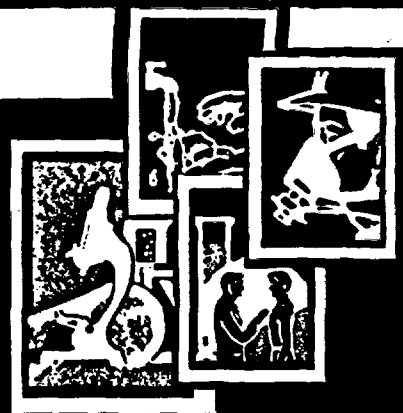


NIOSH

POCKET GUIDE TO
**CHEMICAL
HAZARDS**



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

CDC
CENTERS FOR DISEASE CONTROL

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health**

June 1990

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III

PREFACE

iv The *Pocket Guide to Chemical Hazards* presents information taken from the NIOSH/OSHA *Occupational Health Guidelines for Chemical Hazards*, from National Institute for Occupational Safety and Health (NIOSH) criteria documents and Current Intelligence Bulletins, and from recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry. The information is presented in tabular form to provide a quick, convenient source of information on general industrial hygiene and medical monitoring practices. The information in the *Pocket Guide* includes chemical structures or formulas, identification codes, synonyms, exposure limits, chemical and physical properties, incompatibilities and reactivities, measurement methods, respirator selections, signs and symptoms of exposure, and procedures for emergency treatment.

The information assembled in the original 1978 printing of the *Pocket Guide* was the result of the Standards Completion Program, a joint effort by NIOSH and the Department of Labor to develop supplemental requirements for the approximately 380 workplace environmental exposure standards adopted by the Occupational Safety and Health Administration (OSHA) in 1971.

This revision of the *Pocket Guide* includes current exposure limits, updated sampling and analytical methods, new respirator selections for chemicals with revised exposure limits, flammability/combustibility ratings, and specific gravities.

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I. INTRODUCTION

The *NIOSH Pocket Guide to Chemical Hazards* is intended as a source of general industrial hygiene information for workers, employers, and occupational health professionals. The *Pocket Guide* does not contain an analysis of all pertinent data; rather, it presents key information and data in abbreviated tabular form for 398 chemicals or substance groupings (e.g., cyanides, fluorides, manganese compounds, etc.) that are found in the work environment and that have existing Occupational Safety and Health Administration (OSHA) regulations. The industrial hygiene information found in the *Pocket Guide* should help users recognize and control occupational chemical hazards. The chemicals contained in this revision are substances previously listed in the OSHA Z-1, Z-2, and Z-3 Tables (many of which now have revised permissible exposure limits [PELs]). Additional substances that were included as part of the new OSHA Z-1-A Table on January 19, 1989, will be incorporated into the next edition of the *Pocket Guide*.

Background

In 1974, the National Institute for Occupational Safety and Health (NIOSH) (which is responsible for recommending health

and safety standards) joined OSHA (whose jurisdictions include promulgation and enforcement activities) in developing a series of complete occupational health standards for substances with existing PELs. This joint effort was labeled the Standards Completion Program and involved the cooperative efforts of several contractors and personnel from various divisions within NIOSH and OSHA. The Standards Completion Program developed 380 substance-specific draft standards with supporting documentation that contained technical information and recommendations needed for the promulgation of new occupational health regulations. The *Pocket Guide* was developed to make the technical information in those draft standards more conveniently available to workers, employers, and occupational health professionals. The *Pocket Guide* is updated periodically to reflect new data regarding the toxicity of various substances and any changes in exposure standards or recommendations.

Data Collection and Application

The data collected for this revision were derived from a variety of sources, including NIOSH criteria documents and Current Intelligence Bulletins (CIBs), and recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry.

II. NIOSH RECOMMENDATIONS

2 Acting under the authority of the Occupational Safety and Health Act of 1970 (Public Law 91-596), NIOSH develops and periodically revises recommended exposure limits (RELs) for hazardous substances or conditions in the workplace. NIOSH also recommends appropriate preventive measures to reduce or eliminate the adverse health and safety effects of these hazards. To formulate these recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade, and other information relevant to the hazard. These recommendations are then published and transmitted to OSHA and the Mine Safety and Health Administration (MSHA) for use in promulgating legal standards.

NIOSH recommendations are published in a variety of documents. Criteria documents recommend workplace exposure limits and appropriate preventive measures to reduce or eliminate adverse health effects and accidental injuries.

CIBs are issued to disseminate new scientific information about occupational hazards. A CIB may draw attention to a for-

merly unrecognized hazard, report new data on a known hazard, or present information on hazard control.

Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines support and complement the other standards development activities of the Institute. Their purpose is to assess the safety and health problems associated with a given agent or hazard (e.g., the potential for injury or for carcinogenic, mutagenic, or teratogenic effects) and to recommend appropriate control and surveillance methods. Although these documents are not intended to supplant the more comprehensive criteria documents, they are prepared to assist OSHA and MSHA in the formulation of regulations.

In addition to these publications, NIOSH periodically presents testimony before various Congressional committees and at OSHA and MSHA rulemaking hearings.

A complete list of occupational safety and health issues for which NIOSH has formal policies (e.g., recommendations for occupational exposure to chemical and physical hazards, engineering controls, work practices, safety considerations, etc.) is scheduled for publication in 1990.

III. HOW TO USE THIS POCKET GUIDE

The *Pocket Guide* has been designed to provide chemical-specific data to supplement general industrial hygiene knowledge. To maximize the amount of data provided in this limited space, abbreviations and codes have been used extensively. These abbreviations and codes, which have been designed to permit rapid comprehension by the regular user, are discussed for each column in the following subsections.

Chemical Name and Structure/Formula, CAS and RTECS Numbers, and DOT ID and Guide Numbers

Chemical Name and Structure/Formula. — The chemical name found in the OSHA General Industry Air Contaminants Standard (29 CFR* 1910.1000) is listed first. The chemical structure or formula is also provided; carbon-carbon double bonds (-C=C-) have been indicated where applicable. A page index for selected synonyms and trade names is included at the back of the *Pocket Guide* to help the user locate a specific substance.

CAS and RTECS Numbers. — Below the chemical structure/formula is the Chemical Abstracts Service (CAS) registry

number. This number, in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases. A page index for all CAS registry numbers listed is included at the back of the *Pocket Guide* to help the user locate a specific substance.

Immediately below the CAS number is the *NIOSH Registry of Toxic Effects of Chemical Substances* (RTECS) number, in the format ABxxxxxx. RTECS may be useful for obtaining additional toxicologic information on a specific substance.

DOT ID and Guide Number. — Under the RTECS number are the U.S. Department of Transportation (DOT) identification number and the corresponding guide number. Their format is xxxx xx. The identification number (xxxx) indicates that the chemical is regulated by DOT. The Guide number (xx) refers to actions to be taken to stabilize an emergency situation; this information can be found in the DOT 1987 *Emergency Response Guidebook*, DOT P 5800.4 (Office of Hazardous Materials Transportation [DHM-51], Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street S.W., Washington, D.C. 20590).

Synonyms, Trade Names, and Conversion Factors

Common synonyms and trade names are listed alphabetically for each chemical. Factors for the conversion of ppm

*Code of Federal Regulations.

(parts per million parts of air) to mg/m³ (milligrams per cubic meter of air) at 68°F and 1 atmosphere are listed for all liquids and gases.

Exposure Limits

The NIOSH RELs are listed first in this column. Unless noted otherwise, RELs are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. Any substance that NIOSH considers to be an occupational carcinogen is designated by the notation "Ca" (see Appendix A, which contains a brief discussion of occupational carcinogens).

The OSHA permissible exposure limits (PELs), as found in Tables Z-1-A or Z-2 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000), are listed next. Unless noted otherwise, PELs are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. A STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise.

OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, beryllium, ethylene dibromide, and methylene chloride (from Table Z-2) have PEL ceiling values that must not be exceeded except for a maximum peak over a specified period. Appendix B contains a brief discussion of carcinogens regulated by OSHA.

The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) are also listed when they are more restrictive than the OSHA PEL or NIOSH REL. Unless noted otherwise, TLVs are 8-hour TWA concentrations. Ceiling concentrations (which should not be exceeded at any time) are designated by "C". A STEL is designated by "ST" and is measured over a 15-minute period. Where applicable, the ACGIH A1 (confirmed human carcinogen) and A2 (suspected human carcinogen) designations for individual chemicals are included. The ACGIH TLVs for 1989-1990 were used for this printing of the *Pocket Guide*.

Concentrations are given in ppm, mg/m³, or fibers per cubic centimeter (fibers/cm³). The "[skin]" designation indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices and gloves, coveralls, goggles, and other appropriate equipment. Appendix C contains more detailed discussions of

the specific exposure limits for asbestos, the various chromium compounds, coal tar pitch volatiles, and cotton dust. Appendix D contains a brief discussion of substances with no established RELs.

IDLH

Immediately dangerous to life or health concentrations (IDLHs) represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (e.g., severe eye irritation) or irreversible health effects. These values were determined during the Standards Completion Program only for the purpose of respirator selection. The notation "Ca" appears in this column for all substances that NIOSH considers to be potential human carcinogens (NIOSH recommends the most protective respirators for exposure to these substances). However, the IDLHs that were originally determined in the Standards Completion Program are shown in brackets following the "Ca" designation (note: carcinogenic effects were not considered in the Standards Completion Program). "Unknown" indicates that because of a lack of data, no IDLH could be determined. "LEL" indicates that the IDLH is based on the lower explosive limit. "N.E." indicates that no evidence could be found for the existence of an IDLH.

Physical Description

This column provides a brief description of the appearance and odor of each substance. Notations are made as to whether a substance can be shipped as a liquefied compressed gas or whether it has major use as a pesticide.

Chemical and Physical Properties

The following abbreviations are used for the chemical and physical properties given for each substance. "NA" indicates that a property is not applicable, and a question mark (?) indicates that it is unknown.

| | | |
|------|-------|--|
| MW | | Molecular weight |
| BP | | Boiling point at 1 atmosphere, °F |
| Sol | | Solubility in water at 68°F*, % by weight (i.e., g/100 ml) |
| Fl.P | | Flash point, closed cup (unless annotated "(oc)" for open cup), °F |
| IP** | | Ionization potential, eV (electron volts) |
| VP | | Vapor pressure at 68°F*, mm Hg; "approx" indicates approximately |
| MLT | | Melting point for solids, °F |
| FRZ | | Freezing point for liquids and gases, °F |
| UEL | | Upper explosive limit in air, % by volume (at room temperature*) |

See footnotes at end of table.

LEL Lower explosive limit in air, % by volume
(at room temperature*)
Sp.Gr Specific gravity at 68°F* referenced to
water at 39.2°F(4°C)

*If noted after a specific entry, these properties may be reported at other temperatures.

**Ionization potentials are given as a guideline for the selection of photo-ionization detector lamps used in direct-reading instruments.

When possible, the flammability of a substance was determined and listed below the specific gravity. The following OSHA criteria (29 CFR 1910.106) were used to classify flammable or combustible liquids:

| | |
|-------------------------------------|--|
| Class IA flammable liquid | Fl.P below 73°F and BP below 100°F. |
| Class IB flammable liquid | Fl.P below 73°F and BP at or above 100°F. |
| Class IC flammable liquid | Fl.P at or above 73°F and below 100°F. |
| Class II combustible liquid | Fl.P at or above 100°F and below 140°F. |
| Class IIIA combustible liquid | Fl.P at or above 140°F and below 200°F. |
| Class IIIB combustible liquid | Fl.P at or above 200°F. |

Incompatibilities and Reactivities

This column lists important hazardous incompatibilities or reactivities of each substance.

Measurement Method

This column provides a brief, key word description of the suggested sampling and analysis method. Each description comprises four components:

(1) collection method, (2) sample work-up, (3) analytical method, and (4) method number. The method number is from the 2nd or 3rd edition (i.e., II or III) of the *NIOSH Manual of Analytical Methods* (DHHS [NIOSH] Publication No. 84-100). If the 2nd edition is cited, this fact is noted along with the appropriate volume number (e.g., II(4)). In a number of instances, the table cites the *1985 OSHA Analytical Methods Manual* and applicable method number (e.g., OSHA [#21]). "None available" indicates that no method has been developed by NIOSH or OSHA. The codes listed are explained in Table 1. Table 2 presents ordering information for the measurement methods cited.

Personal Protection and Sanitation

This column presents a summary of recommended practices for each toxic substance. These recommendations sup-

plement general work practices (e.g., no eating, drinking, or smoking where chemicals are used). Table 3 explains the codes used. Each category is described as follows:

- CLOTHING:** Describes conditions that require chemical protective clothing.
- GOGGLES:** Describes conditions that require eye protection.
- WASH:** Tells when workers should clean the spilled chemical from the body (in addition to normal washing before eating, smoking, etc.).
- CHANGE:** Tells when routine changes of clothing are advisable.
- REMOVE:** Advises workers when to remove clothing that has been accidentally contaminated.
- PROVIDE:** Recommends the availability of eyewash and quick drench equipment.

Recommendations for Respirator Selection

This column provides a condensed table of allowable respirator use. Each line lists in ppm or mg/m³ a maximum concentration for use (commonly referred to as MUC, maximum use concentration) or condition (i.e., emergency or planned entry into unknown concentrations or IDLH conditions [designated by the symbol §], or escape from suddenly occurring respira-

tory hazards) followed by a series of codes representing classes of respirators. Individual respirator codes are separated by diagonal marks (/). For each MUC, the table lists only those respirators that possess the minimum required protection factor and other use restrictions based on the *NIOSH Respirator Decision Logic* (DHHS [NIOSH] Publication No. 87-108). All recommended respirators of a given class can be used at any concentration equal to or less than the MUC listed for that class.

The recommendations for respirator selection for each substance are based on the most restrictive occupational exposure limit found among the NIOSH REL, the OSHA PEL, and the ACGIH TLV.

In the *Pocket Guide*, single-use respirators refer only to disposable respirators that have been tested under the provisions of 30 CFR 11.140-5 and that have an established protection factor of 5. To determine whether certain single-use respirators can be used for other applications, including those that require a higher protection factor, consult the *NIOSH Certified Equipment List* (DHHS [NIOSH] Publication No. 89-105). If a higher protection factor is required, the wearer must first be properly fitted with a respirator using either a quantitative fit test or the "improved" qualitative fit test, as accepted in the OSHA lead standard (29 CFR 1910.1025).

All respirators selected must be approved by NIOSH

and MSHA under the provisions of 30 CFR 11. Since an air-purifying respirator must be specifically approved by NIOSH and MSHA for use with pesticides, pesticides are not identified as such in the respirator selection tables.

In addition, a complete respiratory protection program must be implemented and must fulfill all requirements of 29 CFR 1910.134. At a minimum, a respiratory protection program should include regular training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and storage. Selection of a specific respirator within a given class of recommended respirators depends on the particular situation; this choice should be made only by a knowledgeable person. **REMEMBER:** air-purifying respirators will not protect users against oxygen-deficient atmospheres, and they are not to be used in IDLH conditions. The only respirators recommended for fire fighting are self-contained breathing apparatuses that have full facepieces and are operated in a pressure-demand or other positive-pressure modes. Additional information on the selection and use of respirators can be found in the *NIOSH Respirator Decision Logic* and the *NIOSH Guide to Industrial Respiratory Protection* (DHHS [NIOSH] Publication No. 87-116).

Codes for the various categories of respirators are defined in Table 4. In addition, the assigned protection factor (APF) is indicated for each respirator class.

Route of Health Hazard

This column lists the toxicologically important routes of entry for each substance, abbreviated as follows:

| | |
|-----------|-------------------------|
| Inh | Inhalation |
| Abs | Skin absorption |
| Ing | Ingestion |
| Con | Skin and/or eye contact |

Symptoms

This column lists the potential symptoms of exposure. Their abbreviations are defined in Table 5.

First Aid

This column lists first aid procedures for eye and skin contact, inhalation, and ingestion of the toxic substance. Abbreviations are defined in Table 6.

Target Organs

This column lists the organs that are affected by exposure to each substance. Abbreviations are defined in Table 5.

Table 1. — Codes for measurement methods

| Code | Method/reagent | Code | Method/reagent |
|---------------------|------------------------------------|---------------------------------|---------------------------------------|
| Collection method:* | | Sample work-up: | |
| Ambersorb | Ambersorb® XE-347 tube | CCl ₄ | Carbon tetrachloride |
| Bag | Gas collection bag | CFC-113 | 1,1,2-Trichloro-1,2,2-trifluoroethane |
| Bub | Bubbler | CHCl ₃ | Chloroform |
| Carbo-B | Carbosieve® B tube | CH ₂ Cl ₂ | Methylene chloride |
| Char | Charcoal tube | CH ₃ CN | Acetonitrile |
| Char (low-Ni) | Charcoal tube (low nickel content) | CH ₃ COOH | Acetic acid |
| Char (pet) | Charcoal tube (petroleum-based) | CS ₂ | Carbon disulfide |
| Chrom | Chromosorb tube | DMF | Dimethylformamide |
| Dry tube | Drying tube | FeCl ₃ | Ferric chloride |
| Filter | Particulate filter | HCl | Hydrochloric acid |
| Florisil | Florisil® tube | HCOOH | Formic acid |
| G-chrom P | Gas-chrom P® tube | HNO ₃ | Nitric acid |
| Hydrar | Hydrar® sorbent tube | H ₂ O ₂ | Hydrogen peroxide |
| Imp | Impinger | HPLC | High-pressure liquid chromatography |
| Mol-sieve | Molecular sieve tube | H ₂ SO ₄ | Sulfuric acid |
| Porapak | Porapak® tube | KOH | Potassium hydroxide |
| Si gel | Silica gel tube | LTA | Low-temperature ashing |
| Tenax GC | Tenax® GC tube | Na ₂ CO ₃ | Sodium carbonate |
| T-Sorb | Thermosorb® tube | NaHCO ₃ | Sodium bicarbonate |
| Vertical elut | Vertical elutriator | | |
| XAD | XAD® tube | | |

(Continued)

In the chemical listing, an asterisk following an adsorbent tube code (e.g., Char, Si gel*, XAD-2*, etc.) indicates that a special coating must be added. The figure "2" in parentheses following a collection device (e.g., Filter(2), Imp(2), Char(2), etc.) indicates that two are used in series.

Table 1. — Codes for measurement methods (Continued)

| Code | Method/reagent | Code | Method/reagent |
|--------------------------------|---|----------|---|
| Sample work-up (continued): | | GC/PID | GC with photoionization detection |
| NaOH | Sodium hydroxide | GC/TEA | GC with thermal energy analyzer detection |
| NH ₄ OH | Ammonium hydroxide | Grav | Gravimetric |
| Pho-acid | Phosphomolybdic acid | HGA | Flameless atomic absorption with a high-temperature graphite analyzer |
| Thermal desorp | Thermal desorption apparatus | HPLC/FLD | High-pressure liquid chromatog- raphy with fluorescence detection |
| THF | Tetrahydrofuran | HPLC/UVD | High-pressure liquid chromatog- raphy with ultraviolet detection |
| Analytical method: | | IC | Ion chromatography |
| AA | Atomic absorption spectrometry | ICP | Inductively coupled plasma |
| ECA | Electrochemical analysis | IR | Infrared spectrometry |
| GC | Gas chromatography | ISE | Ion-specific electrode |
| GC/AikFID | GC with alkaline flame ionization detection | PCM | Phase contrast microscopy |
| GC/ECD | GC with electron capture detection | PES | Plasma emission spectroscopy |
| GC/EConD | GC with electrolytic conductivity detection | PLR | Polarography |
| GC/FID | GC with flame ionization detection | Titrate | Titration |
| GC/FPD | GC with flame photometric detection for sulfur, nitrogen, or phosphorus | Vis | Visible spectrophotometry |
| GC/NPD | GC with nitrogen/phosphorus detection | XRF | X-ray fluorescence spectrometry |
| | | XRD | X-ray diffraction spectrometry |

Table 2. — Ordering information for measurement methods

| Manual | Publication No. | Ordering No. | Manual | Publication No. | Ordering No. |
|--|-----------------|---------------|--|-----------------|----------------------|
| NIOSH Manual of Analytical Methods, 2nd edition: | | | Supplement to 3rd edition | NIOSH 85-117 | PB-86-116-266 |
| Vol. I | NIOSH 77-157-A | PB-274-845 | 2nd supplement to 3rd edition | NIOSH 87-117 | PB-88-204-722 |
| Vol. II | NIOSH 77-157-B | PB-276-624 | 3rd supplement to 3rd edition | NIOSH 89-127 | PB-90-162-470 |
| Vol. III | NIOSH 77-157-C | PB-276-838 | OSHA Analytical Methods Manual, 1985 edition | — | 4540*, 4541 (fiche)* |
| Vol. IV | NIOSH 78-175 | PB-83-105-437 | | | |
| Vol. V | NIOSH 79-141 | PB-83-105-445 | | | |
| Vol. VI | NIOSH 80-125 | PB-82-157-728 | | | |
| Vol. VII | NIOSH 82-100 | PB-83-105-452 | | | |
| NIOSH Manual of Analytical Methods, 3rd edition | NIOSH 84-100 | PB-85-179-018 | | | |

*Denotes ordering number of the American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Ave., Building D-7, Cincinnati, OH 45211 (513-661-7881). All other ordering numbers are for the National Technical Information Service (NTIS), Springfield, VA 22161 (703-487-4650).

Table 3. — Personal protection and sanitation codes

| Code | Definition |
|---|--|
| CLOTHING | Wear appropriate equipment to prevent: |
| Any poss liq/Repeat vap | Any possibility of liquid contact and repeated or prolonged vapor contact with skin |
| Any poss | Any possibility of skin contact |
| Any poss wet | Any possibility that skin will become wet with contaminant |
| Any poss >x%/Repeat y% | Any possibility of skin contact with liquids containing >x% of contaminant and repeated or prolonged skin contact with liquids containing y% |
| Any poss pH <x/Repeat pH >x | Any possibility of skin contact with solutions having a pH <x and repeated or prolonged skin contact with solutions having a pH >x |
| Prevent skin freezing | Self explanatory |
| Prevent contam or freezing | Contamination or freezing of skin |
| Prevent wet or freezing | Wetting or freezing of skin |
| Repeat | Repeated or prolonged skin contact |
| Reason prob | Reasonable probability of skin contact |
| GOGGLES | Wear eye protection to prevent: |
| Any poss | Any possibility of eye contact |
| Any poss >x%/Reason prob <y% | Any possibility of eye contact with liquids containing >x% of contaminant and reasonable probability of eye contact with liquid containing <y% |
| Any poss molt/Reason prob liq-sol | Any possibility of eye contact with substance in a molten form and reasonable probability of eye contact with a liquid or solid containing the substance |
| Any poss (xxx) | Any possibility that substance xxx will contact the eyes |

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

| Code | Definition |
|---|--|
| GOGGLES (Continued) | |
| Reason prob | Reasonable probability of eye contact |
| Repeat | Repeated or prolonged eye contact |
| WASH | |
| Workers should wash: | |
| Daily | At the end of each work shift |
| Daily (reason prob) | At the end of each work shift when there is reasonable probability of contact with the contaminant |
| Immed contam | Immediately when skin becomes contaminated |
| Immed contam >x%/ Prompt contam y% | Immediately when skin is contaminated with liquids containing >x% contaminant and promptly when skin is contaminated with y% |
| Immed contam >x%/ Prompt wet y% | Immediately when skin is contaminated with liquids containing >x% contaminant and promptly when skin becomes wet with y% |
| Immed contam/daily | Immediately when skin becomes contaminated and at the end of each work shift |
| Immed contam pH <x/ Prompt wet pH >x | Immediately when skin becomes contaminated with liquid of pH <x and promptly when skin becomes wet with liquid of pH >x |
| Immed wet | Immediately when skin becomes wet |
| Immed wet/Prompt contam | Immediately when skin becomes wet and promptly when skin becomes contaminated |
| Immed wet/Prompt contam/daily | Immediately when skin becomes wet, promptly when skin becomes contaminated, and at the end of each work shift |

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

| Code | Definition |
|--|--|
| WASH (Continued) | |
| Prompt contam | Promptly when skin becomes contaminated |
| Prompt contam/daily | Promptly when skin becomes contaminated and at the end of each work shift |
| Prompt wash soap | Promptly wash with soap when skin becomes contaminated |
| Prompt wet | Promptly when skin becomes wet |
| CHANGE | |
| Work clothing should be changed daily: | |
| After work if any poss contam | If there is any possibility that the clothing may be contaminated |
| After work if reason prob contam | If it is reasonably probable that the clothing may be contaminated |
| REMOVE | |
| Remove clothing: | |
| Immed contam | Immediately if it becomes contaminated |
| Immed wet | Immediately if it becomes wet |
| Immed wet (flamm) | Immediately if it becomes wet (to avoid flammability hazard) |
| Immed wet/immed | |
| non-imperv contam | Immediately if it becomes wet or if it is non-impervious clothing that becomes contaminated |
| Immed non-imperv contam | Immediately if it is non-impervious clothing that becomes contaminated |
| Immed non-imperv contam >x%/ | |
| Prompt non-imperv contam y% | Immediately if it is non-impervious clothing that becomes contaminated with liquids containing >x% of contaminant and promptly if clothing is contaminated with y% |

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

| Code | Definition |
|--------------------------------|---|
| REMOVE (Continued) | |
| Immed non-imperv wet/ | |
| prompt non-imperv contam | Immediately if it is non-impervious clothing that becomes wet and promptly if it is non-impervious clothing that becomes contaminated |
| Prompt non-imperv contam | Promptly if it is non-impervious clothing that becomes contaminated |
| Prompt non-imperv wet | Promptly if it is non-impervious clothing that becomes wet |
| PROVIDE | |
| Eyewash | The following equipment should be available: |
| Quick drench | Self-explanatory |
| Eyewash (xxx) | Self-explanatory |
| Eyewash >x% | Eyewash if substance xxx is present |
| Eyewash >x% | Eyewash if liquids containing >x% of contaminant are present |
| OTHER CODES | |
| Liq | Liquid |
| Molt | Molten |
| N.R. | No recommendation applies in this category |
| Sol | Solid |
| Soln | Solution containing the contaminant |
| Vap | Vapor |

Table 4. — Symbols, code components, and codes used for respirator selection

| Item | Definition |
|------------------------|--|
| Symbol: | |
| ¥ | At any detectable concentration |
| \$ | Emergency or planned entry into unknown concentrations or IDLH conditions |
| £ | Substance causes eye irritation or damage; eye protection needed |
| * | Substance reported to cause eye irritation or damage; may require eye protection |
| ^ | If not present as a fume |
| z | Only nonoxidizable sorbents are allowed (not charcoal) |
| † | End of service life indicator (ESLI) required |
| APF | Assigned protection factor |
| Code component: | |
| CCR | Chemical cartridge respirator |
| D | Dust respirator (if an independent code); or a dust filter |
| F | Full facepiece |
| Fu | Fume filter |
| GMF | Air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister |
| M | Mist filter |
| PAPR | Powered, air-purifying respirator |
| SA | Supplied-air respirator |
| SCBA | Self-contained breathing apparatus |
| AG | Acid gas cartridge or canister |
| CF | Continuous flow mode |

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

| Item | Definition |
|------------------------------------|---|
| Code component (continued): | |
| HiE | Air-purifying respirator with a high-efficiency particulate filter (if an independent code); or a high-efficiency particulate filter |
| HiEF | Air-purifying, full-facepiece respirator with a high-efficiency particulate filter |
| OV | Organic vapor cartridge or canister |
| PD,PP | Pressure-demand or other positive-pressure mode |
| S | Chemical cartridge or canister providing protection against the compound of concern |
| T | Tight-fitting facepiece |
| XS | Except single-use respirator |
| XSQ | Except single-use and quarter-mask respirator |
| Code: | |
| CCRFAGHiE (APF = 50) | Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter |
| CCRFOV (APF = 50) | Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) |
| CCRFOVDMFu (APF = 50) | Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a dust, mist, and fume filter |
| CCRFOVHiE (APF = 50) | Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter |
| CCRFS (APF = 50) | Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern |
| CCRFSHiE (APF = 50) | Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern and having a high-efficiency particulate filter |

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

| Item | Definition |
|----------------------------|---|
| Code (continued): | |
| CCROV (APF = 10) | Any chemical cartridge respirator with organic vapor cartridge(s) |
| CCROVAG (APF = 10) | Any chemical cartridge respirator with organic vapor and acid gas cartridge(s) |
| CCROVDM (APF = 10) | Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter |
| CCROVDMFu (APF = 10) | Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter |
| CROVHiE (APF = 10) | Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a high-efficiency particulate filter |
| CCRS (APF = 10) | Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern |
| D (APF = 5) | Any dust respirator |
| DM (APF = 5) | Any dust and mist respirator |
| DMF (APF = 10) | Any dust and mist respirator with a full facepiece |
| DMFu (APF = 10) | Any dust, mist, and fume respirator |
| DMXSQ (APF = 10) | Any dust and mist respirator except single-use and quarter-mask respirators |
| DXSQ (APF = 10) | Any dust respirator except single-use and quarter-mask respirators |
| GMFAG (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister |
| GMFAGHiE (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter |
| GMFOV (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister |

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

| Item | Definition |
|-----------------------------|---|
| Code (continued): | |
| GMFOVAG (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister |
| GMFOVAGHiE (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister having a high efficiency particulate filter |
| GMFOVDMFu (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister in combination with a dust, mist, and fume filter |
| GMFOVHiE (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter |
| GMFS (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern |
| GMFSHiE (APF = 50) | Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter |
| HiE (APF = 10) | Any air-purifying respirator with a high-efficiency particulate filter |
| HiEF (APF = 50) | Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter |
| PAPRAG (APF = 25) | Any powered, air-purifying respirator with acid gas cartridge(s) |
| PAPRAGHiE (APF = 25) | Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter |
| PAPRD (APF = 25) | Any powered, air-purifying respirator with a dust filter |
| PAPRDM (APF = 25) | Any powered, air-purifying respirator with a dust and mist filter |
| PAPRDMFu (APF = 25) | Any powered, air-purifying respirator with a dust, mist, and fume filter |

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

| Item | Definition |
|------------------------------|--|
| Code (continued): | |
| PAPRHiE (APF = 25) | Any powered, air-purifying respirator with a high-efficiency particulate filter |
| PAPROV (APF = 25) | Any powered, air-purifying respirator with organic vapor cartridge(s) |
| PAPROVAG (APF = 25) | Any powered, air-purifying respirator with organic vapor and acid gas cartridge(s) |
| PAPROVDM (APF = 25) | Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter |
| PAPROVDMFu (APF = 25) | Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter |
| PAPRS (APF = 25) | Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern |
| PAPRTHiE (APF = 50) | Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter |
| PAPRTOV (APF = 50) | Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) |
| PAPRTOVHiE (APF = 50) | Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter |
| PAPRTS (APF = 50) | Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern |
| SA (APF = 10) | Any supplied-air respirator |
| SA:CF (APF = 25) | Any supplied-air respirator operated in a continuous-flow mode |
| SAF (APF = 50) | Any supplied-air respirator with a full facepiece |
| SAF:PD,PP (APF = 2000) | Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode |

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

| Item | Definition |
|---|--|
| Code (continued): | |
| SAF:PD,PP:ASCBA (APF = 10,000) | Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode |
| SA:PD,PP (APF = 1000) | Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode |
| SAT:CF (APF = 50) | Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode |
| SCBA (APF = 10) | Any self-contained breathing apparatus |
| SCBAE | Any appropriate escape-type, self-contained breathing apparatus |
| SCBAF (APF = 50) | Any self-contained breathing apparatus with a full facepiece |
| SCBAF:PD,PP (APF = 10,000) | Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode |

Table 5. — Abbreviations for symptoms of exposure and target organs

| Abbreviation | Symptom/organ | Abbreviation | Symptom/organ |
|--------------|------------------------|--------------|--------------------------|
| abdom | Abdominal | convuls | Convulsions |
| album | Albuminuria | CVS | Cardiovascular system |
| anes | Anesthesia | cyan | Cyanosis |
| anor | Anorexia | depres | Depressant/depression |
| anos | Anosmia | derm | Dermatitis |
| appre | Apprehension | diarr | Diarrhea |
| arrhy | Arrhythmias | dist | Disturbance |
| asphy | Asphyxia | dizz | Dizziness |
| BP | Blood pressure | drow | Drowsiness |
| breath | Breathing | dysp | Dyspnea |
| bron | Bronchitis | emphy | Emphysema |
| broncopneu | Bronchopneumonia | eosin | Eosinophilia |
| bronspas | Bronchospasm | epis | Epistaxis |
| BUN | Blood urea nitrogen | equi | Equilibrium |
| [carc] | Carcinogen | eryt | Erythema |
| card | Cardiac | euph | Euphoria |
| chol | Cholinesterase | fail | Failure |
| cirr | Cirrhosis | fasc | Fasciculation |
| CNS | Central nervous system | FEV | Forced expiratory volume |
| conf | Confusion | fib | Fibrosis |
| conj | Conjunctivitis | fibril | Fibrillation |
| constip | Constipation | ftg | Fatigue |
| constric | Constriction | func | Function |

(Continued)

Table 5. — Abbreviations for symptoms of exposure and target organs (Continued)

| Abbreviation | Symptom/organ | Abbreviation | Symptom/organ |
|--------------|------------------|--------------|-----------------------|
| GI | Gastrointestinal | leupen | Leukopenia |
| gidd | Giddiness | li-head | Lightheadedness |
| halu | Hallucinations | low-wgt | Weight loss |
| head | Headache | mal | Malaise |
| hemato | Hematopoietic | malnut | Malnutrition |
| hemog | Hemoglobinuria | monocy | Monocytosis |
| hemorr | Hemorrhage | muc memb | Mucous membrane |
| hypox | Hypoxemia | musc | Muscle |
| incr | Increase(d) | narco | Narcosis |
| ict | Icterus | nau | Nausea |
| inco | Incoordination | nec | Necrosis |
| inflamm | Inflammation | neph | Nephritis |
| inj | Injury | ner | Nervousness |
| insom | Insomnia | numb | Numbness |
| irreg | Irregular | opac | Opacity |
| irrit | Irritation | palp | Palpitations |
| irrity | Irritability | para | Paralysis |
| jaun | Jaundice | pares | Paresthesia |
| kera | Keratitis | perf | Perforation |
| lac | Lacrimation | peri neur | Peripheral neuropathy |
| lar | Laryngeal | periorb | Periorbital |
| lass | Lassitude | phar | Pharyngeal |
| leucyt | Leukocytosis | photo | Photophobia |

(Continued)

Table 5. — Abbreviations for symptoms of exposure and target organs (Continued)

| Abbreviation | Symptom/organ | Abbreviation | Symptom/organ |
|----------------|---------------------------|------------------|--------------------------|
| pig | Pigmentation | subs | Substernal |
| pneu | Pneumonia | sweat | Sweating |
| pneuitis | Pneumonitis | swell | Swelling |
| PNS | Peripheral nervous system | sys | System |
| polyneur | Polyneuropathy | tacar | Tachycardia |
| prot | Proteinuria | tend | Tenderness |
| pulm | Pulmonary | trachbronc | Tracheobronchitis |
| RBC | Red blood cell | venfib | Ventricular fibrillation |
| resp | Respiratory | verti | Vertigo |
| retster | Retrosternal | vesic | Vesiculation |
| rhin | Rhinorrhea | vis dist | Visual disturbance |
| salv | Salivation | vomit | Vomiting |
| sens | Sensitization | weak | Weakness |
| sez | Seizure | wheez | Wheezing |
| som | Somnolence | | |

Table 6. — Codes for first aid data

| Code | Definition | Code | Definition |
|-----------------------|--|--|--|
| Eye: | | Medical attention ... Self-explanatory | |
| Irr immed | If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. | Skin: | |
| Irr immed (15 min) .. | If this chemical contacts the eyes, immediately wash the eyes with large amounts of water and continue flushing for 15 minutes, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. | Dust off solid; water flush | If this solid chemical contacts the skin, dust it off immediately and then flush the contaminated skin with water. If this chemical or liquids containing this chemical penetrate the clothing, promptly remove the clothing and flush the skin with water. Get medical attention immediately. |
| Irr prompt | If this chemical contacts the eyes, promptly wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues. Contact lenses should not be worn when working with this chemical. | Medical attention for frostbite | If this chemical contacts the skin or mouth, stop the exposure immediately. If frostbite has occurred, get medical attention. |
| | | Molten flush immed/ sol-liq soap wash prompt | If this molten chemical contacts the skin, immediately flush the skin with large amounts of water. Get medical attention immediately. If this chemi- |
| | | (Continued) | |

Table 6. — Codes for first aid data (Continued)

| Code | Definition | Code | Definition |
|-------------------------------|--|---|--|
| Skin (continued): | cal (or liquids containing this chemical) contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical or liquids containing this chemical penetrate the clothing, immediately remove the clothing and wash the skin with soap and water. If irritation persists after washing, get medical attention. | | move the clothing and flush the skin with water. If irritation persists after washing, get medical attention. |
| Soap flush immed | If this chemical contacts the skin, immediately flush the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention. | Soap prompt/molten flush immed | If this solid chemical or a liquid containing this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If irritation persists after washing, get medical attention. If this molten chemical contacts the skin or nonimpervious clothing, immediately flush the affected area with large amounts of water to remove heat. Get medical attention immediately. |
| Soap flush prompt | If this chemical contacts the skin, promptly flush the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly re- | Soap wash | If this chemical contacts the skin, wash the contaminated skin with soap and water. |
| | | Soap wash immed | If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, |

(Continued)

Table 6. — Codes for first aid data (Continued)

| Code | Definition | Code | Definition |
|-------------------------|--|--------------------------|---|
| Skin (continued): | immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly. | Water flush prompt | If this chemical contacts the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention. |
| Soap wash prompt | If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. | Water wash immed | If this chemical contacts the skin, immediately wash the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and wash the skin with water. If symptoms occur after washing, get medical attention immediately. |
| Water flush | If this chemical contacts the skin, flush the contaminated skin with water. Where there is evidence of skin irritation, get medical attention. | Water wash prompt | If this chemical contacts the skin, promptly wash the contaminated skin with water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin |
| Water flush immed | If this chemical contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly. | | (Continued) |

Table 6. — Codes for first aid data (Continued)

| Code | Definition | Code | Definition |
|--------------------|--|---|---|
| Skin (continued): | with water. If irritation persists after washing, get medical attention. | Fresh air; 100% O ₂ | If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering 100% oxygen. Keep the affected person warm and at rest. Get medical attention as soon as possible. |
| Breath: | | | |
| Resp support | If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. | | |
| Fresh air | If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary. | Swallow: Medical attention immed .. | If this chemical has been swallowed, get medical attention immediately. |

IV. CHEMICAL LISTING

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| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------------------|--|---|---|--|--|
| | | | | | MW, BP, SOL F.L.P. IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Acetaldehyde <chem>CH3CHO</chem> 75-07-0 AB1925000 | Acetic aldehyde, Ethanal, Ethyl aldehyde | NIOSH Ca See Appendix A OSHA 100 ppm (180 mg/m ³) ST 150 ppm (270 mg/m ³) | Ca [10,000 ppm] | Colorless liquid or gas (above 69°F) with a pungent, fruity odor. | MW: 44.1 BP: 69°F Sol: Miscible F.L.P.: 36°F IP: 10.22 eV | VP: 740 mm FRZ: -190°F UEL: 60% LEL: 4.0% | Strong oxidizers, acids, bases, alcohols, ammonia & amines, phenols, ketones, HCN, H ₂ S [Note: Prolonged contact with air may cause formation of peroxides that may explode and burst con- tainers; easily undergoes polymerization.] | XAD-2; Toluene; GC/FID; II [#2538] |
| 1089 26 | 1 ppm = 1.83 mg/m ³ | | | | Sp.Gr: 0.79 Class IA Flammable Liquid | | | |
| Acetic acid <chem>CH3COOH</chem> 64-19-7 AF1225000 | Acetic acid (aqueous), Ethanoic acid, Glacial acetic acid (pure compound), Methanecarboxylic acid | NIOSH 10 ppm (25 mg/m ³) ST 15 ppm (37 mg/m ³) OSHA 10 ppm (25 mg/m ³) | 1000 ppm | Colorless liquid or crystals with a sour, vinegar- like odor. [Note: Pure com- pound is a solid below 62°F. Often used in an aqueous solution.] | MW: 60.1 BP: 244°F Sol: Miscible F.L.P.: 102°F IP: 10.66 eV | VP: 11 mm FRZ: 62°F UEL(200°F): 19.9% LEL: 4.0% | Strong oxidizers (especially chromic acid, sodium peroxide & nitric acid), strong caustics [Note: Corrosive to metals.] | Char: HCOOH; GC/FID; II [#1603] |
| 1842 29 (soln) 2790 60 (10-80% acid) 2789 29 (80% acid) | [Note: Can be found in concentrations of 5-8% in vinegar.] 1 ppm = 2.50 mg/m ³ | | | | Sp.Gr: 1.05 Class II Combustible Liquid | | | |
| Acetic anhydride <chem>(CH3CO)2O</chem> 108-24-7 AK1925000 | Acetic acid anhydride, Acetic oxide, Acetyl oxide, Ethanoic anhydride | NIOSH/OSHA C 5 ppm (20 mg/m ³) | 1000 ppm | Colorless liquid with a strong, pungent, vinegar- like odor. | MW: 102.1 BP: 282°F Sol: 12% F.L.P.: 120°F IP: 10.00 eV | VP: 4 mm FRZ: -99°F UEL: 10.3% LEL: 2.7% | Water, alcohols, strong oxidizers (especially chromic acid), amines, strong caustics [Note: Corrosive to iron, steel & other metals. Reacts with water to form acetic acid.] | Bub; Reagent; Vis; II [#3506] |
| 1715 39 | 1 ppm = 4.24 mg/m ³ | | | | Sp.Gr: 1.08 Class II Combustible Liquid | | | |
| Acetone <chem>CH3COCH3</chem> 67-64-1 AL3150000 | Dimethyl ketone, Ketone propane, 2-Propanone | NIOSH 250 ppm (590 mg/m ³) OSHA 750 ppm (1800 mg/m ³) ST 1000 ppm (2400 mg/m ³) | 20,000 ppm | Colorless liquid with a fragrant, mint-like odor. [Note: Enforcement of the OSHA TWA for "doctors" in the cellulose acetate fiber industry was stayed on 9/5/89 until 9/1/90; further, the OSHA STEL does NOT apply to that industry.] | MW: 58.1 BP: 282°F Sol: Miscible F.L.P.: 0°F IP: 9.69 eV | VP: 180 mm FRZ: -140°F UEL: 13% LEL: 2.5% | Oxidizers, acids | Char; CS; GC/FID; II [#1300, Ketones I] |
| 1090 26 | 1 ppm = 2.42 mg/m ³ | | | | Sp.Gr: 0.79 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|---|-------------------|--|--------------------------------------|---|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing | Eye, nose, throat irrit; conj; cough; CNS depres; eye, skin burns; derm; delayed pulm edema; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Resp sys, skin, kidneys |
| Goggles: | Any poss | | | | | | |
| Wash: | Prompt wet | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Eyewash | | | | | | |
| | | | | | | | |
| Clothing: | Any poss >50%/Repeat 10-49% | NIOSH/OSHA 250 ppm: SA:CF ¹ /PAPROV ² 500 ppm: CCRFOV/SCBAF/SAF/ GMFOV/PAPRTOV ² 1000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Conj, lac; Irrit nose, throat; phar edema, chronic bron; burns eyes, skin; skin sens; dental erosion; black skin, hyperkeratosis | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, skin, eyes, teeth |
| Goggles: | Any poss | | | | | | |
| Wash: | Immed contam >50%/ Prompt 10-49% | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed non-imperv contam >50%/Prompt non- imperv contam 10-49% | | | | | | |
| Provide: | Eyewash (>5%)/Quick drench (>50%) | | | | | | |
| | | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA 125 ppm: SA:CF ¹ /PAPROV ² 250 ppm: CCRFOV/SCBAF/SAF/ GMFOV/PAPRTOV ² 1000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Conj, lac, corneal edema, opac, photo; nasal, phar irrit; cough, dysp, bron; skin burns, vesic, sens derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, eyes, skin |
| Goggles: | Any poss | | | | | | |
| Wash: | Immed contam | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH 1000 ppm: CCROV ¹ /PAPROV ² /SA ¹ / SCBA ¹ 6250 ppm: SA:CF ¹ 12,500 ppm: GMFOV/SCBAF/SAF 20,000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, nose, throat; head, dizz; derm | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Resp sys, skin |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt wet | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |

Acetone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|---------------------------------|---|---|--|--|--|
| | | | | | MW, BP, SOL F.L.P. IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Acetonitrile CH ₃ CN 75-05-8 AL7700000 | Cyanomethane, Ethyl nitrile, Methyl cyanide | NIOSH 20 ppm (34 mg/m ³) OSHA 40 ppm (70 mg/m ³) ST 60 ppm (105 mg/m ³) | 4000 ppm ACGIH [skin] | Colorless liquid with an aromatic odor. | MW: 41.1 BP: 179°F Sol: Miscible F.L.P.(oc): 42°F IP: 12.20 eV | VP: 73 mm FRZ: -49°F UEL: 16.0% LEL: 3.0% | Strong oxidizers | Char; Benzene; GC/FID; III [#1606] |
| 1648 28 | 1 ppm = 1.71 mg/m ³ | | | | Sp.Gr: 0.78 Class IB Flammable Liquid | | | |
| 2-Acetylaminofluorene C ₁₅ H ₁₃ N 53-96-3 AB9450000 | AAF, 2-AAF, 2-Acetylaminofluorene, N-Acetyl-2-aminofluorene, FAA, 2-FAA, 2-Fluorenylacetamide | NIOSH Ca See Appendix A OSHA [1910.1014] See Appendix B | Ca | Tan, crystalline powder. | MW: 223.3 BP: ? Sol: Insoluble F.L.P.: ? IP: ? | VP: ? MLT: 381°F UEL: ? LEL: ? | None reported | None available |
| | | | | | Combustible Solid | | | |
| Acetylene tetrabromide CHBr ₂ CHBr ₂ 79-27-6 KI8225000 | Symmetrical tetrabromo- ethane; TBE; Tetrabromoacetylene; Tetrabromoethane; 1,1,2,2-Tetrabromoethane | NIOSH See Appendix D OSHA 1 ppm (14 mg/m ³) | 10 ppm | Pale-yellow liquid with a pungent odor. [Note: A solid below 32°F.] | MW: 345.7 BP: 474°F (Decomposes) Sol: 0.07% F.L.P.: NA IP: ? | VP: 0.02 mm FRZ: 32°F UEL: NA LEL: NA | Strong caustics; hot iron; reducing metals such as aluminum, magnesium & zinc | Si gel; THF; GC/FID; III [#2003] |
| 2504 58 | 1 ppm = 14.37 mg/m ³ | | | | Sp.Gr: 2.97 Noncombustible Liquid | | | |
| Acrolein CH ₂ =CHCHO 107-02-8 AS1050000 | Acraldehyde, Acrylaldehyde, Acrylic aldehyde, Allyl aldehyde, Propenal, 2-Propenal | NIOSH/OSHA 0.1 ppm (0.25 mg/m ³) ST 0.3 ppm (0.8 mg/m ³) | 5 ppm | Colorless or yellow liquid with a piercing, disagreeable odor. | MW: 56.1 BP: 127°F Sol: 40% F.L.P.: -15°F IP: 10.13 eV | VP: 210 mm FRZ: -126°F UEL: 31% LEL: 2.8% | Oxidizers, acids, alkalis, ammonia, amines [Note: Polymerizes readily unless inhibited—usually with hydroquinone.] | XAD-2*; Toluene; GC/NPD; III [#2501] |
| 1092 30 (inhibited) | 1 ppm = 2.33 mg/m ³ | | | | Sp.Gr: 0.84 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|---|--|--------------------------|--|--------------------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Repeat Reason prob Immed contam N.R. Immed wet (flamm) Quick drench | NIOSH 200 ppm: CCROV/SA/SCBA 500 ppm: SA/CF/PAPROV 1000 ppm: GMFOV/SCBAF/SAF/ CCRFOV 4000 ppm: SAF/PD,PP §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Asphy; nau, vomit; chest pain; weak; stupor, convuls; eye irrit | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Kidneys, liver, CVS, CNS, lungs, skin, eyes |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Any poss Any poss Immed contam/daily After work if any poss contam Immed contam Eyewash, quick drench | NIOSH §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Abs Ing Con | Reduced function of liver, kidneys, bladder, pancreas, [carc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Liver, bladder, kidneys, pancreas, skin, lungs |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Repeat Reason prob Prompt contam N.R. Prompt non-imperv contam | OSHA 10 ppm: SA/SCBA §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, nose; anor, nau; severe head; abdom pain; jaun; monocy | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, upper resp sys, liver |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Any poss Any poss Immed contam N.R. Immed wet (flamm) Eyewash, quick drench | NIOSH/OSHA 2.5 ppm: SA/CF*/PAPROV* 5 ppm: CCRFOV/GMFOV/SCBAF/SAF §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, skin, muc memb; abnormal pulm func; delayed pulm edema; chronic resp disease | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Heart, eyes, skin, resp sys |

Acrolein

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|------------------------------------|---|--|---|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Acrylamide $\text{CH}_2=\text{CHCONH}_2$ 79-06-1 AS3325000 | Acrylamide monomer, Acrylic amide, Propenamide, 2-Propenamide | NIOSH Ca See Appendix A 0.03 mg/m ³ [skin] OSHA 0.03 mg/m ³ [skin] | Ca [Unknown] ACGIH A2 | White crystalline, odorless solid. | MW: 71.1 BP: 347-572°F (Decomposes) Sol(86°F): 216% FLP: 280°F IP: ? Sp.Gr(86°F): 1.12 Combustible Solid (may also be dissolved in flammable liquids). | VP: 0.007 mm MLT: 184°F UEL: ? LEL: ? | Strong oxidizers [Note: May polymerize violently upon melting.] | Filter/ Si gel; Methanol; GC/NPD; OSHA [#21] |
| 2074 55 | | | | | | | | |
| Acrylonitrile $\text{CH}_2=\text{CHCN}$ 107-13-1 AT5250000 | Acrylonitrile monomer, AN, Cyanoethylene, Propenenitrile, 2-Propenenitrile, VCN, Vinyl cyanide | NIOSH Ca See Appendix A 1 ppm C 10 ppm [15-min] [skin] OSHA [1910.1045] 2 ppm C 10 ppm [15-min] [skin] | Ca [500 ppm] ACGIH A2 | Colorless to pale- yellow liquid with an unpleasant odor. [Note: Odor can only be detected above the PEL.] | MW: 53.1 BP: 171°F Sol: 7% FLP: 30°F IP: 10.91 eV Sp.Gr: 0.81 Class IB Flammable Liquid | VP: 83 mm FRZ: -116°F UEL: 17% LEL: 3.0% | Strong oxidizers, acids & alkalis; bromine, amines [Note: Unless inhib- ited (usually with methylhydroquinone) may polymerize spontaneously or when heated or in presence of strong alkali. Attacks copper.] | Char; Acetone/ CS; GC/FID; III [#1604] |
| 1093 30 (inhibited) | 1 ppm = 2.21 mg/m ³ | | | | | | | |
| Aldrin $\text{C}_{12}\text{H}_8\text{Cl}_6$ 309-00-2 IO2100000 | 1,2,3,4,10,10-Hexachloro- 1,4,4a,5,8,8a-hexahydro- endo,exo-1,4,5,8- dimethanonaphthalene; HHDN; Octalene | NIOSH Ca See Appendix A 0.25 mg/m ³ [skin] OSHA 0.25 mg/m ³ [skin] | Ca [100 mg/m ³] | Colorless to dark brown crystalline solid with a mild chemical odor. [Note: Formerly used as an insecticide.] | MW: 364.9 BP: Decomposes Sol: 0.003% FLP: NA IP: ? Sp.Gr: 1.60 Noncombustible Solid, but may be dissolved in flammable liquids. | VP: 0.00008 mm MLT: 219°F UEL: NA LEL: NA | Concentrated mineral acids, active metals, acid catalysts, acid oxidizing agents, phenol | Filter/Bub; Isocutane; GC/EConD; III [#5502] |
| 2761 55 | | | | | | | | |
| Allyl alcohol $\text{CH}_2=\text{CHCH}_2\text{OH}$ 107-18-6 BA5075000 | AA, Allylic alcohol, 1-Propene-3-ol, Propenol, 2-Propenol, Vinyl carbinol | NIOSH/OSHA 2 ppm (5 mg/m ³) ST 4 ppm (10 mg/m ³) [skin] | 150 ppm | Colorless liquid with a pungent, mustard-like odor. | MW: 58.1 BP: 205°F Sol: Miscible FLP: 70°F IP: 9.63 eV Sp.Gr: 0.85 Class IB Flammable Liquid | VP: 17 mm FRZ: -200°F UEL: 18.0% LEL: 2.5% | Strong oxidizers, acids, carbon tetrachloride | Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III] |
| 1098 28 | 1 ppm = 2.42 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------------|---|--------------------------|--|--------------------------------------|--|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Ataxia, numb limbs, paresis; muscle weak; absent deep tendon reflex; hand sweat; flg, lethargy; irrit eyes, skin; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | CNS, PNS, skin, eyes |
| Goggles: | Reason prob | | | | | | |
| Wash: | Immed contam | | | | | | |
| Change: | After work if reason prob contam | | | | | | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Asphy; irrit eyes; head; sneezing; nau, vomit; weak, ill-head; skin vesic; scaling derm; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water wash immed Resp support Medical attention immed | CVS, liver, kidneys, CNS, skin, brain tumor, lung and bowel cancer |
| Goggles: | Reason prob | | | | | | |
| Wash: | Immed wet | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Any poss | NIOSH Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Head, dizz; nau, vomit, mal; myoclonic jerks of limbs; clonic, tonic convuls; coma; hema, azotemia; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Cancer, CNS, liver, kidneys, skin |
| Goggles: | Reason prob | | | | | | |
| Wash: | Immed contam | | | | | | |
| Change: | After work if any poss contam | | | | | | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Any poss liq/Repeat vap >25 ppm | NIOSH/OSHA 50 ppm: SA:CF*/PAPROV* 100 ppm: CCRFOV/GMFOV/SCBAF/ SAF/PAPRTOV* 150 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing | Eye irrit, tissue damage; irrit upper resp sys, skin; pulm edema | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Eyes, skin, resp sys |
| Goggles: | Reason prob | | | | | | |
| Wash: | Immed contam | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Quick drench | | | | | | |
| Allyl alcohol | | | | | | | |

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|---------|---|---|--|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Allyl chloride <chem>CH2=CHCH2Cl</chem> 107-05-1 UC7350000 | 3-Chloropropene, 1-Chloro-2-propene, 3-Chloropropylene | NIOSH/OSHA 1 ppm (3 mg/m ³) ST 2 ppm (6 mg/m ³) | 300 ppm | Colorless, brown, yellow, or purple liquid with a pungent, unpleasant odor. | MW: 76.5 BP: 113°F Sol: 0.4% Fl.P: -25°F IP: 10.05 eV | VP: 295 mm MLT: -210°F UEL: 11.1% LEL: 2.9% | Strong oxidizers, acids, amines, iron & aluminum chlorides, magnesium, zinc | Char; Benzene; GC/FID; II [#1000] |
| 1100 28 | 1 ppm = 3.18 mg/m ³ | | | | Sp.Gr: 0.94 Class IB Flammable Liquid | | | |
| Allyl glycidyl ether <chem>C6H10O2</chem> 106-92-3 RR0875000 | AGE; 1-Allyloxy-2,3-epoxypropane; Glycidyl allyl ether; [(2-Propenyloxy)methyl] oxirane | NIOSH 5 ppm (22 mg/m ³) ST 10 ppm (44 mg/m ³) [skin] | 270 ppm | Colorless liquid with a pleasant odor. | MW: 114.2 BP: 309°F Sol: 14% Fl.P: 135°F IP: ? | VP: 2 mm FRZ: -148°F [forms glass] UEL: ? LEL: ? | Strong oxidizers | Tenax GC; Diethyl ether; GC/FID; II(4) [#S346] |
| 2219 29 | 1 ppm = 4.75 mg/m ³ | OSHA 5 ppm (22 mg/m ³) ST 10 ppm (44 mg/m ³) | | | Sp.Gr: 0.97 Class II Combustible Liquid | | | |
| 4-Aminodiphenyl <chem>C6H5C6H4NH2</chem> 92-67-1 DU8925000 | 4-Aminobiphenyl, p-Aminobiphenyl, p-Aminodiphenyl, Biphenylamine, 4-Phenylaniline | NIOSH Ca See Appendix A OSHA [1910.1011] See Appendix B ACGIH A1 [skin] | Ca | Colorless crystals with a floral odor. [Note: Turns purple on contact with air.] | MW: 169.2 BP: 576°F Sol: Slight Fl.P: ? IP: ? | VP(227°F): 1 mm MLT: 127°F UEL: ? LEL: ? | None reported | Filter/ Si gel; 2-Propanol; GC/FID; II(4) [P&CAM #269] |
| 2-Aminopyridine <chem>NH2C5H4N</chem> 504-29-0 US1575000 | alpha-Aminopyridine, alpha-Pyridylamine | NIOSH/OSHA 0.5 ppm (2 mg/m ³) | 5 ppm | White powder, leaflets, or crystals with a characteristic odor. | MW: 94.1 BP: 411°F Sol: >100% Fl.P: 154°F IP: 8.00 eV | VP: Low MLT: 137°F UEL: ? LEL: ? | Strong oxidizers | Tenax GC(2); Thermal desorp; GC/FID; II(4) [#S158] |
| 2671 55 | 1 ppm = 3.91 mg/m ³ | | | | Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|---|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, skin; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 25 ppm: SA:CF* | Abs | pulm edema; | Skin: | Soap wash immed | eyes, liver, |
| Wash: | Immed contam | 50 ppm: SCBAF/SAF | Ing | in animals: liver, kidney | Breath: | Resp support | kidneys |
| Change: | N.R. | 300 ppm: SAF:PD,PP | Con | damage | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Quick drench | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Derm; eye, nose irrit; | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Any poss | 50 ppm: SA/SCBA/CCROV | Abs | pulm irrit, edema; narco | Skin: | Water flush prompt | |
| Wash: | Prompt contam | 125 ppm: SA:CF*/PAPROV* | Ing | | Breath: | Resp support | |
| Change: | N.R. | 250 ppm: GMFOV/SCBAF/SAF/CCROV/SAT:CF | Con | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 270 ppm: SAF:PD,PP | | | | | |
| Provide: | Eyewash | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Head, dizz; lethargy, | Eye: | Irr immed | Bladder, skin |
| Goggles: | Any poss | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | dysp; ataxia, weak; | Skin: | Soap wash immed | |
| Wash: | Immed contam/daily | Escape: HIEF/SCBAE | Ing | methemoglobinemia; | Breath: | Resp support | |
| Change: | After work if any poss contam | | Con | urinary burning; acute hemorrhagic cystitis; [carc] | Swallow: | Medical attention immed | |
| Remove: | Immed contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Head, dizz; excitement; | Eye: | Irr immed | CNS, resp sys |
| Goggles: | Reason prob | 5 ppm: SA*/SCBA* | Abs | nau; high BP; resp distress; weak; convuls; | Skin: | Water flush immed | |
| Wash: | Immed contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | stupor | Breath: | Resp support | |
| Change: | After work if reason prob contam | Escape: GMFOVHIE/SCBAE | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |

2-Aminopyridine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|---------------------------|--|--|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ammonia NH ₃ 7664-41-7 BO0875000 2672 60 (12-44% soln) 2073 15 (44% soln) 1005 15 (anhydrous) | Anhydrous ammonia, Aqua ammonia, Aqueous ammonia 1 ppm = 0.71 mg/m ³ | NIOSH 25 ppm (18 mg/m ³) ST 35 ppm (27 mg/m ³) OSHA ST 35 ppm (27 mg/m ³) | 500 ppm | Colorless gas with a pungent, suffo- cating odor. [Note: Often used in an aqueous solution. Easily liquefied under pressure.] | MW: 17.0 BP: -28°F Sol: 34% Fl.P: NA (Gas) IP: 10.18 eV | VP: >1 atm FRZ: -108°F UEL: 28% LEL: 15% | Strong oxidizers, acids, halogens, salts of silver & zinc [Note: Corrosive to copper & galvanized surfaces.] | Passive sampler; none; IC: III [#6701] |
| Ammonium sulfamate NH ₄ SO ₃ NH ₂ 7773-06-0 WO6125000 | Ammate® herbicide, Ammonium aminosulfonate, Monoammonium salt of sulfamic acid, Sulfamate | NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp) | 5000 mg/m ³ | Colorless to white crystalline, odorless solid. [herbicide] | MW: 114.1 BP: 320°F (Decomposes) Sol: 200% Fl.P: NA IP: ? | VP: Low MLT: 268°F UEL: NA LEL: NA | Acids, hot water [Note: Elevated temperatures cause a highly exothermic reaction with water.] | Filter; Water; IC: II(5) [#S348] |
| 9089 31 | | | | | Noncombustible Solid | | | |
| n-Amyl acetate CH ₃ COO(CH ₂) ₄ CH ₃ 628-63-7 AJ1925000 | Amyl acetic ester, Amyl acetic ether, 1-Pentanol acetate, Pentyl ester of acetic acid, Primary amyl acetate | NIOSH/OSHA 100 ppm (525 mg/m ³) | 4000 ppm | Colorless liquid with a persistent banana-like odor. | MW: 130.2 BP: 301°F Sol: 0.2% Fl.P: 77°F IP: ? | VP(77°F): 5 mm FRZ: -95°F UEL: 7.5% LEL: 1.1% | Nitrates; strong oxidizers, alkalis & acids | Char; CS ₂ ; GC/FID; III [#1450, Esters I] |
| 1104 26 | 1 ppm = 5.41 mg/m ³ | | | | Sp.Gr: 0.88 Class IC Flammable Liquid | | | |
| sec-Amyl acetate CH ₃ COOCH(CH ₃)C ₃ H ₇ 626-38-0 AJ2100000 | 1-Methylbutyl acetate, 2-Pentanol acetate, 2-Pentyl ester of acetic acid | NIOSH/OSHA 125 ppm (650 mg/m ³) | 9000 ppm | Colorless liquid with a mild odor. | MW: 130.2 BP: 249°F Sol: Slight Fl.P: 89°F IP: ? | VP: 7 mm FRZ: -148°F UEL: ? LEL: ? | Nitrates; strong oxidizers, alkalis & acids | Char; CS ₂ ; GC/FID; III [#1450, Esters I] |
| 1104 26 | 1 ppm = 5.41 mg/m ³ | | | | Sp.Gr: 0.87 Class IC Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|--|-------------------|--|--------------------------------------|---|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss >10%/Repeat <10% | NIOSH 250 ppm: CCRS*/SA*/SCBA* 500 ppm: PAPRS*/SCBAF/SAF/ GMFS/CCRFS/SA:CF* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh Ing Con | Eye, nose, throat irrit; dysp, bronspas, chest pain; pulm edema; pink frothy sputum; skin burns, vesic | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, eyes |
| Goggles: | Any poss | | | | | | |
| Wash: | Immed contam >10%/ Prompt wet <10% | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed non-imperv >10%/ Prompt non-imperv contam <10% | | | | | | |
| Provide: | Eyewash 10%, quick drench >10% | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA 50 mg/m ³ : DM 100 mg/m ³ : DMXSO/SA 250 mg/m ³ : PAPRDM/SA:CF 500 mg/m ³ : HIEF/PAPRTHIE/ SAT:CF/SCBAF/SAF 5000 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Ing Con | Irrit eyes, nose, throat; cough, difficult breath | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Upper resp sys, eyes |
| Goggles: | N.R. | | | | | | |
| Wash: | N.R. | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: PAPROV*/CCROV*/SA*/ SCBA* | Inh Ing Con | Irrit eyes, nose; narco; derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, resp sys |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt wet | | | | | | |
| Change: | N.R. | 2500 ppm: SA:CF* | | | | | |
| Remove: | Immed wet (flamm) | 4000 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: PAPROV*/CCROV* | Inh Ing Con | Irrit eyes, nose; narco; derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Resp sys, eyes, skin |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt wet | 1250 ppm: SA*/SCBA* | | | | | |
| Change: | N.R. | 3125 ppm: SA:CF* | | | | | |
| Remove: | Immed wet (flamm) | 6250 ppm: GMFOV/SCBAF/SAF 9000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |

sec-Amyl acetate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-------------------------------|---|---|--|--|---|
| | | | | | MW, BP, SOL F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Aniline and homologs $C_6H_5NH_2$ 62-53-3 BW6650000 | Aminobenzene, Aniline oil, Benzenamine, Phenylamine | NIOSH Ca See Appendix A 2 ppm (8 mg/m ³) [skin] OSHA 2 ppm (8 mg/m ³) [skin] | Ca [100 ppm] | Colorless to brown oily liquid with an aromatic amine- like odor. [Note: A solid below 21°F.] | MW: 93.1 BP: 363°F Sol: 4% F.P.: 158°F IP: 7.70 eV | VP: 0.6 mm FRZ: 21°F UEL: 11% LEL: 1.3% | Strong oxidizers, strong acids, toluene diisocyanate | Si gel; Ethanol; GC/FID; III [#2002, Aromatic Amines] |
| 1547 57 | 1 ppm = 3.87 mg/m ³ | | | | Sp.Gr: 1.02 Class IIIA Combustible Liquid | | | |
| Anisidine (o-, p- isomers) $NH_2C_6H_4OCH_3$ o: 90-04-0 BZ5410000 p: 104-94-9 BZ5450000 | o: ortho-Aminoanisole, 2-Anisidine, o-Methoxyaniline, p: para-Aminoanisole, 4-Anisidine, p-Methoxyaniline | NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin] | Ca [50 mg/m ³] | o: Red or yellow oily liquid with an amine-like odor. [Note: A solid below 41°F.] p: Yellow to brown crystalline solid with an amine- like odor. | MW: 123.2 BP: 437/475°F Sol: Insoluble/ Moderate F.P.: 244(oc)/ 86°F IP: 7.44 eV Sp.Gr: 1.10/1.07 o: Class IIIB Combustible Liquid p: Combustible Solid | VP: <0.1/ <0.1 mm FRZ/MLT: 41/135°F UEL: ?/? LEL: ?/? | Strong oxidizers | XAD-2; Methanol; HPLC/UVD; III [#2514] |
| 2431 55 | 1 ppm = 5.12 mg/m ³ | | | | | | | |
| Antimony and compounds (as Sb) Sb 7440-36-0 (Metal) CC4025000 (Metal) 2871 53 (Sb powder) | Metal: Antimony powder, Stibium Synonyms of other com- pounds vary depending upon the specific compound. | NIOSH/OSHA 0.5 mg/m ³ | 80 mg/m ³ | Metal: Silver- white, lustrous, hard, brittle solid; scale-like crystals; or a dark gray, lustrous powder. | MW: 121.8 BP: 2975°F Sol: Insoluble F.P.: NA IP: NA Sp.Gr: 6.69 Metal: Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame. | VP: 0 mm (approx) MLT: 1166°F UEL: NA LEL: NA | Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent (freshly formed) hydrogen.] | Filter; Acid; AA; III(4) [P&CAM #261] |
| ANTU $C_{10}H_7NHC(NH_2)_2S$ 86-88-4 YT9275000 | alpha-Naphthyl thio- carbamide, 1-Naphthyl thiourea, alpha-Naphthyl thiourea | NIOSH/OSHA 0.3 mg/m ³ | 100 mg/m ³ | White crystalline or gray odorless powder. [rodenticide] | MW: 202.3 BP: Decomposes Sol: 0.06% F.P.: NA IP: ? | VP: Low MLT: 388°F UEL: NA LEL: NA | Strong oxidizers, silver nitrate | Filter; Methanol; HPLC/UVD; II(S) [#S276] |
| 1651 53 | | | | | Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH | Inh | Head; weak, dizz; cyan; | Eye: | Irr immed | Blood, CVS, |
| Goggles: | Reason prob | ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | ataxia; dysp on effort; | Skin: | Soap wash prompt | liver, kidneys |
| Wash: | Immed contam | Escape: GMFOV/SCBAE | Ing | tacar; eye irrit; [carc] | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Reason prob | NIOSH | Inh | Head, dizz; cyan; RBC | Eye: | Irr immed | Blood, kidneys, |
| Goggles: | Reason prob | ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | Heinz bodies; [carc] | Skin: | Soap wash immed | liver, CVS |
| Wash: | Immed contam | Escape: HIEF/SCBAE | Ing | | Breath: | Resp support | |
| Change: | After work if reason prob contam | | Con | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit nose, throat, mouth; | Skin: | Soap wash immed | Resp sys, CVS, |
| Goggles: | Reason prob | 5 mg/m ³ : DMXSQ ⁺ /SA/SCBA | Con | cough; dizz; head; nau, | Breath: | Resp support | skin, eyes |
| Wash: | Prompt contam | 12.5 mg/m ³ : PAPRDM ⁺ /SA:CF | | vomit, diarr; stomach | Swallow: | Medical attention | |
| Change: | After work if reason prob contam | 25 mg/m ³ : HIEF/PAPRTHIE/ SAT:CF/SCBAF/SAF | | cramps; insom; anor; irrit | | immed | |
| Remove: | Prompt non-imperv contam | 80 mg/m ³ : SA:PD,PP | | skin; unable to smell | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | properly; cardiac | | | |
| | | Escape: HIEF/SCBAE | | abnormalities in | | | |
| | | | | antimony trichloride | | | |
| | | | | exposures | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | After ingestion of large | Eye: | Irr immed | Resp sys |
| Goggles: | N.R. | 3 mg/m ³ : CCROVDMFw/SA/SCBA | Ing | doses: vomit, dysp, cyan, | Skin: | Soap wash prompt | |
| Wash: | N.R. | 7.5 mg/m ³ : PAPROVDMFw/SA:CF | | coarse pulm rales; mild | Breath: | Resp support | |
| Change: | After work if reason prob contam | 15 mg/m ³ : CCRFOVHIE/PAPRTOVHIE/ SAT:CF/SCBAF/SAF/ GMFOVHIE | | liver damage | Swallow: | Medical attention | |
| Remove: | N.R. | 100 mg/m ³ : SA:PD,PP | | | | immed | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |

ANTU

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|-----------------------------------|--|--|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Arsenic (inorganic compounds as As) As 7740-38-2 (Metal) CG0525000 (Metal) 1558 53 (Metal) | Metal: Arsenia Synonyms of other compounds vary depending upon the specific compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.] | NIOSH Ca See Appendix A C 0.002 mg/m ³ [15-min] OSHA [1910.1018] 0.010 mg/m ³ | Ca [100 mg/m ³] | Metal: Silver-gray or tin-white, brittle, odorless solid. | MW: 74.9 BP: Sublimes Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 5.73 Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame. | VP: 0 mm (approx) MLT: 1135EF (Sublimes) UEL: NA LEL: NA | Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.] | Filter; Acid; AA; III [#7900] |
| Arsine AsH ₃ 7784-42-1 CG6475000 2188 18 | Arsenic hydride, Arsenic trihydride, Arseniuretted hydrogen, Arsenious hydride, Hydrogen arsenide 1 ppm = 3.24 mg/m ³ | NIOSH Ca See Appendix A C 0.002 mg/m ³ [15-min] OSHA 0.05 ppm (0.2 mg/m ³) | Ca [6 ppm] | Colorless gas with a mild garlic-like odor. | MW: 78.0 BP: -81°F Sol: 20% Fl.P: NA (Gas) IP: 9.89 eV Flammable Gas | VP: >1 atm FRZ: -179°F UEL: ? LEL: ? | Strong oxidizers, chlorine, nitric acid [Note: Decomposes above 446°F. There is a high potential for the generation of arsine gas when inorganic arsenic is exposed to nascent (freshly formed) hydrogen.] | Char; HNO ₃ ; HGA; III [#6001] |
| Asbestos Hydrated mineral silicates 1332-21-4 CI6475000 2212 31 (blue) 2590 31 (white) | Actinolite, Amosite (cummingtonite- grunerite), Anthophyllite, Chrysotile, Crocidolite, Tremolite | NIOSH Ca See Appendix A See Appendix C OSHA [1910.1001] OSHA [1910.1101] See Appendix C ACGIH See Appendix C | Ca | White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids. | MW: Varies BP: Decomposes Sol: Insoluble Fl.P: NA IP: NA Noncombustible Solid | VP: 0 mm (approx) MLT: 1112°F (Decomposes) UEL: NA LEL: NA | None reported [Note: Measurements may also be made with transmission electron microscopy using NIOSH #7402.] | Filter; Acetone/ Triacetin; PCM; III [#7400, Fibers] |
| Azinphos-methyl C ₁₀ H ₁₂ O ₃ PS ₂ N ₃ 86-50-0 TE1925000 2783 55 | Guthion®; 0,0-Dimethyl-S-4-oxo-1,2,3- benzotriazin-3(4H)- ylmethyl phosphorodithioate; Methyl azinphos [(CH ₃ O) ₂ P(S)SCH ₂ (N ₃ C ₇ H ₄ O)] | NIOSH/OSHA 0.2 mg/m ³ [skin] | 20 mg/m ³ | Colorless crystals or a brown, waxy solid. [insecticide] | MW: 317.3 BP: Decomposes Sol: 0.003% Fl.P: NA IP: ? Sp.Gr: 1.44 Noncombustible Solid | VP: Low FRZ: 163°F UEL: NA LEL: NA | Strong oxidizers, acids | None available |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Ulceration of nasal septum, | Eye: | Irr immed (15 min) | Liver, kidneys, |
| Goggles: | Any poss | ✓: SCBAF-PD,PP/SAF-PD,PP:ASCBA | Abs | derm, GI disturbances, | Skin: | Soap wash immed | skin, lungs, |
| Wash: | Immed contam/daily | Escape: GMFAGHIE/SCBAE | Con | peri neur, resp irrit, | Swallow: | Medical attention immed | lymphatic sys |
| Change: | After work if reason prob contam | | Ing | hyperpig of skin, [carc] | | | |
| Remove: | Immed contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | N.R. | NIOSH | Inh | Head, malaise, weak, | Breath: | Resp support | Blood, kidneys, liver |
| Goggles: | N.R. | ✓: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | dizz; dysp; abdom | | | |
| Wash: | N.R. | Escape: GMFS/SCBAE | | and back pain; nau, | | | |
| Change: | N.R. | | | vomit; bronze skin; hema; | | | |
| Remove: | N.R. | | | jaun; peri neur; [carc] | | | |
| Clothing: | Any poss | NIOSH | Inh | Dysp, interstitial fib, | Eye: | Irr immed | Lungs |
| Goggles: | Reason prob | ✓: SCBAF-PD,PP/SAF-PD,PP:ASCBA | Ing | restricted pulm function, | | | |
| Wash: | Daily | Escape: HIEF/SCBAE | | finger clubbing, [carc] | | | |
| Change: | After work if reason prob contam | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Miosis; ache eyes; blurred | Eye: | Irr immed | Resp sys, CNS, |
| Goggles: | Reason prob | 2 mg/m ³ : SA/SCBA/CCROVDMFu | Abs | vision, lac, rin; head; | Skin: | Soap wash immed | CVS, blood choi |
| Wash: | Immed contam | 5 mg/m ³ : PAPROVDMFu/SA:CF | Ing | tight chest, wheez, lar | Breath: | Resp support | |
| Change: | After work if any poss contam | 10 mg/m ³ : CCRFOVHIE/PAPRTOVHIE/ | Con | spas; saliv; cyan; anor; | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | SAT:CF/SCBAF/SAF/ | | nau, vomit, diarr; sweat; | | | |
| Provide: | Quick drench | GMFOVHIE | | twitch, para, convuls; low | | | |
| | | 20 mg/m ³ : SA:PD,PP | | BP, card irregularities | | | |
| | | ✓: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |

Azinphos-methyl

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-------------------------------------|--|---|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Barium (soluble compounds as Ba) 1: Ba(NO ₃) ₂ 2: BaCl ₂ 1: 10022-31-8/ CO9625000 2: 10361-37-2/ CO8750000 1448 42 (Barium nitrate) | 1: Barium nitrate, Barium dinitrate 2: Barium chloride, Barium dichloride Synonyms of other soluble compounds vary depend- ing upon the specific com- pound. | NIOSH/OSHA 0.5 mg/m ³ | 1100 mg/m ³ | Barium nitrate & Barium chloride are white odorless solids. | MW: 261.4/ 208.3 BP: Decomposes /2840°F Sol: 9/38% FLP: NA/? IP: ?/? Sp.Gr: 3.24/3.86 Ba(NO ₃) ₂ : Noncombustible Solid BaCl ₂ : Combustible Solid | VP: Low/Low MLT: 1098/ 1765°F UEL: NA/? LEL: NA/? | Acids, oxidizers [Note: Contact of barium nitrate with combustible material may cause fire.] | Filter; Water; AA; III [#7056] |
| Benzene C ₆ H ₆ 71-43-2 CY1400000 | Benzol, Phenyl hydride | NIOSH Ca See Appendix A 0.1 ppm ST 1 ppm OSHA [1910.1028] 1 ppm ST 5 ppm | Ca [3000 ppm] ACGIH A2 | Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.] | MW: 78.1 BP: 176°F Sol: 0.07% FLP: 12°F IP: 9.24 eV Sp.Gr: 0.88 Class IB Flammable Liquid | VP: 75 mm FRZ: 42°F UEL: 7.9% LEL: 1.3% | Strong oxidizers, many fluorides & perchlorates, nitric acid [Note: Measurements may also be made with a portable GC using NIOSH #3700 (III).] | Char; CS; GC/FID; III [#1500, Hydro- carbons] |
| Benzidine NH ₂ C ₆ H ₄ C ₆ H ₄ NH ₂ 92-87-5 DC9625000 | 4,4'-Bianiline; 4,4'-Biphenyldiamine; 1,1'-Biphenyl-4,4'-diamine; 4,4'-Diaminobiphenyl; p-Diaminodiphenyl | NIOSH Ca See Appendix A OSHA [1910.1010] See Appendix B ACGIH A1 [skin] | Ca | Grayish-yellow, reddish-gray, or white crystalline powder. | MW: 184.3 BP: 752°F Sol(54°F): 0.04% FLP: ? IP: ? Sp.Gr: 1.25 Combustible Solid, but difficult to burn. | VP: Low MLT: 239°F UEL: ? LEL: ? | None reported | Filter/ Si gel; Reagent; HPLC/UVD; III [#5509] |
| Benzoyl peroxide (C ₆ H ₅ CO) ₂ O ₂ 94-36-0 DM8575000 2085/2086/2087 49 2088/2089/2090 49 | Benzoperoxide, Dibenzoyl peroxide | NIOSH/OSHA 5 mg/m ³ | 7000 mg/m ³ | Colorless to white crystals or a granular powder with a faint benzaldehyde-like odor. | MW: 242.2 BP: ? Sol: <1% FLP: ? IP: ? Sp.Gr(77°F): 1.33 Combustible Solid (easily ignited and burns very rapidly). | VP: <1 mm MLT: 217°F UEL: ? LEL: ? | Combustible substances (wood, paper, etc.), acids, alkalis, alcohols, amines, ethers [Note: Containers may explode when heated. Extremely explosion-sensitive to shock, heat, and friction.] | Filter; Diethyl ether; HPLC/UVD; III [#5009] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|---|--|--------------------------|--|--------------------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) | |
| Recommendations vary depending upon the specific compound. | | NIOSH/OSHA 5 mg/m ³ : DMXSQ/SA/SCBA 12.5 mg/m ³ : PAPRDM/SA:CF 25 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/ SCBAF/SAF 250 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Ing Con | Upper resp irrit; gastroenteritis; musc spasm; slow pulse, extrasystoles; hypokalemia; irrit eyes, skin; skin burns | Eye: Skin: Breath: Swallow: | Irr Immed Water flush Immed Resp support Medical attention Immed | Heart, CNS, skin, resp sys, eyes |
| Clothing: Goggles: Wash: Change: Remove: | Repeat Reason prob Prompt wash soap N.R. Immed wet (flamm) | NIOSH Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Irrit eyes, nose, resp sys; gidd; head, nau, staggered gait; fig, anor, lass; derm; bone marrow depres; [carc] | Eye: Skin: Breath: Swallow: | Irr Immed Soap wash prompt Resp support Medical attention Immed | Blood, CNS, skin, bone marrow, eyes, resp sys |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Any poss Any poss Immed contam/daily After work if any poss contam Immed contam Eyewash, quick drench | NIOSH Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Abs Ing Con | Hema; secondary anemia from hemolysis; acute cystitis; acute liver disorders; derm; painful and irregular urination; [carc] | Eye: Skin: Breath: Swallow: | Irr Immed (15 min) Soap wash Immed Resp support Medical attention Immed | Bladder, kidneys, liver, skin, blood |
| Clothing: Goggles: Wash: Change: Remove: | Repeat Reason prob Prompt contam After work if reason prob contam Prompt non-imperv contam | NIOSH/OSHA 50 mg/m ³ : DMXSQ ^a /SA ^a /SCBA ^a 125 mg/m ³ : PAPRDM ^a /SA:CF ^a 250 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE ^a 7000 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Ing Con | Irrit skin, eyes, muc memb; sens derm | Eye: Skin: Swallow: | Irr Immed Soap wash prompt Medical attention Immed | Skin, resp sys, eyes |

Benzoyl peroxide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|--|--|---|---|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Benzyl chloride <chem>C6H5CH2Cl</chem> 100-44-7 XS8925000 | Chloromethylbenzene, alpha-Chlorotoluene | NIOSH C 1 ppm (5 mg/m ³) (15-min) OSHA 1 ppm (5 mg/m ³) | 10 ppm | Colorless to slightly yellow liquid with a pungent, aromatic odor. | MW: 126.6 BP: 354°F Sol: 0.05% Fl.P: 153°F IP: ? | VP(72°F): 1 mm FRZ: -38°F UEL: ? LEL: 1.1% | Oxidizers, acids, copper, aluminum, magnesium, iron, zinc, tin [Note: Can polymerize when in contact with all common metals except nickel & lead. Hydrolyzes in H ₂ O to benzyl alcohol.] | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1738 59 | 1 ppm = 5.26 mg/m ³ | | | | Sp.Gr: 1.10 Class IIIA Combustible Liquid | | | |
| Beryllium and compounds (as Be) Be 7440-41-7 DS1750000 1566 53 (cmpds) 1587 32 (powder) | Metal: None Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH Ca See Appendix A Not to exceed 0.0005 mg/m ³ OSHA 0.002 mg/m ³ C 0.005 mg/m ³ 0.025 mg/m ³ [30-min maximum peak] | Ca [10 mg/m ³] ACGIH A2 | Metal: A hard, brittle, gray- white solid. | MW: 9.0 BP: 4532°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 2349°F UEL: NA LEL: NA | Acids, caustics, chlorinated hydro- carbons, oxidizers, molten lithium | Filter; Acid; HGA; III [#7102] |
| Boron oxide <chem>B2O3</chem> 1303-86-2 ED7900000 | Boric anhydride, Boric oxide, Boron trioxide | NIOSH/OSHA 10 mg/m ³ | N.E. | Colorless, semi- transparent lumps or hard, white, odorless crystals. | MW: 69.6 BP: 3380°F Sol: 3% Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 842°F UEL: NA LEL: NA | Water [Note: Reacts slowly with water to form boric acid.] | Filter; none; Grav; III [#0500, Nuisance Dust (total)] |
| | | | | | Sp.Gr: 2.46 Noncombustible Solid | | | |
| Boron trifluoride <chem>BF3</chem> 7637-07-2 ED2275000 | Boron fluoride, Trifluoroborane | NIOSH/OSHA C 1 ppm (3 mg/m ³) | 100 ppm | Colorless gas with a pungent, suffocating odor. [Note: Forms dense white fumes in moist air.] | MW: 67.8 BP: -148°F Sol: 106% (in cold H ₂ O) Fl.P: NA IP: 15.50 eV | VP: >1 atm FRZ: -196°F UEL: NA LEL: NA | Alkali metals, calcium oxide [Note: Hydrolyzes in moist air or hot water to form boric acid, hydrogen fluoride, and fluo- boric acid.] | None available |
| 1008 15 | 1 ppm = 2.82 mg/m ³ | | | | Nonflammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------|---|----------------|---------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes, nose; weak; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Any poss | 10 ppm: SA*/PAPROVAG*/ | Inh | irrit; head; skin | Skin: | Soap wash immed | skin |
| Wash: | Immed contam | CCROVAG*/GMFOVAG/SCBA* | Inh | eruption; pulm edema | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | Escape: GMFOVAG/SCBAE | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Resp symptoms, weak, | Eye: | Irr immed | Lungs, skin, |
| Goggles: | Any poss | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Inh | fat, weight loss, | | | eyes, muc memb |
| Wash: | Daily | Escape: HIEF/SCBAE | Inh | [carc] | | | |
| Change: | After work if any poss contam | | Inh | | | | |
| Remove: | Prompt non-imperv contam | | Inh | | | | |
| Provide: | Eyewash | | Inh | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Nasal irrit, conj, | Eye: | Irr immed | Skin, eyes |
| Goggles: | Reason prob | 50 mg/m ³ : DM* | Inh | erythema | Skin: | Water flush prompt | |
| Wash: | Prompt contam | 100 mg/m ³ : DMXSO**/SA*/SCBA* | Inh | | Breath: | Fresh air | |
| Change: | N.R. | 250 mg/m ³ : PAPRDM**/SA:CF* | Con | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 500 mg/m ³ : SCBAF/SAF/HIEF/PAPRTHIE* | | | | | |
| | | 5000 mg/m ³ : SAF:PD,PP | | | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Nasal irrit, epis; burns | Eye: | Irr immed | Resp sys, |
| Goggles: | N.R. | 10 ppm: SA*/SCBA* | Con | eyes, skin; | Skin: | Water flush immed | kidneys, eyes, |
| Wash: | N.R. | 25 ppm: SA:CF* | | in animals: pneu; kidney | Breath: | Resp support | skin |
| Change: | N.R. | 50 ppm: SCBAF/SAF | | damage; epis | | | |
| Remove: | N.R. | 100 ppm: SAF:PD,PP | | | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |

Boron trifluoride

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|--|---|--|---|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Bromine Br_2 7726-95-6 EF9100000 | Molecular bromine | NIOSH/OSHA 0.1 ppm (0.7 mg/m ³) ST 0.3 ppm (2 mg/m ³) | 10 ppm | Dark reddish-brown fuming liquid with suffocating, irritating fumes. | MW: 159.8 BP: 139°F Sol: 4% Fl.P: NA IP: 10.55 eV Sp.Gr: 3.12 Noncombustible Liquid, but accelerates the burning of combustibles. | VP: 172 mm FRZ: 19°F UEL: NA LEL: NA | Combustible organics (sawdust, wood, cotton, straw, etc.), aluminum, readily oxidizable materials, ammonia, hydrogen, acetylene, phosphorus, potassium, sodium [Note: Corrodes iron, steel, stainless steel & copper.] | Bub: none; IC: OSHA [#ID108] |
| 1744 59 | 1 ppm = 6.64 mg/m ³ | | | | | | | |
| Bromoform CHBr_3 75-25-2 PB5600000 | Methyl tribromide, Tribromomethane | NIOSH/OSHA 0.5 ppm (5 mg/m ³) [skin] | Unknown | Colorless to yellow liquid with a chloroform-like odor. [Note: A solid below 47°F.] | MW: 252.8 BP: 301°F Sol: 0.1% Fl.P: NA IP: 10.48 eV Sp.Gr: 2.89 Noncombustible Liquid | VP: 5 mm FRZ: 47°F UEL: NA LEL: NA | Lithium, sodium, potassium, calcium, aluminum, zinc, magnesium, strong caustics, acetone [Note: Gradually decomposes, acquir- ing yellow color; air & light accel- erate decomposition.] | Char; CS; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 2515 58 | 1 ppm = 10.51 mg/m ³ | | | | | | | |
| 1,3-Butadiene $\text{CH}_2=\text{CHCH}=\text{CH}_2$ 106-99-0 EI9275000 | Biethylene, Bivinyll, Butadiene, Divinyll, Erythrene, Vinylethylene | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 1000 ppm (2200 mg/m ³) | Ca [20,000 ppm] [LEL] ACGIH A2, 10 ppm (22 mg/m ³) | Colorless gas with a mild aromatic or gasoline-like odor. [Note: A liquid below 24°F.] | MW: 54.1 BP: 24°F Sol: Insoluble Fl.P: NA (Gas) <0°F (Liquid) IP: 9.07 eV Sp.Gr: 0.65 (Liquid at 24°F) Flammable Gas Class IA Flammable Liquid | VP: >1 atm FRZ: -164°F UEL: 12.0% LEL: 2.0% | Phenol, chlorine dioxide, copper, crotonaldehyde [Note: May contain inhibitors (such as tri-butylcatechol) to prevent self- polymerization. May form explosive peroxides upon exposure to air.] | Char(2): CH, Cl; GC/FID; III [#1024] |
| 1010 17 (inhibited) | 1 ppm = 2.25 mg/m ³ | | | | | | | |
| 2-Butanone $\text{CH}_3\text{COCH}_2\text{CH}_3$ 78-93-3 EL6475000 | Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone | NIOSH/OSHA 200 ppm (590 mg/m ³) ST 300 ppm (885 mg/m ³) | 3000 ppm | Colorless liquid with a moderately sharp, fragrant, mint- or acetone- like odor. | MW: 72.1 BP: 175°F Sol: 28% Fl.P: 16°F IP: 9.54 eV Sp.Gr: 0.81 Class IB Flammable Liquid | VP: 71 mm FRZ: -123°F UEL(200°F): 11.4% LEL(200°F): 1.4% | Strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines | Ambersorb; CS; GC/FID; III [#2500] |
| 1193/1232 26 | 1 ppm = 3.00 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|---------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Dizz, head; lac, epis; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 2.5 ppm: SA:CF ⁵ /PAPRS ^{4,5} | Ing | cough, feeling of | Skin: | Soap wash immed | CNS |
| Wash: | Immed contam | 5 ppm: CCRFS ⁴ /GMFS ⁴ /SCBAF/SAF | Con | oppression, pulm edema, | Breath: | Resp support | |
| Change: | N.R. | PAPRTS ^{4,5} | | pneu; abdom pain, diarr; | Swallow: | Medical attention | |
| Remove: | Immed contam | 10 ppm: SAF:PD,PP | | measle-like eruptions; | | immed | |
| Provide: | Eyewash, quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | severe burns eyes, skin | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Skin, liver, |
| Goggles: | Reason prob | 12.5 ppm: SA:CF ⁵ /PAPROV ⁶ | Abs | CNS depression; liver | Skin: | Soap wash prompt | kidneys, resp |
| Wash: | Prompt contam | 25 ppm: CCRFOV/GMFOV/SCBAF/SAF/ | Ing | damage | Breath: | Resp support | sys, CNS |
| Change: | N.R. | PAPRTOV ⁶ | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | 1000 ppm: SAF:PD,PP | | | | immed | |
| | contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Prevent skin freezing | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Reason prob | v: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | drow, li-head; | Skin: | Water flush immed | CNS |
| Wash: | Immed wet | Escape: GMFS/SCBAE | | frostbite; [carc] | Breath: | Resp support | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose; head; | Eye: | Irr immed | CNS, lungs |
| Goggles: | Reason prob | 1000 ppm: PAPROV ⁶ /CCRFOV | Ing | dizz; vomit | Skin: | Water wash immed | |
| Wash: | N.R. | 3000 ppm: GMFOV/SA:CF ⁵ /SCBAF/SAF | Con | | Breath: | Fresh air | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | Escape: GMFOV/SCBAE | | | | immed | |
| Provide: | contam | | | | | | |
| | Eyewash | | | | | | |

2-Butanone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---------------|---|--|--|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 2-Butoxyethanol <chem>C4H9OCH2CH2OH</chem> 111-78-2 KJ8575000 | Butyl cellosolve, Butyl oxitol, Dowanol EB, Ektasolve EB, Ethylene glycol monobutyl ether, Jeffersol EB | NIOSH/OSHA 25 ppm (120 mg/m ³) [skin] | 700 ppm | Colorless mobile liquid with a mild ether-like odor. | MW: 118.2 BP: 339°F Sol: Miscible Fl.P: 143°F IP: ? | VP: 0.8 mm FRZ: -107°F UEL(275°F): 12.7% LEL(200°F): 1.1% | Strong oxidizers, strong caustics | Char; Methanol CH ₂ Cl ₂ ; GC/FID; II [#1403, Alcohols IV] |
| 2369 26 | 1 ppm = 4.91 mg/m ³ | | | | Sp.Gr: 0.90 Class IIIA Combustible Liquid | | | |
| n-Butyl acetate <chem>CH3COO(CH2)3CH3</chem> 123-86-4 AF7350000 | Butyl acetate, n-Butyl ester of acetic acid, Butyl ethanoate | NIOSH/OSHA 150 ppm (710 mg/m ³) ST 200 ppm (950 mg/m ³) | 10,000 ppm | Colorless liquid with a fruity odor. | MW: 116.2 BP: 258°F Sol: 1% Fl.P: 72°F IP: 10.00 eV | VP(77°F): 15 mm FRZ: -107°F UEL: 7.6% LEL: 1.7% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; II [#1450, Esters I] |
| 1123 26 | 1 ppm = 4.83 mg/m ³ | | | | Sp.Gr: 0.88 Class IC Flammable Liquid | | | |
| sec-Butyl acetate <chem>CH3COOCH(CH3)-CH2CH3</chem> 105-46-4 AF7380000 | sec-Butyl ester of acetic acid, 1-Methylpropyl acetate | NIOSH/OSHA 200 ppm (950 mg/m ³) | 10,000 ppm | Colorless liquid with a pleasant, fruity odor. | MW: 116.2 BP: 234°F Sol: 0.8% Fl.P: 62°F IP: 9.91 eV | VP(77°F): 24 mm FRZ: -100°F UEL: 9.8% LEL: 1.7% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; II [#1450, Esters I] |
| 1123 26 | 1 ppm = 4.83 mg/m ³ | | | | Sp.Gr: 0.86 Class IB Flammable Liquid | | | |
| tert-Butyl acetate <chem>CH3COOC(CH3)3</chem> 540-88-5 AF7400000 | tert-Butyl ester of acetic acid | NIOSH/OSHA 200 ppm (950 mg/m ³) | 10,000 ppm | Colorless liquid with a fruity odor. | MW: 116.2 BP: 208°F Sol: Insoluble Fl.P: 62-72°F IP: ? | VP: ? FRZ: ? UEL: ? LEL: ? | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; II [#1450, Esters I] |
| 1123 26 | 1 ppm = 4.83 mg/m ³ | | | | Sp.Gr: 0.87 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Reason prob | 250 ppm: SA*/SCBA* | Abs | hemolysis, hemog | Skin: | Soap wash prompt | lymphoid sys, |
| Wash: | Immed contam | 625 ppm: PAPROV*/SA:CF* | Ing | | Breath: | Resp support | skin, blood, |
| Change: | N.R. | 700 ppm: GMFOV/CCRFOV/SCBAF/SAF | Con | | Swallow: | Medical attention | eyes, resp sys |
| Remove: | Immed non-imperv contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| Provide: | Quick drench | Escape: GMFOV/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Head; drow; dryness and | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCROV* | Ing | Irrit eyes, upper resp | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 1500 ppm: SA*/SCBA* | Con | sys, skin | Breath: | Resp support | |
| Change: | N.R. | 3750 ppm: SA:CF* | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 7500 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | 10,000 ppm: SAF:PD,PP | | | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes; head; drow; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCROV | Ing | dryness upper resp sys, | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 5000 ppm: SA:CF* | Con | skin | Breath: | Resp support | |
| Change: | N.R. | 10,000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Itch, inflamm eyes; irrit | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Ing | upper resp tract; head; | Skin: | Water flush prompt | skin |
| Wash: | Prompt wet | 5000 ppm: SA:CF* | Con | narco; derm | Breath: | Resp support | |
| Change: | N.R. | 10,000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |

tert-Butyl acetate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---------------|--|---|---|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| n-Butyl alcohol <chem>CH3CH2CH2CH2OH</chem> 71-36-3 EO1400000 | 1-Butanol, n-Butanol, Butyl alcohol, 1-Hydroxybutane, n-Propyl carbinol | NIOSH/OSHA C 50 ppm (150 mg/m ³) [skin] | 8000 ppm | Colorless liquid with a strong, characteristic, mildly alcoholic odor. | MW: 74.1 BP: 243°F Sol: 9% Fl.P: 99°F IP: 10.04 eV | VP: 6 mm FRZ: -129°F UEL: 11.2% LEL: 1.4% | Strong oxidizers | Char; 2-Propanol/ CS ₂ ; GC/FID; III [#1401, Alcohols II] |
| 1120 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.81 Class IC Flammable Liquid | | | |
| sec-Butyl alcohol <chem>CH3CHOHCH2CH3</chem> 78-92-2 EO1750000 | 2-Butanol, Butylene hydrate, 2-Hydroxybutane, Methyl ethyl carbinol | NIOSH 100 ppm (305 mg/m ³) ST 150 ppm (455 mg/m ³) OSHA 100 ppm (305 mg/m ³) | 10,000 ppm | Colorless liquid with a strong, pleasant odor. | MW: 74.1 BP: 211°F Sol: 16% Fl.P: 75°F IP: 10.10 eV | VP(86°F): 24 mm FRZ: -175°F UEL(212°F): 9.8% LEL(212°F): 1.7% | Strong oxidizers | Char; 2-Propanol/ CS ₂ ; GC/FID; III [#1401, Alcohols II] |
| 1120 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.81 Class IC Flammable Liquid | | | |
| tert-Butyl alcohol <chem>(CH3)3COH</chem> 75-65-0 EO1925000 | 2-Methyl-2-propanol, Trimethyl carbinol | NIOSH/OSHA 100 ppm (300 mg/m ³) ST 150 ppm (450 mg/m ³) | 8000 ppm | Colorless solid or liquid with a camphor-like odor. [Note: Pure com- pound is a liquid above 77°F. Often used in aqueous solu- tions.] | MW: 74.1 BP: 180°F Sol: Miscible Fl.P: 52°F IP: 9.70 eV | VP(77°F): 42 mm FRZ: 77°F UEL: 8.0% LEL: 2.4% | Strong mineral acids, strong hydrochloric acid, oxidizers | Char; 2-Butanol/ CS ₂ ; GC/FID; III [#1400, Alcohols I] |
| 1120 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.79 Class IB Flammable Liquid | | | |
| Butylamine <chem>CH3CH2CH2CH2NH2</chem> 109-73-9 EO2975000 | 1-Aminobutane, n-Butylamine | NIOSH/OSHA C 5 ppm (15 mg/m ³) [skin] | 2000 ppm | Colorless liquid with a fishy, ammonia-like odor. | MW: 73.2 BP: 172°F Sol: Miscible Fl.P: 10°F IP: 8.71 eV | VP: 82 mm FRZ: -58°F UEL: 9.8% LEL: 1.7% | Strong oxidizers, strong acids [Note: May corrode some metals in presence of water.] | Si gel; Methanol; GC/FID; II(4) [#S138] |
| 1125 68 | 1 ppm = 3.04 mg/m ³ | | | | Sp.Gr: 0.74 Class IA Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Abs | head, verti, drow; | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 1250 ppm: SA:CF* | Ing | corneal inflamm, blurred | Breath: | Resp support | |
| Change: | N.R. | 2500 ppm: GMFOV/SCBAF/SAF | Con | vision, lac, photo; dry | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 8000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | cracked skin | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eye irrit, narco | Eye: | Irr immed | Eyes, CNS |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV/ SA*/SCBA* | Ing | | Skin: | Water flush prompt | |
| Wash: | Prompt wet | 2500 ppm: SA:CF* | Con | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 10,000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Drow; irrit skin, eyes | Eye: | Irr immed | Eyes, skin |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Ing | | Skin: | Water flush prompt | |
| Wash: | Prompt wet | 2500 ppm: SA:CF* | Con | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 8000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 50 ppm: SA*/SCBA*/CCRS* | Abs | head; skin flush, burns | Skin: | Water flush immed | eyes |
| Wash: | Immed contam | 125 ppm: SA:CF*/PAPRS* | Ing | | Breath: | Resp support | |
| Change: | N.R. | 250 ppm: CCRFS/GMFS/SCBAF/SAF/ PAPRTS* | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 2000 ppm: SAF:PD,PP | | | | immed | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | | | | | |

Butylamine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-------------------------------|---|--|---|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| tert-Butyl chromate (as CrO ₃) (CH ₃) ₃ CO) ₂ CrO ₂ 1189-85-1 GB2900000 | di-tert-Butyl ester of chromic acid | NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA C 0.1 mg/m ³ [skin] | Ca [30 mg/m ³] | Liquid. [Note: Solidifies at 32-23°F.] | MW: 230.3 BP: ? Sol: ? Fl.P: ? IP: ? | VP: ? FRZ: 32-23°F UEL: ? LEL: ? | Reducing agents, moisture | None available |
| | 1 ppm = 9.57 mg/m ³ | | | | | | | |
| n-Butyl glycidyl ether C ₇ H ₁₄ O ₂ 2426-08-6 TX4200000 | BGE; 1,2-Epoxy-3-butoxypropane | NIOSH C 5.6 ppm (30 mg/m ³) [15-min] OSHA 25 ppm (135 mg/m ³) | 3500 ppm | Colorless liquid with an irritating odor. | MW: 130.2 BP: 327°F Sol: 2% Fl.P: 130°F IP: ? | VP(77°F): 3 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers, strong caustics | Char; CS ₂ ; GC/FID: III(2) [#S81] |
| | 1 ppm = 5.41 mg/m ³ | | | | Sp.Gr(77°F): 0.91 Class II Combustible Liquid | | | |
| Butyl mercaptan CH ₃ CH ₂ CH ₂ CH ₂ SH 109-79-5 EK6300000 | Butanethiol, 1-Butanethiol, n-Butanethiol, 1-Mercaptobutane | NIOSH C 0.5 ppm (1.8 mg/m ³) [15-min] OSHA 0.5 ppm (1.5 mg/m ³) | 2500 ppm | Colorless liquid with a strong garlic-, cabbage-, or skunk-like odor. | MW: 90.2 BP: 209°F Sol: 0.06% Fl.P: 35°F IP: 9.15 eV | VP: 35 mm FRZ: -176°F UEL: ? LEL: ? | Strong oxidizers (such as dry bleaches), acids | Chrom-104; Acetone; GC/FID: III(4) [#S350] |
| | 1 ppm = 3.75 mg/m ³ | | | | Sp.Gr: 0.83 Class IB Flammable Liquid | | | |
| p-tert-Butyltoluene (CH ₃) ₃ CC ₆ H ₄ CH ₃ 98-51-1 XS8400000 | 1-Methyl-4-tert-butylbenzene | NIOSH/OSHA 10 ppm (60 mg/m ³) ST 20 ppm (120 mg/m ³) | 1000 ppm | Colorless liquid with a distinct aromatic odor, somewhat like gasoline. | MW: 148.3 BP: 379°F Sol: Insoluble Fl.P: 155°F IP: 8.28 eV | VP(77°F): 0.7 mm FRZ: -62°F UEL: ? LEL: ? | Oxidizers | Char; CS ₂ ; GC/FID: III [#1501, Aromatic Hydro- carbons] |
| | 1 ppm = 6.16 mg/m ³ | | | | Sp.Gr: 0.86 Class IIIA Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|-----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Lung, sinus cancer; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | [carc] | Skin: | Soap wash immed | eyes, CNS |
| Wash: | Immed contam/daily | Escape: GMFOV/HIE/SCBAE | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| | | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, nose; skin | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 56 ppm: SA*/SCBA*/CCROV* | Ing | irrit, sens; narco. | Skin: | Soap wash immed | sys, CNS |
| Wash: | Prompt contam | 140 ppm: SA:CF*/PAPROV* | Con | | Breath: | Resp support | |
| Change: | N.R. | 280 ppm: SCBAF/SAF/CCRFOV/ | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | GMFOV/PAPRTOV* | | | | | |
| | | 3500 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | In animals: narco, inco, | Eye: | Irr immed | Resp sys; |
| Goggles: | Reason prob | 5 ppm: SA/SCBA/CCROV | Ing | weak; cyan, pulm irrit; | Skin: | Soap wash prompt | in animals: CNS, |
| Wash: | Prompt wet | 12.5 ppm: SA:CF/PAPROV | Con | liver, kidney damage | Breath: | Resp support | liver, kidneys |
| Change: | N.R. | 25 ppm: SCBAF/SAF/CCRFOV/ | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | PAPRTOV/GMFOV | | | | | |
| | | 500 ppm: SA:PD,PP* | | | | | |
| | | 1000 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, skin; dry nose, | Eye: | Irr immed | CVS, CNS, skin, |
| Goggles: | Reason prob | 250 ppm: SA:CF*/PAPROV* | Ing | throat; head; low BP, | Skin: | Water flush prompt | bone marrow, |
| Wash: | Prompt wet | 500 ppm: CCRFOV/GMFOV/SCBAF/SAF | Con | tacar, abnormal | Breath: | Resp support | eyes, upper resp |
| Change: | N.R. | 1000 ppm: SAF:PD,PP | | cardiovascular stress; | Swallow: | Medical attention immed | sys |
| Remove: | Prompt non-imperv wet | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | CNS depres; hemato depres | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

p-tert-Butyltoluene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------------------------------|---|--|---|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Cadmium dust (as Cd) Cd 7440-43-9 EU9800000 | Metal: none Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 0.2 mg/m ³ C 0.6 mg/m ³ | Ca [50 mg/m ³] | Metal: Silver- white, blue-tinged lustrous, odorless solid. | MW: 112.4 BP: 1409°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 810°F UEL: NA LEL: NA | Strong oxidizers; elemental sulfur, selenium & tellurium | Filter; Acid; AA; III [#7048] |
| 2570 53 | | | | | Sp.Gr(77°F): 8.65 Metal: Noncombustible Solid in bulk form, but will burn in powder form. | | | |
| Cadmium fume (as Cd) CdO/Cd 1306-19-0 (CdO) EV1930000 (CdO) | CdO: Cadmium monoxide, Cadmium oxide fume Cd: None | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 0.1 mg/m ³ C 0.3 mg/m ³ | Ca [9 mg/m ³] | Odorless, yellow- brown, finely divided partic- ulate dispersed in air. | MW: 128.4 BP: Decomposes Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 2599°F UEL: NA LEL: NA | Not applicable | Filter; Acid; AA; III [#7048] |
| | | | | | [Note: See Cadmium dust for properties of Cd.] Sp.Gr: 8.15 (crystalline form)/6.95 (amorphous form) Noncombustible Solid | | | |
| Calcium arsenate (as As) Ca ₃ (AsO ₄) ₂ 7778-44-1 CG0830000 | Calcium salt (2:3) of arsenic acid, Cucumber dust, Tricalcium arsenate, Tricalcium ortho-arsenate | NIOSH Ca See Appendix A C 0.002 mg/m ³ [15-min] OSHA [1910.1018] 0.010 mg/m ³ | Ca [100 mg/m ³] | Colorless to white, odorless solid. [insecticide/ herbicide] | MW: 398.1 BP: Decomposes Sol(77°F): 0.01% Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA | None reported [Note: Produces toxic fumes of arsenic when heated to decomposition.] | Filter; Acid; AA; III [#7900, Arsenic] |
| 1573 53 | | | | | Sp.Gr: 3.62 Noncombustible Solid | | | |
| Calcium oxide CaO 1305-78-8 EW3100000 | Burnt lime, Burnt lime, Lime, Pebble lime, Quick lime, Unslaked lime | NIOSH 2 mg/m ³ OSHA 5 mg/m ³ | Unknown | White or gray, odorless lumps or granular powder. | MW: 56.1 BP: 5162°F Sol: Reacts Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 4662°F UEL: NA LEL: NA | Water (liberates heat), fluorine [Note: Reacts with water to form calcium hydroxide.] | Filter; Acid; AA; III [#7020] |
| 1910 60 | | | | | Sp.Gr: 3.34 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|--------------------------|--|--------------------------------------|--|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH | Inh ing | Pulm edema, dysp, cough, chest tight, subs pain; head; chills, musc aches; nau, vomit, diarr; anos, emphy, prot, mild anemia; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash Resp support Medical attention immed | Resp sys, kidneys, prostate, blood |
| Goggles: | Any poss (CdCl ₂) | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| Wash: | Daily (reason prob) | Escape: HIEF/SCBAE | | | | | |
| Change: | After work if any poss contam | | | | | | |
| Remove: | N.R. | | | | | | |
| Provide: | Eyewash (CdCl ₂) | | | | | | |
| Clothing: | N.R. | NIOSH | Inh | Pulm edema, dysp, cough, tight chest, subs pain; head; chills, musc aches; nau, vomit, diarr; emphy, prot, anos, mild anemia; [carc] | Breath: | Resp support | Resp sys, kidneys, blood |
| Goggles: | N.R. | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| Wash: | N.R. | Escape: HIEF/SCBAE | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: | Repeat | NIOSH | Inh Abs ing Con | Weak; GI dist; peri neur; skin hyperpig, palmar planter hyperkeratoses; dermat; [carc]; in animals: liver damage | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Eyes, resp sys, liver, skin, lymphatics, CNS |
| Goggles: | Any poss | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| Wash: | Prompt contam/daily | Escape: HIEF/SCBAE | | | | | |
| Change: | After work if any poss contam | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Reason prob | NIOSH | Inh ing Con | Irrit eyes, upper resp tract; ulcer, perf nasal septum; pneu; dermat | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, skin, eyes |
| Goggles: | Any poss | 10 mg/m ³ : DM | | | | | |
| Wash: | Prompt contam/daily | 20 mg/m ³ : DMXSO/SA/SCBA | | | | | |
| Change: | After work if reason prob contam | 50 mg/m ³ : PAPRHE/SA-CF | | | | | |
| Remove: | Prompt non-imperv contam | 100 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE | | | | | |
| Provide: | Eyewash, quick drench | 250 mg/m ³ : SA-PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: HIEF/SCBAE | | | | | |

Calcium oxide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|-----------------------|--|--|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Camphor (synthetic) <chem>C10H16O</chem> 76-22-2 EX1225000 | 2-Camphonone, Gum camphor, Laurel camphor, Synthetic camphor | NIOSH/OSHA 2 mg/m ³ | 200 mg/m ³ | Colorless or white crystals with a penetrating, aromatic odor. | MW: 152.3 BP: 399°F Sol: Insoluble Fl.P: 150°F IP: 8.76 eV | VP: 0.2 mm MLT: 345°F UEL: 3.5% LEL: 0.6% | Oxidizers (especially chromic anhydride) | Char; Methanol/ CS; GC/FID; III [#1301, Ketones II] |
| 2717 32 | | | | | Sp.Gr: 0.99 Combustible Solid | | | |
| Carbaryl (Sevin®) <chem>C10H9OOCNHCH3</chem> 63-25-2 FC5950000 | alpha-Naphthyl N-methyl- carbamate, 1-Naphthyl N-Methyl- carbamate | NIOSH/OSHA 5 mg/m ³ | 600 mg/m ³ | White or gray odorless solid. [pesticide] | MW: 201.2 BP: Decomposes Sol: 0.01% FL.P: NA IP: ? | VP(77°F): 0.00004 mm MLT: 293°F UEL: NA LEL: NA | Strong oxidizers, strongly alkaline pesticides | Filter; Reagent; Vis; III [#5006] |
| 2757 55 | | | | | Sp.Gr: 1.23 Noncombustible Solid, but may be dissolved in flammable liquids. | | | |
| Carbon black C 1333-86-4 FF5800000 | Acetylene black, Channel black, Furnace black, Lamp black, Thermal black | NIOSH/OSHA 3.5 mg/m ³ NIOSH Ca See Appendix A 0.1 mg/m ³ [Carbon black in presence of polycyclic aro- matic hydrocarbons] | N.E. Ca | Black, odorless solid. | MW: 12.0 BP: Sublimes Sol: Insoluble Fl.P: ? IP: NA | VP: 0 mm (approx) MLT: Sublimes UEL: ? LEL: ? | Strong oxidizers such as chlorates, bromates & nitrates | Filter; none; Grav; III [#5000] |
| Carbon dioxide <chem>CO2</chem> 124-38-9 FF6400000 1013 12 1845 21 (dry ice) 2187 21 (liquid) | Carbonic acid gas, Dry ice 1 ppm = 1.83 mg/m ³ | NIOSH 5,000 ppm (9000 mg/m ³) ST 30,000 ppm (54,000 mg/m ³) OSHA 10,000 ppm (18,000 mg/m ³) ST 30,000 ppm (54,000 mg/m ³) | 50,000 ppm | Colorless, odorless gas. [Note: Normal constituent of air (about 3000 ppm). Solid form is utilized as dry ice.] | MW: 44.0 BP: Sublimes Sol(77°F): 0.2% Fl.P: NA IP: 13.77 eV | VP: >1 atm MLT: -109°F (Sublimes) UEL: NA LEL: NA | Dusts of various metals, such as magnesium, zirconium, titanium, aluminum, chromium & manga- nese are ignitable and explosive when sus- pended in carbon dioxide. | Bag; none; GC/FID; II(3) [#S249] |
| | | | | | Noncombustible Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|---|--------------------------|---|--------------------------------------|---|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason Remove: Prompt non-imperv contam | | NIOSH/OSHA 50 mg/m ³ : SA:CF ⁵ /PAPROVDM ⁶ 100 mg/m ³ : CCRFOVHIE/GMFOVHIE/ PAPRTOVHIE ⁵ /SCBAF/SAF 200 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Ing Con | Irrit eyes, skin, muc memb; nau, vomit, diarr; head, dizz, excitement, irrational, epileptiform convuls | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | CNS, eye, skin, resp sys |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason Remove: Prompt non-imperv contam | | NIOSH/OSHA 50 mg/m ³ : SA*/SCBA* 125 mg/m ³ : SA:CF* 250 mg/m ³ : SCBAF/SAF 600 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Miosis, blurred vision, tear; nasal discharge, saliv; sweat; abdom cramps, nau, vomit, diarr; tremor; cyan; convuls; skin irrit | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, CNS, CVS, skin |
| Clothing: N.R. Goggles: Repeat Wash: Daily Change: N.R. Remove: N.R. | | NIOSH/OSHA 17.5 mg/m ³ : DM 35 mg/m ³ : DMXSO/SA/SCBA 87.5 mg/m ³ : PAPRODM/SA:CF 175 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF 1750 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Con | None expected; in presence of polycyclic aromatic hydrocarbons: [carc] In presence of polycyclic aromatic hydrocarbons: NIOSH §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Eye: | Irr prompt | None known |
| Clothing: Prevent skin freezing Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R. | | NIOSH 50,000 ppm: SA/SCBA §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE | Inh Con | Head, dizz, restless, pares; dysp; sweat, mal; inc heart rate, pulse pressure; elevated BP; coma; asphy; convuls at high concentrations; frostbite (dry ice) | Eye: Skin: Breath: | Medical attention Medical attention for frostbite Resp support | Lungs, skin, CVS |

Carbon dioxide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|--|---|--|--|---|---|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Carbon disulfide CS ₂ 75-15-0 FF6650000 | Carbon bisulfide | NIOSH 1 ppm (3 mg/m ³) ST 10 ppm (30 mg/m ³) [skin] OSHA 4 ppm (12 mg/m ³) ST 12 ppm (36 mg/m ³) [skin] | 500 ppm | Colorless to faint-yellow liquid with a sweet ether-like odor. [Note: Reagent grades are foul smelling.] | MW: 76.1 BP: 116°F Sol: 0.3% Fl.P.: -22°F IP: 10.08 eV | VP: 297 mm FRZ: -169°F UEL: 50.0% LEL: 1.3% | Strong oxidizers; chemically-active metals such as sodium, potassium & zinc; azides; rust; halogens; amines [Note: Vapors may be ignited by contact with ordinary light bulb.] | Char/ Dry tube; Toluene; GC/FPD; III [#1600] |
| 1131 28 | 1 ppm = 3.16 mg/m ³ | | | | Sp.Gr: 1.26 Class IB Flammable Liquid | | | |
| Carbon monoxide CO 630-08-0 FG3500000 | Carbon oxide, Flue gas, Monoxide | NIOSH/OSHA 35 ppm (40 mg/m ³) C 200 ppm (229 mg/m ³) [Note: On 9/5/89 OSHA stayed the start-up date for the Ceiling limit for the following steel industry operations — blast furnaces, vessel blowing at basic oxygen furnaces, and sinter plants.] | 1500 ppm | Colorless, odorless gas. [Note: Shipped as a nonliquefied compressed gas.] | MW: 28.0 BP: -313°F Sol: 2% Fl.P.: NA (Gas) IP: 14.01 eV | VP: >1 atm MLT: -337°F UEL: 74% LEL: 12.5% | Strong oxidizers, bromine trifluoride, chlorine trifluoride, lithium | Bag; none; ECA; II(4) [#S340] |
| 1016 18 | 1 ppm = 1.16 mg/m ³ | | | | Flammable Gas | | | |
| Carbon tetrachloride CCl ₄ 56-23-5 FG4900000 | Carbon chloride, Carbon tet, Freon® 10, Halon® 104, Tetrachloromethane | NIOSH Ca See Appendix A ST 2 ppm (12.6 mg/m ³) [60-min] OSHA 2 ppm (12.6 mg/m ³) | Ca [300 ppm] ACGIH A2 [skin] | Colorless liquid with a character- istic ether-like odor. | MW: 153.8 BP: 170°F Sol: 0.05% Fl.P.: NA IP: 11.47 eV | VP: 91 mm FRZ: -9°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.] | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1846 55 | 1 ppm = 6.39 mg/m ³ | | | | Sp.Gr: 1.59 Noncombustible Liquid | | | |
| Chlordane C ₁₀ H ₆ Cl ₈ 57-74-9 PB9800000 | 1,2,4,5,6,7,8,8- Octachloro-3a,4,7,7a- tetrahydro-4,7- methanoindane | NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin] | Ca [500 mg/m ³] | Amber-colored, viscous liquid with a pungent, chlorine-like odor. [insecticide] | MW: 409.8 BP: Decomposes Sol: Insoluble Fl.P.: NA IP: ? | VP: 0.00001 mm FRZ: ? UEL: NA LEL: NA | Strong oxidizers, alkaline reagents | Filter/ Chrom-102; Toluene; GC/ECD; III [#5510] |
| 2762 28 | 1 ppm = 17.04 mg/m ³ | | | | Sp.Gr(77°F): 1.56 Noncombustible Liquid, but may be utilized in flammable solutions. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|--|----------------|--|----------------------------|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH | Inh | Dizz, head, poor sleep, | Eye: | Irr immed | CNS, PNS, CVS, |
| Goggles: | Reason prob | 10 ppm: CCROV/SA/SCBA | Abs | fig, ner, anor, low-wgt; | Skin: | Soap wash immed | eyes, kidneys, |
| Wash: | Prompt contam | 25 ppm: SA:CF/PAPROV | Ing | psychosis; polyneur; | Breath: | Resp support | liver, skin |
| Change: | N.R. | 50 ppm: CCRFOV/PAPRTOV/GMFOV/ SCBAF/SAF | Con | Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 500 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | kidney, liver damage; eye, skin burns; derm | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Head, tachypnea, nau, | Breath: | Resp support | CVS, lungs, |
| Goggles: | Reason prob | 350 ppm: SA/SCBA | Con | weak, dizz, conf, halu; | | | blood, CNS |
| Wash: | N.R. | 875 ppm: SA:CF | (liq) | cyan; depres S-T segment of electrocardiogram, angina, syncope | | | |
| Change: | N.R. | 1500 ppm: SCBAF/SAF/GMFS ¹ | | | | | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS ¹ /SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh | CNS depres; nau, vomit; | Eye: | Irr immed | CNS, eyes, |
| Goggles: | Reason prob | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | liver, kidney damage; | Skin: | Soap wash immed | lungs, liver, |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | Ing | skin irrit; [carc] | Breath: | Resp support | kidneys, skin |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Any poss | OSHA | Inh | Blurred vision; conf; | Eye: | Irr immed | CNS, eyes, |
| Goggles: | Reason prob | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | ataxia, delirium; cough; | Skin: | Soap wash immed | lungs, liver, |
| Wash: | Immed contam | Escape: GMFOVHIE/SCBAE | Ing | abdom pain, nau, vomit, | Breath: | Resp support | kidneys, skin |
| Change: | After work if any poss contam | | Con | diarr; irrit, tremor, convuls; anuria; in animals: lung, liver, kidney damage | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |

Chlordane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|-----------------------------------|--|---|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Chlorinated camphene $C_{10}H_{10}Cl_2$ 8001-35-2 XW5250000 | Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toxaphene | NIOSH Ca See Appendix A [skin] OSHA 0.5 mg/m ³ ST 1 mg/m ³ [skin] | Ca [200 mg/m ³] | Amber, waxy solid with a mild chlorine- and camphor-like odor. [insecticide] | MW: 413.8 BP: Decomposes Sol: 0.0003% FLP: 275°F IP: ? | VP(77°F): 0.4 mm MLT: 149 to 194°F UEL: ? LEL: ? | Strong oxidizers [Note: Slightly corrosive to metals under moist conditions.] | Filter; Petroleum ether; GC/ECD; II(2) [#S67] |
| 2761 55 | | | | | Sp.Gr(77°F): 1.65 A Solid that does not burn, or burns with difficulty. | | | |
| Chlorinated diphenyl oxide $(C_6H_2Cl_3)_2O$ 55720-99-5 KO0875000 | Hexachlorodiphenyl oxide, Hexachlorophenyl ether | NIOSH/OSHA 0.5 mg/m ³ | Unknown | Light yellow, very viscous, waxy liquid. | MW: 376.9 BP: 446-500°F Sol: 0.1% FLP: NA IP: ? | VP: 0.00006 mm FRZ: ? UEL: NA LEL: NA | Strong oxidizers | Filter; Isocetane; GC/EConD; II [#5025, Chlori- nated diphenyl ether] |
| | 1 ppm = 15.67 mg/m ³ | | | | Sp.Gr: 1.60 Noncombustible Liquid | | | |
| Chlorine Cl_2 7782-50-5 FO2100000 | Molecular chlorine | NIOSH/OSHA 0.5 ppm (1.5 mg/m ³) ST 1 ppm (3 mg/m ³) | 30 ppm | Greenish-yellow gas with a pungent, irritating odor. [Note: Shipped in steel cylinders.] | MW: 70.9 BP: -29°F Sol: 0.7% FLP: NA IP: 11.48 eV | VP: >1 atm FRZ: -150°F UEL: NA LEL: NA | Reacts explosively or forms explosive compounds with many common substances such as acetylene, ether, turpentine, ammonia, fuel gas, hydrogen & finely divided metals. | Bub; none; ISE; OSHA [#D101] |
| 1017 20 | 1 ppm = 2.95 mg/m ³ | | | | Noncombustible Gas, but a strong oxidizer. | | | |
| Chlorine dioxide ClO_2 10049-04-4 FO3000000 | Chlorine oxide, Chlorine peroxide | NIOSH/OSHA 0.1 ppm (0.3 mg/m ³) ST 0.3 ppm (0.9 mg/m ³) | 10 ppm | Yellow to red gas or a red-brown liquid (below 52°F) with an unpleasant odor similar to chlorine and nitric acid. | MW: 67.5 BP: 52°F Sol(77°F): 0.3% FLP: NA (Gas) ? (Liquid) IP: 10.36 eV | VP: >1 atm FRZ: -74°F UEL: ? LEL: ? | Organic materials, heat, phosphorus, potassium hydroxide, sulfur [Note: Unstable in light. A powerful oxidizer.] | None available |
| | 1 ppm = 2.81 mg/m ³ | | | | Sp.Gr: 1.6 (Liquid at 32°F) Combustible Gas/Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------------------|---|--------------------------|--|--------------------------------------|--|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss liq/Repeat sol | NIOSH v: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Nau, conf, agitation, tremors, convuls, unconscious; dry, red skin; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | CNS, skin |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt contam | | | | | | |
| Change: | After work if reason prob contam sol | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Acne-form derm, liver damage | Eye: | Irr immed | Skin, liver |
| Goggles: | Reason prob | 5 mg/m ³ : SA/SCBA | Ing | | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | Escape: GMFOVHIE/SCBAE | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Burning of eyes, nose, mouth; lac, rin; cough, choking, subs pain; nau, vomit; head, dizz; syncope; pulm edema; pneu; hypox; derm; eye, skin burns | Eye: | Irr immed | Resp sys |
| Goggles: | Any poss | 5 ppm: CCRS*/SA*/SCBA* | Con | | Skin: | Water flush immed | |
| Wash: | Immed contam | 12.5 ppm: SA:CF*/PAPRS* | | | Breath: | Resp support | |
| Change: | N.R. | 25 ppm: SCBAF/SAF/GMFS/PAPRTS*/CCRFS | | | | | |
| Remove: | Immed non-imperv contam | 30 ppm: SAF:PD,PP | | | | | |
| Provide: | Eyewash, quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; cough, wheez, bron, pulm edema; chronic bron | Eye: | Irr immed | Resp sys, eyes |
| Goggles: | Any poss | 1 ppm: CCRS | Ing | | Skin: | Soap wash immed | |
| Wash: | Immed contam | 2.5 ppm: SA:CF*/PAPRS* | Con | | Breath: | Resp support | |
| Change: | N.R. | 5 ppm: CCRFS/GMFS*/SCBAF/SAF | | | Swallow: | Medical attention immed | |
| Remove: | Immed contam | 10 ppm: SAF:PD,PP | | | | | |
| Provide: | Eyewash, quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape GMFS*/SCBAE | | | | | |

Chlorine dioxide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|-----------------------|--|--|--|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Chlorine trifluoride ClF ₃ 7790-91-2 FO2800000 | Chlorine fluoride, Chlorotrifluoride | NIOSH/OSHA C 0.1 ppm (0.4 mg/m ³) | 20 ppm | Colorless gas or a greenish-yellow liquid (below 53°F) with a somewhat sweet, suffocating odor. | MW: 92.5 BP: 53°F Sol: Reacts Fl.P: NA IP: 13.00 eV | VP: >1 atm FRZ: -105°F UEL: NA LEL: NA | Oxidizers, water, acids, combustible materials, sand, glass [Note: Reacts with water to form chlorine and hydrofluoric acid.] | None available |
| 1749 44 | 1 ppm = 3.85 mg/m ³ | | | | Sp.Gr: 1.77 (Liquid at 53°F) Noncombustible Liquid, but contact with organic materials may result in SPONTANEOUS ignition. | | | |
| Chloroacetaldehyde ClCH ₂ CHO 107-20-0 AB2450000 | Chloroacetaldehyde (40% aqueous solution), 2-Chloroacetaldehyde, 2-Chloroethanal | NIOSH/OSHA C 1 ppm (3 mg/m ³) | 100 ppm | Colorless liquid with an acrid, penetrating odor. | MW: 78.5 BP: 186°F Sol: Miscible Fl.P: 190°F (40% soln) IP: 10.61 eV | VP: 100 mm FRZ: -3°F (40% soln) UEL: ? LEL: ? | Oxidizers, acids | Si gel; Methanol; GC/ECD; II(5) [§S11] |
| 2232 55 | 1 ppm = 3.26 mg/m ³ | | | | Sp.Gr: 1.19 Class IIIA Combustible Liquid | | | |
| alpha-Chloroaceto- phenone C ₆ H ₅ COCH ₂ Cl 532-27-4 AM6300000 | 2-Chloroacetophenone, Chloromethyl phenyl ketone, Mace®, Phenacyl chloride, Phenyl chloromethyl ketone, Tear gas | NIOSH/OSHA 0.3 mg/m ³ (0.05 ppm) | 100 mg/m ³ | Colorless to gray crystalline solid with a sharp, irritating odor. | MW: 154.6 BP: 172°F Sol: Insoluble Fl.P: 244°F IP: 9.44 eV | VP: 0.01 mm MLT: 134°F UEL: ? LEL: ? | Water, steam [Note: Slowly corrodes metals.] | Tenax GC (2); Thermal desorp; GC/FID; II(5) [P&CAM #291] |
| 1697 58 | | | | | Sp.Gr(59°F): 1.32 Combustible Solid | | | |
| Chlorobenzene C ₆ H ₅ Cl 108-90-7 CZ0175000 | Benzene chloride, Chlorobenzol, MCB, Monochlorobenzene, Phenyl chloride | NIOSH See Appendix D OSHA 75 ppm (350 mg/m ³) | 2400 ppm | Colorless liquid with an almond- like odor. | MW: 112.6 BP: 270°F Sol: 0.05% Fl.P: 85°F IP: 9.07 eV | VP(77°F): 12 mm FRZ: -50°F UEL: 9.6% LEL: 1.3% | Strong oxidizers | Char; CS; GC/FID; III [§1003, Haloge- nated Hydro- carbons] |
| 1134 27 | 1 ppm = 4.68 mg/m ³ | | | | Sp.Gr: 1.11 Class IC Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Eye, skin burns; | Eye: | Irr immed | Skin, eyes |
| Goggles: | Any poss | 2.5 ppm: SA:CF [†] | Ing | in animals: lac, corneal | Skin: | Water flush immed | |
| Wash: | Immed contam | 5 ppm: SCBAF/SAF | Con | ulcer; pulm edema | Breath: | Resp support | |
| Change: | N.R. | 20 ppm: SAF-PD,PP | | | Swallow: | Medical attention immed | |
| Remove: | Immed contam | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| Provide: | Eyewash, quick drench | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss >0.1%/Repeat <0.1% | NIOSH/OSHA | Inh | Irrit skin, eyes, muc | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Any poss | 10 ppm: CCROV [†] /SA [†] /SCBA [†] | Ing | nemb; skin burns; eye | Skin: | Water flush immed | sys |
| Wash: | Immed contam | 25 ppm: SA:CF [†] /PAPROV [†] | Con | damage; pulm edema; | Breath: | Resp support | |
| Change: | N.R. | 50 ppm: CCRFOV/GMFOV/SCBAF/SAF | | skin, resp sys sens: | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 100 ppm: SAF-PD,PP | | narco, coma | | | |
| Provide: | Eyewash, quick drench | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, skin, resp sys; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Any poss | 3 mg/m ³ : CCROVDM | Ing | pulm edema | Skin: | Soap wash immed | sys |
| Wash: | Immed contam | 7.5 mg/m ³ : SA:CF [†] /PAPROVDM [†] | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | 15 mg/m ³ : CCRFOVHIE/SCBAF/SAF | | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 100 mg/m ³ : SAF-PD,PP | | | | | |
| Provide: | Eyewash | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | OSHA | Inh | Irrit skin, eyes, nose; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 1000 ppm: PAPROV [†] /CCRFOV | Ing | drow, inco; | Skin: | Soap wash prompt | skin, CNS, liver |
| Wash: | Prompt wet | 1875 ppm: SA:CF [†] | Con | in animals: liver, lung, | Breath: | Resp support | |
| Change: | N.R. | 2400 ppm: GMFOV/SCBAF/SAF | | kidney damage | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

Chlorobenzene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-------------------------------|--|--|--|---|---|
| | | | | | MW, BP, SOL F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| o-Chlorobenzylidene malononitrile $\text{ClC}_6\text{H}_4\text{CH}=\text{C}(\text{CN})_2$ 2698-41-1 OO3675000 | 2-Chlorobenzalmonitrile, CS, OCBM | NIOSH/OSHA C 0.05 ppm (0.4 mg/m ³) [skin] | 2 mg/m ³ | White crystalline solid with a pepper-like odor. | MW: 188.6 BP: 590-599°F Sol: Insoluble F.P.: ? IP: ? | VP: 1 mm MLT: 199-203°F UEL: ? LEL: ? | Strong oxidizers | Filter/ Tenax GC; Reagent; HPLC/UV- VIS; [P&CAM #304] |
| Combustible Solid | | | | | | | | |
| Chlorobromomethane CH_2BrCl 74-97-5 PA5250000 | Bromochloromethane, CB, CBM, Fluorocarbon 1011, Halon [®] 1011, Methyl chlorobromide | NIOSH/OSHA 200 ppm (1050 mg/m ³) | 5000 ppm | Colorless to pale yellow liquid with a chloroform-like odor. | MW: 129.4 BP: 155°F Sol: Insoluble F.P.: NA IP: 10.77 eV | VP(77°F): 160 mm FRZ: -124°F UEL: NA LEL: NA | Chemically-active metals such as calcium, powdered aluminum, zinc & magnesium | Char; CS ₂ ; GC/FID; III [#1003, Halo- genated Hydro- carbons] |
| 1887 58 | 1 ppm = 5.38 mg/m ³ | | | | Sp.Gr: 1.93 Noncombustible Liquid | | | |
| Chlorodiphenyl (42% chlorine) $\text{C}_6\text{H}_4\text{ClC}_6\text{H}_4\text{Cl}_2$ (approx) 53469-21-9 TQ1356000 | Aroclor [®] 1242, PCB, Polychlorinated biphenyl | NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA 1 mg/m ³ [skin] | Ca [10 mg/m ³] | Colorless to light colored, viscous liquid with a mild hydrocarbon odor. | MW: 258(approx) BP: 617-691°F Sol: Insoluble F.P.: ? IP: ? | VP: 0.001 mm FRZ: -2°F UEL: ? LEL: ? | Strong oxidizers | Filter/ Florisil; Hexane; GC/ECD; III [#5503, PCBs] |
| 2315 31 | 1 ppm = 10.72 mg/m ³ | | | | Sp.Gr(77°F): 1.39 Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins. | | | |
| Chlorodiphenyl (54% chlorine) $\text{C}_6\text{H}_3\text{Cl}_2\text{C}_6\text{H}_4\text{Cl}_3$ (approx) 11097-69-1 TQ1360000 | Aroclor [®] 1254, PCB, Polychlorinated biphenyl | NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA 0.5 mg/m ³ [skin] | Ca [5 mg/m ³] | Colorless to pale yellow, viscous liquid or solid (below 50°F) with a mild, hydro- carbon odor. | MW: 326(approx) BP: 689-734°F Sol: Insoluble F.P.: ? IP: ? | VP: 0.00006 mm FRZ: 50°F UEL: ? LEL: ? | Strong oxidizers | Filter/ Florisil; Hexane; GC/ECD; III [#5503, PCBs] |
| 2315 31 | 1 ppm = 13.55 mg/m ³ | | | | Sp.Gr(77°F): 1.38 Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Pain, burn eyes, lac, conj; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 2 mg/m ³ : SA:CF ⁺ /SCBAF/SAF | Abs | eryt eyelids, | Skin: | Soap wash immed | eyes |
| Wash: | Prompt contam/daily | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | blepharospasm; irrit | Breath: | Resp support | |
| Change: | After work any poss | Escape: GMFOVHIE/SCBAE | Con | throat, cough, chest | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | | | constrict; head: eryt, vesic | | immed | |
| | contam | | | skin | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Disorientation, dizz; irrit | Eye: | Irr immed | Skin, liver, |
| Goggles: | Reason prob | 1000 ppm: PAPROV ⁺ /CCRFOV | Ing | eyes, throat, skin; pulm | Skin: | Soap wash prompt | kidneys, resp |
| Wash: | Prompt wet | 5000 ppm: SA:CF ⁺ /GMFOV/SCBAF/SAF | Con | edema | Breath: | Resp support | sys, CNS |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes; chloracne; liver | Eye: | Irr immed | Skin, eyes, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | damage; [carc] | Skin: | Soap wash immed | liver |
| Wash: | Prompt contam | Escape: GMFOVHIE/SCBAE | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Prompt contam non-imperv | | | | | immed | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, skin; acne-form | Eye: | Irr immed | Skin, eyes, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | derm; [carc]; | Skin: | Soap wash immed | liver |
| Wash: | Immed contam | Escape: GMFOVHIE/SCBAE | Ing | In animals: liver damage | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | | | | | immed | |

Chlorodiphenyl (54% chlorine)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-------------------------------------|--|--|--|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Chloroform CHCl ₃ 67-66-3 FS9100000 | Methane trichloride, Trichloromethane | NIOSH Ca See Appendix A ST 2 ppm (9.78 mg/m ³) [60-min] OSHA 2 ppm (9.78 mg/m ³) | Ca [1000 ppm] ACGIH A2 | Colorless liquid with a pleasant odor. | MW: 119.4 BP: 143°F Sol(77°F): 0.5% Fl.P: NA IP: 11.42 eV Sp.Gr: 1.48 Noncombustible Liquid | VP: 160 mm FRZ: -82°F UEL: NA LEL: NA | Strong caustics; chemically-active metals such as aluminum or mag- nesium powder, sodium & potassium; strong oxidizers [Note: When heated to decomposition, forms phosgene gas.] | Char; CS ₂ ; GC/FID: III [#1003, Haloge- nated Hydro- carbons] |
| 1888 55 | 1 ppm = 4.96 mg/m ³ | | | | | | | |
| bis-Chloromethyl ether (CH ₂ Cl) ₂ O 542-88-1 KN1575000 | BCME, bis-CME, Chloromethyl ether, Dichlorodimethyl ether, Oxybis(chloromethane) | NIOSH Ca See Appendix A OSHA [1910.1008] See Appendix B ACGIH A1, 0.001 ppm (0.005 mg/m ³) | Ca | Colorless liquid with a suffocating odor. | MW: 115.0 BP: 223°F Sol: Reacts Fl.P: <66°F IP: ? Sp.Gr: 1.32 Class IA Flammable Liquid | VP(72°F): 30 mm FRZ: -43°F UEL: ? LEL: ? | Acids, water [Note: Reacts with water to form hydrochloric acid and formaldehyde.] | Imp; Reagent; GC/ECD OSHA [#10] |
| 2249 55 | 1 ppm = 4.78 mg/m ³ | | | | | | | |
| Chloromethyl methyl ether CH ₃ OCH ₂ Cl 107-30-2 KN6650000 | Chlorodimethyl ether, Chloromethoxymethane, CMME, Dimethylchloroether, Methylchloromethyl ether | NIOSH Ca See Appendix A OSHA [1910.1006] See Appendix B ACGIH A2 | Ca | Colorless liquid with an irritating odor. | MW: 80.5 BP: 138°F Sol: Reacts Fl.P(oc): 32°F IP: 10.25 eV Sp.Gr: 1.06 Class IA Flammable Liquid | VP: ? FRZ: -154°F UEL: ? LEL: ? | Water [Note: Reacts with water to form hydrochloric acid and formaldehyde.] | Imp; Hexane; GC/ECD; II(1) [P&CAM #220] |
| 1239 28 | 1 ppm = 3.35 mg/m ³ | | | | | | | |
| 1-Chloro-1-nitropropane CH ₃ CH ₂ CHClNO ₂ 600-25-9 TX5075000 | Korax, Lanstan® | NIOSH/OSHA 2 ppm (10 mg/m ³) | 2000 ppm | Colorless liquid with an unpleasant odor. [fungicide] | MW: 123.6 BP: 289°F Sol: 0.5% Fl.P(oc): 144°F IP: ? Sp.Gr: 1.21 Class IIIA Combustible Liquid | VP(77°F): 6 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers, acids | Chrom-108; Ethyl Acetate; GC/FID; II(5) [#S211] |
| | 1 ppm = 5.14 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------|--|----------------|--|----------------------------|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH | Inh | Dizz, mental dullness, nau, | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Reason prob | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Ing | disorientation; head, fig; | Skin: | Soap wash prompt | heart, eyes, |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | Con | anes; hepatomegaly; irrit | Breath: | Resp support | skin |
| Change: | N.R. | | | eyes, skin; [carc] | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, skin, | Eye: | Irr immed (15 min) | Lungs, eyes, |
| Goggles: | Any poss | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Abs | muc memb of resp | Skin: | Soap wash immed | skin |
| Wash: | Immed contam/daily | Escape: GMFOV/SCBAE | Con | system; pulm congestion, | Breath: | Resp support | |
| Change: | After work if any poss | | | edema; corneal damage, | Swallow: | Medical attention immed | |
| Remove: | Immed contam | | | nec; reduced pulm | | | |
| Provide: | Eyewash, quick drench | | | function, cough, dysp, | | | |
| | | | | wheez; blood-stained sputum, bronchial secretions; [carc] | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, skin, | Eye: | Irr immed (15 min) | Resp sys, skin, |
| Goggles: | Any poss | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Abs | muc memb; pulm | Skin: | Soap wash immed | eyes, muc memb |
| Wash: | Immed contam/daily | Escape: GMFOV/SCBAE | Con | edema, pulm congestion, | Breath: | Resp support | |
| Change: | After work if any poss | | | pneu; burns, nec, | Swallow: | Medical attention immed | |
| Remove: | Immed contam | | | cough, wheez, pulm | | | |
| Provide: | Eyewash, quick drench | | | congestion; blood stained-sputum; low-wgt; loss; bronchial secretions; [carc] | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | In animals: irrit eyes; | Eye: | Irr immed | In animals: resp |
| Goggles: | Reason prob | 50 ppm: SA-CF*/PAPROV* | Ing | pulm edema; liver, kidney, | Skin: | Soap wash | sys, liver, |
| Wash: | Prompt wet | 100 ppm: CCRFOV/GMFOV/SCBAF/SAF | Con | heart damage | Breath: | Resp support | kidneys, CVS |
| Change: | N.R. | 2000 ppm: SAF-PD, PP | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv wet | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

1-Chloro-1-nitropropane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|-------------------------------|--|--|---|---|--|
| | | | | | MW, BP, SOL F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Chloropicrin CCl_3NO_2 76-06-2 PB6300000 1580 56 2929 52 (flam. mixture) 1583 56 (mixture) | Nitrochloroform, Nitrotrichloromethane, Trichloronitromethane 1 ppm = 6.83 mg/m ³ | NIOSH/OSHA 0.1 ppm (0.7 mg/m ³) | 4 ppm | Colorless to faint yellow, oily liquid with an intensely irritating odor. [pesticide] | MW: 164.4 BP: 234°F Sol: 0.2% F.P.: NA IP: ? Sp.Gr: 1.66 Noncombustible Liquid | VP: 20 mm FRZ: -93°F UEL: NA LEL: NA | Strong oxidizers [Note: With strong initiation, the heated material under confinement will detonate.] | None available |
| beta-Chloroprene $\text{CH}_2=\text{CClCH}=\text{CH}_2$ 126-99-8 E19625000 1991 30 (inhibited) | 2-Chloro-1,3-butadiene; Chlorobutadiene; Chloroprene 1 ppm = 3.68 mg/m ³ | NIOSH Ca See Appendix A C 1 ppm (3.6 mg/m ³) [15-min] OSHA 10 ppm (35 mg/m ³) [skin] | Ca [400 ppm] | Colorless liquid with a pungent, ether-like odor. | MW: 88.5 BP: 139°F Sol: Slight F.P.: -4°F IP: 8.79 eV Sp.Gr: 0.96 Class 1A Flammable Liquid | VP: 188 mm FRZ: -153°F UEL: 20.0% LEL: 4.0% | Peroxides & other oxidizers [Note: Polymerizes at room temperature unless inhibited with antioxidants.] | Char; CS; GC/FID; III [#1002] |
| Chromic acid and chromates (as CrO_3) H_2CrO_4 (acid) 7738-94-5 (acid) GB2450000 (acid) 1755 60 (acid soln) 1463 42 (acid, solid) | Chromic acid: none Synonyms of chromates (i.e., chromium(VI) compounds) vary depending upon the specific compound. | NIOSH Ca See Appendix A 0.001 mg/m ³ See Appendix C OSHA C 0.1 mg/m ³ See Appendix C ACGIH See Appendix C | Ca [30 mg/m ³] | Appearance and odor vary depending upon the specific compound. | Properties vary depending upon the specific compound. Chromic acid is noncombustible, but will accelerate the burning of combustible materials. | | Chromic acid: Combustible, organic, or other readily oxidizable materials (paper, wood, sulfur, aluminum, plastics, etc.); corrosive to metals | Filter; Reagent; Vis; III [#7600, Hexavalent Chromium] |
| Chromium metal (as Cr) Cr 7440-47-3 GB4200000 | Chrome, Chromium | NIOSH 0.5 mg/m ³ See Appendix C OSHA 1 mg/m ³ See Appendix C ACGIH See Appendix C | N.E. | Blue-white to steel-gray, lustrous, brittle, hard solid. | MW: 52.0 BP: 4788°F Sol: Insoluble F.P.: NA IP: NA Sp.Gr: 7.14 Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame. | VP: 0 mm (approx) MLT: 3452°F UEL: NA LEL: NA | Strong oxidizers such as hydrogen peroxide, alkalis | Filter; Acid; AA; III [#7024] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|--|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Eye irrit, lac; cough, pulm | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 2.5 ppm: SA/CF*/PAPROV* | ing | edema; nau, vomit; skin | Skin: | Soap wash immed | eyes |
| Wash: | Immed contam | 4 ppm: SCBAF/SAF/CCRFOV/GMFOV | Con | irrit | Breath: | Resp support | |
| Change: | N.R. | 8: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | Escape: GMFOV/SCBAE | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | ner, irrit; derm; | Skin: | Soap wash immed | eyes |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | ing | alopecia; [carc] | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Clothing: | Any poss | NIOSH | Inh | Resp sys irrit, nasal septum | Eye: | Irr immed | Blood, resp sys, |
| Goggles: | Any poss | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | ing | perf; liver, kidney damage; | Skin: | Soap flush immed | liver, kidneys, |
| Wash: | Immed contam | Escape: HIEF/SCBAE | Con | leucyt, leupen, monoc, eosin; eye inj, conj; skin ulcer; sens derm; [carc] | Breath: | Resp support | eyes, skin |
| Change: | After work if reason prob contam | | | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Histologic fibrosis of | Eye: | Irr immed | Resp sys |
| Goggles: | Reason prob | 2.5 mg/m ³ : DM* | ing | lungs | Skin: | Soap wash | |
| Wash: | Prompt contam | 5 mg/m ³ : DMXSQ*/SA*/SCBA* | | | Breath: | Resp support | |
| Change: | N.R. | 12.5 mg/m ³ : PAPRDM*/SA/CF* | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 25 mg/m ³ : HIEF/PAPRTHIE*/SCBAF/SAF | | | | immed | |
| | | 500 mg/m ³ : SAF:PD,PP | | | | | |
| | | 8: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Chromium metal (as Cr)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|--|--|--|--|---|--|
| | | | | | MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability | VP, FRZ, UEL, LEL | | |
| Chromium(II) and (III) compounds (as Cr) | Synonyms vary depending upon the specific Cr(II) or Cr(III) compound. | NIOSH/OSHA 0.5 mg/m ³ See Appendix C ACGIH See Appendix C | N.E. | Appearance and odor vary depending upon the specific compound. | Properties vary depending upon the specific compound. | | Water | Filter; Acid; AA; III [#7024] |
| Coal tar pitch volatiles (benzene-soluble fraction) | Synonyms vary depending upon the specific compound (e.g., benzo(a)pyrene, phenanthrene, acridine, chrysene, anthracene & pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.] | NIOSH Ca See Appendix A 0.1 mg/m ³ (cyclohexane-extractable fraction) See Appendix C OSHA 0.2 mg/m ³ | Ca [700 mg/m ³] ACGIH A1 | Black or dark-brown amorphous residue. | Properties vary depending upon the specific compound. | | Strong oxidizers | Filter; Benzene; Grav; III [#5023] |
| 65996-93-2 GF8655000 | | | | | Combustible Solid | | | |
| Cobalt metal, dust, and fume (as Co) Co 7440-48-4 (Metal) GF8750000 (Metal) | Metal: none Synonyms of other compounds vary depending upon the specific compound. | NIOSH/OSHA 0.05 mg/m ³ | 20 mg/m ³ | Metal: Odorless, silver-gray to black solid. | MW: 58.9 BP: 5612°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA | Strong oxidizers, ammonium nitrate | Filter; Acid; AA; III [#7027] |
| | | | | | Sp.Gr: 8.92 (Metal) Metal: Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures. | | | |
| Copper dusts and mists (as Cu) Cu 7440-50-8 (Metal) GL5325000 (Metal) | Metal: none Synonyms of other compounds vary depending upon the specific compound. | NIOSH/OSHA 1 mg/m ³ | N.E. | Metal: Reddish, lustrous, malleable, odorless solid. | MW: 63.5 BP: 4703°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 1961°F UEL: NA LEL: NA | Oxidizers, alkalis, sodium azide, acetylene | Filter; Acid; AA; III [#7029] |
| | | | | | Sp.Gr: 8.94 (Metal) Metal: Noncombustible Solid in bulk form, but powdered form may ignite. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------------|---|-------------------|--|--------------------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Ing Con | Sens derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Skin |
| Goggles: | Any poss | 2.5 mg/m ³ : DM* | | | | | |
| Wash: | Prompt contam | 5 mg/m ³ : DMXSQ*/SA*/SCBA* | | | | | |
| Change: | N.R. | 12.5 mg/m ³ : PAPRDM*/SA:CF* | | | | | |
| Remove: | Prompt non-imperv contam | 25 mg/m ³ : HIEF/PAPRTHIE*/SCBAF/SAF 250 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH | Inh Con | Derm, bron, [carc] | Eye: Skin: Breath: | Irr immed Soap wash Resp support | Resp sys, bladder, kidneys, skin |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Wash: | Daily (reason prob) | Escape: GMFOVHIE/SCBAE | | | | | |
| Change: | After work if reason prob contam | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | Cough, dysp, decrease pulm func; low-wgt; derm; diffuse nodular fibrosis; resp hypersensitivity | Eye: Skin: Breath: Swallow: | Irr immed Soap wash Resp support Medical attention immed | Resp sys, skin |
| Goggles: | N.R. | 0.25 mg/m ³ : DM* | | | | | |
| Wash: | Prompt contam | 0.5 mg/m ³ : DMXSQ*/DMFu*/SA*/SCBA* | | | | | |
| Change: | After work if reason prob contam | 1.25 mg/m ³ : PAPRDM*/SA:CF*/ PAPRDMFu* | | | | | |
| Remove: | Prompt non-imperv contam | 2.5 mg/m ³ : HIEF/SCBAF/SAF 20 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | Irrit nasal muc memb, pharynx; nasal perforation; eye irrit; metallic taste; derm; in animals: lung, liver, kidney damage; anemia | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, skin, liver, kidneys, inc risk with Wilson's disease |
| Goggles: | Reason prob | 5 mg/m ³ : DM* | | | | | |
| Wash: | Prompt contam | 10 mg/m ³ : DMXSQ*/SA*/SCBA* | | | | | |
| Change: | After work if reason prob contam | 25 mg/m ³ : PAPRDM*/SA:CF* | | | | | |
| Remove: | Prompt contam non- imperv | 50 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE* 2000 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |

Copper dusts and mists (as Cu)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---------------------------|---|---|--|--|--|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Copper fume (as Cu) CuO/Cu 7440-50-8 (Cu) 1317-38-0 (CuO) GL5350000 (Cu) | CuO: Black copper oxide, Copper monoxide, Copper(II) oxide, Cupric oxide Cu: none | NIOSH/OSHA 0.1 mg/m ³ | N.E. | Finely divided black particulate dispersed in air. [Note: Exposure may occur in copper & brass plants and during the welding of copper alloys.] | MW: 79.5 BP: Decomposes Sol: Insoluble Fl.P: NA IP: NA [Note: See Copper Dusts & Mists for properties of Cu.] Sp.Gr: 8.4 (CuO) CuO: Noncombustible Solid | VP: 0 mm (approx) MLT: 1879°F (Decomposes) UEL: NA LEL: NA | Acetylene | Filter; Acid; AA; III [#7029] |
| Cotton dust (raw) GN2275000 | None | NIOSH 0.200 mg/m ³ See Appendix C OSHA [Z-1-A & 1910.1043] 1 mg/m ³ (waste processing during waste recycling [sorting, blending, cleaning & willowing] & garretting) 0.200 mg/m ³ (textile yarn manufacturing) 0.750 mg/m ³ (textile slashing & weaving) 0.500 mg/m ³ (all other operations) See Appendix C | N.E. | Colorless, odorless solid. | MW: ? BP: Decomposes Sol: Insoluble Fl.P: ? IP: NA Combustible Solid | VP: 0 mm (approx) MLT: Decom- poses UEL: ? LEL: ? | Strong oxidizers | Vertical elut; none; Grav; OSHA [1910.1043] |
| Crag® herbicide C ₈ H ₇ Cl ₂ OCH ₂ CH ₂ - OSO ₂ Na 136-78-7 KK4900000 | Crag® herbicide No. 1; Sesone; Sodium-2-(2,4-dichloro- phenoxy) ethyl sulfate | NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp) | 5000 mg/m ³ | Colorless to white crystalline, odorless solid. [herbicide] | MW: 309.1 BP: Decomposes Sol(77°F): 26% Fl.P: NA IP: ? Sp.Gr: 1.70 Noncombustible Solid | VP: 0.1 mm MLT: 473°F (Decomposes) UEL: NA LEL: NA | Strong oxidizers, acids | Filter; Water; Vis; II(5) [#S356] |
| Cresol (all isomers) CH ₃ C ₆ H ₄ OH 1319-77-3 GO5950000 2076 55 | ortho-, meta-, or para-Cresol; Cresylic acid; 2-, 3-, or 4-Methyl phenol 1 ppm = 4.50 mg/m ³ | NIOSH 2.3 ppm (10 mg/m ³) OSHA 5 ppm (22 mg/m ³) [skin] | 250 ppm | Colorless, yellow, brown, or pinkish, oily liquids or solids with a sweet, tarry odor. | MW: 108.2 BP: 376-397°F Sol: 2% Fl.P: 178°F(o) 187°F(m) 187°F(p) IP: 8.93 eV(o) 8.98 eV(m) 8.97 eV(p) Sp.Gr(77°F): 1.03 Class IIIA Combustible Liquids | VP(100°F): 1 mm FRZ: 52-95°F UEL: ? LEL(300°F): 1.4%(o) 1.1%(m) 1.1%(p) | Strong oxidizers, acids | Si gel; Acetone; GC/FID; III [#2001] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|--|----------------|---|----------------------------|-------------------------|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, weakness; irrit eyes, upper respiratory tract; metallic or sweet taste; discoloration skin, hair | Breath | Resp support | Resp sys, skin, eyes, inc risk with Wilson's disease |
| Goggles: | N.R. | 1 mg/m ³ : DMFu/SA/SCBA | Con | | | | |
| Wash: | N.R. | 2.5 mg/m ³ : PAPRDMFu/SA:CF | | | | | |
| Change: | N.R. | 5 mg/m ³ : HiEF/PAPRTHiE/SCBAF/SAF/SAT:CF | | | | | |
| Remove: | N.R. | 200 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH | Inh | Tight chest, cough, wheez, dysp; decrease FEV; bron; mal; cough, fever, chills, upper resp symptoms after initial exposure | Eye: | Irr immed | Resp sys, CVS |
| Goggles: | N.R. | 1 mg/m ³ : D | | | Breath: | Fresh air | |
| Wash: | N.R. | 2 mg/m ³ : DXSQ/SA/HiE/SCBA | | | | | |
| Change: | N.R. | 5 mg/m ³ : PAPRD/SA:CF | | | | | |
| Remove: | N.R. | 10 mg/m ³ : HiEF/PAPRTHiE/SCBAF/SAF/SAT:CF 20 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | None known | Eye: | Irr immed | None known |
| Goggles: | Reason prob | 50 mg/m ³ : DM | Ing | | Skin: | Water wash prompt | |
| Wash: | Prompt contam | 100 mg/m ³ : DMXSQ/SA/SCBA | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | 250 mg/m ³ : PAPRDM/SA:CF | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 500 mg/m ³ : HiEF/SCBAF/SAF/PAPRTHiE*/SAT:CF* 5000 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | CNS effects; conf, depres, resp fail; dysp, irreg rapid resp, weak pulse; skin, eye burns; dermat; lung, liver, kidney damage | Eye: | Irr immed | CNS, resp sys, liver, kidneys, skin, eyes |
| Goggles: | Any poss | 23 ppm: CCROVDM/SA/SCBA | Abs | | Skin: | Soap wash immed | |
| Wash: | Immed contam | 57.5 ppm: SA:CF/PAPROVDM | Ing | | Breath: | Resp support | |
| Change: | After work if any poss contam | 115 ppm: CCRFOVHiE/SCBAF/SAF/GMFOVHiE/PAPRTHiE*/SAT:CF* | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 250 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |

Cresol (all isomers)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|----------------------|---|--|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Crotonaldehyde <chem>CH3CH=CHCHO</chem> 123-73-9 (trans-isomer) GP9625000 (trans-isomer) | 2-Butenal, beta-Methylacrolein, Propylene aldehyde | NIOSH/OSHA 2 ppm (6 mg/m ³) | 400 ppm | Water-white liquid with a suffocating odor. [Note: Turns pale-yellow on contact with air.] | MW: 70.1 BP: 219°F Sol: 18% Fl.P: 45°F IP: 9.73 eV | VP: 19 mm FRZ: -101°F UEL: 15.5% LEL: 2.1% | Caustics, ammonia, strong oxidizers, nitric acid, amines [Note: Polymerization may occur at elevated temperatures, such as in fire conditions.] | Bub: none; PLR; II(5) [P&CAM #285] |
| 1143 28 (inhibited) | 1 ppm = 2.91 mg/m ³ | | | | Sp.Gr: 0.87 Class 1A Flammable Liquid | | | |
| Cumene <chem>C6H5CH(CH3)2</chem> 98-82-8 GR8575000 | Cumol, Isopropyl benzene, 2-Phenyl propane | NIOSH/OSHA 50 ppm (245 mg/m ³) [skin] | 8000 ppm | Colorless liquid with a sharp, penetrating, aromatic odor. | MW: 120.2 BP: 306°F Sol: Insoluble Fl.P: 96°F IP: 8.75 eV | VP(77°F): 5 mm FRZ: -141°F UEL: 6.5% LEL: 0.9% | Oxidizers | Char; CS; GC/FID; III [#1501, Aromatic Hydrocarbons] |
| 1918 28 | 1 ppm = 5.00 mg/m ³ | | | | Sp.Gr: 0.86 Class 1C Flammable Liquid | | | |
| Cyanides (as CN) 1: KCN 2: NaCN 1: 151-50-8/TS8750000 2: 143-33-9/VZ7530000 1680 55 (KCN soln) 1689 55 (NaCN) | 1: Potassium cyanide, Potassium salt of hydrocyanic acid 2: Sodium cyanide, Sodium salt of hydrocyanic acid Synonyms of other compounds vary depending upon the specific compound. | NIOSH C 5 mg/m ³ (4.7 ppm) [10-min] OSHA 5 mg/m ³ | 50 mg/m ³ | KCN & NaCN are white granular or crystalline solids with a faint almond-like odor. | MW: 65.1/49.0 BP: 7/2725°F Sol(77°F): 72/58% Fl.P: NA/NA IP: NA/NA | VP: 0/0 mm (approx) MLT: 1173/1047°F UEL: NA/NA LEL: NA/NA | Strong oxidizers, such as acids, acid salts, chlorates & nitrates | Filter/Bub; KOH; ISE; III [#7904] |
| Cyclohexane <chem>C6H12</chem> 110-82-7 GU6300000 | Benzene hexahydride, Hexahydrobenzene, Hexamethylene, Hexanaphthene | NIOSH/OSHA 300 ppm (1050 mg/m ³) | 10,000 ppm | Colorless liquid with a sweet, chloroform-like odor. [Note: A solid below 44°F.] | MW: 84.2 BP: 177°F Sol: Insoluble Fl.P: 0°F IP: 9.88 eV | VP(77°F): 98 mm FRZ: 44°F UEL: 8% LEL: 1.3% | Oxidizers | Char; CS; GC/FID; III [#1500, Hydrocarbons] |
| 1145 26 | 1 ppm = 3.50 mg/m ³ | | | | Sp.Gr: 0.78 Class 1A Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|--|----------------|----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 20 ppm: CCROV*/SA*/SCBA* | Ing | in animals: dysp, pulm | Skin: | Water flush immed | skin |
| Wash: | Immed contam | 50 ppm: SA:CF*/PAPROV* | Con | edema, irrit skin | Breath: | Resp support | |
| Change: | N.R. | 100 ppm: CCRFOV/GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 400 ppm: SAF:PD,PP | | | | immed | |
| Provide: | Eyewash, quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, muc memb; | Eye: | Irr immed | Eyes, upper resp |
| Goggles: | Reason prob | 500 ppm: CCROV*/SA*/SCBA* | Abs | head; derm; narco, coma | Skin: | Water flush prompt | sys, skin, CNS |
| Wash: | Prompt wet | 1000 ppm: PAPROV*/CCRFOV | Ing | | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: SA:CF* | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 2500 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | 8000 ppm: SAF:PD,PP | | | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Asphy and death can occur; | Eye: | Irr immed | CVS, CNS, liver, |
| Goggles: | Any poss | 50 mg/m ³ : SA/SCBA | Abs | weak, head, conf; nau, | Skin: | Soap wash immed | kidneys, skin |
| Wash: | Immed contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | vomit; incr rate resp; | Breath: | Resp support | |
| Change: | After work if any poss | Escape: GMFSHIE/SCBAE | Con | slow gasping resp; irrit | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | eyes, skin | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Ing | drow; derm; narco, | Skin: | Water flush prompt | skin, CNS |
| Wash: | Prompt wet | 7500 ppm: SA:CF* | Con | coma | Breath: | Resp support | |
| Change: | N.R. | 10,000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |

Cyclohexane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|---------------|--|---|---|--|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Cyclohexanol <chem>C6H11OH</chem> 108-93-0 GV7875000 | Anol, Cyclohexyl alcohol, Hexahydrophenol, Hexalin, Hydralin, Hydroxycyclohexane | NIOSH/OSHA 50 ppm (200 mg/m ³) [skin] | 3500 ppm | Sticky solid or colorless to light-yellow liquid (above 77°F) with a camphor-like odor. | MW: 100.2 BP: 322°F Sol: 4% FLP: 154°F IP: 10.00 eV | VP: 1 mm MLT: 77°F UEL: ? LEL: ? | Strong oxidizers | Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III] |
| 1 ppm = 4.17 mg/m ³ | | | | | Sp.Gr: 0.96 Class IIIA Combustible Liquid | | | |
| Cyclohexanone <chem>C6H10O</chem> 108-94-1 GW1050000 | Cyclohexyl ketone, Pimelic ketone | NIOSH/OSHA 25 ppm (100 mg/m ³) [skin] | 5000 ppm | Water-white to pale-yellow liquid with a peppermint- or acetone-like odor. | MW: 98.2 BP: 312°F Sol(50°F): 15% FLP: 146°F IP: 9.14 eV | VP(77°F): 5 mm FRZ: -49°F UEL: 9.4% LEL(212°F): 1.1% | Oxidizers, nitric acid | Char; CS; GC/FID; III [#1300, Ketones I] |
| 1915 26 | | | | | Sp.Gr: 0.95 Class IIIA Combustible Liquid | | | |
| Cyclohexene <chem>C6H10</chem> 110-83-8 GW2500000 | Benzene tetrahydride, Tetrahydrobenzene | NIOSH/OSHA 300 ppm (1015 mg/m ³) | 10,000 ppm | Colorless liquid with a sweet odor. | MW: 82.2 BP: 181°F Sol: Insoluble FLP: 11°F IP: 8.95 eV | VP(100°F): 160 mm FRZ: -154°F UEL ? LEL ? | Strong oxidizers [Note: Forms explosive peroxides with oxygen upon storage.] | Char; CS; GC/FID; III [#1500, Hydro- carbons] |
| 2256 29 | | | | | Sp.Gr: 0.81 Class IA Flammable Liquid | | | |
| Cyclopentadiene <chem>C5H6</chem> 542-92-7 GY1000000 | 1,3-Cyclopentadiene | NIOSH/OSHA 75 ppm (200 mg/m ³) | 2000 ppm | Colorless liquid with an irritating, terpene-like odor. | MW: 66.1 BP: 107°F Sol: Insoluble FLP(oc): 77°F IP: 8.56 eV | VP: ? FRZ: -121°F UEL: ? LEL: ? | Strong oxidizers [Note: Polymerizes to dicyclopentadiene upon standing.] | Chrom- 104*; Ethyl acetate; GC/FID; III [#2523] |
| 1 ppm = 2.75 mg/m ³ | | | | | Sp.Gr: 0.80 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat, | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Reason prob | 500 ppm: CCROV*/SA*/SCBA* | Abs | skin; narco | Skin: | Water wash prompt | skin |
| Wash: | Prompt contam | 1000 ppm: PAPROV*/CCRFOV | Ing | | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: SA:CF* | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 2500 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | 3500 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, muc memb; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 625 ppm: SA:CF*/PAPROV* | Abs | head; narco, coma; derm | Skin: | Water flush prompt | skin, CNS |
| Wash: | Prompt wet | 1000 ppm: CCRFOV | Ing | | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: GMFOV/SCBAF/SAF | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 5000 ppm: SAF:PD,PP | | | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp sys, | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Ing | skin; drow | Skin: | Soap wash prompt | sys |
| Wash: | Prompt wet | 7500 ppm: SA:CF* | Con | | Breath: | Resp support | |
| Change: | N.R. | 10,000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose | Eye: | Irr immed | Eyes, resp sys |
| Goggles: | Reason prob | 750 ppm: CCROV/SA/SCBA | Ing | | Skin: | Soap wash prompt | |
| Wash: | Prompt wet | 1000 ppm: PAPROV*/CCRFOV/PAPRTOV | Con | | Breath: | Resp support | |
| Change: | N.R. | 1875 ppm: SA:CF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 2000 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

Cyclopentadiene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|-----------------------|---|--|--|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 2,4-D <chem>Cl2C6H3OCH2COOH</chem> 94-75-7 AG6825000 | 2,4-Dichlorophenoxyacetic acid; Dichlorophenoxyacetic acid | NIOSH/OSHA 10 mg/m ³ | 500 mg/m ³ | White to yellow crystalline, odorless powder. [herbicide] | MW: 221.0 BP: Decomposes Sol: 0.05% Fl.P: NA IP: ? | VP: Low MLT: 280°F UEL: NA LEL: NA | Strong oxidizers | Filter; Methanol; HPLC/UVD; III [#5001] |
| 2765 55 | | | | | Sp.Gr(86°F): 1.57 Noncombustible Solid, but may be dissolved in flammable liquids. | | | |
| DDT <chem>(C6H4Cl)2CHCCl3</chem> 50-29-3 KJ3325000 | 1,1,1-Trichloro-2,2- bis(p-chlorophenyl)ethane; p,p'-DDT; Dichlorodiphenyltrichloro- ethane | NIOSH Ca See Appendix A 0.5 mg/m ³ OSHA 1 mg/m ³ [skin] | Ca [N.E.] | Colorless crystals or off-white powder with a slight aromatic odor. [pesticide] | MW: 354.5 BP: 230°F (Decomposes) Sol: Insoluble Fl.P: 162-171°F IP: ? | VP: Low MLT: 227°F UEL: ? LEL: ? | Strong oxidizers, alkalis | Filter; Isooctane; GC/ECD; II(3) [#S274] |
| 2761 55 | | | | | Sp.Gr: 0.99 Combustible Solid | | | |
| Decaborane <chem>B10H14</chem> 17702-41-9 HD1400000 | Boron hydride, Decaboron tetradecahydride | NIOSH/OSHA 0.3 mg/m ³ (0.05 ppm) ST 0.9 mg/m ³ (0.15 ppm) [skin] | 100 mg/m ³ | Colorless to white crystalline solid with an intense, bitter, chocolate- like odor. | MW: 122.2 BP: 415°F Sol: Slight Fl.P: 176°F IP: 9.88 eV | VP(77°F): 0.05 mm MLT: 211°F UEL: ? LEL: ? | Oxidizers, water, halogenated materials (especially carbon tetrachloride) [Note: May sponta- neously ignite on exposure to air. Decomposes slowly in hot water.] | None available |
| 1868 34 | | | | | Sp.Gr(77°F): 0.94 Combustible Solid | | | |
| Demeton <chem>C6H19O3PS2</chem> 8065-48-3 TF3150000 | O-O-Diethyl-(O and S)-2- (ethylthio)ethyl phosphoro- thioate mixture; Systox® | NIOSH/OSHA 0.1 mg/m ³ [skin] | 20 mg/m ³ | Amber, oily liquid with a sulfur-like odor. [insecticide] | MW: 258.3 BP: Decomposes Sol: 0.01% Fl.P: 113°F IP: ? | VP: 0.0003 mm FRZ: <-13°F UEL: ? LEL: ? | Strong oxidizers, alkalis, water | Filter/ XAD-2; Toluene; GC/FPD; III [#5514] |
| | | | | | Sp.Gr: 1.12 Class II Combustible Liquid | | | |
| | | | | | 1 ppm = 10.74 mg/m ³ | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|----------------------------------|---|----------------|---|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Weak, stupor, | Eye: | Skin, CNS |
| Goggles: | Reason prob | 100 mg/m ³ : CCROVDMFw/SA/SCBA | Abs | hyporeflexia, musc twitch; | Skin: | Irr immed |
| Wash: | Prompt contam | 250 mg/m ³ : PAPROVDMFw/SA:CF | Ing | convuls; derm; | Breath: | Soap wash prompt |
| Change: | After work if reason prob contam | 500 mg/m ³ : CCRFOVHIE/GMFOVHIE/PAPRTOVHIE/SCBAF/SAF/SAT:CF | Con | in animals: liver, kidney damage | Swallow: | Resp support |
| Remove: | Prompt non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | Medical attention immed |
| | | Escape: GMFOVHIE/SCBAE | | | | |
| Clothing: | Repeat | NIOSH | Inh | Pares tongue, lips, face; | Eye: | CNS, kidneys, |
| Goggles: | Reason prob | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | tremor; appre, dizz, conf, | Skin: | liver, skin, PNS |
| Wash: | Prompt contam | Escape: GMFOVHIE/SCBAE | Ing | mal, head, fig; convuls; | Breath: | Soap wash immed |
| Change: | After work if reason prob contam | | Con | paresis hands; vomit; irrit eyes, skin; [carc] | Swallow: | Resp support |
| Remove: | Prompt non-imperv contam | | | | | Medical attention immed |
| | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Dizz, head, nau, ill-head, | Eye: | CNS |
| Goggles: | Reason prob | 3 mg/m ³ : SA/SCBA | Abs | drow; inco, local musc | Skin: | Irr immed |
| Wash: | Immed contam/daily | 7.5 mg/m ³ : SA:CF | Ing | spasm, tremor, convuls; | Breath: | Soap wash immed |
| Change: | After work if reason prob contam | 15 mg/m ³ : SCBAF/SAF/SAT:CF | Con | fig; in animals: dysp; weak; liver, kidney damage | Swallow: | Resp support |
| Remove: | Immed non-imperv contam | 100 mg/m ³ : SAF:PD,PP | | | | Medical attention immed |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Miosis, ache eyes, rhin, | Eye: | Resp sys, CVS, |
| Goggles: | Any poss | 1 mg/m ³ : SA/SCBA | Abs | head; tight chest, wheez, | Skin: | CNS, skin, eyes, |
| Wash: | Immed contam | 2.5 mg/m ³ : SA:CF | Ing | lar spasm, saliv, cyan; anor, | Breath: | blood chol |
| Change: | N.R. | 5 mg/m ³ : SCBAF/SAF/SAT:CF | Con | nau, vomit, abdom | Swallow: | Medical attention immed |
| Remove: | Immed non-imperv contam | 20 mg/m ³ : SA:PD,PP | | cramp, diarr; local sweat; | | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | musc fasc, weak, para; gidd, | | |
| | | Escape: GMFOVHIE/SCBAE | | conf, ataxia; convuls, coma; | | |
| | | | | low BP; card irregularities; | | |
| | | | | irrit eyes, skin | | |

Demeton

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|----------|---|---|--|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Diacetone alcohol <chem>CH3COCH2C(CH3)2OH</chem> 123-42-2 SA9100000 | Diacetone, 4-Hydroxy-4-methyl-2- pentanone, 2-Methyl-2-pentanol-4-one | NIOSH/OSHA 50 ppm (240 mg/m ³) | 2100 ppm | Colorless liquid with a faint, minty odor. | MW: 116.2 BP: 334°F Sol: Miscible Fl.P: 125°F IP: ? | VP: 1 mm FRZ: -47°F UEL: 6.9% LEL: 1.8% | Strong oxidizers, strong alkalis | Char: 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III] |
| 1148 26 | 1 ppm = 4.83 mg/m ³ | | | | Sp.Gr: 0.94 Class II Combustible Liquid | | | |
| Diazomethane <chem>CH2N2</chem> 334-88-3 PA7000000 | Azomethylene, Azomethylene, Diazirine, Diazomethane | NIOSH/OSHA 0.2 ppm (0.4 mg/m ³) | 2 ppm | Yellow gas with a musty odor. [Note: Shipped as a liquefied compressed gas.] | MW: 42.1 BP: -9°F Sol: Reacts Fl.P: NA (Gas) IP: 9.00 eV | VP: >1 atm FRZ: -229°F UEL: ? LEL: ? | Alkali metals, water, drying agents such as calcium arsenate [Note: May explode violently on heating, exposure to sunlight, or contact with rough edges such as ground glass.] | XAD-2*; CS; GC/FID; III [#2515] |
| | 1 ppm = 1.75 mg/m ³ | | | | Flammable Gas [EXPLOSIVE!] | | | |
| Diborane <chem>B2H6</chem> 19287-45-7 HQ9275000 | Boroethane, Boron hydride, Diboron hexahydride | NIOSH/OSHA 0.1 ppm (0.1 mg/m ³) | 40 ppm | Colorless gas with a repulsive, sweet odor. [Note: Usually shipped in pressurized cylinders.] | MW: 27.7 BP: -135°F Sol: Reacts Fl.P: NA (Gas) IP: 11.38 eV | VP: >1 atm FRZ: -265°F UEL: 88% LEL: 0.8% | Water, halogenated compounds, aluminum, lithium, oxidized surfaces, acids [Note: Will ignite spontaneously in moist air at room temperature. Reacts with water to form hydrogen & boric acid.] | Filter/ Char*; H ₂ O ₂ ; PES; III [#6006] |
| 1911 18 | 1 ppm = 1.15 mg/m ³ | | | | Flammable Gas | | | |
| 1,2-Dibromo-3-chloro- propane <chem>CH2BrCHBrCH2Cl</chem> 96-12-8 TX8750000 | 1-Chloro-2,3-dibromo- propane; DBCP; Dibromochloropropane | NIOSH Ca See Appendix A OSHA [1910.1044] 0.001 ppm | Ca | Dense yellow or amber liquid with a pungent odor at high concentra- tions. [Note: A solid below 43°F.] [pesticide] | MW: 236.4 BP: 384°F Sol(70°F): 0.1% Fl.P(oc): 170°F IP: ? | VP: 0.8 mm FRZ: 43°F UEL: ? LEL: ? | Chemically-active metals such as aluminum, magnesium & tin alloys [Note: Corrosive to metals.] | None available |
| 2872 58 | 1 ppm = 9.83 mg/m ³ | | | | Sp.Gr: 2.05 Class IIIA Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|---|----------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV* 1250 ppm: SA:CF* 2100 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, nose, throat, skin; corneal tissue damage; narco | Eye: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, resp sys |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt wet | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Prompt non-imperv wet | | | | | | |
| Clothing: | Prevent contam or freezing | NIOSH/OSHA 2 ppm: SA*/SCBA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Cough, short breath; head; flush skin, fever; chest pain, pulm edema, pneumitis; irrit eyes; asthma; fig | Eye: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, eyes, skin |
| Goggles: | Any poss | | Ing | | Skin: | | |
| Wash: | Prompt contam | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Eyewash | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA 1 ppm: SA/SCBA 2.5 ppm: SA:CF 5 ppm: SCBAF/SAF/SAT:CF 40 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh | Tight chest, precordial pain, short breath, non- productive cough, nau; head, li-head, verti, chills, fever, fig, weak, tremor, musc fasc; in animals: liver, kidney damage; pulm edema; hemorr | Eye: | Irr immed Resp support | Resp sys, CNS |
| Goggles: | N.R. | | Con | | Breath: | | |
| Wash: | N.R. | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: | Any poss | NIOSH §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Drow; nau, vomit; irrit eyes, nose, throat, skin; pulm edema, [carc] | Eye: | Irr immed Soap wash immed Resp support Medical attention immed | CNS, skin, liver, kidneys, spleen, reproductive sys, digestive sys |
| Goggles: | Any poss | | Abs | | Skin: | | |
| Wash: | Immed contam/daily | | Con | | Breath: | | |
| Change: | After work if any poss contam | | | | Swallow: | | |
| Remove: | Immed contam | | | | | | |

1,2-Dibromo-3-chloropropane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|---------------------------|--|--|---|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dibutyl phosphate (C ₄ H ₉ O) ₂ (OH)PO 107-66-4 TB9605000 | Dibutyl acid o-phosphate, di-n-Butyl hydrogen phosphate, Dibutyl phosphoric acid | NIOSH/OSHA 1 ppm (5 mg/m ³) ST 2 ppm (10 mg/m ³) | 125 ppm | Pale amber, odorless liquid. | MW: 210.2 BP: 212°F (Decomposes) Sol: Insoluble Fl.P: ? IP: ? | VP: 1 mm (approx) FRZ: ? UEL: ? LEL: ? | Strong oxidizers | Filter; CH ₄ /CN; GC/FPD; III [#5017] |
| | 1 ppm = 8.74 mg/m ³ | | | | Sp.Gr: 1.06 Combustible Liquid | | | |
| Dibutylphthalate C ₆ H ₄ (COOC ₄ H ₉) ₂ 84-74-2 TI0875000 | DBP; Dibutyl 1,2-benzene- dicarboxylate; Di-n-butyl phthalate | NIOSH/OSHA 5 mg/m ³ | 9300 mg/m ³ | Colorless to faint yellow, oily liquid with a slight, aromatic odor. | MW: 278.3 BP: 644°F Sol(77°F): 0.5% Fl.P: 315°F IP: ? | VP: <0.01 mm FRZ: -31°F UEL: ? LEL(456°F): 0.5% | Nitrates; strong oxidizers, alkalis & acids; liquid chlorine | Filter; CS ₂ ; GC/FID; III [#5020] |
| | 1 ppm = 11.57 mg/m ³ | | | | Sp.Gr: 1.05 Class IIIB Combustible Liquid | | | |
| o-Dichlorobenzene C ₆ H ₄ Cl ₂ 95-50-1 CZ4500000 | o-DCB; 1,2-Dichlorobenzene; ortho-Dichlorobenzene; o-Dichlorobenzol | NIOSH/OSHA C 50 ppm (300 mg/m ³) | 1000 ppm | Colorless to pale- yellow liquid with a pleasant, aromatic odor. [herbicide] | MW: 147.0 BP: 357°F Sol: 0.01% Fl.P: 151°F IP: 9.06 eV | VP: 1 mm FRZ: 1°F UEL: 9.2% LEL: 2.2% | Strong oxidizers, aluminum, acids, acid fumes, chlorides | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1591 58 | 1 ppm = 6.11 mg/m ³ | | | | Sp.Gr: 1.30 Class IIIA Combustible Liquid | | | |
| p-Dichlorobenzene C ₆ H ₄ Cl ₂ 106-46-7 CZ4550000 | p-DCB; 1,4-Dichlorobenzene; para-Dichlorobenzene; Dichlorocide | NIOSH Ca See Appendix A OSHA 75 ppm (450 mg/m ³) ST 110 ppm (675 mg/m ³) | Ca [1000 ppm] | Colorless or white crystalline solid with a mothball- like odor. [insecticide] | MW: 147.0 BP: 345°F Sol: 0.008% Fl.P: 150°F IP: 8.98 eV | VP(77°F): 0.4 mm MLT: 128°F UEL: ? LEL: ? | Oxidizers | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1592 58 | | | | | Sp.Gr: 1.25 Combustible Solid, but may take some effort to ignite. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|----------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit resp sys, skin; | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Reason prob | 10 ppm: SA/SCBA | Ing | head | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | 25 ppm: SA:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 50 ppm: SCBAF/SAF/SAT:CF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 125 ppm: SA:PD,PP | | | | immed | |
| Provide: | Quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit upper resp tract, | Eye: | Irr immed | Resp sys, GI |
| Goggles: | Reason prob | 50 mg/m ³ : DMF | Ing | stomach | Skin: | Wash regularly | tract |
| Wash: | N.R. | 125 mg/m ³ : PAPRDM ⁶ /SA:CF ⁶ | Con | | Breath: | Resp support | |
| Change: | N.R. | 250 mg/m ³ : HIEF/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | N.R. | 9300 mg/m ³ : SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | immed | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit nose, eyes; liver, | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Reason prob | 1000 ppm: PAPROV ⁶ /CCRFOV | Abs | kidney damage; skin | Skin: | Soap wash prompt | skin, eyes |
| Wash: | Prompt contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | blister | Breath: | Resp support | |
| Change: | N.R. | Escape: GMFOV/SCBAE | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | | | | | immed | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Head; eye irrit, swell | Eye: | Irr immed | Liver, resp sys, |
| Goggles: | Reason prob | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | periorb; profuse rhinitis; | Skin: | Soap wash | eyes, kidneys, |
| Wash: | Daily (reason prob) | Escape: GMFOV/SCBAE | Con | anor, nau, vomit; low-wgt, | Breath: | Resp support | skin |
| Change: | N.R. | | | jaun, clrr; [carc] | Swallow: | Medical attention | |
| Remove: | N.R. | | | in animals: liver, kidney damage | | immed | |

p-Dichlorobenzene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|---------------|---|--|---|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 3,3'-Dichlorobenzidine (and its salts) <chem>C6H3ClNH2C6H3ClNH2</chem> 91-94-1 DD0525000 | 4,4'-Diamino-3,3'-dichloro- biphenyl; Dichlorobenzidine base; o,o'-Dichlorobenzidine; 3,3'-Dichlorobiphenyl-4,4'- diamine; 3,3'-Dichloro-4,4'-biphenyl- diamine; 3,3'-Dichloro-4,4'-diamino- biphenyl | NIOSH Ca See Appendix A OSHA (1910.1007) See Appendix B ACGIH A2 [skin] | Ca | Gray to purple crystalline solid. | MW: 253.1 BP: 786°F Sol: Almost Insoluble FLP: ? IP: ? | VP: ? MLT: 271°F UEL: ? LEL: ? | None reported | Filter/ Si gel; Reagent; HPLC/UVD; III [#5509] |
| Dichlorodifluoromethane <chem>CCl2F2</chem> 75-71-8 PA8200000 | Difluorodichloromethane, Fluorocarbon 12, Freon® 12, Halon® 122, Propellant 12, Refrigerant 12 | NIOSH/OSHA 1000 ppm (4950 mg/m³) | 50,000 ppm | Colorless gas with an ether-like odor at extremely high concentrations. [Note: Shipped as a liquefied compressed gas.] | MW: 120.9 BP: -22°F Sol(77°F): 0.03% FLP: NA IP: 11.75 eV | VP: >1 atm FRZ: -252°F UEL: NA LEL: NA | Chemically active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium | Char(2): <chem>CH2Cl2</chem> ; GC/FID; III [#1018] |
| 1028 12 | 1 ppm = 5.03 mg/m³ | | | | Nonflammable Gas | | | |
| 1,3-Dichloro-5,5- dimethylhydantoin <chem>C5H6Cl2N2O2</chem> 118-52-5 MU0700000 | Dactin, DDH, Halane | NIOSH/OSHA 0.2 mg/m³ ST 0.4 mg/m³ | Unknown | White powder with a chlorine-like odor. | MW: 197.0 BP: ? Sol: 0.2% FLP: 346°F IP: ? | VP: ? MLT: 270°F UEL: ? LEL: ? | Water, strong acids, easily oxidized materials such as ammonia salts & sulfides | None available |
| | | | | | Sp.Gr: 1.5 Combustible Solid | | | |
| 1,1-Dichloroethane <chem>CHCl2CH3</chem> 75-34-3 K10175000 | Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride | NIOSH/OSHA 100 ppm (400 mg/m³) | 4000 ppm | Colorless, oily liquid with a chloroform-like odor. | MW: 99.0 BP: 135°F Sol: 0.6% FLP(oc): 22°F IP: 11.06 eV | VP(77°F): 230 mm FRZ: -143°F UEL: ? LEL: 5.6% | Strong oxidizers, strong caustics | Char; <chem>CS2</chem> ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 2362 27 | 1 ppm = 4.12 mg/m³ | | | | Sp.Gr: 1.18 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Allergic skin reaction, | Eye: | Irr immed (15 min) | Bladder, liver, |
| Goggles: | Any poss | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | sens, dermat; head, dizz; | Skin: | Soap wash immed | lung, skin, GI |
| Wash: | Immed contam/daily | Escape: NIEF/SCBAE | Ing | caustic burns; frequent | Breath: | Resp support | tract |
| Change: | After work if any poss | | Con | urination, dysuria; hema; | Swallow: | Medical attention | |
| Remove: | Immed contam | | | GI upsets; upper resp | | immed | |
| Provide: | Eyewash, quick drench | | | infection; [carc] | | | |
| Clothing: | Prevent wet or freezing | NIOSH/OSHA | Inh | Dizz, tremors, | Eye: | Irr immed | CVS, PNS |
| Goggles: | Reason prob | 10,000 ppm: SA/S:CB | Con | unconsciousness, card | Skin: | Water flush immed | |
| Wash: | N.R. | 25,000 ppm: SA:CF | | arry, card arrest | Breath: | Resp support | |
| Change: | N.R. | 50,000 ppm: SCBAF/SAF | | | | | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, muc memb, | Eye: | Irr immed | Resp sys, eyes |
| Goggles: | Any poss | 2 mg/m ³ : SA/SCBA | Ing | resp sys | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | 5 mg/m ³ : SA:CF/SCBAF/SAF | Con | | Breath: | Resp support | |
| Change: | After work if reason | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | prob contam | Escape: GMFSHIE/SCBAE | | | | immed | |
| Provide: | Prompt non-imperv | | | | | | |
| | contam | | | | | | |
| | Eyewash | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | CNS depres; skin irrit; | Eye: | Irr immed | Skin, liver, |
| Goggles: | Reason prob | 1000 ppm: SA/SCBA | Ing | liver, kidney damage | Skin: | Soap flush prompt | kidneys |
| Wash: | Immed wet | 2500 ppm: SA:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 4000 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |

1,1-Dichloroethane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|-----------------|--|--|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 1,2-Dichloroethylene CICH=CHCI 540-59-0 KV9360000 | Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene | NIOSH/OSHA 200 ppm (790 mg/m ³) | 4000 ppm | Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acid, chloroform-like odor. | MW: 97.0 BP: 118-140°F Sol: 0.4% FLP: 36°F IP: 9.65 eV | VP: 180-264 mm FRZ: -57 to -115°F UEL: 12.8% LEL: 5.6% | Strong oxidizers, strong alkalis, potassium hydroxide, copper | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1150 29 | 1 ppm = 4.03 mg/m ³ | | | | Sp.Gr(77°F): 1.27 Class IB Flammable Liquid | | | |
| Dichloroethyl ether (CICH ₂ CH ₂) ₂ O 111-44-4 KN0875000 | bis(2-Chloroethyl)ether; 2,2'-Dichlorodiethyl ether | NIOSH Ca See Appendix A 5 ppm (30 mg/m ³) ST 10 ppm (60 mg/m ³) [skin] OSHA 5 ppm (30 mg/m ³) ST 10 ppm (60 mg/m ³) [skin] | Ca [250 ppm] | Colorless liquid with a chlorinated solvent-like odor. | MW: 143.0 BP: 352°F Sol: 1% FLP: 131°F IP: ? | VP: 0.7 mm FRZ: -58°F UEL: ? LEL: 2.7% | Strong oxidizers [Note: Decomposes in presence of moisture to form hydrochloric acid.] | Char; CS ₂ ; GC/FID; III [#1004] |
| 1916 57 | 1 ppm = 5.94 mg/m ³ | | | | Sp.Gr: 1.22 Class IIIA Combustible Liquid | | | |
| Dichloromonofluoro- methane CHCl ₂ F 75-43-4 PA8400000 | Dichlorofluoromethane, Fluorodichloromethane, Freon® 21, Halon® 112, Refrigerant 21 | NIOSH/OSHA 10 ppm (40 mg/m ³) | 50,000 ppm | Colorless gas with a slight, ether- like odor. [Note: A liquid below 48°F. Shipped as a liquefied compressed gas.] | MW: 102.9 BP: 48°F Sol(86°F): 0.7% FLP: NA IP: 12.39 eV | VP: >1 atm FRZ: -211°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; acid; acid fumes | Char(2); CS ₂ ; GC/FID; III [#2516] |
| 1029 12 | 1 ppm = 4.28 mg/m ³ | | | | Nonflammable Gas | | | |
| 1,1-Dichloro-1-nitro- ethane CH ₃ CCl ₂ NO ₂ 594-72-9 KH1050000 | Dichloronitroethane | NIOSH/OSHA 2 ppm (10 mg/m ³) | 150 ppm | Colorless liquid with an unpleasant odor. [Irritant] | MW: 143.9 BP: 255°F Sol: 0.3% FLP: 136°F IP: ? | VP: 15 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers [Note: Corrosive to iron in presence of moisture.] | Char(pet); CS ₂ ; GC/FID; III [#1601] |
| 2650 57 | 1 ppm = 5.98 mg/m ³ | | | | Sp.Gr: 1.43 Class II Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--------------------------|--|----------------|----------------------------|-------------------------|-------------------|-----------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 6) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp sys; CNS | Eye: | Irr immed | Resp sys, eyes, CNS |
| Goggles: | Reason prob | 1000 ppm: PAPROV/CCRFOV | Ing | depres | Skin: | Soap wash prompt | |
| Wash: | Prompt wet | 4000 ppm: SA:CF/GMFOV/SCBAF/SAF | Con | | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Reason prob | NIOSH | Inh | Lac: Irrit nose, throat, | Eye: | Irr immed | Resp sys, skin, eyes |
| Goggles: | Reason prob | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | cough; nau, vomit; [carc]; | Skin: | Soap wash | |
| Wash: | Immed contam | Escape: GMFOV/SCBAE | Ing | in animals: pulm irrit, | Breath: | Resp support | |
| Change: | N.R. | | Con | edema; liver damage | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Any poss wet | NIOSH/OSHA | Inh | Asphy, card arrhy, | Eye: | Irr immed | Resp sys, CVS |
| Goggles: | Reason prob | 100 ppm: SA/SCBA | Ing | card arrest | Skin: | Water flush immed | |
| Wash: | N.R. | 250 ppm: SA:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 500 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet | 10,000 ppm: SA:PD,PP | | | | immed | |
| | | 20,000 ppm: SAF:PD,PP | | | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | In animals: irrit eyes, | Eye: | Irr immed | Lungs |
| Goggles: | Reason prob | 20 ppm: SA/SCBA | Ing | skin; liver, heart, kidney | Skin: | Soap wash immed | |
| Wash: | Prompt contam | 50 ppm: SA:CF | Con | damage; pulm edema, hemorr | Breath: | Resp support | |
| Change: | N.R. | 100 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 150 ppm: SAF:PD,PP | | | | immed | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

1,1-Dichloro-1-nitroethane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|----------------------|---|--|---|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dichlorotetrafluoro- ethane <chem>CClF2CCIF2</chem> 76-14-2 K11101000 | 1,2-Dichlorotetra- fluoroethane; Freon® 114; Halon® 242; Refrigerant 114 | NIOSH/OSHA 1000 ppm (7000 mg/m³) | 50,000 ppm | Colorless gas with a faint, ether- like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.] | MW: 170.9 BP: 38°F Sol: 0.01% FLP: NA IP: 12.20 eV | VP: >1 atm FRZ: -137°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; acids; acid fumes | Char(2); CH ₂ Cl ₂ ; GC/FID; III [#1018] |
| 1958 12 | 1 ppm = 7.10 mg/m³ | | | | Nonflammable Gas | | | |
| Dichlorvos <chem>(CH3O)2P(O)OCH=CCl2</chem> 62-73-7 TC0350000 | DDVP; 2,2-Dichlorovinyl dimethyl phosphate | NIOSH/OSHA 1 mg/m³ [skin] | 200 mg/m³ | Colorless to amber liquid with a mild, chemical odor. [Note: Insecticide that may be absorbed on a dry carrier.] | MW: 221.0 BP: Decomposes Sol: 0.5% FLP(oc): >175°F IP: ? | VP(86°F): 0.01 mm FRZ: ? UEL: ? LEL: ? | Strong acids, strong alkalis [Note: Corrosive to iron & mild steel.] | XAD-2; Toluene; GC/FPD; II(5) [P&CAM #295] |
| 2783 55 | 1 ppm = 9.19 mg/m³ | | | | Sp.Gr(77°F): 1.42 Class III Combustible Liquid | | | |
| Dieldrin <chem>C12H8Cl6O</chem> 60-57-1 IO1750000 | 1,2,3,4,10,10-Hexachloro- 6,7-epoxy-1,4,4a,5,6,7,8, 8a-octahydro-1,4-endo- exo-5,8-dimethano- naphthalene; HEOD | NIOSH Ca See Appendix A 0.25 mg/m³ [skin] OSHA 0.25 mg/m³ [skin] | Ca [450 mg/m³] | Colorless to light tan crystals with a mild, chemical odor. [insecticide] | MW: 380.9 BP: Decomposes Sol: 0.02% FLP: NA IP: ? | VP: Low MLT: 349°F UEL: NA LEL: NA | Strong oxidizers, active metals such as sodium, strong acids, phenols | Filter; Isocetane; GC/ECD; II(3) [#S283] |
| 2761 55 | | | | | Sp.Gr: 1.75 Noncombustible Solid | | | |
| Diethylamine <chem>(C2H5)2NH</chem> 109-89-7 HZ8750000 | Diethylamine; N,N-Diethylamine; N-Ethylethanamine | NIOSH/OSHA 10 ppm (30 mg/m³) ST 25 ppm (75 mg/m³) | 2000 ppm | Colorless liquid with a fishy, ammonia-like odor. | MW: 73.1 BP: 132°F Sol: Miscible FLP: -15°F IP: 8.01 eV | VP: 192 mm FRZ: -58°F UEL: 10.1% LEL: 1.6% | Strong oxidizers, strong acids, cellulose nitrate | Si gel; H ₂ SO ₄ ; Methanol; GC/FID; III [#2010] |
| 1154 68 | 1 ppm = 3.04 mg/m³ | | | | Sp.Gr: 0.71 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|---|----------------|------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss wet | NIOSH/OSHA | Inh | Irrit resp sys; asphy; | Eye: | Irr Immed | Resp sys, CVS |
| Goggles: | Reason prob | 10,000 ppm: SA/SCBA | Ing | card arrhy, card arrest | Skin: | Water flush immed | |
| Wash: | N.R. | 25,000 ppm: SA:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 50,000 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Miosis, ache eyes; rhin; | Eye: | Irr Immed | Resp sys, CVS, |
| Goggles: | Reason prob | 10 mg/m ³ : SA/SCBA | Abs | head; tight chest, wheez, | Skin: | Soap wash immed | CNS, eyes, skin, |
| Wash: | Immed contam | 25 mg/m ³ : SA:CF | Ing | lar spasm, saliv; cyan; | Breath: | Resp support | blood chol |
| Change: | N.R. | 50 mg/m ³ : SCBAF/SAF/SAT:CF | Con | anor, nau, vomit, diarr; | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 200 mg/m ³ : SA:PD,PP | | sweat; musc fasc, para, | | immed | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | gidd, ataxia; convuls; | | | |
| | | Escape: GMFOVHIE/SCBAE | | low BP, card irregularities; | | | |
| | | | | irrit skin, eyes | | | |
| Clothing: | Any poss | NIOSH | Inh | Head, dizz; nau, vomit, | Eye: | Irr Immed | CNS, liver, |
| Goggles: | Any poss | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | mal, sweat; myoclonic | Skin: | Soap wash immed | kidneys, skin |
| Wash: | Immed contam | Escape: GMFOVHIE/SCBAE | Ing | limb jerks; clonic, tonic | Breath: | Resp support | |
| Change: | After work if any poss | | Con | convuls; coma; [carc]; | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | in animals: liver, kidney | | immed | |
| Provide: | Eyewash, quick drench | | | damage | | | |
| Clothing: | Any poss liq | NIOSH/OSHA | Inh | Eye, skin, resp sys irrit | Eye: | Irr Immed | Resp sys, skin, |
| Goggles: | Any poss >0.5%/ Reason prob 0.5% | 250 ppm: SA:CF/PAPRS ^c | Abs | | Skin: | Water flush immed | eyes |
| Wash: | Immed contam liq | 500 ppm: GMFS/SCBAF/SAF/CCRFS | Ing | | Breath: | Resp support | |
| Change: | N.R. | 2000 ppm: SAF:PD,PP | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| Provide: | Eyewash (>0.5%)/ Quick drench (liq) | Escape: GMFS/SCBAE | | | | | |

Diethylamine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|----------------|---|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 2-Diethylaminoethanol (C ₂ H ₅) ₂ NCH ₂ CH ₂ OH 100-37-8 KK5075000 | Diethylaminoethanol; 2-Diethylaminoethyl alcohol; N,N-Diethylethanolamine; Diethyl-(2-hydroxyethyl)- amine; 2-Hydroxytriethylamine | NIOSH/OSHA 10 ppm (50 mg/m ³) [skin] | 500 ppm | Colorless liquid with a nauseating, ammonia-like odor. | MW: 117.2 BP: 325°F Sol: Miscible FLP: 126°F IP: ? | VP: 21 mm FRZ: -94°F UEL: ? LEL: ? | Strong oxidizers, strong acids | Si gel; Methanol; GC/FID; III [#2007, Amino- ethanol Com- pounds] |
| 2686 29 | 1 ppm = 4.87 mg/m ³ | | | | Sp.Gr: 0.89 Class II Combustible Liquid | | | |
| Difluorodibromomethane CBr ₂ F ₂ 75-61-6 PA7525000 | Dibromodifluoromethane, Freon® 12B2, Halon® 1202 | NIOSH/OSHA 100 ppm (860 mg/m ³) | 2500 ppm | Colorless, heavy liquid or gas (above 76°F) with a characteristic odor. | MW: 209.8 BP: 76°F Sol: Insoluble FLP: NA IP: 11.07 eV | VP: 620 mm FRZ: -231°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium | Char(2); 2-Propanol; GC/FID; III [#1012] |
| 1941 58 | 1 ppm = 8.72 mg/m ³ | | | | Sp.Gr(59°F): 2.29 Nonflammable Liquid | | | |
| Diglycidyl ether C ₈ H ₁₀ O ₃ 2238-07-5 KN2350000 | Diallyl ether dioxide; DGE; 2-Epoxypropyl ether; bis (2,3-Epoxypropyl) ether; di(2,3-Epoxypropyl) ether | NIOSH Ca See Appendix A 0.1 ppm (0.5 mg/m ³) OSHA 0.1 ppm (0.5 mg/m ³) | Ca [25 ppm] | Colorless liquid with a strong, irritating odor. | MW: 130.2 BP: 500°F Sol: ? FLP: 147°F IP: ? | VP(77°F): 0.09 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers | None available |
| | 1 ppm = 5.41 mg/m ³ | | | | Sp.Gr(77°F): 1.26 Class IIIA Combustible Liquid | | | |
| Diisobutyl ketone ((CH ₃) ₂ CHCH ₂) ₂ CO 108-83-8 MJ5775000 | DIBK; sym-Diisopropyl acetone; 2,6-Dimethyl-4-heptanone; Isovalerone; Valerone | NIOSH/OSHA 25 ppm (150 mg/m ³) | 2000 ppm | Colorless liquid with a mild, sweet odor. | MW: 142.3 BP: 334°F Sol: 0.05% FLP: 120°F IP: ? | VP: 2 mm FRZ: -43°F UEL(200°F): 7.1% LEL(200°F): 0.8% | Strong oxidizers | Char; CS ₂ ; GC/FID; III [#1300, Ketones I] |
| 1157 26 | 1 ppm = 5.92 mg/m ³ | | | | Sp.Gr: 0.81 Class II Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|--|----------------|-----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Nau, vomit; irrit resp | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss >5%/Reason | 100 ppm: CCROV*/SA*/SCBA* | Abs | sys, skin, eyes | Skin: | Water flush immed | eyes |
| Wash: | prob <5% | 250 ppm: SA:CF*/PAPROV* | Inh | | Breath: | Resp support | |
| Change: | Immed contam | 500 ppm: CCRFOV/PAPRTOV*/GMFOV/ | Ing | | Swallow: | Medical attention | |
| Remove: | N.R. | SCBAF/SAF | Con | | | immed | |
| Provide: | Immed non-imperv contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | Eyewash (>5%), | Escape: GMFOV/SCBAE | | | | | |
| | quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | In animals: irrit resp sys; | Eye: | Irr immed | Resp sys |
| Goggles: | Reason prob | 1000 ppm: SA/SCBA | Ing | CNS symptoms; liver damage | Skin: | Water flush immed | |
| Wash: | N.R. | 2500 ppm: SA:CF/SCBAF/SAF | Con | | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | Escape: GMFOV/SCBAE | | | | immed | |
| | | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, resp sys; skin | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | burns; [carc]; | Skin: | Soap wash immed | sys |
| Wash: | Immed contam/daily | Escape: GMFOV/SCBAE | Con | In animals: hemato sys, | Breath: | Resp support | |
| Change: | After work if any poss | | | lung, liver, kidney | Swallow: | Medical attention | |
| Remove: | contam | | | damage | | immed | |
| Provide: | Immed non-imperv contam | | | | | | |
| | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | N.R. | 825 ppm: SA:CF*/PAPROV* | Ing | head, dizz; derm | Skin: | Soap wash prompt | eyes |
| Wash: | Prompt wet | 1000 ppm: CCRFOV | Con | | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | 2000 ppm: SAF:PD,PP | | | | immed | |
| | contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

Diisobutyl ketone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|----------|---|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Diisopropylamine $((CH_3)_2CH)_2NH$ 108-18-9 IM4025000 | N-(1-Methylethyl)-2- propanamine | NIOSH/OSHA 5 ppm (20 mg/m ³) [skin] | 1000 ppm | Colorless liquid with an ammonia- or fish-like odor. | MW: 101.2 BP: 183°F Sol: Slight FLP: 20°F IP: 7.73 eV | VP: 70 mm FRZ: -141°F UEL: 7.1% LEL: 1.1% | Strong oxidizers, strong acids | Imp; KOH; GC/FID; II(4) [#S141] |
| 1156 68 | 1 ppm = 4.21 mg/m ³ | | | | Sp.Gr: 0.72 Class IB Flammable Liquid | | | |
| Dimethyl acetamide $CH_3CON(CH_3)_2$ 127-19-5 AB7700000 | N,N-Dimethyl acetamide; DMAC | NIOSH/OSHA 10 ppm (35 mg/m ³) [skin] | 400 ppm | Colorless liquid with a weak ammonia- or fish- like odor. | MW: 87.1 BP: 329°F Sol: Miscible FLP(oc): 158°F IP: 8.81 eV | VP: 2 mm FRZ: -4°F UEL(320°F): 11.5% LEL(212°F): 1.8% | Carbon tetrachloride, other halogenated compounds when in contact with iron | Si gel; Methanol; GC/FID; III [#2004] |
| | 1 ppm = 3.62 mg/m ³ | | | | Sp.Gr: 0.94 Class IIIA Combustible Liquid | | | |
| Dimethylamine $(CH_3)_2NH$ 124-40-3 IP8750000 | Dimethylamine (anhydrous), N-Methylmethanamine | NIOSH/OSHA 10 ppm (18 mg/m ³) | 2000 ppm | Colorless gas with an ammonia- or fish-like odor. [Note: A liquid below 44°F. Shipped as a liquefied compressed gas.] | MW: 45.1 BP: 44°F Sol(140°F): 24% FLP: NA (Gas) 20°F(Liquid) IP: 8.24 eV | VP: >1 atm FRZ: -134°F UEL: 14.4% LEL: 2.8% | Strong oxidizers, chlorine, mercury, acetaldehyde, fluoride, maleic anhydride | Si gel; H ₂ SO ₄ / Methanol; GC/FID; III [#2010] |
| 1032 19 | 1 ppm = 1.87 mg/m ³ | | | | Sp.Gr: 0.67 (Liquid at 44°F) Class IA Flammable Liquid | | | |
| 4-Dimethylamino- azobenzene $C_6H_5NNC_6H_4N(CH_3)_2$ 60-11-7 BX7350000 | Butter yellow; DAB; p-Dimethylaminoazobenzene; N,N-Dimethyl-4-aminoazo- benzene; Methyl yellow | NIOSH Ca See Appendix A OSHA (1910.1015) See Appendix B | Ca | Yellow, leaf- shaped crystals. | MW: 225.3 BP: Sublimes Sol: Insoluble FLP: ? IP: ? | VP: ? MLT: 237°F UEL: ? LEL: ? | None reported | G-chrom P; 2-Propanol; GC/FID; II(4) [P&CAM #284] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|---------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Nau, vomit; head; eye | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss (soln >5%) | 125 ppm: SA:CF [†] /PAPROV [‡] | Abs | irrit, vis dist; pulm | Skin: | Water wash immed | eyes |
| Wash: | Prompt wet | 250 ppm: CCRFOV/GMFOV/SCBAF/SAF | Inh | | Breath: | Resp support | |
| Change: | N.R. | 1000 ppm: SAF:PD, PP | Ing | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | Con | | | immed | |
| Provide: | Eyewash (<5%) | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Jaun, liver damage; | Eye: | Irr immed | Liver, skin |
| Goggles: | Reason prob | 100 ppm: SA/SCBA | Abs | depres, lethargy, halo, | Skin: | Water flush immed | |
| Wash: | Immed contam | 250 ppm: SA:CF | Ing | delusions; irrit skin | Swallow: | Medical attention | |
| Change: | N.R. | 400 ppm: SCBAF/SAF | Con | | | immed | |
| Remove: | Immed non-imperv contam | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | | |
| Provide: | Quick drench | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss liq/Repeat | NIOSH/OSHA | Inh | Irrit nose, throat; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | soln | 250 ppm: SA:CF [†] | Ing | sneezing, cough, dysp; | Skin: | Water flush immed | eyes |
| Wash: | Any poss | 500 ppm: SCBAF/SAF | Con | pulm edema; conj; burns | Breath: | Resp support | |
| Change: | Immed contam liq/ | 2000 ppm: SAF:PD, PP | | skin, muc memb; derm | Swallow: | Medical attention | |
| Remove: | Prompt contam soln | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | immed | |
| Provide: | N.R. | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Enlarged liver; hepatic | Eye: | Irr immed | Liver, skin, |
| Goggles: | Any poss | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | Abs | and renal dysfunction; | Skin: | Soap wash immed | bladder |
| Wash: | Immed contam/daily | Escape: HIEF/SCBAE | Ing | contact derm; cough, | Breath: | Resp support | |
| Change: | After work if any poss | | Con | wheez, difficulty | Swallow: | Medical attention | |
| Remove: | contam | | | breath; bloody sputum; | | immed | |
| Provide: | Immed contam | | | bronchial secretions; | | | |
| | Eyewash, quick drench | | | frequent urination, hema, | | | |
| | | | | dysuria; [carc] | | | |

4-Dimethylaminoazobenzene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-----------------------------------|---|--|--|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dimethylaniline <chem>C6H5N(CH3)2</chem> 121-69-7 BX4725000 | N,N-Dimethylaniline; N,N-Dimethylbenzenamine; N,N-Dimethylphenylamine | NIOSH/OSHA 5 ppm (25 mg/m ³) ST 10 ppm (50 mg/m ³) [skin] | 100 ppm | Pale yellow, oily liquid with an amine-like odor. [Note: A solid below 36°F.] | MW: 121.2 BP: 378°F Sol: 2% Fl.P: 142°F IP: 7.14 eV | VP(85°F): 1 mm FRZ: 36°F UEL: ? LEL: ? | Strong oxidizers, strong acids, benzoyl peroxide | Sl gel; Ethanol; GC/FID; III [#2002, Aromatic Amines] |
| 2253 57 | 1 ppm = 5.04 mg/m ³ | | | | Sp.Gr: 0.96 Class IIIA Combustible Liquid | | | |
| Dimethyl-1,2-dibromo- 2,2-dichloroethyl phosphate <chem>C6H5O4PBr2Cl2</chem> 300-76-5 TB9450000 | Dibrom; 1,2-Dibromo-2,2-dichloro- ethyl dimethyl phosphate; Naled [(CH ₃ O) ₂ P(O)OC(Br)- HCCl ₂ (Cl ₂)] | NIOSH/OSHA 3 mg/m ³ [skin] | 1800 mg/m ³ | Colorless to white solid or straw- colored liquid (above 80°F) with a slightly pungent odor. | MW: 380.8 BP: Decomposes Sol: Insoluble Fl.P: NA IP: ? | VP: 0.0002 mm MLT: 80°F UEL: NA LEL: NA | Strong oxidizers, acids [Note: Corrosive to metals.] | None available |
| 2783 55 | 1 ppm = 15.83 mg/m ³ | | | | Sp.Gr(77°F): 1.96 Noncombustible Solid | | | |
| Dimethylformamide <chem>HCON(CH3)2</chem> 68-12-2 LQ2100000 | Dimethyl formamide; N,N-Dimethylformamide; DMF | NIOSH/OSHA 10 ppm (30 mg/m ³) [skin] | 3500 ppm | Colorless to pale- yellow liquid with a faint, amine- like odor. | MW: 73.1 BP: 307°F Sol: Miscible Fl.P: 136°F IP: 9.12 eV | VP(77°F): 4 mm FRZ: -78°F UEL: 15.2% LEL(212°F): 2.2% | Carbon tetrachloride; other halogenated compounds when in contact with iron; strong oxidizers; alkyl aluminums; inorganic nitrates | Sl gel; Methanol; GC/FID; III [#2004] |
| 2265 26 | 1 ppm = 3.04 mg/m ³ | | | | Sp.Gr: 0.95 Class IIIA Combustible Liquid | | | |
| 1,1-Dimethylhydrazine <chem>(CH3)2NNH2</chem> 57-14-7 MV2450000 | Dimazine, DMH, UDMH, Unsymmetrical dimethyl- hydrazine | NIOSH Ca See Appendix A C 0.06 ppm (0.15 mg/m ³) (2-hr) OSHA 0.5 ppm (1 mg/m ³) [skin] | Ca [50 ppm] ACGIH A2 | Colorless liquid with an ammonia- or fish-like odor. | MW: 60.1 BP: 147°F Sol: Miscible Fl.P: 5°F IP: 8.05 eV | VP(77°F): 157 mm FRZ: -72°F UEL: 95% LEL: 2% | Oxidizers, halogens, metallic mercury, fuming nitric acid, hydrogen peroxide [Note: May ignite SPONTANEOUSLY in contact with oxidizers.] | Bub; Reagent; Vis; II(3) [#S143] |
| 1163 28 | 1 ppm = 2.50 mg/m ³ | | | | Sp.Gr: 0.79 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|--|----------------|-----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Anoxia symptoms: cyan, | Eye: | Irr immed | Blood, kidneys, |
| Goggles: | Reason prob | 50 ppm: SA/SCBA | Abs | weak, dizz, ataxia | Skin: | Soap wash immed | liver, CVS |
| Wash: | Immed contam | 100 ppm: SA:CF/SCBAF/SAF | Ing | | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | Escape: GMFOV/SCBAE | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Miosis, lac; head; tight | Eye: | Irr immed | Resp sys, CNS, |
| Goggles: | Immed contam | 30 mg/m ³ : DMFw/SA/HIE/SCBA | Abs | chest, wheez, lar spasm; | Skin: | Soap wash immed | CVS, skin, eyes, |
| Wash: | After work if reason | 75 mg/m ³ : PAPRDMFw/SA:CF | Ing | salv; cyan; anor, nau, | Breath: | Resp support | blood chol |
| Change: | prob contam | 150 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBAF/SAF | Con | vomit, abdom cramp, diarr; | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 1800 mg/m ³ : SA:PD,PP | | weak, twitch, para; gidd, | | | |
| Provide: | Eyewash | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | ataxia, convuls; low BP; | | | |
| | | Escape: HIEF/SCBAE | | card irregularities; irrit | | | |
| | | | | skin, eyes | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Nau, vomit, colic; liver | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Reason prob | 100 ppm: SA*/SCBA* | Abs | damage, hepatomegaly; | Skin: | Water flush prompt | CVS, skin |
| Wash: | Prompt contam | 250 ppm: SA:CF* | Ing | high BP; face flush; derm; | Breath: | Resp support | |
| Change: | N.R. | 500 ppm: SCBAF/SAF/SAT:CF* | Con | in animals: kidney, heart | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 3500 ppm: SAF:PD,PP | | damage | | | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, skin; choking, | Eye: | Irr immed | CNS, liver, GI |
| Goggles: | Any poss | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | chest pain, dysp; lethargy; | Skin: | Water flush immed | tract, blood, |
| Wash: | Immed contam | Escape: GMFS/SCBAE | Ing | nau; anoxia; convuls; liver | Breath: | Resp support | resp sys, eyes, |
| Change: | N.R. | | Con | in; [carc] | Swallow: | Medical attention immed | skin |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |

1,1-Dimethylhydrazine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-----------------------------------|---|---|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dimethylphthalate $C_6H_4(COOCH_3)_2$ 131-11-3 TI1575000 | Dimethyl ester of 1,2- benzenedicarboxylic acid; DMP | NIOSH/OSHA 5 mg/m ³ | 9300 mg/m ³ | Colorless, oily liquid with a slight, aromatic odor. [Note: A solid below 42°F.] | MW: 194.2 BP: 543°F Sol: 0.4% FLP: 295°F IP: 9.64 eV | VP: 0.01 mm FRZ: 42°F UEL: ? LEL(358°F): 0.9% | Nitrates; strong oxidizers, alkalis & acids | None available |
| | 1 ppm = 8.07 mg/m ³ | | | | Sp.Gr: 1.19 Class IIIB Combustible Liquid | | | |
| Dimethyl sulfate (CH_3) ₂ SO ₄ 77-78-1 WS8225000 | Dimethyl ester of sulfuric acid, Dimethylsulfate, Methyl sulfate | NIOSH Ca See Appendix A 0.1 ppm (0.5 mg/m ³) [skin] OSHA 0.1 ppm (0.5 mg/m ³) [skin] | Ca [10 ppm] ACGIH A2 | Colorless, oily liquid with a faint, onion-like odor. | MW: 126.1 BP: 370°F (Decomposes) Sol(64°F): 3% FLP: 182°F IP: ? | VP: 0.1 mm FRZ: -25°F UEL: ? LEL: ? | Strong oxidizers, ammonia solutions [Note: Decomposes in water to sulfuric acid; corrosive to metals.] | Porapak-P; Diethyl ether; GC/EConD; III; [#2524] |
| 1595 57 | 1 ppm = 5.24 mg/m ³ | | | | Sp.Gr: 1.33 Class IIIA Combustible Liquid | | | |
| Dinitrobenzene (all isomers) $C_6H_4(NO_2)_2$ o: 528-29-0 CZ7450000 m: 99-65-0 CZ7350000 p: 100-25-4 CZ7525000 1597 56 | o: ortho-Dinitrobenzene; 1,2-Dinitrobenzene; m: meta-Dinitrobenzene; 1,3-Dinitrobenzene; p: para-Nitrobenzene; 1,4-Dinitrobenzene | NIOSH/OSHA 1 mg/m ³ [skin] | 200 mg/m ³ | Pale white or yellow solids. | MW: 168.1 BP: 606/572/ 570°F Sol: 0.05/ 0.02/0.01% FLP: 302/ 302°F/? IP: 10.71/10.43/10.50 eV Sp.Gr(64°F): 1.57/1.58/1.63 Combustible Solids | VP: ?/?/? MLT: 244/ 192/343°F UEL: ?/?/? LEL: ?/?/? | Strong oxidizers, caustics, metals such as tin & zinc [Note: Prolonged exposure to fire and heat may result in an explosion due to SPONTANEOUS decomposition.] | Filter/Bub; Methanol; HPLC/UV/D; II(4) [#S214] |
| Dinitro-o-cresol $CH_3C_6H_3OH(NO_2)_2$ 534-52-1 GO9625000 | 4,6-Dinitro-o-cresol; 3,5-Dinitro-2-hydroxy- toluene; 4,6-Dinitro-2-methyl phenol; DN; DNOC | NIOSH/OSHA 0.2 mg/m ³ [skin] | 5 mg/m ³ | Yellow, odorless solid. [insecticide] | MW: 198.1 BP: 594°F Sol: 0.01% FLP: NA IP: ? | VP: 0.00005 mm MLT: 190°F UEL: NA LEL: NA | Strong oxidizers | Filter/Bub; 2-Propanol; HPLC/UV/D; II(5) [#S168] |
| 1598 53 | | | | | Sp.Gr: 1.1 (estimated) Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit upper resp sys, | Eye: | Irr prompt | Resp sys, GI |
| Goggles: | Reason prob | 50 mg/m ³ : DMF | Ing | stomach pain | Skin: | Wash regularly | tract |
| Wash: | N.R. | 125 mg/m ³ : PAPRDM ⁶ /SA:CF ² | Con | | Breath: | Resp support | |
| Change: | N.R. | 250 mg/m ³ : HIEF/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | N.R. | 9300 mg/m ³ : SAF:PD,PP | | | | Immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, nose; head; | Eye: | Irr Immed | Eyes, resp sys, |
| Goggles: | Any poss | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | gidd; conj irrit; photo; | Skin: | Water flush immed | liver, kidneys, |
| Wash: | Immed contam | Escape: GMFS/SCBAE | Ing | periorb edema; dysphonia, | Breath: | Resp support | CNS, skin |
| Change: | N.R. | | Con | aphonia, dysphagia, | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | productive cough; chest | | Immed | |
| Provide: | Eyewash, quick drench | | | pain; dysp, cyan; | | | |
| | | | | vomit, diarr; dysuria; | | | |
| | | | | analgesia; fever; ict; | | | |
| | | | | album, hema; skin, eye | | | |
| | | | | burns; delirium; [carc] | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Anoxia, cyan; vis dist, | Eye: | Irr Immed | Blood, liver, |
| Goggles: | Reason prob | 5 mg/m ³ : DM | Abs | central scotomas; bad | Skin: | Soap wash immed | CVS, eyes, CNS |
| Wash: | Immed wet/Prompt contam | 10 mg/m ³ : DMXSQ/SA/HIE/SCBA | Ing | taste, burning mouth, dry | Breath: | Resp support | |
| Change: | After work if reason | 25 mg/m ³ : PAPRDM/SA:CF | Con | throat, thirst; yellowing | Swallow: | Medical attention | |
| Remove: | prob contam | 50 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ | | hair; eyes, skin; anemia; | | Immed | |
| | Immed non-imperv wet/ | SAF/SAT:CF | | liver damage | | | |
| | Prompt non-imperv | 200 mg/m ³ : SA:PD,PP | | | | | |
| | contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Quick drench | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Sense of well being; | Eye: | Irr Immed | CVS, endocrine |
| Goggles: | Reason prob | 2 mg/m ³ : DMF | Abs | head, fever, lass, profuse | Skin: | Soap wash immed | sys, eyes |
| Wash: | Prompt contam/daily | 5 mg/m ³ : PAPRDM ⁶ /SA:CF ² /HIEF/ | Ing | sweat, excess thirst, | Breath: | Resp support | |
| Change: | After work if reason | SCBAF/SAF | Con | tacar, hyperpnea, cough, | Swallow: | Medical attention | |
| Remove: | prob contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | short breath, coma | | Immed | |
| | Prompt non-imperv | Escape: HIEF/SCBAE | | | | | |
| | contam | | | | | | |

Dinitro-o-cresol

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|-----------------------------------|--|---|--|--|--|
| | | | | | MW, BP, SOL, FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dinitrotoluene $C_6H_3CH_3(NO_2)_2$ 25321-14-6 XT1300000 | Dinitrotoluol, DNT, Methyldinitrobenzene | NIOSH Ca See Appendix A 1.5 mg/m ³ [skin] OSHA 1.5 mg/m ³ [skin] | Ca [200 mg/m ³] | Orange-yellow crystalline solid with a character- istic odor. [Note: Often shipped molten.] | MW: 182.2 BP: 572°F Sol: Insoluble FLP: 404°F IP: ? | VP: 1 mm MLT: 158°F UEL: ? LEL: ? | Strong oxidizers, caustics, metals such as tin & zinc [Note: Commercial grades will decompose at 482°F, with self-sustaining decomposition at 536°F.] | None available |
| 1600 56 (liquid) 2038 56 (solid) | | | | | Sp.Gr: 1.32 Combustible Solid, but difficult to ignite. | | | |
| Di-sec octyl phthalate $C_{24}H_{38}O_4$ 117-81-7 TI0350000 | DEHP, DOP, bis-(2-Ethylhexyl) phthalate, di(2-Ethylhexyl) phthalate, Octyl phthalate $(C_8H_{17}(COOCH_2CH_2C_6H_5)_2)$ 1 ppm = 16.23 mg/m ³ | NIOSH Ca See Appendix A 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³ ST 10 mg/m ³ | Ca [Unknown] | Colorless, oily liquid with a slight odor. | MW: 390.5 BP: 727°F Sol: Insoluble FLP (cc): 420°F IP: ? | VP: <0.01 mm FRZ: -58°F UEL: ? LEL (474°F): 0.3% | Nitrates; strong oxidizers, acids & alkalis | Filter; CS; GC/FID; III [#5020, di(2-Ethyl- hexyl) phthalate] |
| | | | | | Sp.Gr: 0.99 Class IIIB Combustible Liquid | | | |
| Dioxane $C_4H_8O_2$ 123-91-1 JG8225000 | Diethylene dioxide; Diethylene ether; Dioxan; p-Dioxane; 1,4-Dioxane | NIOSH Ca See Appendix A C 1 ppm (3.6 mg/m ³) (30-min) OSHA 25 ppm (90 mg/m ³) [skin] | Ca [2000 ppm] | Colorless liquid or solid (below 53°F) with a mild ether-like odor. | MW: 88.1 BP: 214°F Sol: Miscible FLP: 55°F IP: 9.13 eV | VP: 29 mm FRZ: 53°F UEL: 22% LEL: 2.0% | Strong oxidizers, decaborane, triethynyl aluminum | Char; CS; GC/FID; III [#1602] |
| 1165 26 | 1 ppm = 3.66 mg/m ³ | | | | Sp.Gr: 1.03 Class IB Flammable Liquid | | | |
| Diphenyl $C_6H_5C_6H_5$ 92-52-4 DU8050000 | Biphenyl, Phenyl benzene | NIOSH/OSHA 1 mg/m ³ (0.2 ppm) | 300 mg/m ³ | Colorless to pale- yellow solid with a pleasant, characteristic odor. | MW: 154.2 BP: 489°F Sol: Insoluble FLP: 235°F IP: 7.95 eV | VP (160°F): 1 mm FRZ: 53°F MLT: 156°F UEL (311°F): 5.8% LEL (232°F): 0.6% | Oxidizers | Tenax GC; CCl; GC/FID; III [#2530, Biphenyl] |
| | | | | | Sp.Gr: 1.04 Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|--|--------------------------|--|--------------------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss molt/Repeat liq | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Anoxia, cyan; anemia, jaun; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Blood, liver, CVS |
| Goggles: | Any poss molt | | | | | | |
| Wash: | Immed wet/Prompt contam/daily | | | | | | |
| Change: | After if reason prob contam | | | | | | |
| Remove: | Immed non-imperv wet/Prompt non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | N.R. | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Con Ing | Irrit eyes, muc memb; [carc] | Eye: Skin: Breath: Swallow: | Irr immed (Not a dermal hazard) Resp support Medical attention immed | Eyes, upper resp sys, GI tract |
| Goggles: | N.R. | | | | | | |
| Wash: | N.R. | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: | Repeat | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Drow, head; nau, vomit; irrit eyes, nose, throat; liver damage; kidney failure; skin irrit; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water wash prompt Resp support Medical attention immed | Liver, kidney, skin, eyes |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt contam | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | NIOSH/QSHA 10 mg/m ³ : CCROVDM/SA/SCBA 25 mg/m ³ : SA:CF/PAPROVDM* 50 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ GMFOVHIE/PAPRTOVHIE* 300 mg/m ³ : SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Irrit throat, eyes; head, nau, fig, numb limbs; liver damage | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Liver, skin, CNS, upper resp sys, eyes |
| Goggles: | Any poss molt/Repeat otherwise | | | | | | |
| Wash: | Prompt contam | | | | | | |
| Change: | After work if reason prob contam | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |

Diphenyl

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------------|--|--|---|---|--|
| | | | | | MW, BP, SOL, F.L.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Dipropylene glycol methyl ether <chem>CH3OC3H6OC3H6OH</chem> 34590-94-8 JM1575000 | Dipropylene glycol monomethyl ether, Dowanol® 50B | NIOSH/OSHA 100 ppm (600 mg/m³) ST 150 ppm (900 mg/m³) [skin] | Unknown | Colorless liquid with a mild, ether-like odor. | MW: 148.2 BP: 374°F Sol: Miscible F.L.P.: 180°F IP: ? | VP(79°F): 0.4 mm FRZ: -112°F UEL: ? LEL: ? | Strong oxidizers | Char; CS; GC/FID; IK(2) [#589] |
| 1 ppm = 6.16 mg/m³ | | | | | Sp.Gr: 0.95 Class IIIA Combustible Liquid | | | |
| Endrin <chem>C12H8Cl6O</chem> 72-20-8 101575000 | 1,2,3,4,10,10-Hexachloro- 8,7-epoxy-1,4,4a,5,6,7, 8,8a-octahydro-1,4-endo- endo-5,8-dimethano- naphthalene; Hexadrin | NIOSH/OSHA 0.1 mg/m³ [skin] | 2000 mg/m³ | Colorless to tan crystalline solid with a mild, chemical odor. [insecticide] | MW: 380.9 BP: Decomposes Sol: Insoluble F.L.P.: NA IP: ? | VP: Low MLT: 392°F (Decomposes) UEL: NA LEL: NA | Strong oxidizers, strong acids, parathion | Filter/ Chrom-102; Toluene; GC/ECD; III [#5519] |
| 2761 55 | | | | | Sp.Gr: 1.70 Noncombustible Solid, but may be dissolved in flammable liquids. | | | |
| Epichlorohydrin <chem>C3H5OCl</chem> 106-89-8 TX4900000 | 1-Chloro-2,3-epoxypropane; 2-Chloropropylene oxide; gamma-Chloropropylene oxide | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 2 ppm (8 mg/m³) [skin] | Ca [250 ppm] | Colorless liquid with a slightly irritating, chloroform-like odor. | MW: 92.5 BP: 242°F Sol: 7% F.L.P.: 93°F IP: 10.60 eV | VP: 13 mm FRZ: -54°F UEL: 21.0% LEL: 3.8% | Strong oxidizers, strong acids, certain salts, caustics, zinc, aluminum, water [Note: May polymerize in presence of strong acids and bases, particularly when hot.] | Char; CS; GC/FID; III [#1010] |
| 2023 30 | | | | | Sp.Gr: 1.18 Class IC Flammable Liquid | | | |
| EPN <chem>C6H5O(C6H5)P(S)(OC6H4NO2)</chem> 2104-64-5 TB1925000 | O-Ethyl O-P-nitrophenyl benzenephosphonothioate, O-Ethyl O-P-nitrophenyl benzenethiophosphonate | NIOSH/OSHA 0.5 mg/m³ [skin] | 50 mg/m³ | Yellow solid with an aromatic odor. [Note: A brown liquid above 97°F] [pesticide] | MW: 323.3 BP: ? Sol: Insoluble F.L.P.: NA IP: ? | VP(212°F): 0.0003 mm MLT: 97°F UEL: NA LEL: NA | Strong oxidizers | Filter: Isocetane; GC/FPD; III [#5012] |
| | | | | | Sp.Gr(77°F): 1.27 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|------------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit eyes, nose; weak, ill- | Eye: | Irr immed | Resp sys, eyes |
| Goggles: | N.R. | 1000 ppm: SA/SCBA | Abs | head, head | Skin: | Water wash prompt | |
| Wash: | N.R. | 2500 ppm: SA:CF | Ing | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: SCBAF/SAF/SAT:CF | Con | | Swallow: | Medical attention immed | |
| Remove: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Epileptiform convuls; | Eye: | Irr immed | CNS, liver |
| Goggles: | Any poss | 1 mg/m ³ : CCROVDMFu/SA/SCBA | Abs | stupor, head, dizz; abdom, | Skin: | Soap wash immed | |
| Wash: | Immed contam | 2.5 mg/m ³ : SA:CF/PAPROVDMFu | Ing | discomfort, nau, vomit; | Breath: | Resp support | |
| Change: | After work if any poss | 5 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ | Con | insom; aggressiveness, | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | GMFOVHIE/PAPRTOVHIE/ | | conf; lethargy, weak; anor; | | | |
| Provide: | Eyewash, quick drench | SAT:CF | | in animals: liver damage | | | |
| | | 100 mg/m ³ : SA:PD,PP | | | | | |
| | | 200 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Nau, vomit; abdom pain; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | v: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | resp distress, cough; | Skin: | Soap wash immed | kidneys |
| Wash: | Immed contam | Escape: GMFOVAG/SCBAE | Ing | cyan; irrit eyes, skin with | Breath: | Resp support | |
| Change: | N.R. | | Con | deep pain; [carc] | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Miosis, lac, rhin; head; | Eye: | Irr immed | Resp sys, CVS, |
| Goggles: | Any poss | 5 mg/m ³ : SA/SCBA | Abs | tight chest, wheez, lar | Skin: | Soap wash immed | CNS, eyes, skin, |
| Wash: | Immed contam | 12.5 mg/m ³ : SA:CF | Ing | spasm; saliv; cyan; anor, | Breath: | Resp support | blood chol |
| Change: | After work if any poss | 25 mg/m ³ : SCBAF/SAF/SAT:CF | Con | nau, abdom cramp, diarr; | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 50 mg/m ³ : SA:PD,PP | | para, convuls; low BP; | | | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | card irregularities; irrit | | | |
| | | Escape: GMFOVHIE/SCBAE | | skin, eyes | | | |

EPN

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|---|--|---|--|---|---|
| | | | | | MW, BP, SOL F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ethanolamine <chem>NH2CH2CH2OH</chem> 141-43-5 KJ5775000 | 2-Aminoethanol, beta-Aminoethyl alcohol, Ethanolamine, 2-Hydroxyethylamine, Monoethanolamine | NIOSH/OSHA 3 ppm (8 mg/m ³) ST 6 ppm (15 mg/m ³) | 1000 ppm | Colorless, viscous liquid or solid (below 51°F) with an unpleasant, ammonia-like odor. | MW: 61.1 BP: 339°F Sol: Miscible F.P.: 185°F IP: 8.96 eV | VP: 0.4 mm FRZ: 51°F UEL: ? LEL: ? | Strong oxidizers, strong acids | Si gel; Methanol/ Water; GC/FID; III [#2007, Amino- ethanol Com- pounds] |
| 2491 60 | 1 ppm = 2.54 mg/m ³ | | | | Sp.Gr: 1.02 Class IIIA Combustible Liquid | | | |
| 2-Ethoxyethanol <chem>C2H5OCH2CH2OH</chem> 110-80-5 KK8050000 | Cellulosolve®, EGEE, Ethylene glycol monoethyl ether | NIOSH Reduce expo- sure to lowest feasible con- centration. OSHA 200 ppm (740 mg/m ³) [skin] | * [6000 ppm] *Not applicable because of the NIOSH REL. | Colorless liquid with a sweet, pleasant, ether- like odor. | MW: 90.1 BP: 275°F Sol: Miscible F.P.: 110°F IP: ? | VP: 4 mm FRZ: -130°F UEL(200°F): 15.6% LEL(200°F): 1.7% | Strong oxidizers | Char/ <chem>CH2Cl2</chem> ; Methanol; GC/FID; III [#1403, Alcohols IV] |
| 1171 28 | 1 ppm = 3.75 mg/m ³ | | | | Sp.Gr: 0.93 Class II Combustible Liquid | | | |
| 2-Ethoxyethyl acetate <chem>CH3COOCH2CH2OC2H5</chem> 111-15-9 KK8225000 | Cellulosolve® acetate, EGEEA, Ethylene glycol monoethyl ether acetate, Glycol monoethyl ether acetate | NIOSH Reduce expo- sure to lowest feasible con- centration. OSHA 100 ppm (540 mg/m ³) [skin] | * [2500 ppm] *Not applicable because of the NIOSH REL. | Colorless liquid with a mild odor. | MW: 132.2 BP: 313°F Sol: 23% F.P.: 124°F IP: ? | VP: 2 mm FRZ: -79°F UEL: ? LEL: 1.7% | Nitrates; strong oxidizers, alkalis & acids | Char; <chem>CS2</chem> ; GC/FID; III [#1450, Esters I] |
| 1172 28 | 1 ppm = 5.49 mg/m ³ | | | | Sp.Gr: 0.88 Class II Combustible Liquid | | | |
| Ethyl acetate <chem>CH3COOC2H5</chem> 141-78-6 AH5425000 | Acetic ester, Acetic ether, Ethyl ester of acetic acid, Ethyl ethanoate | NIOSH/OSHA 400 ppm (1400 mg/m ³) | 10,000 ppm | Colorless liquid with an ether- like, fruity odor. | MW: 88.1 BP: 171°F Sol(77°F): 10% F.P.: 24°F IP: 10.01 eV | VP: 74 mm FRZ: -117°F UEL: 11.5% LEL: 2.0% | Nitrates; strong oxidizers, alkalis & acids | Char; <chem>CS2</chem> ; GC/FID; II(2) [#S49] |
| 1173 26 | 1 ppm = 3.66 mg/m ³ | | | | Sp.Gr: 0.90 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------------|---|--------------------------|---|--------------------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | Resp sys, skin, eye irrit; lethargy | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Skin, eyes, resp sys |
| Goggles: | Any poss | 30 ppm: SA*/SCBA*/CCRS* | | | | | |
| Wash: | Prompt contam | 75 ppm: SA*/CF*/PAPRS* | | | | | |
| Change: | After work if reason prob contam | 150 ppm: CCRFS/GMFS/SCBAF/SAF | | | | | |
| Remove: | Prompt non-imperv contam | 1000 ppm: SAF:PD, PP | | | | | |
| Provide: | Eyewash | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh Abs Ing Con | In animals: pulm irrit; hematologic effects; liver, kidneys, lung damage, irrit eyes | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | In animals: lungs, eyes, blood, kidneys, liver |
| Goggles: | Reason prob | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | | |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Repeat | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | Inh Abs Ing Con | Irrit eyes, nose; vomit; kidney damage; para | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Resp sys, eyes, GI tract |
| Goggles: | Reason prob | Escape: GMFOV/SCBAE | | | | | |
| Wash: | Prompt wet | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Prompt non-imperv wet | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | Irrit eyes, nose, throat; narco; derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, resp sys |
| Goggles: | Reason prob | 1000 ppm: CCRFOV/PAPROV* | | | | | |
| Wash: | Prompt wet | 10,000 ppm: GMFOV/SCBAF/SAF/ SA:CF* | | | | | |
| Change: | N.R. | §: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | | |
| Remove: | Immed wet (flamm) | Escape: GMFOV/SCBAE | | | | | |

Ethyl acetate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|------------------|--|---|--|--|---|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ethyl acrylate <chem>CH2=CHCOOC2H5</chem> 140-88-5 AT0700000 | Ethyl acrylate (inhibited), Ethyl ester of acrylic acid, Ethyl propenoate | NIOSH Ca See Appendix A OSHA 5 ppm (20 mg/m³) ST 25 ppm (100 mg/m³) [skin] | Ca [2000 ppm] | Colorless liquid with an acrid odor. | MW: 100.1 BP: 211°F Sol: 2% Fl.P: 48°F IP: ? Sp.Gr: 0.92 Class IB Flammable Liquid | VP: 29 mm FRZ: -96°F UEL: 14% LEL: 1.4% | Oxidizers, peroxides, polymerizers, strong alkalis, moisture, chlorosulfonic acid [Note: Polymerizes readily unless an inhibitor such as hydroquinone is added.] | Char; CS; GC/FID; III [#1450, Esters I] |
| 1917 27 | 1 ppm = 4.16 mg/m³ | | | | | | | |
| Ethylamine <chem>CH3CH2NH2</chem> 75-04-7 KH2100000 | Aminoethane, Ethylamine (anhydrous), Monoethylamine | NIOSH/OSHA 10 ppm (18 mg/m³) | 4000 ppm | Colorless gas or water-white liquid (below 62°F) with an ammonia-like odor. [Note: Shipped as a liquefied compressed gas.] | MW: 45.1 BP: 62°F Sol: Miscible Fl.P: 1°F IP: 8.86 eV Sp.Gr: 0.69 (Liquid) Flammable Gas Class IA Flammable Liquid | VP: >1 atm FRZ: -114°F UEL: 14.0% LEL: 3.5% | Strong acids; strong oxidizers; copper, tin & zinc in presence of moisture; cellulose nitrate | Si gel; H2SO4; GC/FID; II(3) [#S144] |
| 1036 68 | 1 ppm = 1.87 mg/m³ | | | | | | | |
| Ethyl benzene <chem>CH3CH2C6H5</chem> 100-41-4 DA0700000 | Ethylbenzol, Phenylethane | NIOSH/OSHA 100 ppm (435 mg/m³) ST 125 ppm (545 mg/m³) | 2000 ppm | Colorless liquid with an aromatic odor. | MW: 106.2 BP: 277°F Sol: 0.01% Fl.P: 55°F IP: 8.76 eV Sp.Gr: 0.87 Class IB Flammable Liquid | VP(79°F): 10 mm FRZ: -139°F UEL: 6.7% LEL: 1.0% | Strong oxidizers | Char; CS; GC/FID; III [#1501, Aromatic Hydro- carbons] |
| 1175 26 | 1 ppm = 4.41 mg/m³ | | | | | | | |
| Ethyl bromide <chem>CH3CH2Br</chem> 74-96-4 KH6475000 | Bromoethane | NIOSH See Appendix D OSHA 200 ppm (890 mg/m³) ST 250 ppm (1110 mg/m³) | 3500 ppm | Colorless to yellow liquid with an ether-like odor. [Note: A gas above 101°F.] | MW: 109.0 BP: 101°F Sol: 0.9% Fl.P: <4°F IP: 10.29 eV Sp.Gr: 1.46 Class IB Flammable Liquid | VP(70°F): 400 mm FRZ: -182°F UEL: 8.0% LEL: 8.8% | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium | Char; 2-Propanol; GC/FID; III [#1011] |
| 1891 58 | 1 ppm = 4.53 mg/m³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------------|---|----------------|---|----------------------------|-------------------------|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, resp sys, skin; [carc] | Eye: | Irr immed | Resp sys, eyes, skin |
| Goggles: | Reason prob | | Abs | | Skin: | Water flush immed | |
| Wash: | Prompt wet | | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA 250 ppm: SA:CF/PAPRS [†] 500 ppm: CCRFS/GMFS/SCBAF/SAF 4000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh | Irrit eyes; burns skin; resp irrit; derm | Eye: | Irr immed | Resp sys, eyes, skin |
| Goggles: | Any poss | | Abs | | Skin: | Water flush immed | |
| Wash: | Immed contam | | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet/Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: PAPROV*/SA*/SCBA*/CCROV* 2000 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, muc memb; head; derm; narco, coma | Eye: | Irr immed | Eyes, upper resp sys, skin, CNS |
| Goggles: | Reason prob | | Ing | | Skin: | Water flush prompt | |
| Wash: | Prompt contam | | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | OSHA 2000 ppm: SA/SCBA 3500 ppm: SA:CF/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, resp sys, skin; CNS depres; pulm edema; liver, kidney disease; card arrhy; card arrest | Eye: | Irr immed | Skin, liver, kidneys, resp sys, CVS, CNS |
| Goggles: | Reason prob | | Ing | | Skin: | Soap flush prompt | |
| Wash: | Prompt wet | | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |

Ethyl bromide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|---------------|---|--|--|---|--|
| | | | | | MW, BP, SOL, F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ethyl butyl ketone <chem>CH3CH2CO(CH2)3CH3</chem> 106-35-4 MJ5250000 | Butyl ethyl ketone, 3-Heptanone | NIOSH/OSHA 50 ppm (230 mg/m ³) | 3000 ppm | Colorless liquid with a powerful, fruity odor. | MW: 114.2 BP: 298°F Sol: 1% F.P.(oc): 115°F IP: 9.02 eV | VP: 4 mm FRZ: -38°F UEL: ? LEL: ? | Oxidizers, acetaldehyde, perchloric acid | Char; Methanol/ CS; GC/FID; III [#1301, Ketones II] |
| | 1 ppm = 4.75 mg/m ³ | | | | Sp.Gr: 0.82 Class II Combustible Liquid | | | |
| Ethyl chloride <chem>CH3CH2Cl</chem> 75-00-3 KH7525000 | Chloroethane, Hydrochloric ether, Monochloroethane, Muriatic ether | NIOSH See Appendix D Handle with caution in the workplace. OSHA 1000 ppm (2600 mg/m ³) | 20,000 ppm | Colorless gas or liquid (below 54°F) with a pungent, ether- like odor. [Note: Shipped as a liquefied compressed gas.] | MW: 64.5 BP: 54°F Sol: 0.6% F.P. NA (Gas) IP: 10.97 eV | VP: >1 atm FRZ: -218°F UEL: 15.4% LEL: 3.8% | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; oxidizers; water or steam [Note: Reacts with water to form hydrochloric acid.] | Char(2); CS; GC/FID; III [#2519] |
| 1037 27 | 1 ppm = 2.68 mg/m ³ | | | | Sp.Gr: 0.92 (Liquid at 32°F) Flammable Gas Class IA Flammable Liquid | | | |
| Ethylene chlorohydrin <chem>CH2ClCH2OH</chem> 107-07-3 KK0875000 | 2-Chloroethanol, 2-Chloroethyl alcohol, Ethylene chlorhydrin | NIOSH/OSHA C 1 ppm (3 mg/m ³) [skin] | 10 ppm | Colorless liquid with a faint, ether-like odor. | MW: 80.5 BP: 262°F Sol: Miscible F.P: 140°F IP: 10.90 eV | VP: 5 mm FRZ: -90°F UEL: 15.9% LEL: 4.9% | Strong oxidizers, strong caustics, water or steam | Char(pet); 2-Propanol/ CS; GC/FID; III [#2513] |
| 1135 55 | 1 ppm = 3.35 mg/m ³ | | | | Sp.Gr: 1.20 Class IIIA Combustible Liquid | | | |
| Ethylenediamine <chem>NH2CH2CH2NH2</chem> 107-15-3 KH8575000 | 1,2-Diaminoethane; 1,2-Ethanediamine; Ethylenediamine (anhydrous) | NIOSH/OSHA 10 ppm (25 mg/m ³) | 2000 ppm | Colorless, viscous liquid with an ammonia-like odor. [Note: A solid below 47°F.] [fungicide] | MW: 60.1 BP: 241°F Sol: Miscible F.P: 93°F IP: 8.60 eV | VP: 11 mm FRZ: 47°F UEL: 14.4% LEL: 4.2% | Strong acids & oxidizers, carbon tetrachloride & other chlorinated organic compounds, carbon disulfide [Note: Corrosive to metals.] | XAD-2*; DMF; HPLC/UVD; III [#2540] |
| 1604 29 | 1 ppm = 2.50 mg/m ³ | | | | Sp.Gr: 0.91 Class IC Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------------------|--|----------------|--|----------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 500 ppm: CCROV*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA:CF* 2500 ppm: GMFOV/SCBAF/SAF 3000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, muc memb; head; narco, coma; derm | Eye: | Irr immed Water flush Resp support Medical attention immed | Eyes, skin, resp sys |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt contam | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Repeat | OSHA 10,000 ppm: SA*/SCBA* 20,000 ppm: SA:CF*/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Inco, inebriate; abdom cramps; card arrhy, card arrest; liver, kidney damage | Eye: | Irr immed Water flush prompt Resp support Medical attention immed | Liver, kidneys, resp sys, CVS |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | N.R. | | Ing | | Breath: | | |
| Change: | N.R. | | Con | | Swallow: | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA 10 ppm: SCBA*/SA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit muc memb; nau, vomit; verti, inco; numb; vis dist; head; thirst; delirium; low BP; collapse, shock, coma | Eye: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, liver, kidneys, CNS, skin, CVS |
| Goggles: | Any poss | | Abs | | Skin: | | |
| Wash: | Immed contam | | Ing | | Breath: | | |
| Change: | N.R. | | Con | | Swallow: | | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA 250 ppm: SA:CF*/PAPRS† 500 ppm: CCRFS/GMFS/SCBAF/SAF 2000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh | Nasal irrit; primary irrit; sens derm, irrit resp sys, asthma; liver, kidney damage | Eye: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, liver, kidneys, skin |
| Goggles: | Any poss | | Abs | | Skin: | | |
| Wash: | Immed contam/daily | | Ing | | Breath: | | |
| Change: | After work if any poss contam | | Con | | Swallow: | | |
| Remove: | Immed wet/Immed non-imperv contam | | | | | | |
| Provide: | Eyewash (>5%), quick drench | | | | | | |

Ethylenediamine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|--|--|--|---|---|---|
| | | | | | MW, BP, SOL, FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ethylene dibromide <chem>BrCH2CH2Br</chem> 106-93-4 KH9275000 | 1,2-Dibromoethane; Ethylene bromide; Glycol dibromide | NIOSH Ca See Appendix A 0.045 ppm C 0.13 ppm [15-min] OSHA 20 ppm C 30 ppm 50 ppm [5-min max peak] | Ca [400 ppm] ACGIH A2 [skin] | Colorless liquid or solid (below 50°F) with a sweet odor. | MW: 187.9 BP: 268°F Sol: 0.4% FLP: NA IP: 9.45 eV | VP: 12 mm FRZ: 50°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium, calcium, hot aluminum & magnesium; liquid ammonia; strong oxidizers | Char; Benzene/ Methanol; GC/ECD; III [#1008] |
| 1605 55 | 1 ppm = 7.81 mg/m ³ | | | | Sp.Gr: 2.17 Noncombustible Liquid | | | |
| Ethylene dichloride <chem>ClCH2CH2Cl</chem> 107-06-2 KI0525000 | 1,2-Dichloroethane; Ethylene chloride; Glycol dichloride | NIOSH Ca See Appendix A 1 ppm (4 mg/m ³) ST 2 ppm (8 mg/m ³) OSHA 1 ppm (4 mg/m ³) ST 2 ppm (8 mg/m ³) | Ca [1000 ppm] | Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] | MW: 99.0 BP: 182°F Sol: 0.9% FLP: 58°F IP: 11.05 eV | VP: 64 mm FRZ: -32°F UEL: 16% LEL: 6.2% | Strong oxidizers & caustics; chemically- active metals such as aluminum or magnesium powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112°F.] | Char; CS; GC/FID; III [#1003, Halo- genated Hydro- carbons] |
| 1184 26 | 1 ppm = 4.11 mg/m ³ | | | | Sp.Gr: 1.24 Class IB Flammable Liquid | | | |
| Ethylene glycol dinitrate <chem>O2NOCH2CH2ONO2</chem> 628-96-6 KW5800000 | EGDN; 1,2-Ethanediol dinitrate; Ethylene dinitrate; Ethylene nitrate; Glycol dinitrate; Nitroglycol | NIOSH/OSHA ST 0.1 mg/m ³ [skin] [Note: OSHA stayed the start-up date of the PEL on 12/6/89 for the explosives industry until 2/1/90.] | 500 mg/m ³ | Colorless to yellow, oily, odorless liquid. [Note: An explo- sive ingredient (60-80%) in dynamite along with nitroglycerine (40-20%).] | MW: 152.1 BP: 387°F Sol: Insoluble FLP: 419°F IP: ? | VP: 0.05 mm FRZ: -8°F UEL: ? LEL: ? | Acids, alkalis | Tenax GC; Ethanol; GC/ECD; III [#2507] |
| | 1 ppm = 6.12 mg/m ³ | | | | Sp. Gr: 1.49 Explosive Liquid | | | |
| Ethyleneimine <chem>C2H5N</chem> 151-56-4 KX5075000 | Aminoethylene, Azirane, Aziridine, Dimethylethyleneimine, Dimethylethyleneimine, Ethyleneimine, Ethylimine | NIOSH Ca See Appendix A OSHA [1910.1012] See Appendix B | Ca [100 ppm] | Colorless liquid with an ammonia- like odor. | MW: 43.1 BP: 133°F Sol: Miscible FLP: 12°F IP: 9.20 eV | VP: 160 mm FRZ: -97°F UEL: 48% LEL: 3.6% | Polymerizes explosively in presence of acids [Note: Explosive silver derivatives may be formed with silver alloys (e.g., silver solder).] | Bub; CHCl ₃ ; HPLC/UV/D; II(5) [P&CAM #300] |
| 1185 30 (inhibited) | 1 ppm = 1.79 mg/m ³ | | | | Sp.Gr: 0.83 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH | Inh | Irrit resp sys, eyes; derm | Eye: | Irr immed | Resp sys, liver, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | with vesic; [carc] | Skin: | Soap wash immed | kidneys, skin, |
| Wash: | Immed contam | Escape: GMFOV/SCBAE | Ing | | Breath: | Resp support | eyes |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | CNS depres; nau, vomit; | Eye: | Irr immed | Kidneys, liver, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | derm; irrit eyes, corneal | Skin: | Soap wash prompt | eyes, skin, CNS |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | Abs | opacity; [carc] | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| | | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Throb head; dizz; nau, | Eye: | Irr immed | CVS, blood, skin |
| Goggles: | Reason prob | 1 mg/m ³ : SA*/SCBA* | Abs | vomit, abdom pain; | Skin: | Soap wash immed | |
| Wash: | Immed contam | 2.5 mg/m ³ : SA:CF* | Ing | hypotension, flush; palp; | Breath: | Resp support | |
| Change: | After work if any poss | 5 mg/m ³ : SCBAF/SAF/SAT:CF* | Con | methemoglobinemia; | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 200 mg/m ³ : SAF:PD,PP | | delirium, depres CNS; | | | |
| Provide: | Quick drench | 5: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | angina; skin irrit; | | | |
| | | Escape: GMFOVHIE/SCBAE | | in animals: anemia; mild | | | |
| | | | | liver, kidney damage | | | |
| | | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Nau, vomit; head, dizz; | Eye: | Irr immed (15 min) | Eyes, lungs, |
| Goggles: | Any poss | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | pulm edema; liver, kidney | Skin: | Soap wash immed | skin, liver, |
| Wash: | Immed contam/daily | Escape: GMFOV/SCBAE | Con | damage; eye burns; skin | Breath: | Resp support | kidneys |
| Change: | After work if any poss | | Ing | sens; irrit nose, throat; | Swallow: | Medical attention immed | |
| Remove: | Immed contam | | | [carc] | | | |
| Provide: | Eyewash, quick drench | | | | | | |

Ethyleneimine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|------------------------|---|---|--|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ethylene oxide <chem>C2H4O</chem> 75-21-8 KX2450000 | Dimethylene oxide; 1,2-Epoxy ethane; Oxirane | NIOSH Ca See Appendix A <0.1 ppm (0.18 mg/m ³) C 5 ppm (9 mg/m ³)[10-min/day] OSHA [1910.1047] ACGIH 1 ppm A2 5 ppm [15-min Excursion] | Ca [800 ppm] | Colorless gas or liquid (below 51°F) with an ether-like odor. | MW: 44.1 BP: 51°F Sol: Miscible Fl.P(oc): -20°F IP: 10.56 eV | VP: >1 atm FRZ: -171°F UEL: 100% LEL: 3.0% | Strong acids, alkalis & oxidizers; chlorides of iron, aluminum & tin; oxides of iron & aluminum | Char(pet)*; DMF; GC/ECD; III [#1614] |
| 1040 69 | 1 ppm = 1.83 mg/m ³ | | | | Sp.Gr: 0.82 (Liquid at 50°F) Class IA Flammable Liquid | | | |
| Ethyl ether <chem>C2H5OC2H5</chem> 60-29-7 KI5775000 | Diethyl ether, Ethyl oxide, Ether, Diethyl oxide, Solvent ether | NIOSH See Appendix D OSHA 400 ppm (1200 mg/m ³) ST 500 ppm (1500 mg/m ³) | 19,000 ppm [LEL] | Colorless liquid with a pungent, sweetish odor. [Note: A gas above 84°F.] | MW: 74.1 BP: 94°F Sol: 8% Fl.P: -49°F IP: 9.53 eV | VP: 440 mm FRZ: -177°F UEL: 36.0% LEL: 1.9% | Strong oxidizers [Note: Tends to form explosive peroxides under influence of air & light.] | Char; Ethyl acetate; GC/FID; III [#1610] |
| 1155 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.71 Class IA Flammable Liquid | | | |
| Ethyl formate <chem>CH3CH2OCHO</chem> 109-94-4 LQ8400000 | Ethyl ester of formic acid, Ethyl methanoate | NIOSH/OSHA 100 ppm (300 mg/m ³) | 8000 ppm | Colorless liquid with a fruity odor. | MW: 74.1 BP: 130°F Sol(64°F): 9% Fl.P: -4°F IP: 10.61 eV | VP: 200 mm FRZ: -113°F UEL: 16.0% LEL: 2.8% | Nitrates; strong oxidizers, alkalis & acids [Note: Decomposes slowly in water to form ethyl alcohol & formic acid.] | Char; CS; GC/FID; II(2) [#S38] |
| 1190 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.92 Class IB Flammable Liquid | | | |
| Ethyl mercaptan <chem>CH3CH2SH</chem> 75-08-1 K19625000 | Ethanethiol, Ethyl sulfhydrylate, Mercaptoethane | NIOSH C 0.5 ppm (1.3 mg/m ³) [15-min] OSHA 0.5 ppm (1 mg/m ³) | 2500 ppm | Colorless liquid with a strong skunk-like odor. [Note: A gas above 95°F.] | MW: 62.1 BP: 95°F Sol: 0.7% Fl.P: -55°F IP: 9.29 eV | VP: 442 mm FRZ: -228°F UEL: 18.0% LEL: 2.8% | Strong oxidizers [Note: Reacts violently with calcium hypochlorite.] | None available |
| 2363 27 | 1 ppm = 2.58 mg/m ³ | | | | Sp.Gr: 0.84 Class IA Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|---|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 6) |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, blood, resp |
| Goggles: | Reason prob | 5 ppm: GMFS ¹ /SCBAF/SAF | Ing | peculiar taste; head; nau. | Skin: | Water flush immed | sys, liver, CNS, |
| Wash: | Immed contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | vomit, diarr; dysp, cyan, | Breath: | Resp support | kidneys |
| Change: | N.R. | Escape: GMFS ¹ /SCBAE | | pulm edema; drow, weak, | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | inco; EKG abnormalities; | | immed | |
| Provide: | Eyewash | | | burns eyes, skin; frostbite; [carc]; in animals: convuls; liver, kidney damage | | | |
| Clothing: | Repeat | OSHA | Inh | Dizz; drow; head, | Eye: | Irr immed | CNS, skin, resp |
| Goggles: | Reason prob | 1000 ppm: CCR ² OV*/PAPROV* | Ing | excited, narco; nau, | Skin: | Water wash prompt | sys, eyes |
| Wash: | N.R. | 4000 ppm: SA*/SCBA* | Con | vomit; irrit eyes, upper | Breath: | Resp support | |
| Change: | N.R. | 10,000 ppm: SA:CF* | | resp sys, skin | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 10,000 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, upper resp sys; | Eye: | Irr immed | Eyes, resp sys |
| Goggles: | Reason prob | 1000 ppm: CCRFOV/PAPROV* | Ing | narco | Skin: | Water flush immed | |
| Wash: | Prompt wet | 2500 ppm: SA:CF* | Con | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Any wet immed (flamm) | 8000 ppm: SAF:PD,PP | | | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Head, nau, irrit muc memb; | Eye: | Irr immed | Resp sys; |
| Goggles: | Reason prob | 5 ppm: SA/SCBA/CCROV | Ing | in animals: inco; weak; | Skin: | Soap wash immed | in animals: |
| Wash: | Prompt contam | 12.5 ppm: SA:CF/PAPROV | Con | pulm irrit; liver, kidney | Breath: | Resp support | liver, kidneys |
| Change: | N.R. | 25 ppm: SCBAF/SAF/GMFOV/PAPRTOV/ | | damage; cyan | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | CCRFOV/SAT:CF | | | | immed | |
| | | 500 ppm: SA:PD,PP | | | | | |
| | | 1000 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

Ethyl mercaptan

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|----------|--|--|--|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| N-Ethylmorpholine <chem>C4H9ONCH2CH3</chem> 100-74-3 QE4025000 | 4-Ethylmorpholine | NIOSH/OSHA 5 ppm (23 mg/m ³) [skin] | 2000 ppm | Colorless liquid with an ammonia- like odor. | MW: 115.2 BP: 281°F Sol: Miscible FLP(oc): 90°F IP: ? | VP: 6 mm FRZ: -61°F UEL: ? LEL: ? | Strong acids, strong oxidizers | Si gel; H ₂ SO ₄ ; GC/FID; II(3) [#S148] |
| 1 ppm = 4.79 mg/m ³ | | | | | Sp.Gr: 0.90 Class IC Flammable Liquid | | | |
| Ethyl silicate <chem>(C2H5)4SiO4</chem> 78-10-4 VV9450000 | Ethyl orthosilicate, Ethyl silicate (condensed), Tetraethoxysilane, Tetraethyl silicate | NIOSH/OSHA 10 ppm (85 mg/m ³) | 1000 ppm | Colorless liquid with a sharp, alcohol-like odor. | MW: 208.3 BP: 336°F Sol: Reacts FLP: 99°F IP: 9.77 eV | VP: 1 mm FRZ: -117°F UEL: ? LEL: ? | Strong oxidizers, water [Note: Reacts with water to form a silicone adhesive (a milky-white mass).] | XAD-2; CS ₂ ; GC/FID; II(3) [#S264] |
| 1292 29 | | | | | Sp.Gr: 0.93 Class IC Flammable Liquid | | | |
| Ferbam <chem>((CH3)2NCS2)3Fe</chem> 14484-64-1 NO8750000 | tris(Dimethyldithio- carbamate)iron, Ferric dimethyl dithio- carbamate | NIOSH/OSHA 10 mg/m ³ | N.E. | Dark brown to black, odorless solid. [fungicide] | MW: 416.5 BP: Decomposes Sol: 0.01% FLP: ? IP: 7.72 eV | VP: Low MLT: >356°F (Decomposes) UEL: ? LEL: ? | Strong oxidizers | None available |
| | | | | | Combustible Solid | | | |
| Ferrovandium dust FeV 12604-58-9 LK2900000 | None | NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³ | N.E. | Dark, odorless particulate dispersed in air. [Note: Ferro- vanadium metal is an alloy usu- ally containing 50-80% vana- dium.] | MW: 108.8 BP: ? Sol: Insoluble FLP: NA IP: NA | VP: 0 mm (approx) MLT: 2696 to 2768°F UEL: NA LEL: NA | Strong oxidizers | Filter; Acid; AA; OSHA [#ID121, #ID125G] |
| | | | | | Noncombustible Solid, but dust may be an explosion hazard. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eye, nose, throat irrit; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 50 ppm: SA*/SCBA*/CCROV* | Abs | vis dist; severe eye irrit | Skin: | Water flush prompt | skin |
| Wash: | Prompt contam | 125 ppm: SA:CF*/PAPROV* | Ing | from splashes | Breath: | Resp support | |
| Change: | N.R. | 250 ppm: SCBAF/SAF/CCRFOV/ | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | GMFOV/PAPRTOV*/SAT:CF* | | | | immed | |
| Provide: | Eyewash (>15%), quick drench | 2000 ppm: SAF:PD, PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose; | Eye: | Irr immed | Resp sys, liver, |
| Goggles: | Reason prob | 100 ppm: SA*/SCBA* | Ing | in animals: lac; dysp, | Skin: | Soap wash prompt | kidneys, blood, |
| Wash: | Prompt wet | 250 ppm: SA:CF* | Con | pulm edema; tremor, narco; | Breath: | Resp support | skin |
| Change: | N.R. | 500 ppm: SCBAF/SAF | | liver, kidney damage; | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 1000 ppm: SAF:PD, PP | | anemia | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp tract; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 50 mg/m ³ : D | Ing | derm; GI dist | Skin: | Soap wash prompt | GI tract |
| Wash: | Prompt contam | 100 mg/m ³ : DXSQ*/SA*/SCBA*/HIE* | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | 250 mg/m ³ : PAPRD*/SA:CF* | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 500 mg/m ³ : HIEF/SCBAF/SAF/ | | | | immed | |
| | | PAPRTHIE*/SAT:CF* | | | | | |
| | | 5000 mg/m ³ : SAF:PD, PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Resp sys, eyes |
| Goggles: | N.R. | 5 mg/m ³ : DM* | Con | in animals: bron, pneumitis | Breath: | Resp support | |
| Wash: | N.R. | 10 mg/m ³ : D XSQ*/SA*/SCBA* | | | | | |
| Change: | N.R. | 25 mg/m ³ : PAPRDM*/SA:CF* | | | | | |
| Remove: | N.R. | 50 mg/m ³ : HIEF/SCBAF/SAF/ | | | | | |
| | | PAPRTHIE*/SAT:CF* | | | | | |
| | | 500 mg/m ³ : SAF:PD, PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Ferrovandium dust

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|-----------------------------------|---|--|---|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Fluorides (as F) 1: NaF 2: Na ₂ AlF ₆ 1: 7681-49-4/ WB0350000 2: 15096-52-3/ WA9625000 1690 54 (NaF) | 1: Sodium fluoride, Floridine 2: Cryolite, Cryocide, Cryodust, Sodium aluminum fluoride, Sodium hexafluoroaluminate Synonyms of other compounds vary depending upon the specific compound. | NIOSH/OSHA 2.5 mg/m ³ | 500 mg/m ³ | 1: Odorless white powder or colorless crystals. [Note: Pesticide grade is often dyed blue.] 2: Colorless to dark odorless solid. [Note: Loses color on heating.] [pesticide] | MW: 42.0/209.9 BP: 3099°F/ Decomposes Sol: 4/0.04% Fl.P: NA/NA IP: NA/NA Sp.Gr: 2.78/2.90 Noncombustible Solids | VP: 0/0 mm (approx) MLT: 1819/ 1832°F UEL: NA/NA LEL: NA/NA | Strong oxidizers | None available |
| Fluorine F ₂ 7782-41-4 LM6475000 9192 25 (cryogenic liquid) 1045 20 (compressed) | Fluorine-19 1 ppm = 1.58 mg/m ³ | NIOSH/OSHA 0.1 ppm (0.2 mg/m ³) | 25 ppm | Pale yellow to greenish gas with a pungent, irritating odor. | MW: 38.0 BP: -307°F Sol: Reacts Fl.P: NA IP: 15.70 eV | VP: >1 atm FRZ: -363°F UEL: NA LEL: NA | Water, nitric acid, oxidizers, organic compounds [Note: Reacts violently with all combustible materials, except the metal containers in which it is shipped. Reacts with H ₂ O to form hydrofluoric acid.] | None available |
| Fluorotrichloromethane CCl ₃ F 75-69-4 PB6125000 | Freon® 11, Monofluorotrichloromethane, Trichlorofluoromethane, Trichloromonofluoromethane, Refrigerant 11 | NIOSH/OSHA C 1000 ppm (5600 mg/m ³) | 10,000 ppm | Colorless to water-white, nearly odorless liquid or gas (above 75°F). | MW: 137.4 BP: 75°F Sol(77°F): 0.1% Fl.P: NA IP: 11.77 eV Sp.Gr: 1.47 (Liquid at 75°F) Noncombustible Liquid | VP: 690 mm FRZ: -168°F UEL: NA LEL: NA | Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc, magnesium & lithium shavings; granular barium | Char; CS ₂ ; GC/FID; III [1008, Trichlorofluoromethane] |
| Formaldehyde HCHO 50-00-0 LP8925000 1198 29 (formalin) 2209 29 (formalin) | 1) Gaseous form: Methanal, Methyl aldehyde, Methylene oxide 2) Aqueous solution: Formalin (30 to 50% formaldehyde by weight, which usually contains 6 to 12% methanol) | NIOSH Ca See Appendix A 0.016 ppm C 0.1 ppm (15-min) OSHA [1910.1048] 1 ppm ST 2 ppm | Ca [30 ppm] ACGIH A2 | Nearly colorless gas with a pungent, suffocating odor. [Note: Often used in an aqueous solution.] | MW: 30.0 BP: -6/207 to 214°F Sol: Miscible Fl.P: NA(Gas)/ 140-185°F IP: 10.88 eV/7 Sp.Gr(77°F): 1.08-1.10 (Formalin) Flammable Gas Class IIIB Combustible Liquid (Formalin) | VP: >1 atm/ 1 mm FRZ: -134°F/? UEL: 73%/? LEL: 7.0%/? | Strong oxidizers, alkalis & acids; phenols; urea [Note: Pure formaldehyde has a tendency to polymerize.] | Filter/Imp(2); none; Vis; III [#3500] [Note: Also XAD-2; Toluene; GC/FID; #2541.] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|------------------------------|----------------------------|---------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Any poss | 12.5 mg/m ³ : DM | Ing | nau, abdom pain, diarr; | Skin: | Soap wash prompt | CNS, skeleton, |
| Wash: | Prompt contam | 25 mg/m ³ : DMXSO*/SA*/SCBA* | Con | excess saliv, thirst, sweat; | Breath: | Fresh air, art resp | kidneys, skin |
| Change: | After work if any poss | 62.5 mg/m ³ : PAPRODM*/SA:CF* | | stiff spine; derm; | Swallow: | Medical attention | |
| Remove: | Promptly non-imperv | 125 mg/m ³ : SCBAF/SAF/HIEF† | | calcification of | | immed | |
| | contam | 500 mg/m ³ : SAF:PD,PP | | ligaments of ribs, pelvis | | | |
| | | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF†/SCBAE | | | | | |
| | | †Note: May need acid gas sorbent | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, resp | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 1 ppm: SA*/SCBA* | Con | tract; lar spasm, bron | Skin: | Water flush immed | skin; |
| Wash: | Immed contam | 2.5 ppm: SA:CF* | | spasm; pulm edema; eyes, | Breath: | Resp support | in animals: |
| Change: | N.R. | 5 ppm: SCBAF/SAF | | skin burns; | | | liver, kidneys |
| Remove: | Immed non-imperv contam | 25 ppm: SAF:PD,PP | | in animals: liver, kidney | | | |
| Provide: | Eyewash, quick drench | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | damage | | | |
| | | Escape: GMFS‡/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Inco, tremors; derm; | Eye: | Irr immed | CVS, skin |
| Goggles: | Any poss | 10,000 ppm: SA/SCBA | Ing | frostbite; card arrhy, | Skin: | Water flush immed | |
| Wash: | N.R. | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | card arrest | Breath: | Resp support | |
| Change: | N.R. | Escape: GMFOV/SCBAE | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Reason prob | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | lac, burns nose, cough; | Skin: | Water flush prompt | skin |
| Wash: | Immed contam | Escape: GMFS/SCBAE | Con | bron spasm, pulm irrit; | Breath: | Resp support | |
| Change: | N.R. | | | derm; [carc] | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |

Formaldehyde

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|---------|--|--|--|---|--|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Formic acid HCOOH 64-18-6 LQ4900000 | Formic acid, 85-95% in aqueous solution; Hydrogenecarboxylic acid; Methanoic acid | NIOSH/OSHA 5 ppm (9 mg/m ³) | 30 ppm | Colorless liquid with a pungent, penetrating odor. [Note: Often used in an aqueous solution. The 90% solution freezes at 20°F.] | MW: 46.0 BP: 224°F (90% soln) Sol: Miscible Fl.P.(cc): 122°F (90% soln) IP: 11.05 eV Sp.Gr: 1.22 (90% soln) Class IIIA Combustible Liquid | VP: 35 mm FRZ: 20°F (90% soln) UEL: 57% (90% soln) LEL: 16% (90% soln) | Strong oxidizers, strong caustics, concentrated sulfuric acid [Note: Corrosive to metals.] | Filter/ Chrom- 103 (2); Water; IC; II(5) [#S173] |
| 1779 60 | 1 ppm = 1.91 mg/m ³ | | | | | | | |
| Furfural C ₅ H ₄ OCHO 98-01-1 LT7000000 | Fural, 2-Furfuraldehyde, 2-Furancarboxaldehyde, Furfuraldehyde | NIOSH See Appendix D OSHA 2 ppm (8 mg/m ³) [skin] | 250 ppm | Colorless to amber liquid with an almond-like odor. [Note: Darkens in light and air.] | MW: 96.1 BP: 323°F Sol: 8% Fl.P: 140°F IP: 9.21 eV Sp.Gr: 1.16 Class IIIA Combustible Liquid | VP(68°F): 1 m.m. FRZ: -34°F UEL: 19.3% LEL: 2.1% | Strong acids, oxidizers, strong alkalis | XAD-2*; Toluene; GC/FID; III [#2529] |
| 1199 29 | 1 ppm = 3.99 mg/m ³ | | | | | | | |
| Furfuryl alcohol C ₅ H ₄ OCH ₂ OH 98-00-0 LU9100000 | 2-Furylmethanol, 2-Hydroxymethylfuran | NIOSH/OSHA 10 ppm (40 mg/m ³) ST 15 ppm (60 mg/m ³) [skin] | 250 ppm | Amber liquid with a faint, burning odor. | MW: 98.1 BP: 336°F Sol: Miscible Fl.P: 149°F IP: ? Sp.Gr: 1.13 Class IIIA Combustible Liquid | VP(89°F): 1 mm FRZ: 6°F UEL: 16.3% LEL: 1.8% | Strong oxidizers & acids [Note: Contact with organic acids may lead to polymeriza- tion.] | Porapak-Q; Acetone; GC/FID; III [#2505] |
| 2874 55 | 1 ppm = 4.08 mg/m ³ | | | | | | | |
| Glycidol C ₃ H ₆ O ₂ 556-52-5 UB4375000 | 2,3-Epoxy-1-propanol; Epoxypropyl alcohol; Hydroxymethyl ethylene oxide; 2-Hydroxymethyl oxiran; 3-Hydroxypropylene oxide | NIOSH/OSHA 25 ppm (75 mg/m ³) | 500 ppm | Colorless liquid. | MW: 74.1 BP: 320°F (Decomposes) Sol: Miscible Fl.P: 162°F IP: ? Sp.Gr: 1.12 Class IIIA Combustible Liquid | VP(77°F): 0.9 mm FRZ: -49°F UEL: ? LEL: ? | Strong oxidizers, nitrates | Char; THF; GC/FID; III [#1608] |
| | 1 ppm = 3.08 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|-----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Eye irrit, lac; nasal | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 30 ppm: SA*/SCBA* | Ing | discharge; throat irrit, | Skin: | Water flush immed | kidneys, liver, |
| Wash: | Immed contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | cough, dysp; nau; skin | Breath: | Resp support | eyes |
| Change: | N.R. | Escape: GMFOVHIE/SCBAE | | burns, derm | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | OSHA | Inh | Irrit eyes, upper resp | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Reason prob | 20 ppm: CCROV*/SA*/SCBA* | Abs | sys; head; derm | Skin: | Water flush prompt | skin |
| Wash: | Prompt contam | 50 ppm: SA:CF*/PAPROV* | Ing | | Breath: | Resp support | |
| Change: | N.R. | 100 ppm: CCRFOV/GMFOV/SCBAF/ SAF/PAPRTOV*/SAT:CF* | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 250 ppm: SAF:PD,PP | | | | immed | |
| Provide: | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Dizz; nau, diarr; diuresis; | Eye: | Irr immed | Resp sys |
| Goggles: | Reason prob | 100 ppm: PAPROV*/SCBA*/SA*/CCROV* | Abs | resp, body temperature, | Skin: | Water flush immed | |
| Wash: | Immed contam | 250 ppm: PAPRTOV*/SA:CF*/CCRFOV/ GMFOV/SCBAF/SAF | Ing | depres; vomit; | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | in animals: eye irrit, drow | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | Escape: GMFOV/SCBAE | | | | immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat, | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 250 ppm: SA*/SCBA* | Ing | skin; narco | Skin: | Water wash prompt | sys, CNS |
| Wash: | Prompt contam | 500 ppm: SA:CF*/SCBAF/SAF | Con | | Breath: | Resp support | |
| Change: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | Escape: GMFOV/SCBAE | | | | immed | |
| Provide: | | | | | | | |

Glycidol

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|-----------------------------------|--|--|--|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Graphite (natural) C 7782-42-5 MD9659600 | Black lead, Mineral carbon, Plumbago, Silver graphite, Stove black | NIOSH/OSHA 2.5 mg/m ³ (resp) | N.E. | Steel gray to black, greasy feeling, odorless solid. | MW: 12.0 BP: ? Sol: Insoluble FLP: ? IP: NA | VP: 0 mm (approx) MLT: ? UEL: ? LEL: ? | Very strong oxidizers such as fluorine, chlorine trifluoride & potassium peroxide | Filter: none; Grav; III [#0500, Nuisance Dust (total)] |
| | | | | | Sp.Gr: 2.0-2.25 Combustible Solid | | | |
| Hafnium and compounds (as Hf) Hf 7440-58-6 (Metal) MG4600000 (Metal) 2545 40 (Metal powder, dry) 1326 32 (Metal powder, wet) | Metal: Cesium, Elemental hafnium Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH/OSHA 0.5 mg/m ³ | Unknown | Metal: Highly lustrous, ductile, grayish solid. | MW: 178.5 BP: 8316°F Sol: Insoluble FLP: NA IP: NA | VP: 0 mm (approx) MLT: 4041°F UEL: NA LEL: NA | Strong oxidizers, chlorine | Filter: Acid; PES; II(5) [S194] |
| | | | | | Sp.Gr: 13.31 (Metal) Metal: Explosive in powder form (either dry or with <25% water). Finely divided powder can be ignited by static electricity or EVEN SPONTANEOUSLY. | | | |
| Heptachlor C ₁₀ H ₅ Cl ₇ 76-44-8 PC0700000 2761 55 | 1,4,5,6,7,8,8-Heptachloro- 3a,4,7,7a-tetrahydro-4,7- methanoindene | NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin] | Ca [700 mg/m ³] | White to light tan crystals with a camphor-like odor. [insecticide] | MW: 373.4 BP: 293°F (Decomposes) Sol: Insoluble FLP: NA IP: ? | VP(77°F): 0.0003 mm MLT: 203°F UEL: NA LEL: NA | Iron, rust | Chrom-102; Toluene; GC/ECD; II(5) [S287] |
| | | | | | Sp.Gr: 1.66 Noncombustible Solid, but may be dissolved in flammable liquids. | | | |
| n-Heptane CH ₃ (CH ₂) ₅ CH ₃ 142-82-5 MI7700000 1206 27 | Heptane, normal-Heptane | NIOSH 85 ppm (350 mg/m ³) C 440 ppm (1800 mg/m ³) [15-min] OSHA 400 ppm (1600 mg/m ³) ST 500 ppm (2000 mg/m ³) | 5000 ppm | Colorless liquid with a gasoline- like odor. | MW: 100.2 BP: 209°F Sol(60°F): 0.005% FLP: 25°F IP: 9.90 eV | VP(72°F): 40 mm FRZ: -131°F UEL: 6.7% LEL: 1.05% | Strong oxidizers | Char; CS; GC/FID; III [#1500; Hydro- carbons] |
| | 1 ppm = 4.17 mg/m ³ | | | | Sp.Gr: 0.68 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------|---|----------------|---|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Cough, dysp, black sputum, pulm func impairment, lung fib | Eye: | Irr immed | Resp sys, CVS |
| Goggles: | N.R. | 12.5 mg/m ³ : D | Con | | Breath: | Fresh air | |
| Wash: | N.R. | 25 mg/m ³ : DXSQ/SA/SCBA | | | | | |
| Change: | N.R. | 62.5 mg/m ³ : PAPRD/SA:CF | | | | | |
| Remove: | N.R. | 125 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/SAT:CF | | | | | |
| | | 1250 mg/m ³ : SAF:PD:PP | | | | | |
| | | §: SCBAF:PD:PP/SAF:PD:PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | In animals: irrit eyes, skin, muc memb; liver damage | Eye: | Irr immed | Eyes, skin, muc memb |
| Goggles: | Any poss | 2.5 mg/m ³ : DM | Ing | | Skin: | Soap wash prompt | |
| Wash: | Prompt contam/daily | 5 mg/m ³ : DMXSQ/SA/SCBA | Con | | Breath: | Resp support | |
| Change: | After work if any poss contam | 12.5 mg/m ³ : PAPRDM*/SA:CF* | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 25 mg/m ³ : HIEF/PAPRTHIE*/SCBAF/SAF/SAT:CF* | | | | | |
| Provide: | Eyewash, quick drench | 250 mg/m ³ : SAF:PD:PP | | | | | |
| | | §: SCBAF:PD:PP/SAF:PD:PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH | Inh | In animals: tremors, convuls; liver damage; [carc] | Eye: | Irr immed | In animals: CNS, liver |
| Goggles: | Reason prob | v: SCBAF:PD:PP/SAF:PD:PP:ASCBA | Abs | | Skin: | Soap wash immed | |
| Wash: | Immed contam | Escape: GMFOVHIE/SCBAE | Ing | | Breath: | Resp support | |
| Change: | After work if any poss contam | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | LI-head, gidd, stupor; no appetite, nau; derm; chemical preu; unconsciousness | Eye: | Irr immed | Skin, resp sys, PNS |
| Goggles: | Reason prob | 850 ppm: CCROV/SA/SCBA | Ing | | Skin: | Soap wash prompt | |
| Wash: | Prompt wet | 1000 ppm: PAPROV/CCRFOV | Con | | Breath: | Resp support | |
| Change: | N.R. | 2125 ppm: SA:CF | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 4250 ppm: GMFOV/SCBAF/SAF/SAT:CF | | | | | |
| | | 5000 ppm: SA:PD:PP | | | | | |
| | | §: SCBAF:PD:PP/SAF:PD:PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

n-Heptane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---------------------|---|---|--|--|---|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Hexachloroethane <chem>Cl3CCCCl3</chem> 67-72-1 KI4025000 | Carbon hexachloride, Perchloroethane | NIOSH Ca See Appendix A 1 ppm (10 mg/m ³) [skin] OSHA 1 ppm (10 mg/m ³) [skin] | Ca [300 ppm] | Colorless crystals with a camphor- like odor. | MW: 238.7 BP: Sublimes Sol(72°F): 0.005% Fl.P: NA IP: 11.22 eV | VP: 0.2 mm MLT: 368°F (Sublimes) UEL: NA LEL: NA | Alkalis; metals such as zinc, cadmium, aluminum, hot iron & mercury | Char; CS; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 9037 53 | | | | | Sp.Gr: 2.09 Noncombustible Solid | | | |
| Hexachloronaphthalene <chem>C10H2Cl6</chem> 1335-87-1 QJ7350000 | Halowax® 1014 | NIOSH/OSHA 0.2 mg/m ³ [skin] | 2 mg/m ³ | White to light- yellow solid with an aromatic odor. | MW: 334.9 BP: 650-730°F Sol: Insoluble Fl.P: NA IP: ? | VP: <1 mm MLT: 279°F UEL: NA LEL: NA | Strong oxidizers | Filter; Hexane; GC/ECD; II(2) [#S100] |
| | | | | | Sp.Gr: 1.78 Noncombustible Solid | | | |
| n-Hexane <chem>CH3(CH2)4CH3</chem> 110-54-3 MN9275000 | Hexane, Hexyl hydride, Normal-hexane | NIOSH/OSHA 50 ppm (180 mg/m ³) | 5000 ppm | Colorless liquid with a gasoline- like odor. | MW: 86.2 BP: 156°F Sol: 0.002% Fl.P: -7°F IP: 10.18 eV | VP(77°F): 150 mm FRZ: -219°F UEL: 7.5% LEL: 1.1% | Strong oxidizers | Char; CS; GC/FID; III [#1500, Hydro- carbons] |
| 1208 27 | 1 ppm = 3.58 mg/m ³ | | | | Sp.Gr: 0.68 Class IB Flammable Liquid | | | |
| 2-Hexanone <chem>CH3CO(CH2)3CH3</chem> 591-78-8 MP1400000 | Butyl methyl ketone, MBK, Methyl butyl ketone, Methyl n-butyl ketone | NIOSH 1 ppm (4 mg/m ³) OSHA 5 ppm (20 mg/m ³) | 5000 ppm | Colorless liquid with an acetone- like odor. | MW: 100.2 BP: 262°F Sol: 2% Fl.P: 77°F IP: 9.34 eV | VP(77°F): 4 mm FRZ: -71°F UEL: 8% LEL: ? | Strong oxidizers | Char; CS; GC/FID; III [#1300, Ketones I] |
| | 1 ppm = 4.17 mg/m ³ | | | | Sp.Gr: 0.81 Class IC Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|--|----------------|--|----------------------------|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 6) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH | Inh | Irrit eyes; [carc] | Eye: | Irr immed | Eyes |
| Goggles: | N.R. | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | | Skin: | Soap wash immed | |
| Wash: | Prompt contam/daily | Escape: GMFOV/SCBAE | Ing | | Breath: | Resp support | |
| Change: | After work if reason prob contam | | Con | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Any poss molt/Repeat liq sol/Reason prob fumes | NIOSH/OSHA 2 mg/m ³ : SA*/SCBA* | Inh | Acne-form derm, nau, conf, jaun, coma | Eye: | Irr immed | Liver, skin |
| Goggles: | Any poss molt/Reason prob liq | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | | Skin: | Soap wash prompt | |
| Wash: | Prompt contam/daily | Escape: GMFOV/SCBAE | Ing | | Breath: | Resp support | |
| Change: | After work if reason prob contam | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet molt/Prompt non-imperv contam liq | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Li-head; nau, head; | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | 500 ppm: SA*/SCBA* | Ing | numb extremities, musc | Skin: | Soap wash immed | sys |
| Wash: | Prompt contam | 1250 ppm: SA:CF* | Con | weak; irrit eyes, nose; derm; | Breath: | Resp support | |
| Change: | N.R. | 2500 ppm: SAT:CF*/SCBAF/SAF | | chemical pneu; gidd | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 5000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH | Inh | Irrit eyes, nose; | Eye: | Irr immed | CNS, skin, resp |
| Goggles: | Reason prob | 10 ppm: SA/SCBA | Abs | peri neur: weak, pares; | Skin: | Soap wash immed | sys |
| Wash: | Prompt contam | 25 ppm: SA:CF | Ing | derm; head; drow | Breath: | Resp support | |
| Change: | N.R. | 50 ppm: SCBAF/SAF/SAT:CF | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 2000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |

2-Hexanone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|-----------------------------------|--|---|--|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Hexone <chem>CH3COCH2CH(CH3)2</chem> 108-10-1 SA9275000 | Isobutyl methyl ketone, Methyl isobutyl ketone, 4-Methyl 2-pentanone, MIBK | NIOSH/OSHA 50 ppm (205 mg/m ³) ST 75 ppm (300 mg/m ³) | 3000 ppm | Colorless liquid with a pleasant odor. | MW: 100.2 BP: 242°F Sol: 2% Fl.P: 64°F IP: 9.30 eV | VP: 16 mm FRZ: -120°F UEL(200°F): 8.0% LEL(200°F): 1.2% | Strong oxidizers, potassium tert- butoxide | Char; CS ₂ ; GC/FID; III [#1300, Ketones I] |
| 1245 26 | 1 ppm = 4.17 mg/m ³ | | | | Sp.Gr: 0.80 Class IB Flammable Liquid | | | |
| sec-Hexyl acetate <chem>C8H16O2</chem> 108-84-9 SA7525000 | 1,3-Dimethylbutyl acetate; Methylisobutyl acetate [<chem>CH3COOCH(CH3)-CH2CH(CH3)2</chem>] | NIOSH/OSHA 50 ppm (300 mg/m ³) | 4000 ppm | Colorless liquid with a mild, pleasant, fruity odor. | MW: 144.2 BP: 297°F Sol: 0.08% Fl.P: 113°F IP: ? | VP: 3 mm FRZ: -83°F UEL: ? LEL: ? | Nitrates; strong oxidizers, alkalis & acids | Char; CS ₂ ; GC/FID; III [#1450, Esters I] |
| 1233 26 | 1 ppm = 5.99 mg/m ³ | | | | Sp.Gr: 0.86 Class II Combustible Liquid | | | |
| Hydrazine <chem>N2H4</chem> 302-01-2 MU7175000 | Diamine, Hydrazine (anhydrous), Hydrazine base | NIOSH Ca See Appendix A C 0.03 ppm (0.04 mg/m ³) [2-hr] OSHA 0.1 ppm (0.1 mg/m ³) [skin] | Ca [80 ppm] ACGIH A2 | Colorless liquid with an ammonia- like odor. [Note: A solid below 36°F.] | MW: 32.1 BP: 236°F Sol: Miscible Fl.P: 99°F IP: 8.93 eV | VP: 10 mm FRZ: 36°F UEL: 98% LEL: 2.9% | Oxidizers, hydrogen peroxide, nitric acid, metallic oxides, acids [Note: Can ignite SPONTANEOUSLY on contact with oxidizers or porous materials such as earth, wood, and cloth.] | Bub; Reagent; Vis; III [#3503] |
| 2030 59 (<64% soln) 2029 28 (>64% soln) | 1 ppm = 1.33 mg/m ³ | | | | Sp.Gr: 1.01 Class IC Flammable Liquid | | | |
| Hydrogen bromide HBr 10035-10-6 MW3850000 | Anhydrous hydrogen bromide; Aqueous hydrogen bromide (i.e., Hydrobromic acid) | NIOSH/OSHA C 3 ppm (10 mg/m ³) | 50 ppm | Colorless gas with a sharp, irritating odor. [Note: Often used in an aqueous solution.] | MW: 80.9 BP: -88°F Sol: 49% Fl.P: NA IP: 11.62 eV | VP: >1 atm FRZ: -124°F UEL: NA LEL: NA | Strong oxidizers, strong caustics, metals, moisture [Note: Hydrobromic acid is highly corrosive to metals.] | Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids] |
| 1048 15 | 1 ppm = 3.36 mg/m ³ | | | | Nonflammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|---|--------------------------|--|--------------------------------------|---|------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH/OSHA 500 ppm: CCROV ¹ /SA ² /SCBA ³ 1000 ppm: PAPROV ¹ /CCRFOV 1250 ppm: SA:CF ⁴ 2500 ppm: GMFOV/SCBAF/SAF/SAT:CF ⁵ 3000 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, muc memb; head; narco, coma; derm | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Resp sys, eyes, skin, CNS |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet | | NIOSH/OSHA 500 ppm: CCROV ¹ /SA ² /SCBA ³ 1000 ppm: PAPROV ¹ /CCRFOV 1250 ppm: SA:CF ⁴ 2500 ppm: GMFOV/SCBAF/SAF 4000 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Head; in animals: Irrit eyes, nose, throat; narco | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | CNS, eyes |
| Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench | | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE | Inh Abs Ing Con | Irrit eyes, nose, throat; temporary blindness; dizz, naus; derm; burns skin, eyes; [carc]; in animals: bron, pulm edema; liver, kidney damage; convuls | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | CNS, resp sys, skin, eyes |
| Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench | | NIOSH/OSHA 50 ppm: SA:CF ⁴ /PAPRAG ⁶ /GMFAG/ SCBAF/SAF g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFAG/SCBAE | Inh Ing Con | Irrit eyes, nose, throat; skin, eye burns | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, eyes, skin |

Hydrogen bromide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|---------|---|--|--|---|--|
| | | | | | MW, BP, SOL, F.P., IP, Sp.Gr, flammability | VP, FRZ, UEL, LEL | | |
| Hydrogen chloride HCl 7647-01-0 MW4025000 | Anhydrous hydrogen chloride; Aqueous hydrogen chloride (i.e., Hydrochloric acid, Muriatic acid) | NIOSH/OSHA C 5 ppm (7 mg/m ³) | 100 ppm | Colorless to slightly yellow gas with a pungent, irritating odor. [Note: Often used in an aqueous solution.] | MW: 36.5 BP: -121°F Sol(88°F): 67% F.P.: NA IP: 12.74 eV | VP: >1 atm FRZ: -174°F UEL: NA LEL: NA | Metals, hydroxides, amines, alkalis [Note: Hydrochloric acid is highly corrosive to most metals.] | Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids] |
| 1050 15 (anhydrous) | 1 ppm = 1.52 mg/m ³ | | | | Nonflammable Gas | | | |
| Hydrogen cyanide HCN 74-90-8 MW6825000 | Formonitrile, hydrocyanic acid, Prussic acid | NIOSH/OSHA ST 4.7 ppm (5 mg/m ³) [skin] | 50 ppm | Colorless or pale blue liquid or gas (above 78°F) with a bitter, almond- like odor. | MW: 27.0 BP: 78°F Sol: Miscible F.P.: 0°F IP: 13.60 eV | VP: 630 mm FRZ: 8°F UEL: 40.0% LEL: 5.6% | Amines, oxidizers, acids, sodium hydroxide, calcium hydroxide, sodium carbonate, water, caustics, ammonia [Note: Can polymerize at 122-140°F.] | Filter/Bub; KOH; ISE; III [#7904, Cyanides] [Note: Also Soda lime; Water; Vis; #6010.] |
| 1051 13 1613 57 (5% acid) | 1 ppm = 1.12 mg/m ³ | | | | Sp.Gr: 0.69 Class 1A Flammable Liquid | | | |
| Hydrogen fluoride (as F) HF 7664-39-3 MW7875000 | Anhydrous hydrogen fluoride; Aqueous hydrogen fluoride (i.e., Hydrofluoric acid); HF-A | NIOSH 3 ppm (2.5 mg/m ³) C 8 ppm 5 mg/m ³ [15-min] OSHA 3 ppm ST 8 ppm | 30 ppm | Colorless gas or fuming liquid (below 67°F) with a strong, irritating odor. [Note: Shipped in cylinders.] | MW: 20.0 BP: 67°F Sol: Miscible F.P.: NA IP: 15.98 eV | VP: >1 atm FRZ: -118°F UEL: NA LEL: NA | Metals, water or steam [Note: Corrosive to metals. Will attack glass and concrete.] | Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids] |
| 1052 15 (anhydrous) | 1 ppm = 0.83 mg/m ³ | | | | Sp.Gr: 1.00 (Liquid at 67°F) Nonflammable Gas | | | |
| Hydrogen peroxide H ₂ O ₂ 7722-84-1 MX0900000 2984 60 (8-20% soln) 2014 45 (20-52% soln) 2015 47 (>52% soln) | High-strength hydrogen peroxide, Hydrogen dioxide, Hydrogen peroxide (aqueous), Hydroperoxide, Peroxide | NIOSH/OSHA 1 ppm (1.4 mg/m ³) | 75 ppm | Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12°F. Often used in an aqueous solu- tion.] | MW: 34.0 BP: 288°F Sol: Miscible F.P.: NA IP: 10.54 eV | VP(88°F): 5 mm FRZ: 12°F UEL: NA LEL: NA | Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, manganese, silver [Note: Contact with combustible material may result in SPONTANEOUS combustion.] | None available |
| | 1 ppm = 1.41 mg/m ³ | | | | Sp.Gr: 1.39 Noncombustible Liquid, but a powerful oxidizer. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|---|----------------|-------------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss pH <3/Repeat pH >3 | NIOSH/OSHA | Inh | Inflam nose, throat, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 50 ppm: SA*/SCBA*/CCRS* | Ing | lar; cough, burns throat, | Skin: | Water flush immed | eyes |
| Wash: | Immed contam pH <3/ Prompt wet pH >3 | 100 ppm: SA:CF*/SCBAF/SAF/GMFS/ CCRS/PAPRS* | Con | choking; burns eyes, skin; derm; | Breath: | Resp support | |
| Change: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | in animals: lar spasm; pulm | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | Escape: GMFAG/SCBAE | | edema | | immed | |
| Provide: | pH <3/Prompt non-imperv wet pH <3: Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Asphy and death at high | Eye: | Irr immed | CNS, CVS, liver, |
| Goggles: | Any poss | 47 ppm: SA/SCBA | Abs | levels; weak, head, | Skin: | Water flush immed | kidneys |
| Wash: | Immed contam | 50 ppm: SA:CF/SCBAF/SAF | Ing | conf; nau, vomit; incr rate | Breath: | Resp support | |
| Change: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | and depth of respiration or | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | Escape: GMFS/SCBAE | | respiration slow and | | immed | |
| Provide: | Eyewash, quick drench | | | gasping | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Any poss | 30 ppm: SA*/SCBA*/PAPRS*/CCRS*/ GMFS | Ing | pulm edema; skin, eye | Skin: | Water flush immed | skin |
| Wash: | Immed contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | burns; nasal congestion; bron | Breath: | Resp support | |
| Change: | N.R. | Escape: GMFS/SCBAE | | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Any poss | 10 ppm: SA*/SCBA* | Ing | corneal ulcer; erythema, | Skin: | Water flush immed | sys |
| Wash: | Prompt contam | 25 ppm: SA:CF* | Con | vesicles on skin; | Breath: | Resp support | |
| Change: | N.R. | 50 ppm: SCBAF/SAF | | bleaching hair | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 75 ppm: SCBAF:PD,PP | | | | immed | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | | | | | |

Hydrogen peroxide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|---------|---|---|---|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Hydrogen selenide (as Se) H ₂ Se 7783-07-5 MX1050000 | Selenium dihydride, Selenium hydride | NIOSH/OSHA 0.05 ppm (0.2 mg/m ³) | 2 ppm | Colorless gas with an odor resembling decayed horse radish. | MW: 81.0 BP: -42°F Sol(73°F): 0.9% FLP: NA (Gas) IP: 9.88 eV | VP: >1 atm FRZ: -87°F UEL: ? LEL: ? | Strong oxidizers, acids, water, halogenated hydrocarbons | None available |
| 2202 18 | 1 ppm = 3.37 mg/m ³ | | | | Flammable Gas | | | |
| Hydrogen sulfide H ₂ S 7783-06-4 MX1225000 | Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen | NIOSH C 10 ppm (15 mg/m ³) [10-min] OSHA 10 ppm (14 mg/m ³) ST 15 ppm (21 mg/m ³) | 300 ppm | Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & can NOT be relied upon to warn of the continuous presence of H ₂ S. Shipped as a liquefied compressed gas.] | MW: 34.1 BP: -77°F Sol: 0.4% FLP: NA (Gas) IP: 10.46 eV | VP: >1 atm FRZ: -122°F UEL: 44.0% LEL: 4.0% | Strong oxidizers, strong nitric acid, metals | Dry tube/ Mol-sieve; Thermal desorp; GC/FID; II(6) [P&CAM #296] |
| 1053 13 | 1 ppm = 1.42 mg/m ³ | | | | Flammable Gas | | | |
| Hydroquinone C ₆ H ₄ (OH) ₂ 123-31-9 MX3500000 | 1,4-Benzenediol; Dihydroxybenzene; 1,4-Dihydroxybenzene; Quinol | NIOSH C 2 mg/m ³ [15-min] OSHA 2 mg/m ³ | Unknown | Light tan, light gray, or colorless crystals. | MW: 110.1 BP: 545°F Sol: 7% FLP: 329°F (Molten) IP: 7.95 eV | VP: 0.00001 mm MLT: 338°F UEL: ? LEL: ? | Strong oxidizers, alkalis | Filter; CH ₃ COOH; HPLC/UVD; III [#5004] |
| 2662 53 | | | | | Sp.Gr: 1.33 Combustible Solid, dust cloud may explode if ignited in an enclosed area. | | | |
| Iodine I ₂ 7553-56-2 NN1575000 | Iodine crystals, Molecular iodine | NIOSH/OSHA C 0.1 ppm (1 mg/m ³) | 10 ppm | Violet solid with a sharp, characteristic odor. | MW: 253.8 BP: 385°F Sol: 0.01% FLP: NA IP: 9.31 eV | VP(77°F): 0.3 mm MLT: 236°F UEL: NA LEL: NA | Ammonia, acetylene, acetaldehyde, powdered aluminum, active metals, liquid chlorine | Char*; Na ₂ CO ₃ ; IC; III [#6005] |
| | | | | | Sp.Gr: 4.93 Noncombustible | Solid | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------------|---|----------------|---|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Breath: | Resp support | Resp sys, eyes |
| Goggles: | N.R. | 0.5 ppm: SA/SCBA | Con | nausea, vomit, diarr; metallic taste, garlic breath; dizz, lass, fig; | | | |
| Wash: | N.R. | 1.25 ppm: SA/CF* | | in animals: pneumonia, liver damage | | | |
| Change: | N.R. | 2 ppm: SCBAF/SAF | | | | | |
| Remove: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Apnea, coma, convuls; | Eye: | Irr Immed | Resp sys, eyes |
| Goggles: | Reason prob | 100 ppm: SA/SCBA* | Ing | Irrit eyes: conj, pain, | Skin: | Water flush immed | |
| Wash: | N.R. | 250 ppm: SA/CF* | Con | lac, photo, corneal vesic; | Breath: | Resp support | |
| Change: | N.R. | 300 ppm: SCBAF/SAF | | irrit resp sys; dizz; head; | | | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | fig, irrit; insom; GI dist | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes: conj; kera; CNS | Eye: | Irr Immed (15 min) | Eyes, resp sys, |
| Goggles: | Any poss >7%/Reason | 50 mg/m ³ : PAPRD [†] | Ing | excitement; colored urine, | Skin: | Water flush | skin, CNS |
| Wash: | prob <7% | 100 mg/m ³ : HIEF/SCBAF/SAF/ | Con | nausea, dizz, suffocation, | Breath: | Fresh air | |
| Change: | Prompt contam | PAPRTHIE/SAT:CF [†] | | rapid breath; musc twitch, | Swallow: | Medical attention | |
| Remove: | After work if reason | 200 mg/m ³ : SAF:PD,PP | | delirium; collapse | | Immed | |
| Provide: | prob contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | Prompt non-imperv | Escape: HIEF/SCBAE | | | | | |
| | contam | | | | | | |
| | >7%: Eyewash | | | | | | |
| Clothing: | Any poss >7%/Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose; lac; | Eye: | Irr Immed | Resp sys, eyes, |
| Goggles: | <7% | 1 ppm: SA/SCBA* | Ing | head; tight chest; skin | Skin: | Soap wash immed | skin, CNS, CVS |
| Wash: | Any poss >7%/Reason | 2.5 ppm: SA/CF* | Con | burns, rash; cutaneous | Breath: | Resp support | |
| Change: | prob <7% | 5 ppm: SCBAF/SAF | | hypersensitivity | Swallow: | Medical attention | |
| Remove: | Immed contam >7%/ | 10 ppm: SAF:PD,PP | | | | Immed | |
| Provide: | Prompt contam <7% | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | N.R. | Escape: GMFAGHIE/SCBAE | | | | | |
| | Immed non-imperv contam | | | | | | |
| | >7%/Prompt non-imperv wet <7% | | | | | | |
| | 7%: Eyewash, quick drench | | | | | | |

Iodine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|---------------|---|---|--|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Iron oxide dust and fume (as Fe) Fe ₂ O ₃ 1309-37-1 NO7525000 1376 37 | Ferric oxide | NIOSH 5 mg/m ³ OSHA 10 mg/m ³ | N.E. | Reddish-brown solid. [Note: Exposure to fume may occur during the arc-welding of iron.] | MW: 159.7 BP: ? Sol: Insoluble FLP: NA IP: NA Sp.Gr: 5.24 Noncombustible Solid | VP: 0 mm (approx) MLT: 2664°F UEL: NA LEL: NA | Calcium hypochlorite | Filter; none; XRF; III [#7200, Welding & Brazing Fume] |
| Isoamyl acetate CH ₃ COOCH ₂ - CH ₂ CH(CH ₃) ₂ 123-92-2 NS9800000 | Banana oil, Isopentyl acetate, 3-Methyl-1-butanol acetate, 3-Methylbutyl ester of acetic acid, 3-Methylbutyl ethanoate | NIOSH/OSHA 100 ppm (525 mg/m ³) | 3000 ppm | Colorless liquid with a banana- like odor. | MW: 130.2 BP: 288°F Sol: 0.3% FLP: 77°F IP: ? Sp.Gr: 0.87 Class IC Flammable Liquid | VP: 4 mm FRZ: -109°F UEL: 7.5% LEL(212°F): 1.0% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; III [#1450, Esters I] |
| Isoamyl alcohol (primary and secondary) 1: (CH ₃) ₂ CHCH ₂ CH ₂ OH 2: (CH ₃) ₂ CHCH(OH)CH ₃ 1: 123-51-3 2: 528-75-4 1: EL5425000 1105 26 | 1(primary): Fermentation amyl alcohol, Fusel oil, Isobutyl carbinol, Isopentyl alcohol, 3-Methyl-1-butanol 2(secondary): 3-Methyl-2-butanol 1 ppm = 5.41 mg/m ³ | NIOSH/OSHA 100 ppm (380 mg/m ³) ST 125 ppm (450 mg/m ³) | 10,000 ppm | Colorless liquids with a disagree- able odor. | MW: 88.2 BP: 270/234°F Sol(57°F): 2%/? FLP: 109/ 95°F(oc) IP: ?/? Sp.Gr: 0.81 (at 57°F)/0.82 primary: Class II Combustible Liquid secondary: Class IC Flammable Liquid | VP: 28/1 mm FRZ: -179°F/? UEL(212°F): 9.0%/? LEL: 1.2%/? | Strong oxidizers | Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III] |
| Isobutyl acetate CH ₃ COOCH ₂ CH(CH ₃) ₂ 110-19-0 AI4025000 | Isobutyl ester of acetic acid, 2-Methylpropyl acetate, 2-Methylpropyl ester of acetic acid, beta-Methylpropyl ethanoate | NIOSH/OSHA 150 ppm (700 mg/m ³) | 7500 ppm | Colorless liquid with a fruity, floral odor. | MW: 116.2 BP: 243°F Sol(77°F): 0.6% FLP: 64°F IP: 9.97 eV Sp.Gr: 0.87 Class IB Flammable Liquid | VP: 13 mm FRZ: -145°F UEL: 10.5% LEL: 1.3% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; III [#1450, Esters I] |
| 1213 26 | 1 ppm = 4.83 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|---|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH | Inh | Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis | Breath: | Resp support | Resp sys |
| Goggles: | N.R. | 50 mg/m ³ : DMFw/SA/SCBA | | | | | |
| Wash: | N.R. | 125 mg/m ³ : PAPRDMFw/SA:CF | | | | | |
| Change: | N.R. | 250 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/SAT:CF | | | | | |
| Remove: | N.R. | 5000 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 1000 ppm: CCROV/PAPROV/SA/SCBA | Ing | narco; dermat | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 2500 ppm: SA:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 3000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 1000 ppm: CCRFOV/PAPROV ^c | Ing | narco; head, dizz; dysp, | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 2500 ppm: SA:CF ^c | Con | nau, vomit, diarr; skin | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: SCBAF/SAF/GMFOV | | cracking | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 10,000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Head; drow; irrit | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV ^c /CCRFOV | Ing | eyes, upper resp sys, | Skin: | Water flush prompt | sys |
| Wash: | Prompt wet | 3750 ppm: SA:CF ^c | Con | skin; anes | Breath: | Resp support | |
| Change: | N.R. | 7500 ppm: SCBAF/SAF/GMFOV | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |

Isobutyl acetate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|---------------|---|--|--|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Isobutyl alcohol (CH ₃) ₂ CHCH ₂ OH 78-83-1 NP9625000 | IBA, Isobutanol, Isopropylcarbinol, 2-Methyl-1-propanol | NIOSH/OSHA 50 ppm (150 mg/m ³) | 8000 ppm | Colorless, oily liquid with a sweet, musty odor. | MW: 74.1 BP: 227°F Sol: 10% Fl.P: 82°F IP: 10.12 eV | VP: 9 mm FRZ: -162°F UEL(202°F): 10.8% LEL(123°F): 1.7% | Strong oxidizers | Char; 2-Propanol/ CS ₂ ; GC/FID; III [#1401, Alcohols II] |
| 1212 26 | 1 ppm = 3.08 mg/m ³ | | | | Sp.Gr: 0.80 Class IC Flammable Liquid | | | |
| Isophorone C ₉ H ₁₆ O 78-59-1 GW7700000 | Isacetophorone; 3,5,5-Trimethyl-2-cyclo- hexenone; 3,5,5-Trimethyl-2-cyclo- hexen-1-one | NIOSH/OSHA 4 ppm (23 mg/m ³) | 800 ppm | Colorless to white liquid with a peppermint-like odor. | MW: 138.2 BP: 227°F Sol: 1% Fl.P: 184°F IP: 9.07 eV | VP(77°F): 0.4 mm FRZ: 17°F UEL: 3.8% LEL: 0.8% | Strong oxidizers | Char(pet); CS ₂ ; GC/FID; III [#2508] |
| | 1 ppm = 5.74 mg/m ³ | | | | Sp.Gr: 0.92 Class IIIA Combustible Liquid | | | |
| Isopropyl acetate CH ₃ COOCH(CH ₃) ₂ 108-21-4 AI4930000 | Isopropyl ester of acetic acid, 1-Methylethyl ester of acetic acid, 2-Propyl acetate | NIOSH See Appendix D OSHA 250 ppm (950 mg/m ³) ST 310 ppm (1185 mg/m ³) | 16,000 ppm | Colorless liquid with a fruity odor. | MW: 102.2 BP: 194°F Sol: 3% Fl.P: 36°F IP: 9.95 eV | VP: 42 mm FRZ: -92°F UEL: 8% LEL(100°F): 1.8% | Nitrates; strong oxidizers, alkalis & acids | Char; CS ₂ ; GC/FID; II(2) [#550] |
| 1220 26 | 1 ppm = 4.25 mg/m ³ | | | | Sp.Gr: 0.87 Class IB Flammable Liquid | | | |
| Isopropyl alcohol (CH ₃) ₂ CHOH 67-63-0 NT8050000 | Dimethyl carbinol, IPA, Isopropanol, 2-Propanol, sec-Propyl alcohol, Rubbing alcohol | NIOSH/OSHA 400 ppm (980 mg/m ³) ST 500 ppm (1225 mg/m ³) | 12,000 ppm | Colorless liquid with the odor of rubbing alcohol. | MW: 60.1 BP: 181°F Sol: Miscible Fl.P: 53°F IP: 10.10 eV | VP: 33 mm FRZ: -127°F UEL(200°F): 12.7% LEL: 2.0% | Strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates | Char; 2-Butanol/ CS ₂ ; GC/FID; III [#1400, Alcohols II] |
| 1219 26 | 1 ppm = 2.50 mg/m ³ | | | | Sp.Gr: 0.79 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|--|-------------------|--|--------------------------------------|--|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH/OSHA 500 ppm: SA*/SCBA*/CCROV* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA:CF* 2500 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, throat; head, drow; skin irrit, cracking | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, resp sys |
| Clothing: Repeat Goggles: Any poss Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet Provide: Eyewash | | NIOSH/OSHA 40 ppm: SA*/SCBA*/CCROV* 100 ppm: SA:CF*/PAPROV* 200 ppm: GMFOV/SCBAF/SAF/ PAPROV*/SAT:CF* 800 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, nose, throat; narco; derm | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, skin |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | OSHA 6250 ppm: SA:CF* 12,500 ppm: SCBAF/SAF 16,000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, nose, skin; derm; narco | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, resp sys |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH/OSHA 1000 ppm: PAPROV*/CCRFOV 10,000 ppm: SA:CF* 12,000 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Mild irrit eyes, nose, throat; drow, dizz, head; dry cracking skin | Eye: Skin: Breath: Swallow: | Irr immed Water flush Resp support Medical attention immed | Eyes, skin, resp sys |
| Isopropyl alcohol | | | | | | | |

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|---------------|--|---|--|--|---|
| | | | | | MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Isopropylamine (CH ₃) ₂ CHNH ₂ 75-31-0 NT8400000 | 2-Aminopropane, Monoisopropylamine, 2-Propylamine, sec-Propylamine | NIOSH See Appendix D OSHA 5 ppm (12 mg/m ³) ST 10 ppm (24 mg/m ³) | 4000 ppm | Colorless liquid with an ammonia- like odor. [Note: A gas above 91°F.] | MW: 59.1 BP: 91°F Sol: Miscible Fl.P(oc): -35°F IP: 8.72 eV | VP: 480 mm FRZ: -150°F UEL: ? LEL: ? | Strong acids, strong oxidizers | Sub: NaOH; GC/FID; II(3) [S147] |
| 1221 68 | 1 ppm = 2.46 mg/m ³ | | | | Sp.Gr: 0.69 Class 1A Flammable Liquid | | | |
| Isopropyl ether (CH ₃) ₂ CHOCH(CH ₃) ₂ 108-20-3 TZ5425000 | Diisopropyl ether, Diisopropyl oxide, 2-Isopropoxy propane | NIOSH/OSHA 500 ppm (2100 mg/m ³) ACGIH 250 ppm (1050 mg/m ³) ST 310 ppm (1320 mg/m ³) | 10,000 ppm | Colorless liquid with a sharp, sweet, ether-like odor. | MW: 102.2 BP: 154°F Sol: 0.2% Fl.P: -18°F IP: 9.20 eV | VP: 119 mm FRZ: -76°F UEL: 7.9% LEL: 1.4% | Strong oxidizers, acids [Note: Unstable peroxides may form upon long contact of isopropyl ether with air.] | Char; CS; GC/FID; II(3) [S368] |
| 1159 26 | 1 ppm = 4.25 mg/m ³ | | | | Sp.Gr: 0.73 Class 1B Flammable Liquid | | | |
| Isopropyl glycidyl ether C ₆ H ₁₂ O ₂ 4016-14-2 TZ3500000 | 1,2-Epoxy-3-isopropoxy- propane; IGE; Isopropoxymethyl oxirane | NIOSH C 50 ppm (240 mg/m ³) [15-min] OSHA 50 ppm (240 mg/m ³) ST 75 ppm (360 mg/m ³) | 1000 ppm | Colorless liquid. | MW: 116.2 BP: 279°F Sol: 19% Fl.P: 92°F IP: ? | VP(77°F): 9 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers, strong caustics | Char; CS; GC/FID; II(2) [S77] |
| | 1 ppm = 4.83 mg/m ³ | | | | Sp.Gr: 0.92 Class 1C Flammable Liquid | | | |
| Ketene CH ₂ =CO 463-51-4 QA7700000 | Carbomethene, Ethenone, Keto-ethylene | NIOSH/OSHA 0.5 ppm (0.9 mg/m ³) ST 1.5 ppm (3 mg/m ³) | Unknown | Colorless gas with a penetrating odor. | MW: 42.0 BP: -69°F Sol: Decomposes Fl.P: NA (Gas) IP: 9.61 eV | VP: >1 atm FRZ: -238°F UEL: ? LEL: ? | Water (decomposes), alcohols, ammonia [Note: Readily polymerizes.] | Sub: FeCl ₃ ; Vis: II(2) [S92] |
| | 1 ppm = 1.75 mg/m ³ | | | | Flammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|---------------------------|----------------------------|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | OSHA | Inh | Irrit eyes, nose, throat, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 125 ppm: SA:CF ¹ /PAPRS ² | Abs | skin; pulm edema; vis | Skin: | Water flush immed | eyes |
| Wash: | Immed wet | 250 ppm: CCRFS/GMFS/SCBAF/SAF/ PAPRS ² | Inh | dist; skin, eye burns; | Breath: | Resp support | |
| Change: | N.R. | | Con | derm | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 4000 ppm: SAF-PD, PP | | | | | |
| Provide: | Eyewash, quick drench | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | ACGIH | Inh | Irrit eyes, nose; resp | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Reason prob | 1000 ppm: PAPROV ¹ /CCROV ² | Ing | discomfort; derm; | Skin: | Soap wash prompt | |
| Wash: | Prompt wet | 2500 ppm: SA ¹ /SCBA ² | Con | in animals: drow, dizz, | Breath: | Resp support | |
| Change: | N.R. | 6250 ppm: SA:CF ² | | unconsciousness, narco | Swallow: | Medical attention immed | |
| Remove: | Immed wet | 10,000 ppm: SCBAF/SAF/GMFOV §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, upper resp | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 1000 ppm: SA:CF ¹ | Ing | sys, skin; skin sens | Skin: | Soap wash immed | sys |
| Wash: | Prompt contam | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit eyes, nose, throat, | Breath: | Resp support | Resp sys, eyes, |
| Goggles: | N.R. | 5 ppm: SA ¹ /SCBA ² | Con | lungs; pulm edema | | | skin |
| Wash: | N.R. | 12.5 ppm: SA:CF ² | | | | | |
| Change: | N.R. | 25 ppm: SCBAF/SAF | | | | | |
| Remove: | N.R. | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | | | | | |

Ketene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|------------------|--|---|--|--|---|
| | | | | | MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability | VP, FRZ, UEL, LEL | | |
| Lead (as Pb) Pb 7439-92-1 (Metal) OF7525000 (Metal) | Metal: Lead metal, Plumbum [Note: OSHA considers "Lead" to mean metallic Pb, all inorganic Pb cmpds (Pb oxides and Pb salts), and a class of organic Pb cmpds called soaps. All other organic Pb cmpds are excluded from this definition.] | NIOSH 0.100 mg/m³ [Air concentration to be maintained so that worker blood lead remains <0.060 mg/100 g of whole blood.] OSHA [1910.1025] 0.050 mg/m³ | 700 mg/m³ | Metal: A heavy, ductile, soft gray solid. | MW: 207.2 BP: 3164°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 621°F UEL: NA LEL: NA | Strong oxidizers, hydrogen peroxide, acids | Filter; HNO ₃ /H ₂ O ₂ ; AA; III [#7082] |
| 2291 53(soluble cmpds) | | | | | Sp.Gr: 11.34 (Metal) Metal: Noncombustible Solid in bulk form. | | | |
| Lindane C ₆ H ₆ Cl ₆ 58-89-9 GV4900000 | BHC; gamma-Hexachlorocyclohexane; HCH; 1,2,3,4,5,6-Hexachlorocyclohexane | NIOSH/OSHA 0.5 mg/m³ [skin] | 1000 mg/m³ | White to yellow, crystalline powder with a slight musty odor. [pesticide] | MW: 290.8 BP: 614°F Sol: 0.001% Fl.P: NA IP: ? | VP: 0.00001 mm MLT: 235°F UEL: NA LEL: NA | Corrosive to metals | Filter/Bub; Isocytane; GC/EConD; III [#5502] |
| 2761 55 | | | | | Sp.Gr: 1.85 Noncombustible Solid, but may be dissolved in flammable liquids. | | | |
| Lithium hydride LiH 7580-67-8 OJ6300000 | Lithium monohydride | NIOSH/OSHA 0.025 mg/m³ | 55 mg/m³ | Odorless, off-white to gray translucent, crystalline mass or white powder. Sp.Gr: 0.78 Combustible Solid, but can form airborne dust clouds which may explode on contact with flame, heat, or oxidizers. | MW: 7.95 BP: Decomposes Sol: Reacts Fl.P: ? IP: NA | VP: 0 mm (approx) MLT: 1256°F UEL: ? LEL: ? | Strong oxidizers, halogenated hydrocarbons, acids, water [Note: May ignite SPONTANEOUSLY in air and may reignite after fire is extinguished. Reacts with water to form hydrogen & lithium hydroxide.] | None available |
| 1414 40 2805 40 (fused solid) | | | | | | | | |
| L.P.G. C ₃ H ₈ /C ₃ H ₆ /C ₄ H ₁₀ /C ₄ H ₈ 68476-85-7 SE7545000 | Bottled gas, Compressed petroleum gas, Liquefied hydrocarbon gas, Liquefied petroleum gas, LPG | NIOSH/OSHA 1000 ppm (1800 mg/m³) | 19,000 ppm [LEL] | Colorless, noncorrosive, odorless gas when pure. [Note: A foul-smelling odorant is usually added. A fuel mixture of propane, propylene, butanes & butylenes. Shipped as a liquefied compressed gas.] Flammable Gas | MW: 42 to 58 BP: >-44°F Sol: ? Fl.P: NA (Gas) IP: 10.95 eV | VP: >1 atm FRZ: ? UEL: 9.5% (Propane) 8.4% (Butane) LEL: 2.1% (Propane) 1.6% (Butane) | Strong oxidizers, chlorine dioxide | Combustible gas meter; none; none; II(2) [S93] |
| 1075 22 | | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|----------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | OSHA | Inh | Weak, lass, insom; facial | Eye: | Irr immed | GI tract, CNS, |
| Goggles: | Reason prob | 0.5 mg/m ³ : SA/HIE/SCBA | Ing | pallor; pal eye, anor; | Skin: | Soap flush prompt | kidneys, blood, |
| Wash: | Daily | 1.25 mg/m ³ : PAPRIE/SA:CF | Con | low-wgt, malnut; constip; | Breath: | Resp support | gingival tissue |
| Change: | N.R. | 2.5 mg/m ³ : HIEF/PAPRIHIE/SCBAF/SAF/SAT:CF | | abdom pain, colic; anemia; | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 50 mg/m ³ : SA:PD,PP | | gingival lead line; | | immed | |
| | | 100 mg/m ³ : SAF:PD,PP | | tremor; para wrist, ankles; | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | encephalopathy; | | | |
| | | Escape: HIEF/SCBAE | | nephropathy; irrit eyes; | | | |
| | | | | hypotension | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Eyes, CNS, |
| Goggles: | N.R. | 5 mg/m ³ : CCROVDMFu/SA/SCBA | Abs | head; nau; clonic convuls; | Skin: | Soap wash prompt | blood, liver, |
| Wash: | Immed contam | 12.5 mg/m ³ : PAPROVDMFu/SA:CF* | Ing | resp difficulty; cyan; | Breath: | Resp support | kidneys, skin |
| Change: | After work if reason | 25 mg/m ³ : CCRFOVHIE/SCBAF/SAF/GMFOVHIE/PAPRTOVHIE* | Con | aplastic anemia; skin | Swallow: | Medical attention | |
| Remove: | prob contam | 1000 mg/m ³ : SAF:PD,PP | | irrit; musc spasm; | | immed | |
| Provide: | Immed non-imperv contam liq | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | In animals: liver, kidney damage | | | |
| | Quick drench | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Any poss sol/Repeat | NIOSH/OSHA | Inh | Burns eyes, skin; burns | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | air >0.1 mg/m ³ | 0.25 mg/m ³ : SA/SCBA/HIE | Ing | mouth, esophagus (if | Skin: | Water flush immed | eyes |
| Wash: | Any poss | 0.625 mg/m ³ : SA:CF*/PAPRIE* | Con | ingested); nau; musc | Breath: | Resp support | |
| Change: | Brush/Immed contam | 1.25 mg/m ³ : HIEF/SCBAF/SAF/PAPRIHIE* | | twitches; mental conf; | Swallow: | Medical attention | |
| Remove: | After work if any poss | 50 mg/m ³ : SAF:PD,PP | | blurred vision | | immed | |
| Provide: | Immed contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | Eyewash/>0.5 mg/m ³ : | Escape: HIEF/SCBAE | | | | | |
| | quick drench | | | | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | LI-head, drow | Eye: | Irr immed | Resp sys, CNS |
| Goggles: | Reason prob | 10,000 ppm: SA/SCBA | Ing | | Skin: | Water flush immed | |
| Wash: | N.R. | 19,000 ppm: SA:CF/SCBAF/SAF/SAT:CF | Con | | Breath: | Resp support | |
| Change: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Remove: | Immed wet (flamm) | Escape: SCBAE | | | | | |

L.P.G.

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|---------------------------|--|--|---|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Magnesium oxide fume MgO 1309-48-4 OM3850000 | Magnesia fume | NIOSH See Appendix D OSHA 10 mg/m ³ | N.E. | Finely divided white particulate dispersed in air. [Note: Exposure may occur when magnesium is burned, thermally cut, or welded upon.] | MW: 40.3 BP: 6512°F Sol(86°F): 0.009% Fl.P: NA IP: NA Sp.Gr: 3.58 Noncombustible Solid | VP: 0 mm (approx) MLT: 5072°F UEL: NA LEL: NA | Chlorine trifluoride, phosphorus penta- chloride | Filter; Acid; ICP; III [#7300, Elements] |
| Malathion C ₁₀ H ₁₉ O ₆ PS ₂ 121-75-5 WM8400000 2783 55 | S-[1,2-bis(ethoxycarbonyl) ethyl]0,0-dimethyl- phosphorodithioate; Diethyl (dimethoxyphosphino- thioylthio) succinate | NIOSH/OSHA 10 mg/m ³ [skin] | 5000 mg/m ³ | Deep brown to yellow liquid with a garlic-like odor. [Note: A solid below 37°F.] [insecticide] | MW: 330.4 BP: 140°F (Decomposes) Sol: 0.02% Fl.P(oc): >325°F IP: ? Sp.Gr: 1.21 Class IIIB Combustible Liquid, but may be difficult to ignite. | VP: 0.00004 mm FRZ: 37°F UEL: ? LEL: ? | Strong oxidizers, magnesium, alkaline pesticides [Note: Corrosive to metals.] | Filter; Isocetane; GC/FPD; III [#5012] |
| Maleic anhydride C ₄ H ₂ O ₃ 108-31-8 ON3675000 2215 60 | cis-Butenedioic anhydride; 2,5-Furandione; Maleic acid anhydride; Toxic anhydride | NIOSH/OSHA 1 mg/m ³ (0.25 ppm) | Unknown | Colorless needles, white lumps, or pellets with an irritating, choking odor. | MW: 98.1 BP: 396°F Sol: Reacts Fl.P: 218°F IP: 9.90 eV Sp.Gr: 1.48 Combustible Solid, but may be difficult to ignite. | VP: 0.2 mm MLT: 127°F UEL: 7.1% LEL: 1.4% | Strong oxidizers, water, alkalis, metals, caustics & amines above 150°F [Note: Reacts slowly with water (hydro- lyzes) to form maleic acid.] | Bub; none; HPLC/UVD; II(5) [P&CAM #302] |
| Manganese compounds (as Mn) Mn 7439-98-5 (Metal) OO9275000 (Metal) | Metal: Colloidal manganese, Manganese-55 Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH 1 mg/m ³ ST 3 mg/m ³ OSHA C 5 mg/m ³ | N.E. | Metal: A lustrous brittle, silvery solid. | MW: 54.9 BP: 3564°F Sol: Insoluble Fl.P: ? IP: NA Sp.Gr: 7.20 Combustible Solid | VP: 0 mm (approx) MLT: 2271°F UEL: ? LEL: ? | Oxidizers [Note: Will react with water or steam to produce hydrogen.] | Filter; Acid; ICP; III [#7300, Elements] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|-------------------|--|----------------|---|-------------------------|-------------------|-----------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | OSHA | Inh | Irrit eyes, nose; | Breath: | Resp support | Resp sys, eyes |
| Goggles: | N.R. | 100 mg/m ³ : DMFu/SA/SCBA | Con | metal fume fever: cough, chest pain, flu-like fever | | | |
| Wash: | N.R. | 250 mg/m ³ : SA:CF/PAPRODMFu | | | | | |
| Change: | N.R. | 500 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE* | | | | | |
| Remove: | N.R. | 5000 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Miosis, aching eyes, | Eye: | Irr Immed | Resp sys, liver, |
| Goggles: | Reason prob | 100 mg/m ³ : SA/SCBA/CCROVDMFu | Abs | blurred vision, lac; eye, | Skin: | Soap wash prompt | blood chol, CNS, |
| Wash: | Prompt contam | 250 mg/m ³ : SA:CF*/PAPROVDMFu* | Ing | skin irrit; saliv; anor, | Breath: | Resp support | CVS, GI tract |
| Change: | N.R. | 500 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ | Con | nau, vomit, abdom cramps, | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | GMFOVHIE/PAPRTOVHIE*/ | | diarr, gidd, conf, ataxia; | | immed | |
| | contam | SAT:CF* | | rhin, head; tight chest, | | | |
| | | 5000 mg/m ³ : SAF:PD,PP | | wheez, lar spasm | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Conj; photo, double vision; | Eye: | Irr Immed | Eyes, resp sys, |
| Goggles: | Any poss | 25 mg/m ³ : SA:CF† | Ing | nasal, upper resp irrit; | Skin: | Soap wash Immed | skin |
| Wash: | Prompt contam | 50 mg/m ³ : SCBAF/SAF | Con | bronchial asthma; derm | Breath: | Resp support | |
| Change: | N.R. | 2000 mg/m ³ : SAF:PD,PP | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| Provide: | Eyewash | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH | Inh | Parkinson's; asthenia, | Breath: | Resp support | Resp sys, CNS, |
| Goggles: | N.R. | 10 mg/m ³ : DMXSO*/SA/SCBA | Ing | insom, mental conf; | Swallow: | Medical attention | blood, kidneys |
| Wash: | N.R. | 25 mg/m ³ : PAPRDM*/SA:CF | | metal fume fever: dry | | | |
| Change: | N.R. | 50 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ | | throat, cough, tight chest, | | | |
| Remove: | N.R. | SAF/SAT:CF | | dysp, rales, flu-like | | | |
| | | 1000 mg/m ³ : SA:PD,PP | | fever; low-back pain; vomit; | | | |
| | | 2000 mg/m ³ : SAF:PD,PP | | mal; fig | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Manganese compounds (as Mn)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|----------------------|--|--|--|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Mercury vapor Hg 7439-97-8 OV4550000 | Colloidal mercury, Metallic mercury, Quicksilver | NIOSH/OSHA 0.05 mg/m ³ [skin] | 28 mg/m ³ | Silver-white, heavy, odorless liquid. | MW: 200.6 BP: 674°F Sol: Insoluble Fl.P: NA IP: ? | VP: 0.0012 mm FRZ: -38°F UEL: NA LEL: NA | Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper | Hydrar; Acid; AA cold; III [#6009] |
| 2809 60 | | | | | Sp.Gr: 13.6 Noncombustible Liquid | | | |
| Mercury (organo) alkyl compounds (as Hg) | Synonyms vary depending upon the specific (organo) alkyl compound. | NIOSH/OSHA 0.01 mg/m ³ ST 0.03 mg/m ³ [skin] | 10 mg/m ³ | Appearance and odor vary depending upon the specific (organo) alkyl compound. | Properties vary depending upon the specific (organo) alkyl compound. | | Strong oxidizers such as chlorine | None available |
| Mesityl oxide (CH ₃) ₂ C=CHCOCH ₃ 141-79-7 SB4200000 | Isobutenyl methyl ketone, Isopropylideneacetone, Methyl isobutenyl ketone, 4-Methyl-3-penten-2-one | NIOSH 10 ppm (40 mg/m ³) OSHA 15 ppm (60 mg/m ³) ST 25 ppm (100 mg/m ³) | 5000 ppm | Oily, colorless to light-yellow liquid with a peppermint- or honey-like odor. | MW: 98.2 BP: 266°F Sol: 3% Fl.P: 87°F IP: 9.08 eV | VP: 9 mm FRZ: -52°F UEL: 7.2% LEL: 1.4% | Oxidizers, acids | Char; Methanol/ CS ₂ ; GC/FID; III [#1301, Ketones II] |
| 1229 26 | 1 ppm = 4.08 mg/m ³ | | | | Sp.Gr(59°F): 0.86 Class IC Flammable Liquid | | | |
| Methoxychlor Cl ₃ CCH(C ₆ H ₄ OCH ₃) ₂ 72-43-5 KJ3675000 | p,p'-Dimethoxydiphenyltri- chloroethane; DMDT; Methoxy-DDT; 2,2-bis(p-Methoxyphenyl)- 1,1,1-trichloroethane; 1,1,1-Trichloro-2,2-bis- (p-methoxyphenyl)ethane | NIOSH Ca See Appendix A OSHA 10 mg/m ³ | Ca [N.E.] | Colorless to light yellow crystals with a slight, fruity odor. [insecticide] | MW: 345.7 BP: Decomposes Sol: Insoluble Fl.P: ? IP: ? | VP: Low MLT: 171-192°F UEL: ? LEL: ? | Oxidizers | Filter; Isocetane; GC/ECD; II(4) [#S371] |
| 2761 55 | | | | | Sp.Gr(77°F): 1.41 Combustible Solid, but difficult to burn. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|--|----------------|--|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Cough, chest pain, dysp, | Eye: | Irr immed | Skin, resp sys, |
| Goggles: | N.R. | 0.5 mg/m ³ : CCRS ¹ /SA/SCBA | Abs | bron pneumitis; tremor, | Skin: | Soap wash prompt | CNS, kidneys, |
| Wash: | Prompt contam | 1.25 mg/m ³ : SA-CF/PAPRS ¹ (canister) | Con | insom; irrity, indecision; | Breath: | Resp support | eyes |
| Change: | After work if reason prob contam | 2.5 mg/m ³ : SCBAF/SAF/SAT/CF/CCRFS ¹ /GMFS ¹ /PAPRTS(canister) | | head, fig, weak; stomatitis, saliv; GI dist, anor, | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 28 mg/m ³ : SA:PD,PP | | low-wgt; prot; irrit eyes, skin | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Pares; ataxia, dysarthria; | Eye: | Irr immed | CNS, kidneys, |
| Goggles: | Any poss | 0.1 mg/m ³ : SA/SCBA | Abs | vision, hearing dist; | Skin: | Soap wash immed | eyes, skin |
| Wash: | Immed contam | 0.25 mg/m ³ : SA:CF | Ing | spastic, jerky; dizz; | Breath: | Resp support | |
| Change: | After work if any poss contam | 0.5 mg/m ³ : SCBAF/SAF/SAT:CF | Con | saliv; lac; nau, vomit, diarr, constip; skin burns; emotional dist | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | 10 mg/m ³ : SA:PD,PP | | | | | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH | Inh | Irrit eyes, skin, muc | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 250 ppm: SA:CF ² /PAPROV ² | Ing | memb; narco, coma; | Skin: | Water flush immed | sys, CNS |
| Wash: | Immed contam | 500 ppm: CCRFOV/GMFOV/SCBAF/SAF | Con | in animals: CNS effects | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: SAF:PD,PP | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Quick drench | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh | None known in humans; | Skin: | Soap wash | None known |
| Goggles: | N.R. | v: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | in animals: fasc trembling, convuls; kidney, liver damage; [carc] | Breath: | Fresh air | |
| Wash: | Prompt contam | Escape: GMFOVHIE/SCBAE | | | Swallow: | Medical attention immed | |
| Change: | N.R. | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |

Methoxychlor

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|------------------------|--|---|--|--|---|
| | | | | | MW, BP, SOL, F.L.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methyl acetate <chem>CH3COOCH3</chem> 79-20-9 A19100000 | Methyl ester of acetic acid, Methyl ethanoate | NIOSH/OSHA 200 ppm (610 mg/m³) ST 250 ppm (760 mg/m³) | 10,000 ppm | Colorless liquid with a fragrant, fruity odor. | MW: 74.1 BP: 135°F Sol: 30% F.L.P.: 14°F IP: 10.27 eV | VP: 173 mm FRZ: -145°F UEL: 16% LEL: 3.1% | Nitrates; strong oxidizers, alkalis & acids; water [Note: Reacts slowly with water to form acetic acid & methanol.] | Char; CS; GC/FID; II(2) [#S42] |
| 1231 26 | 1 ppm = 3.08 mg/m³ | | | | Sp.Gr: 0.93 Class IB Flammable Liquid | | | |
| Methyl acetylene <chem>CH3C#CH</chem> 74-99-7 UK4250000 | Allylene, Propyne, 1-Propyne | NIOSH/OSHA 1000 ppm (1650 mg/m³) | 15,000 ppm [LEL] | Colorless gas with a sweet odor. [Note: A fuel that is shipped as a liquefied compressed gas.] | MW: 40.1 BP: -10°F Sol: Insoluble F.L.P.: NA (Gas) IP: 10.36 eV | VP: >1 atm FRZ: -153°F UEL: ? LEL: 1.7% | Strong oxidizers such as chlorine, copper alloys [Note: Can decompose explosively at 4.5 to 5.6 atmospheres of pressure.] | Bag; none; GC/FID; II(5) [#S84] |
| | 1 ppm = 1.67 mg/m³ | | | | Flammable Gas | | | |
| Methyl acetylene- propadiene mixture <chem>CH3C#CH/CH2=C=CH2</chem> UK4920000 | MAPP gas, Methyl acetylene-allene mixture, Methyl acetylene-propadiene mixture (stabilized), Propadiene-methyl acetylene, Propyne-allene mixture, Propyne-propadiene mixture | NIOSH/OSHA 1000 ppm (1800 mg/m³) ST 1250 ppm (2250 mg/m³) | 15,000 ppm [LEL] | Colorless gas with a strong, characteristic, foul odor. [Note: A fuel that is shipped as a liquefied compressed gas.] | MW: 40.1 BP: -36 to -4°F Sol: Insoluble F.L.P.: NA (Gas) IP: ? | VP: >1 atm FRZ: -213°F UEL: ? LEL: ? | Strong oxidizers, copper alloys [Note: Forms explosive com- pounds at high pressure in contact with alloys containing more than 67% copper.] | Bag; none; GC/FID; II(6) [#S85] |
| 1060 17 (stabilized) | 1 ppm = 1.67 mg/m³ | | | | Flammable Gas | | | |
| Methyl acrylate <chem>CH2=CHCOOCH3</chem> 96-33-3 AT2800000 | Methoxycarbonylethylene, Methyl ester of acrylic acid, Methyl propenoate | NIOSH/OSHA 10 ppm (35 mg/m³) [skin] | 1000 ppm | Colorless liquid with an acid odor. | MW: 86.1 BP: 176°F Sol: 6% F.L.P.: 25°F IP: 9.90 eV | VP: 65 mm FRZ: -106°F UEL: 25% LEL: 2.8% | Nitrates, oxidizers such as peroxides, strong alkalis [Note: Polymerizes easily; usually contains an inhibitor such as hydro- quinone.] | Char; CS; GC/FID; II(2) [#S38] |
| 1919 27 (inhibited) | 1 ppm = 3.58 mg/m³ | | | | Sp.Gr: 0.96 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|-----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit nose, throat; head, | Eye: | Irr Immed | Resp sys, skin, |
| Goggles: | Reason prob | 1000 ppm: CCROV*/PAPROV* | ing | drow; optic atrophy | Skin: | Water flush prompt | eyes |
| Wash: | Prompt wet | 2000 ppm: SA*/SCBA* | Con | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: SA:CF* | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | Immed | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Hyperexcitability, tremors, | Breath: | Resp support | CNS |
| Goggles: | Reason prob | 10,000 ppm: SA/SCBA | | anes; irrit resp sys | | | |
| Wash: | N.R. | 15,000 ppm: SA:CF/SCBAF/SAF | | | | | |
| Change: | N.R. | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| Remove: | Immed wet (flamm) | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Frostbite; disorientation, | Eye: | Irr Immed | CNS, skin, eyes |
| Goggles: | Reason prob | 10,000 ppm: SA/SCBA | Con | excitement | Skin: | Water flush immed | |
| Wash: | N.R. | 15,000 ppm: SA:CF/SCBAF/SAF | | | Breath: | Resp support | |
| Change: | N.R. | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| Remove: | Immed wet (flamm) | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, upper resp | Eye: | Irr Immed | Resp sys, eyes, |
| Goggles: | Reason prob | 100 ppm: SA*/SCBA* | Abs | sys, skin | Skin: | Water flush immed | skin |
| Wash: | Immed wet | 250 ppm: SA:CF* | Con | | Breath: | Resp support | |
| Change: | N.R. | 500 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 1000 ppm: SAF-PD,PP | | | | Immed | |
| Provide: | Quick drench | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |

Methyl acrylate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|------------------------|--|---|---|--|--|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methylal <chem>CH3OCH2OCH3</chem> 109-87-5 PA8750000 | Dimethoxymethane, Formal, Formaldehyde dimethylacetal, Methoxymethyl methyl ether, Methylene dimethyl ether | NIOSH/OSHA 1000 ppm (3100 mg/m³) | 15,000 ppm [LEL] | Colorless liquid with a chloroform- like odor. | MW: 76.1 BP: 111°F Sol: 33% Fl.P(oc): -26°F IP: 10.00 eV | VP: 330 mm FRZ: -157°F UEL: 13.8% LEL: 2.2% | Strong oxidizers, acids | Char; Hexane; GC/FID; III [#1611] |
| 1234 26 | 1 ppm = 3.16 mg/m³ | | | | Sp.Gr: 0.86 Class IB Flammable Liquid | | | |
| Methyl alcohol <chem>CH3OH</chem> 67-56-1 PC1400000 | Carbinol, Columbian spirits, Methanol, Wood alcohol, Wood spirits | NIOSH/OSHA 200 ppm (260 mg/m³) ST 250 ppm (325 mg/m³) [skin] | 25,000 ppm | Colorless liquid with a character- istic pungent odor. | MW: 32.1 BP: 147°F Sol: Miscible Fl.P: 52°F IP: 10.84 eV | VP: 92 mm FRZ: -144°F UEL: 36% LEL: 6.0% | Strong oxidizers | Si gel; Water; GC/FID; III [#2000, Methanol] |
| 1230 28 | 1 ppm = 1.33 mg/m³ | | | | Sp.Gr: 0.79 Class IB Flammable Liquid | | | |
| Methylamine <chem>CH3NH2</chem> 74-89-5 PF6300000 | Aminomethane, Anhydrous methylamine, Aqueous methylamine, Monomethylamine | NIOSH/OSHA 10 ppm (12 mg/m³) | 100 ppm | Colorless gas with a fish- or ammonia-like odor. [Note: A liquid below 21°F. Shipped as a liquefied compressed gas.] | MW: 31.1 BP: 21°F Sol: Soluble Fl.P: NA (Gas) IP: 8.97 eV | VP: >1 atm FRZ: -136°F UEL: 20.7% LEL: 4.9% | Mercury, strong oxidizers, nitromethane [Note: Corrosive to copper & zinc alloys, aluminum & galvanized surfaces.] | XAD-7; Reagent; HPLC/FLD; OSHA [#40] |
| 1061 19 (anhydrous) 1235 68 (aqueous soln) | 1 ppm = 1.29 mg/m³ | | | | Sp.Gr: 0.70 (Liquid at 13°F) Flammable Gas | | | |
| Methyl (n-amy) ketone <chem>CH3CO(CH2)4CH3</chem> 110-43-0 MJ5075000 | Amyl methyl ketone, n-Amyl methyl ketone, 2-Heptanone | NIOSH/OSHA 100 ppm (465 mg/m³) ACGIH 50 ppm (235 mg/m³) | 4000 ppm | Colorless to white liquid with a banana-like, fruity odor. | MW: 114.2 BP: 305°F Sol: 0.4% Fl.P: 102°F IP: 9.33 eV | VP: 3 mm FRZ: -32°F UEL(250°F) 7.9% LEL(151°F): 1.1% | Strong acids, alkalis & oxidizers [Note: Will attack some forms of plastic.] | Char; Methanol/ CS; GC/FID; III [#1301, Ketones II] |
| 1110 26 | 1 ppm = 4.75 mg/m³ | | | | Sp.Gr: 0.81 Class II Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|--|--------------------------|---|--------------------------------------|---|-----------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Goggles: Wash: Change: Remove: | Repeat Reason prob Prompt wet N.R. Immed wet (flamm) | NIOSH/OSHA 10,000 ppm: SA/SCBA 15,000 ppm: SA/CF/SCBAF/SAF g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Mild irrit eyes, upper resp; anos; irrit skin | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Skin, resp sys, CNS |
| Clothing: Goggles: Wash: Change: Remove: | Repeat Reason prob Prompt wet N.R. Immed wet (flamm) | NIOSH/OSHA 2000 ppm: SA/SCBA 5000 ppm: SA/CF 10,000 ppm: SCBAF/SAF/SAT:CF 25,000 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE | Inh Abs Ing Con | Eye irrit, head, drow, li-head, nau, vomit; vis dist, blindness | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, skin, CNS, GI tract |
| Clothing: Goggles: Wash: Change: Remove: Provide: | Any poss liq Any poss Immed contam N.R. Immed wet (flamm) Eyewash, quick drench | NIOSH/OSHA 100 ppm: SCBAF/SAF/CCRFS/GMFS/ PAPRS [†] g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh Abs Ing Con | Irrit eyes, resp sys; cough; skin, muc memb burns; derm; conj | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, eyes, skin |
| Clothing: Goggles: Wash: Change: Remove: | Repeat Reason prob Prompt wet N.R. Immed contam | ACGIH 500 ppm: CCROV*/SA*/SCBA* 1250 ppm: SA/CF*/PAPROV* 2500 ppm: CCRFOV/GMFOV/SCBAF/ SAF/SAT:CF* 4000 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Irrit eyes, muc memb; head; narco, coma; derm | Eye: Skin: Breath: Swallow: | Irr immed Soap wash Fresh air Medical attention immed | Eyes, skin, resp sys, CNS, PNS |

Methyl (n-amy) ketone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---|--|--|--|--|---|
| | | | | | MW, BP, SOL F.L.P. IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methyl bromide <chem>CH3Br</chem> 74-83-9 PA4900000 | Bromomethane, Monobromomethane | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 5 ppm (20 mg/m³) [skin] | Ca [2000 ppm] | Colorless gas with a chloroform-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.] | MW: 95.0 BP: 38°F Sol: 2% F.L.P.: ? IP: 10.54 eV Sp.Gr: 1.73 (Liquid at 32°F) Flammable Gas, but only in presence of a high energy ignition source. | VP: >1 atm FRZ: -137°F UEL: 18.0% LEL: 10% | Aluminum, magnesium, strong oxidizers [Note: Attacks aluminum to form aluminum trimethyl, which is SPONTANEOUSLY flammable.] | Char(2); CH ₃ Cl; GC/FID; III [#2520] |
| Methyl Cellosolve® <chem>CH3OCH2CH2OH</chem> 109-86-4 KL5775000 | EGME, Ethylene glycol monomethyl ether, Glycol monomethyl ether, 2-Methoxyethanol | NIOSH Reduce exposure to lowest feasible concentration. OSHA 25 ppm (80 mg/m³) [skin] | * [2000 ppm] *Not applicable because of the NIOSH REL. | Colorless liquid with a mild, ether-like odor. | MW: 76.1 BP: 256°F Sol: Miscible F.L.P.: 102°F IP: 9.60 eV Sp.Gr: 0.96 Class II Combustible Liquid | VP: 6 mm FRZ: -121°F UEL: 1.8% LEL: 14% | Strong oxidizers, caustics | Char; Methanol/ CH ₃ Cl; GC/FID; III [#1403, Alcohols IV] |
| Methyl Cellosolve® acetate <chem>CH3COOCH2CH2OCH3</chem> 110-49-6 KL5950000 | EGMEA, Ethylene glycol monomethyl ether acetate, Glycol monomethyl ether acetate, 2-Methoxyethyl acetate | NIOSH Reduce exposure to lowest feasible concentration. OSHA 25 ppm (120 mg/m³) [skin] | * [4000 ppm] *Not applicable because of the NIOSH REL. | Colorless liquid with a mild, ether-like odor. | MW: 118.1 BP: 293°F Sol: Miscible F.L.P.: 120°F IP: ? Sp.Gr: 1.01 Class II Combustible Liquid | VP: 2 mm FRZ: -85°F UEL: 8.2% LEL: 1.7% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; II(2) [#S39] |
| Methyl chloride <chem>CH3Cl</chem> 74-87-3 PA6300000 | Chloromethane, Monochloromethane | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 50 ppm (105 mg/m³) ST 100 ppm (210 mg/m³) | Ca [10,000 ppm] | Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations. [Note: Shipped as a liquefied compressed gas.] | MW: 50.5 BP: -12°F Sol: 0.5% F.L.P.: NA (Gas) IP: 11.28 eV Flammable Gas | VP: >1 atm FRZ: -144°F UEL: 17.4% LEL: 8.1% | Chemically-active metals such as potassium, powdered aluminum, zinc & magnesium; water [Note: Reacts with water (hydrolyzes) to form hydrochloric acid.] | Char(2); CH ₃ Cl; GC/FID; III [#1001] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|---|--------------------------|---|--------------------------------------|---|------------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Any poss Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench | | NIOSH ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Head; vis dist; verti; nau, vomit; mal; hand tremor; convuls; dysp; irrit eyes; skin irrit, vesic; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | CNS, resp sys, skin, eyes |
| Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench | | NIOSH ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Head, drow, weak; ataxia, tremor, som; anemic pallor, irrit eyes; [carc] | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | CNS, blood, skin, eyes, kidneys |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet | | ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Kidney damage; brain damage; eye irrit; in animals: eye, nose, throat irrit; narco | Eye: Skin: Breath: Swallow: | Irr immed Water flush prompt Resp support Medical attention immed | Kidneys, brain, CNS, PNS |
| Clothing: Prevent wet or freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm) | | NIOSH ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE | Inh Con | Dizz, nau, vomit; vis dist; stagger; slur speech; convuls, coma; liver, kidney damage; frostbite; [carc] | Eye: Skin: Breath: | Irr immed Water flush immed Resp support | CNS, liver, kidneys, skin |

Methyl chloride

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|---------------|--|--|---|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methyl chloroform <chem>CH2Cl3</chem> 71-55-6 KJ2975000 | Chloroethene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized) | NIOSH C 350 ppm (1900 mg/m ³) [15-min] OSHA 350 ppm (1900 mg/m ³) ST 450 ppm (2450 mg/m ³) | 1000 ppm | Colorless liquid with a mild, chloroform-like odor. | MW: 133.4 BP: 165°F Sol: 0.4% FLP: None IP: 11.00 eV Sp.Gr: 1.34 Noncombustible Liquid, however the vapor will burn. | VP: 100 mm FRZ: -23°F UEL: 12.5% LEL: 7.5% | Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] | Char; CS; GC/FID; III [#1003, Halo- genated Hydro- carbons] |
| 2831 74 | 1 ppm = 5.55 mg/m ³ | | | | | | | |
| Methylcyclohexane <chem>CH2C6H11</chem> 108-87-2 GV6125000 | Cyclohexylmethane, Hexahydrotoluene | NIOSH/OSHA 400 ppm (1600 mg/m ³) | 10,000 ppm | Colorless liquid with a faint, benzene-like odor. | MW: 98.2 BP: 165°F Sol: Insoluble FLP: 25°F IP: 9.85 eV Sp.Gr: 0.77 Class IB Flammable Liquid | VP(72°F): 43 mm FRZ: -196°F UEL: 6.7% LEL: 1.2% | Strong oxidizers | Char; CS; GC/FID; III [#1500, Hydro- carbons] |
| 2296 27 | 1 ppm = 4.08 mg/m ³ | | | | | | | |
| Methylcyclohexanol <chem>CH2C6H10OH</chem> 25639-42-3 GW0175000 | Hexahydroresol, Hexahydromethylphenol | NIOSH/OSHA 50 ppm (235 mg/m ³) | 10,000 ppm | Straw-colored liquid with a weak odor like coconut oil. | MW: 114.2 BP: 214°F Sol: 4% FLP: 154°F IP: ? Sp.Gr: 0.92 Class IIIA Combustible Liquid | VP(86°F): 2 mm FRZ: -58°F UEL: ? LEL: ? | Strong oxidizers | Char; CH2Cl2; GC/FID; II(4) [#S374] |
| 2617 26 | 1 ppm = 4.75 mg/m ³ | | | | | | | |
| o-Methylcyclohexanone <chem>CH2C6H9O</chem> 583-60-8 GW1750000 | 2-Methylcyclohexanone | NIOSH/OSHA 50 ppm (230 mg/m ³) ST 75 ppm (345 mg/m ³) [skin] | 2500 ppm | Colorless liquid with a weak peppermint-like odor. | MW: 112.2 BP: 325°F Sol: Insoluble FLP: 118°F IP: ? Sp.Gr: 0.93 Class II Combustible Liquid | VP: 1 mm (approx) FRZ: 7°F UEL: ? LEL: ? | Strong oxidizers | Porapak; Acetone; GC/FID; III [#2521] |
| 2297 26 | 1 ppm = 4.66 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------|---|----------------|--|----------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: SA*/SCBA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Head, less, CNS depres, poor equil; irrit eyes; derm; card arrhy | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Skin, CNS, CVS, eyes |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt wet | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Prompt non-imperv wet | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 4000 ppm: SA/SCBA 10,000 ppm: SA-CF/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | LI-head, drow; skin, nose, throat irrit | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, skin |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt wet | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 500 ppm: SA*/SCBA* 1250 ppm: SA-CF* 2500 ppm: SCBAF:SAF 10,000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Head: irrit eyes, upper resp sys; in animals: narco; liver, kidney damage | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, skin, eyes; in animals: CNS, liver, kidneys |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | Prompt contam | | Ing | | Breath: | | |
| Change: | N.R. | | Con | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 500 ppm: SA*/SCBA* 1250 ppm: SA-CF* 2500 ppm: SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | In animals: narco; irrit eyes, muc memb; derm | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | In animals; resp sys, liver, kidneys, skin |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | Prompt contam | | Ing | | Breath: | | |
| Change: | N.R. | | Con | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |

o-Methylcyclohexanone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|---|---|--|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methylene bisphenyl isocyanate <chem>CH2(C6H4NCO)2</chem> 101-68-8 NQ9350000 2489 53 | 4,4'-Diphenylmethane diisocyanate; MDI; Methylene bis(4-phenyl isocyanate; Methylene di-p-phenylene ester of isocyanic acid | NIOSH 0.05 mg/m ³ (0.005 ppm) C 0.2 mg/m ³ (0.020 ppm) [10-min] OSHA C 0.2 mg/m ³ (0.02 ppm) | 100 mg/m ³ | White to light- yellow, odorless flakes. [Note: A liquid above 99°F.] | MW: 250.3 BP: 342°F Sol: 0.2% Fl.P(oc): 396°F IP: ? Sp.Gr(122°F): 1.19 Combustible Solid | VP(104°F): 0.001 mm MLT: 99°F UEL: ? LEL: ? | Strong alkalis, acids, alcohol | Bub; Acetylate; HPLC/UVD; III [#5521] |
| Methylene chloride <chem>CH2Cl2</chem> 75-09-2 PA8050000 1593 74 | Dichloromethane, Methylene dichloride 1 ppm = 3.53 mg/m ³ | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 500 ppm C 1000 ppm 2000 ppm (5-min max peak in any 2 hrs) | Ca [5000 ppm] ACGIH A2, 50 ppm (175 mg/m ³) | Colorless liquid with a chloroform- like odor. [Note: A gas above 104°F.] | MW: 84.9 BP: 104°F Sol: 2% Fl.P: ? IP: 11.32 eV Sp.Gr: 1.33 Combustible Liquid | VP: 350 mm FRZ: -139°F UEL: 22% LEL: 14% | Strong oxidizers; caustics; chemically- active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid | Char(2); CS ₂ ; GC/FID; III [#1005] |
| Methyl formate <chem>HCOOCH3</chem> 107-31-3 LQ8925000 1243 26 | Methyl ester of formic acid, Methyl methanoate 1 ppm = 2.50 mg/m ³ | NIOSH/OSHA 100 ppm (250 mg/m ³) ST 150 ppm (375 mg/m ³) | 5000 ppm | Colorless liquid with a pleasant odor. [Note: A gas above 89°F.] | MW: 60.1 BP: 89°F Sol: 30% Fl.P: -2°F IP: 10.82 eV Sp.Gr: 0.98 Class IA Flammable Liquid | VP: 476 mm FRZ: -146°F UEL: 23% LEL: 4.5% | Strong oxidizers [Note: Reacts slowly with water to form methanol & formic acid.] | Carbo-B(2); Ethyl acetate; GC/FID; II(5) [#S291] |
| 5-Methyl-3-heptanone <chem>CH3CH2CO(CH2)4CH3</chem> 541-85-5 MJ7350000 2271 26 | Amyl ethyl ketone, Ethyl amyl ketone 1 ppm = 5.33 mg/m ³ | NIOSH/OSHA 25 ppm (130 mg/m ³) | 3000 ppm | Colorless liquid with a pungent odor. | MW: 128.2 BP: 315°F Sol: Insoluble Fl.P: 138°F IP: ? Sp.Gr: 0.82 Class II Combustible Liquid | VP: 2 mm FRZ: -70°F UEL: ? LEL: ? | Strong oxidizers | Char; Methanol/ CS ₂ ; GC/FID; III, Ketones II] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|---------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, eyes |
| Goggles: | Any poss | 2 mg/m ³ : SA*/SCBA* | Ing | cough, pulm secretions, | Skin: | Soap wash immed | |
| Wash: | Prompt contam | 5 mg/m ³ : SA,CF* | Con | chest pain, dysp; asthma | Breath: | Resp support | |
| Change: | After work if reason prob contam | 10 mg/m ³ : SCBAF/SAF | | | Swallow | Medical attention | |
| Remove: | Prompt non-imperv contam | 100 mg/m ³ : SCBAF-PD,PP | | | | immed | |
| | | g: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Ftg, weak, sleepiness, | Eye: | Irr immed | Skin, CVS, eyes, |
| Goggles: | Reason prob | V: SCBAF-PD,PP/SAF-PD,PP:ASCBA | Ing | ti-head; limbs numb, | Skin: | Soap wash prompt | CNS |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | Con | tingle; nau; irrit eyes, | Breath: | Resp support | |
| Change: | N.R. | | | skin; [carc] | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eye, nose irrit; chest | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Reason prob | 1000 ppm: SA*/SCBA* | Abs | oppression, dysp; vis | Skin: | Soap wash immed | CNS |
| Wash: | Prompt wet | 2500 ppm: SA,CF* | Ing | dist; CNS depres; | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: SCBAF/SAF | Con | in animals: pulm edema | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | immed | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, muc memb; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 250 ppm: SA*/SCBA* | Ing | head; narco, coma; derm | Skin: | Water flush | sys, CNS |
| Wash: | Prompt wet | 625 ppm: SA,CF*/PAPROV* | Con | | Breath: | Resp support | |
| Change: | N.R. | 1000 ppm: CCRFOV | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 1250 ppm: GMFOV/SCBAF/SAF | | | | immed | |
| | | 3000 ppm: SAF-PD,PP | | | | | |
| | | g: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

5-Methyl-3-heptanone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|------------------------------------|---|--|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methyl hydrazine <chem>CH3NHNH2</chem> 60-34-4 MV5600000 | Monomethyl hydrazine, MMH | NIOSH Ca See Appendix A C 0.04 ppm (0.08 mg/m ³) (2-hr) OSHA C 0.2 ppm (0.35 mg/m ³) [skin] | Ca [50 ppm] ACGIH A2 | Fuming, colorless liquid with an ammonia-like odor. | MW: 48.1 BP: 190°F Sol: Miscible Fl.P: 17°F IP: 8.00 eV | VP(77°F): 50 mm FRZ: -62°F UEL: 92% LEL: 2.5% | Oxides of iron; copper; manganese; lead; copper alloys; porous materials such as earth, asbestos, wood & cloth; strong oxidizers such as fluorine & chlorine; nitric acid; hydrogen peroxide | Bub; Pho-acid; Vis; II(3); [#S149] |
| 1244 28 | 1 ppm = 1.92 mg/m ³ | | | | Sp.Gr(77°F): 0.87 Class IB Flammable Liquid | | | |
| Methyl iodide <chem>CH3I</chem> 74-88-4 PA9450000 | Iodomethane, Moniodomethane | NIOSH Ca See Appendix A 2 ppm (10 mg/m ³) [skin] OSHA 2 ppm (10 mg/m ³) [skin] | Ca [800 ppm] ACGIH A2 | Colorless liquid with a pungent, ether-like odor. [Note: Turns yellow, red, or brown on expo- sure to light & moisture.] | MW: 141.9 BP: 109°F Sol: 1% Fl.P: NA IP: 9.54 eV | VP(77°F): 400 mm FRZ: -88°F UEL: NA LEL: NA | Strong oxidizers [Note: Decomposes at 518°F.] | Char; Toluene; GC/FID; III [#1014] |
| 2644 55 | 1 ppm = 5.90 mg/m ³ | | | | Sp.Gr: 2.28 Noncombustible Liquid | | | |
| Methyl isobutyl carbinol <chem>(CH3)2CHCH2CH2-</chem> <chem>(OH)CH3</chem> 108-11-2 SA7350000 | Isobutylmethylcarbinol, Methyl amyl alcohol, 4-Methyl-2-pentanol, MIBC | NIOSH/OSHA 25 ppm (100 mg/m ³) ST 40 ppm (165 mg/m ³) [skin] | 2000 ppm | Colorless liquid with a mild odor. | MW: 102.2 BP: 271°F Sol: 2% Fl.P: 106°F IP: ? | VP: 3 mm FRZ: -130°F UEL: 5.5% LEL: 1.0% | Strong oxidizers | Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III] |
| 2053 26 | 1 ppm = 4.25 mg/m ³ | | | | Sp.Gr: 0.81 Class II Combustible Liquid | | | |
| Methyl isocyanate <chem>CH3NCO</chem> 624-83-9 NQ9450000 | Methyl ester of isocyanic acid, MIC | NIOSH/OSHA 0.02 ppm (0.05 mg/m ³) [skin] | 20 ppm | Colorless liquid with a sharp, pungent odor. | MW: 57.1 BP: 139°F Sol(59°F): 10% Fl.P: 19°F IP: 10.67 eV | VP: 348 mm MLT: -49°F UEL: 26% LEL: 5.3% | Water, oxidizers, acids, alkalis, amines, iron, tin, copper | XAD-7; CH3CN; HPLC/FLD; OSHA [#54] |
| 2480 30 | 1 ppm = 2.37 mg/m ³ | | | | Sp.Gr: 0.96 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|---------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, vomit, diarr, | Eye: | Irr immed | CNS, resp sys, |
| Goggles: | Any poss | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | resp sys irrit, tremors, | Skin: | Water flush immed | liver, blood, |
| Wash: | Immed contam | Escape: SCBAE | Ing | ataxia; anoxia, cyan; | Breath: | Resp support | CVS, eyes |
| Change: | N.R. | | Con | convuls, [carc] | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Nau, vomit; verti, | Eye: | Irr immed | CNS, skin, eyes |
| Goggles: | Reason prob | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | ataxia; slurred speech, | Skin: | Soap flush immed | |
| Wash: | Immed wet | Escape: GMFOV/SCBAE | Ing | drow; derm; eye irrit; | Breath: | Resp support | |
| Change: | N.R. | | Con | [carc] | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eye irrit; head, drow; | Eye: | Irr immed | Eyes, skin |
| Goggles: | Reason prob | 625 ppm: SA:CF* | Abs | derm | Skin: | Water flush prompt | |
| Wash: | Prompt wet | 1250 ppm: SCBAF/SAF | Ing | | Breath: | Resp support | |
| Change: | N.R. | 2000 ppm: SAF:PD,PP | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 0.2 ppm: SA*/SCBA* | Abs | cough, secretions, chest | Skin: | Water flush immed | skin |
| Wash: | Immed contam | 0.5 ppm: SA:CF* | Ing | pain, dysp; asthma; eye, | Breath: | Resp support | |
| Change: | N.R. | 1 ppm: SCBAF/SAF | Con | skin inj; | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | 20 ppm: SAF:PD,PP | | in animals: pulm edema | | | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |

Methyl isocyanate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|----------|--|---|--|---|---|
| | | | | | MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Methyl mercaptan <chem>CH3SH</chem> 74-93-1 PB4375000 | Mercaptomethane, Methanethiol, Methyl sulfhydrate | NIOSH C 0.5 ppm (1 mg/m³) [15-min] OSHA 0.5 ppm (1 mg/m³) | 400 ppm | Colorless gas with a disagreeable odor like garlic or rotten cabbage. [Note: A liquid below 43°F. Shipped as a liquefied compressed gas.] | MW: 48.1 BP: 43°F Sol: 2% Fl.P(oc): 0°F (Liquid) IP: 9.44 eV Sp.Gr: 0.90 (Liquid at 32°F) Flammable Gas Class 1A Flammable Liquid | VP: >1 atm FRZ: -186°F UEL: 21.8% LEL: 3.9% | Strong oxidizers, bleaches | Filter; HCl/CH ₂ Cl ₂ ; GC/FPD; OSHA [#26] |
| 1064 13 | 1 ppm = 2.00 mg/m³ | | | | | | | |
| Methyl methacrylate <chem>CH2=C(CH3)COOCH3</chem> 80-62-6 OZ5075000 | Methacrylate monomer, Methyl ester of methacrylic acid, Methyl-2-methyl-2-propenoate | NIOSH/OSHA 100 ppm (410 mg/m³) | 4000 ppm | Colorless liquid with an acrid, fruity odor. | MW: 100.1 BP: 214°F Sol: Slight Fl.P(oc): 50°F IP: 9.70 eV Sp.Gr: 0.94 Class 1B Flammable Liquid | VP(77°F): 40 mm FRZ: -54°F UEL: 8.2% LEL: 1.7% | Nitrates, oxidizers, peroxides, strong alkalis, moisture [Note: May polymerize if subjected to heat, oxidizers, or ultraviolet light. Usually contains an inhibitor such as hydroquinone.] | XAD-2; CS ₂ ; GC/FID; III [#2537] |
| 1247 27 (inhibited) | 1 ppm = 4.18 mg/m³ | | | | | | | |
| alpha-Methyl styrene <chem>C6H5C(CH3)=CH2</chem> 98-83-9 WL5250000 | AMS, Isopropenyl benzene, 1-Methyl-1-phenylethylene, 2-Phenyl propylene | NIOSH/OSHA 50 ppm (240 mg/m³) ST 100 ppm (485 mg/m³) | 5000 ppm | Colorless liquid with a character- istic odor. | MW: 118.2 BP: 330°F Sol: Insoluble Fl.P: 129°F IP: 8.35 eV Sp.Gr: 0.91 Class II Combustible Liquid | VP: 2 mm FRZ: -10°F UEL: 6.1% LEL: 1.9% | Oxidizers, peroxides, halogens, catalysts for vinyl or ionic polymers; aluminum, iron chloride, copper [Note: Usually con- tains an inhibitor such as tert-butyl catechol.] | Char; CS ₂ ; GC/FID; III [#1501, Aromatic Hydro- carbons] |
| | 1 ppm = 4.91 mg/m³ | | | | | | | |
| Mica (containing less than 1% quartz) 12001-26-2 VV8760000 | Silicate mica | NIOSH/OSHA 3 mg/m³ (resp) | N.E. | Colorless, odor- less flakes or sheets of hydrous silicates. | MW: 797(approx) BP: ? Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 2.6-3.2 Noncombustible Solid | VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA | None reported | Filter; none; Grav; III [#0600, Nuisance Dust (resp)] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------|---|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Prevent freezing | NIOSH/OSHA | Inh | Narco; cyan; convuls; | Eye: | Irr Immed | Resp sys, CNS |
| Goggles: | Reason prob | 5 ppm: SA/SCBA/CCROV | Con | pulm irrit | Skin: | Water flush immed | |
| Wash: | N.R. | 12.5 ppm: SA:CF/PAPROV | | | Breath: | Resp support | |
| Change: | N.R. | 25 ppm: SCBAF/SAF/CCRFOV/GMFOV/ PAPRTOV/SAT:CF | | | | | |
| Remove: | Immed wet (flamm) | 400 ppm: SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr Immed | Eyes, upper resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV*/CCRFOV | Ing | derm | Skin: | Water flush prompt | sys, skin |
| Wash: | Prompt wet | 2500 ppm: SA:CF ^c | Con | | Breath: | Resp support | |
| Change: | N.R. | 4000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr Immed | Eyes, resp sys, |
| Goggles: | Reason prob | 500 ppm: CCROV*/SA*/SCBA* | Ing | drow; derm | Skin: | Water flush prompt | skin |
| Wash: | Prompt contam | 1000 ppm: PAPROV*/CCRFOV | Con | | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: SA:CF* | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 2500 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Pneumoconiosis, cough, | Eye: | Irr Immed | Lungs |
| Goggles: | N.R. | 15 mg/m ³ : DM | | dysp; weak; low-wgt | Breath: | Fresh air | |
| Wash: | N.R. | 30 mg/m ³ : DMXSQ/SA/SCBA | | | | | |
| Change: | N.R. | 75 mg/m ³ : PAPRDM/SA:CF | | | | | |
| Remove: | N.R. | 150 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ SAF/SAT:CF 1500 mg/m ³ : SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |

Mica (containing less than 1% quartz)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|----------|---|---|---|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Molybdenum (soluble compounds as Mo) | Synonyms vary depending upon the specific soluble compound. | NIOSH See Appendix D OSHA 5 mg/m ³ | N.E. | Appearance and odor vary depending upon the specific soluble compound. | Properties vary depending upon the specific soluble compound. | | Alkali metals, sodium, potassium, molten magnesium | Filter; Acid; ICP; III [#7300, Elements] |
| Molybdenum (insoluble compounds as Mo) | Metal: Molybdenum metal Synonyms of other insoluble compounds vary depending upon the specific compound. | NIOSH See Appendix D OSHA 10 mg/m ³ | N.E. | Metal: Dark gray or black powder with a metallic luster. | MW: 95.9 BP: 8717°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 4752°F UEL: NA LEL: NA | Strong oxidizers | Filter; Acid; ICP; III [#7300, Elements] |
| Mo (Metal) | | | | | Sp.Gr: 10.28 (Metal) Flammable in form of dust or powder. | | | |
| 7439-93-7 (Metal) QA4680000 (Metal) | | | | | | | | |
| Monomethyl aniline C ₆ H ₅ NHCH ₃ 100-81-8 BY4550000 | MA, Methyl aniline, N-Methyl aniline, (Methylamino)benzene, Methylphenyl amine | NIOSH/OSHA 0.5 ppm (2 mg/m ³) [skin] | 100 ppm | Yellow to light- brown liquid with a weak, ammonia- like odor. | MW: 107.2 BP: 384°F Sol: Insoluble Fl.P: 175°F IP: 7.32 eV | VP(97°F): 1 mm FRZ: -71°F UEL: ? LEL: ? | Strong acids, strong oxidizers | Bub; NaOH; GC/FID; II(3) [#S153] |
| 2294 57 | 1 ppm = 4.46 mg/m ³ | | | | Sp.Gr: 0.99 Class IIIA Combustible Liquid | | | |
| Morpholine C ₄ H ₉ ONH 110-91-8 QD6475000 | Diethylene imidoxide; Diethylene oximide; Tetrahydro-1,4-oxazine; Tetrahydro-p-oxazine | NIOSH/OSHA 20 ppm (70 mg/m ³) ST 30 ppm (105 mg/m ³) [skin] | 8000 ppm | Colorless liquid with a weak, ammonia- or fish- like odor. [Note: A solid below 23°F.] | MW: 87.1 BP: 264°F Sol: Miscible Fl.P(oc): 98°F IP: 8.88 eV | VP: 6 mm FRZ: 23°F UEL: 11.2% LEL: 1.4% | Strong acids, strong oxidizers, metals [Note: Corrosive to metals.] | Si gel; H ₂ SO ₄ /NaOH; GC/FID; II(3) [#S150] |
| 2054 29 | 1 ppm = 3.62 mg/m ³ | | | | Sp.Gr: 1.00 Class IC Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--------------------------|--|----------------|------------------------------|-------------------------|-------------------|-----------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 6) |
| Clothing: | Repeat | OSHA | Inh | In animals: anor; inco; | Eye: | Irr immed | Resp sys; |
| Goggles: | Reason prob | 25 mg/m ³ : DM* | Ing | irrit eyes, nose, throat; | Skin: | Water flush | In animals: |
| Wash: | Prompt contam | 50 mg/m ³ : DMXSO*/SA*/SCBA* | Con | dysp; anemia | Breath: | Resp support | kidneys, blood |
| Change: | N.R. | 125 mg/m ³ : PAPRDM*/SA:CF* | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 250 mg/m ³ : HIEF/PAPRTHIE*/SAT:CF*/SCBAF/SAF | | | | | |
| | | 2500 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | OSHA | Inh | In animals: irrit eyes, | Breath: | Resp support | None known in |
| Goggles: | N.R. | 50 mg/m ³ : DM* | Ing | nose, throat; anor, diarr, | Swallow: | Medical attention | humans |
| Wash: | N.R. | 100 mg/m ³ : DMXSO*/SA/SCBA | | low-wgt; listlessness; | | | |
| Change: | N.R. | 250 mg/m ³ : PAPRDM*/SA:CF | | liver, kidney damage | | | |
| Remove: | N.R. | 500 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBAF/SAF | | | | | |
| | | 5000 mg/m ³ : SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Weak, dizz, head; dysp, | Eye: | Irr immed | Resp sys, liver, |
| Goggles: | Reason prob | 5 ppm: SA/SCBA | Abs | cyan; methemoglobinemia; | Skin: | Soap wash immed | kidneys, blood |
| Wash: | Immed contam | 12.5 ppm: SA:CF | Ing | pulm edema; liver, kidney | Breath: | Resp support | |
| Change: | N.R. | 25 ppm: SCBAF/SAF/SAT:CF | Con | damage | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 100 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss >25%/Repeat | NIOSH/OSHA | Inh | Via dist; nose irrit; cough; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | <25% | 550 ppm: SA:CF*PAPROV* | Abs | resp irrit; eye, skin irrit; | Skin: | Water flush immed | skin |
| Wash: | Any poss | 1000 ppm: SCBAF/SAF/CCRFOV | Ing | liver, kidney, damage | Breath: | Art resp | |
| Change: | Prompt Contam | 8000 ppm: SAF:PD,PP | Con | | Swallow: | Medical attention | |
| Remove: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Immed wet (flamm) | Escape: GMFOV/SCBAE | | | | | |
| | 15-25%: Eyewash/ | | | | | | |
| | >25%: Quick drench | | | | | | |

Morpholine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|------------------------|--|--|--|--|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Naphtha (coal tar) 3030-30-6 DE3030000 | Crude solvent coal tar naphtha, High solvent naphtha, Naphtha | NIOSH/OSHA 100 ppm (400 mg/m ³) | 10,000 ppm [LEL] | Reddish-brown, mobile liquid with an aromatic odor. | MW: 110(approx) BP: 320-428°F Sol: Insoluble FLP: 100-109°F IP: ? | VP: <5 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers | Char; CS ₂ ; GC/FID; III [#1550] |
| 2553 27 | 1 ppm = 4.57 mg/m ³ (approx) | | | | Sp.Gr: 0.89-0.97 Class II Combustible Liquid | | | |
| Naphthalene C ₁₀ H ₈ 91-20-3 QJ0525000 | Naphthalin, Tar camphor, White tar | NIOSH/OSHA 10 ppm (50 mg/m ³) ST 15 ppm (75 mg/m ³) | 500 ppm | Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.] | MW: 128.2 BP: 424°F Sol: 0.003% FLP: 174°F IP: 8.12 eV | VP: 0.08 mm MLT: 178°F UEL: 5.9% LEL: 0.9% | Strong oxidizers, chromic anhydride | Char; CS ₂ ; GC/FID; III [#1501, Aromatic Hydro- carbons] |
| 1334 32 | | | | | Sp.Gr: 1.15 Combustible Solid, but will take some effort to ignite. | | | |
| alpha-Naphthylamine C ₁₀ H ₇ NH ₂ 134-32-7 QM1400000 | 1-Aminonaphthalene, 1-Naphthylamine | NIOSH Ca See Appendix A OSHA [1910.1004] See Appendix B | Ca | Colorless crystals with an ammonia- like odor. [Note: Darkens in air to a reddish- purple color.] | MW: 143.2 BP: 573°F Sol: 0.002% FLP: 315°F IP: 7.30 eV | VP(220°F): 1 mm MLT: 222°F UEL: ? LEL: ? | Oxidizes in air | Filter/ Si gel; CH ₃ COOH/ 2-Pro- panol; GC/FID; III [#5518] |
| 2077 55 | | | | | Sp.Gr(77°F): 1.12 Combustible Solid | | | |
| beta-Naphthylamine C ₁₀ H ₇ NH ₂ 91-59-8 QM2100000 | 2-Aminonaphthalene, 2-Naphthylamine | NIOSH Ca See Appendix A OSHA [1910.1009] See Appendix B ACGIH A1 | Ca | Odorless, white to red crystals with a faint aromatic odor. [Note: Darkens in air to a reddish- purple color.] | MW: 143.2 BP: 583°F Sol: Miscible in hot water FLP: 315°F IP: 9.71 eV | VP(226°F): 1 mm MLT: 232°F UEL: ? LEL: ? | None reported | Filter/ Si gel; CH ₃ COOH/ 2-Pro- panol; GC/FID; III [#5518] |
| 1650 55 | | | | | Sp.Gr(208°F): 1.06 Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|------------------------|--|----------------|---------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Li-head, drow; irrit | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 1000 ppm: PAPROV ² /CCRFOV | Ing | eyes, nose, skin; derm | Skin: | Soap wash prompt | skin |
| Wash: | Prompt wet | 2500 ppm: SA:CF ¹ | Con | | Breath: | Resp support | |
| Change: | N.R. | 5000 ppm: GMFOV/SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 10,000 ppm: SAF:PD,PP | | | | immed | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eye irrit; head; conf, | Eye: | Irr immed | Eyes, blood, |
| Goggles: | Reason prob | 100 ppm: CCROVDM*/SA*/SCBA* | Abs | excitement, mal; nau, | Skin: | Molten: flush | liver, kidneys, |
| Wash: | Prompt contam | 250 ppm: SA:CF*/PAPROVDM* | Ing | vomit, abdom pain; irrit | | immed/ | skin, RBC, CNS |
| Change: | After work if reason | 500 ppm: CCRFOVHIE/SCBAF/SAF | Con | bladder; profuse sweat; | Breath: | Sol-Liq: soap | |
| Remove: | Prompt non-imperv | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | jaun; hema, hemog, renal | Swallow: | wash prompt | |
| | contam | Escape: GMFOVHIE/SCBAE | | shutdown; derm | | Resp support | |
| | | | | | | Medical attention | |
| | | | | | | immed | |
| Clothing: | Any poss | NIOSH | Inh | Derm; hemorrhagic | Eye: | Irr immed (15 min) | Bladder, skin |
| Goggles: | Any poss | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | cystitis; dysp, ataxia, | Skin: | Soap wash immed | |
| Wash: | Immed contam/daily | Escape: HIEF/SCBA | Ing | methemoglobinemia; | Breath: | Resp support | |
| Change: | After work if any poss | | Con | hema; dysuria; [carc] | Swallow: | Medical attention | |
| Remove: | Immed contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Derm; hemorrhagic | Eye: | Irr immed (15 min) | Bladder, skin |
| Goggles: | Any poss | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | cystitis; dysp; ataxia; | Skin: | Soap wash immed | |
| Wash: | Immed contam/daily | Escape: HIEF/SCBA | Con | methemoglobinemia, hema; | Breath: | Resp support | |
| Change: | After work if any poss | | Ing | dysuria; [carc] | Swallow: | Medical attention | |
| Remove: | Immed contam | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |

beta-Naphthylamine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|----------------------|---|---|---|---|--|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Nickel carbonyl (as Ni) Ni(CO) ₄ 13483-39-3 QR8300000 | Nickel tetracarbonyl | NIOSH Ca See Appendix A 0.001 ppm (0.007 mg/m ³) OSHA 0.001 ppm (0.007 mg/m ³) | Ca [7 ppm] | Colorless to yellow liquid with a musty odor. [Note: A gas above 110°F.] | MW: 170.7 BP: 110°F Sol: 0.05% Fl.P: < 4°F IP: 8.28 eV | VP: 315 mm FRZ: -13°F UEL: ? LEL: 2% | Nitric acid, bromine, chlorine & other oxidizers; flammable materials | Char(low Ni); HNO ₃ ; HGA; III [#6007] |
| 1259 28 | 1 ppm = 7.10 mg/m ³ | | | | Sp.Gr(63°F): 1.32 Class IB Flammable Liquid | | | |
| Nickel metal and other compounds (as Ni) Ni 7440-02-0 (Metal) QR5950000 (Metal) | Metal: Elemental nickel Synonyms of other compounds vary depending upon the specific compound. | NIOSH Ca See Appendix A 0.015 mg/m ³ OSHA 0.1 mg/m ³ (soluble cmpds) 1 mg/m ³ (metal & insoluble cmpds) | Ca [N.E.] | Metal: Lustrous, silvery solid. | MW: 58.7 BP: 5139°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 2831°F UEL: NA LEL: NA | Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate | Filter: Acid; ICP; III [#7300, Elements] |
| 1654 55 | 1 ppm = 6.74 mg/m ³ | | | | Sp.Gr: 8.90 Noncombustible Solid in bulk form. | | | |
| Nicotine C ₁₀ H ₁₄ NC ₂ H ₄ NCH ₃ 54-11-5 QS5250000 | 3-(1-Methyl-2-pyrrolidyl) pyridine | NIOSH/OSHA 0.5 mg/m ³ [skin] | 35 mg/m ³ | Pale-yellow to dark brown liquid with a fish-like odor when warm. [insecticide] | MW: 162.2 BP: 482°F (Decomposes) Sol: Miscible Fl.P: 203°F IP: 8.01 eV | VP: 0.08 mm FRZ: -110°F UEL: 4.0% LEL: 0.7% | Strong oxidizers, strong acids | XAD-2; Ethyl acetate; GC/Alk-FID; III [#5293] |
| 1760 60 (<40% acid soln) 2031 44 (>40% acid soln) 2032 44 (fuming) | Aqua fortis, Engravers acid, Hydrogen nitrate, Red fuming nitric acid (RFNA), White fuming nitric acid (WFNA) | NIOSH/OSHA 2 ppm (5 mg/m ³) ST 4 ppm 10 mg/m ³ [Note: Often used in an aqueous solution. Fuming nitric acid is concentrated nitric acid that contains dissolved nitrogen.] | 100 ppm | Colorless, yellow, or red fuming liquid with an acid, suffocating odor. | MW: 63.0 BP: 181°F Sol: Miscible Fl.P: NA IP: 11.95 eV | VP: 48 mm FRZ: -44°F UEL: NA LEL: NA | Combustible materials, metallic powders, hydrogen sulfide, carbides, alcohols [Note: Reacts with water to produce heat. Corrosive to metals.] | Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids] |
| | 1 ppm = 2.62 mg/m ³ | | | | Sp.Gr(77°F): 1.50 Noncombustible Liquid, but increases the flammability of combustible materials. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|--|--|---|--------------------------|--|--|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: After work if reason Remove: prob contam Prompt non-imperv contam | | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Ing Con | Sens derm, allergic asthma, pneulitis; [carc] | Skin: Breath: Swallow: Water flush immed Resp support Medical attention immed | Nasal cavities, lungs, skin |
| Clothing: Any poss Goggles: Any poss Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh Ing Con | Head, verti; nau, vomit, epigastric pain; substernal pain; cough, hyperpnea; cyan; weak; leucyt, pneulitis; delirium, convuls; [carc] | Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed | Lungs, paranasal sinus, CNS |
| Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench | | NIOSH/OSHA 5 mg/m ³ : SA/SCBA 12.5 mg/m ³ : SA:CF* 25 mg/m ³ : SCBAF/SAF/SAT:CF* 35 mg/m ³ : SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Nau, saliv, abdom pain, vomit, diarr; head, dizz, disturb hearing, vision; conf, weak, inco; paroxysmal atrial fibr; convuls, dysp | Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed | CNS, CVS, lungs, GI tract |
| Clothing: Any poss pH <2.5/Repeat pH >2.5 Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: pH <2.5: Eyewash, quick drench | | NIOSH/OSHA 50 ppm: SA:CF* 100 ppm: SCBAF/SAF/GMFS/CCRFS* g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh Ing Con | Irrit eyes, muc memb, skin; delayed pulm edema, pneulitis, bron; dental erosion | Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed | Eyes, resp sys, skin, teeth |

Nitric acid

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------|--|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Nitric oxide NO 10102-43-9 QX0525000 | Mononitrogen monoxide, Nitrogen monoxide | NIOSH/OSHA 25 ppm (30 mg/m³) | 100 ppm | Colorless gas. | MW: 30.0 BP: -241°F Sol: 5% FLP: NA IP: 9.27 eV | VP: >1 atm FRZ: -263°F UEL: NA LEL: NA | Combustible materials, ozone, chlorinated hydro- carbons, ammonia, carbon disulfide, metals, fluorine [Note: Reacts with water to form nitric acid.] | Mol-sieve*; Reagent; Via; II(1) [P&CAM #231] |
| 1660 20 | 1 ppm = 1.25 mg/m³ | | | | Nonflammable Gas, but will accelerate the burning of combustible materials. | | | |
| p-Nitroaniline NO₂C₆H₄NH₂ 100-01-6 BY7000000 | para-Aminonitrobenzene, 4-Nitroaniline, 4-Nitrobenzenamine, p-Nitrophenylamine, PNA | NIOSH/OSHA 3 mg/m³ [skin] | 300 mg/m³ | Bright yellow, crystalline powder with a slight ammonia-like odor. | MW: 138.1 BP: 630°F Sol: 0.08% FLP: 390°F IP: 8.85 eV | VP(288°F): 1 mm MLT: 295°F UEL: ? LEL: ? | Strong oxidizers, strong reducers [Note: May result in spontaneous heating of organic materials in the presence of moisture.] | Filter; 2-Pro- panol; HPLC/UVD; II(5) [S7] |
| 1661 55 | | | | | Sp.Gr: 1.42 Combustible Solid | | | |
| Nitrobenzene C₆H₅NO₂ 98-95-3 DA6475000 | Essence of mirbane, Nitrobenzol, Oil of mirbane | NIOSH/OSHA 1 ppm (5 mg/m³) [skin] | 200 ppm | Yellow, oily liquid with a pungent odor like paste shoe polish. [Note: A solid below 42°F.] | MW: 123.1 FRZ: 411°F Sol: 0.2% FLP: 190°F IP: 9.92 eV | VP(112°F): 1 mm FRZ: 42°F UEL: ? LEL(200°F): 1.8% | Concentrated nitric acid, nitrogen tetroxide, caustics, phosphorus penta- chloride, chemically- active metals such as tin or zinc | Si gel; Methanol; GC/FID; III [#2005] |
| 1662 55 | 1 ppm = 5.12 mg/m³ | | | | Sp.Gr: 1.20 Class IIIA Combustible Liquid | | | |
| 4-Nitrobiphenyl C₁₂H₉NO₂ 92-93-3 DV5600000 | p-Nitrobiphenyl, p-Nitrodiphenyl, 4-Nitrodiphenyl, 4-Phenylnitrobenzene, p-Phenylnitrobenzene, PNB | NIOSH Ca See Appendix A OSHA [1910.1003] See Appendix B ACGIH A1 | Ca | White to yellow, needle-like crystalline solid with a sweetish odor. | MW: 199.2 BP: 644°F Sol: Insoluble FLP: 290°F IP: ? | VP: ? MLT: 237°F UEL: ? LEL: ? | Strong reducers | Filter/ Si gel(2); 2-Propanol; GC/FID; II(4) [P&CAM #273] |
| | | | | | Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Route | Symptoms (See Table 5) | Health hazards | | |
|---|-------------------------|---|-------|---------------------------|----------------------------|--------------------------------|----------------|
| | | | | | First aid (See Table 6) | Target organs (See Table 5) | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Breath: | Resp support | Resp sys |
| Goggles: | N.R. | 100 ppm: SA:CF*/PAPRS*/SA*/ | Con | drow; unconscious | | | |
| Wash: | N.R. | SCBA*/CCRFS*/GMFS* | | | | | |
| Change: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Remove: | N.R. | Escape: GMFS*/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Cyan, ataxia; tacar, | Eye: | Irr immed | Blood, heart, |
| Goggles: | Reason prob | 30 mg/m ³ : SA*/SCBA* | Abs | tachypnea; dysp; irrity; | Skin: | Water flush immed | lungs, liver |
| Wash: | Immed contam/daily | 75 mg/m ³ : SA:CF* | Ing | vomit, diarr; convuls; | Breath: | Resp support | |
| Change: | After work if reason | 150 mg/m ³ : SCBAF/SAF | Con | resp arrest; anemia; | Swallow: | Medical attention | |
| Remove: | prob contam | 300 mg/m ³ : SAF:PD,PP | | methemoglobinemia | | immed | |
| Provide: | Immed non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | Quick drench | Escape: GMFOVDMFu/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Anoxia; irrit eyes; derm; | Eye: | Irr immed | Blood, liver, |
| Goggles: | Reason prob | 10 ppm: CCROV*/SA*/SCBA* | Abs | anemia; | Skin: | Soap wash immed | kidneys, CVS, |
| Wash: | N.R. | 25 ppm: SA:CF*/PAPROV* | Ing | in animals: liver, kidney | Breath: | Resp support | skin |
| Change: | After work if any poss | 50 ppm: CCRFOV/GMFOV/SCBAF/SAF | Con | damage | Swallow: | Medical attention | |
| Remove: | contam | 200 ppm: SAF:PD,PP | | | | immed | |
| Provide: | Immed non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | Quick drench | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Head, lethargy, dizz; | Eye: | Irr immed | Bladder, blood |
| Goggles: | Any poss | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | dysp; ataxia, weak; | Skin: | Soap wash immed | |
| Wash: | Immed contam/daily | Escape: HIEF/SCBAE | Ing | methemoglobinemia; | Breath: | Resp support | |
| Change: | After work if any poss | | Con | urinary burning; acute | Swallow: | Medical attention | |
| Remove: | contam | | | hemorrhagic cystitis; | | immed | |
| Provide: | Immed contam | | | [carc] | | | |
| | Eyewash, quick drench | | | | | | |

4-Nitrobiphenyl

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------------------|---|---|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| p-Nitrochlorobenzene <chem>ClC6H4NO2</chem> 100-00-5 CZ1050000 | p-Chloronitrobenzene, 4-Chloronitrobenzene, 1-Chloro-4-nitrobenzene, PCNB, PCNB | NIOSH Ca See Appendix A [skin] OSHA 1 mg/m³ [skin] | Ca [1000 mg/m³] | Yellow crystalline solid with a sweet odor. | MW: 157.6 BP: 468°F Sol: Insoluble Fl.P: 261°F IP: 9.96 eV | VP: ? MLT: 182°F UEL: ? LEL: ? | Strong oxidizers | Si gel; Methanol; GC/FID; III [#2005, Nitro- benzenes] |
| 1578 55 | | | | | Sp.Gr: 1.52 Solid that does not burn, or burns with difficulty. | | | |
| Nitroethane <chem>CH3CH2NO2</chem> 79-24-3 K15600000 | None | NIOSH/OSHA 100 ppm (310 mg/m³) | 1000 ppm | Colorless, oily liquid with a mild, fruity odor. | MW: 75.1 BP: 237°F Sol: 5% Fl.P: 82°F IP: 10.88 eV | VP: 16 mm FRZ: -130°F UEL: ? LEL: 3.4% | Amines; strong acids, alkalis & oxidizers; hydrocarbons; combustibles; metal oxides | XAD-2(2); Ethyl acetate; GC/FID; III [#2526] |
| 2842 26 | 1 ppm = 3.12 mg/m³ | | | | Sp.Gr: 1.05 Class IC Flammable Liquid | | | |
| Nitrogen dioxide <chem>NO2</chem> 10102-44-0 QW9800000 | Dinitrogen tetroxide, Nitrogen peroxide, Nitrogen tetroxide, NTO | NIOSH/OSHA ST 1 ppm (1.8 mg/m³) | 50 ppm | Yellowish-brown liquid or reddish- brown gas (above 70°F) with a pun- gent, acrid odor. [Note: In solid form (below 15°F) it is found structurally as N₂O₄.] | MW: 46.0 BP: 70°F Sol: Reacts Fl.P: NA IP: 9.75 eV | VP: 720 mm FRZ: 15°F UEL: NA LEL: NA | Combustible material, water, chlorinated hydrocarbons, carbon disulfide, ammonia, [Note: Reacts with water to form nitric acid.] | Palmer Tube; Reagent; Vis; III [#6700] |
| 1067 20 | 1 ppm = 1.91 mg/m³ | | | | Sp.Gr: 1.44 (Liquid at 68°F) Noncombustible Liquid/Gas, but will accelerate the burning of combustible materials. | | | |
| Nitrogen trifluoride <chem>NF3</chem> 7783-54-2 QX1925000 | Trifluoramine, Trifluorammonia | NIOSH/OSHA 10 ppm (29 mg/m³) | 2000 ppm | Colorless gas with a moldy odor. [Note: Shipped as a liquefied compressed gas.] | MW: 71.0 BP: -200°F Sol: Insoluble Fl.P: NA IP: 12.97 eV | VP: >1 atm FRZ: -340°F UEL: NA LEL: NA | Water, oil, grease, oxidizable materials, ammonia, carbon monoxide, methane, hydrogen, hydrogen sulfide, activated charcoal, diborane | None available |
| 2451 15 | 1 ppm = 2.95 mg/m³ | | | | Nonflammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|---|----------------|----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH | Inh | Anoxia; unpleasant taste; | Eye: | Irr | Blood, liver, |
| Goggles: | Reason prob | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | Abs | mild anemia; [carc] | Skin: | Soap wash | kidneys, CVS |
| Wash: | Immed wet/Prompt | Escape: HIEF/SCBAE | Ing | in animals: hema, hemog | Breath: | immed | |
| Change: | After work if reason | | Con | | Swallow: | Medical attention | |
| Remove: | prob contam | | | | | immed | |
| Provide: | Immed non-imperv wet/ Prompt non-imperv contam Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Derm: | Eye: | Irr | Skin |
| Goggles: | Reason prob | 1000 ppm: SCBAF/SAF | Con | in animals: lac; dysp, | Skin: | Soap wash | |
| Wash: | Prompt wet | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | Ing | pulm rales, edema; liver, | Breath: | prompt | |
| Change: | N.R. | Escape: SCBAE | | kidney inj; narco | Swallow: | Resp support | |
| Remove: | Immed wet (flamm) | | | | | Medical attention | |
| | | | | | | immed | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Cough, mucoid frothy | Eye: | Irr | Resp sys, CVS |
| Goggles: | Any poss | 25 ppm: SA-CF* | Ing | sputum, dysp; chest pain; | Skin: | Water flush | |
| Wash: | Immed contam | 50 ppm: SCBAF/SAF | Con | pulm edema, cyan, | Breath: | immed | |
| Change: | N.R. | §: SCBAF-PD,PP/SAF-PD,PP:ASCBA | | tachypnea, tacar; | Swallow: | Resp support | |
| Remove: | Immed non-imperv contam | Escape: GMFS/SCBAE | | eye irrit | | Medical attention | |
| Provide: | Eyewash, quick drench | | | | | immed | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | In animals: methemoglobin; | Breath: | Resp support | In animals: |
| Goggles: | N.R. | 100 ppm: SA/SCBA/CCRS | | anoxia, cyan; weak, dizz, | | | blood |
| Wash: | N.R. | 250 ppm: SA-CF/PAPRS | | head; liver, kidney inj | | | |
| Change: | N.R. | 500 ppm: SCBAF/SAF/CCRFs/GMFS/ SAT-CF*/PAPRTS* | | | | | |
| Remove: | N.R. | 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE | | | | | |

Nitrogen trifluoride

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|--|---|---|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Nitroglycerine <chem>CH3NO3CHNO3CH2NO3</chem> 55-63-0 QX2100000 | Glyceryl trinitrate; NG; 1,2,3-Propanetriol trinitrate; Trinitroglycerine | NIOSH/OSHA ST 0.1 mg/m ³ [skin] [Note: OSHA stayed the start-up date for the PEL on 12/6/89 for the explosives industry until 2/1/90.] | 500 mg/m ³ | Colorless to pale- yellow, viscous liquid or solid (below 56°F). [Note: An explosive ingredient in dy- namite (20-40%) with ethylene glycol dinitrate (80-60%).] | MW: 227.1 BP: Begins to decompose at 122-140°F Sol: 0.1% Fl.P: Explodes IP: ? Sp.Gr: 1.60 Class IIIB Combustible Liquid | VP: 0.0003 mm FRZ: 56°F UEL: ? LEL: ? | Heat, ozone, shock, acids | Tenax GC; Ethanol; GC/ECD; III; [#2507] |
| 3064 26 | 1 ppm = 9.44 mg/m ³ | | | | | | | |
| Nitromethane <chem>CH3NO2</chem> 75-52-5 PA9800000 | Nitrocarbol | NIOSH See Appendix D OSHA 100 ppm (250 mg/m ³) | 1000 ppm | Colorless, oily liquid with a disagreeable odor. | MW: 61.0 BP: 214°F Sol: 10% Fl.P: 95°F IP: 11.08 eV Sp.Gr: 1.14 Class IC Flammable Liquid | VP: 28 mm FRZ: -20°F UEL: ? LEL: 7.3% | Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metallic oxides [Note: Slowly corrodes steel & copper when wet.] | Chrom-106; Ethyl acetate; GC/FPD; III [#2527] |
| 1261 26 | 1 ppm = 2.54 mg/m ³ | | | | | | | |
| 1-Nitropropane <chem>CH3CH2CH2NO2</chem> 108-03-2 TZ5075000 | Nitropropane, 1-NP | NIOSH/OSHA 25 ppm (90 mg/m ³) | 2300 ppm | Colorless liquid with a somewhat disagreeable odor. | MW: 89.1 BP: 269°F Sol: 1% Fl.P: 98°F IP: 10.81 eV Sp.Gr: 1.00 Class IC Flammable Liquid | VP: 8 mm FRZ: -182°F UEL: ? LEL: 2.2% | Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metal oxides | XAD-4; CS; GC/NPD; OSHA [#46] |
| 2608 26 | 1 ppm = 3.70 mg/m ³ | | | | | | | |
| 2-Nitropropane <chem>CH3CH(NO2)CH3</chem> 79-46-9 TZ5250000 | Dimethylnitromethane, sec-Nitropropane, iso-Nitropropane, 2-NP | NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 10 ppm (35 mg/m ³) | Ca [2300 ppm] ACGIH C 10 ppm, A2 (35 mg/m ³) | Colorless liquid with a pleasant, fruity odor. | MW: 89.1 BP: 249°F Sol: 2% Fl.P: 75°F IP: 10.71 eV Sp.Gr: 0.99 Class IC Flammable Liquid | VP: 13 mm FRZ: -135°F UEL: 11.0% LEL: 2.6% | Amines; strong acids, alkalis & oxidizers, metal oxides, combustible materials | Chrom-106; Ethyl acetate; GC/FID; III [#2528] |
| 2608 26 | 1 ppm = 3.70 mg/m ³ | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|------------------------|---|----------------|---------------------------|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Throb head; dizz; nau, | Eye: | CVS, blood, skin |
| Goggles: | Reason prob | 1 mg/m ³ : SA*/SCBA* | Abs | vomit, abdom pain; | Skin: | |
| Wash: | Immed contam | 2.5 mg/m ³ : SA/CF* | Ing | hypotension; flush; palp; | Breath: | Irr immed |
| Change: | After work if any poss | 5 mg/m ³ : SCBAF/SAF/SAT:CF* | Con | methemoglobin; | Swallow: | Soap wash immed |
| Remove: | Immed wet (flamm) | 200 mg/m ³ : SAF:PD,PP | | delirium, depres CNS; | | Resp support |
| Provide: | Quick drench | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | angina; skin irrit | | Medical attention |
| | | Escape: GMFOVHIE/SCBAE | | | | immed |
| Clothing: | Repeat | OSHA | Inh | Derm | Eye: | Skin |
| Goggles: | Reason prob | 1000 ppm: SA:CF*/SCBAF/SAF | Con | | Skin: | Irr immed |
| Wash: | Prompt wet | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | | Breath: | Soap wash prompt |
| Change: | N.R. | Escape: SCBAE | | | Swallow: | Resp support |
| Remove: | Immed wet (flamm) | | | | | Medical attention |
| | | | | | | immed |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Eye irrit, head, nau, | Eye: | Eyes, CNS |
| Goggles: | Reason prob | 250 ppm: SA*/SCBA* | Con | vomit, diarr | Skin: | Irr immed |
| Wash: | N.R. | 625 ppm: SA:CF* | Ing | | Breath: | Soap wash prompt |
| Change: | N.R. | 1250 ppm: SCBAF/SAF | | | Swallow: | Resp support |
| Remove: | Immed wet (flamm) | 2300 ppm: SAF:PD,PP | | | | Medical attention |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed |
| | | Escape: SCBAE | | | | |
| Clothing: | N.R. | NIOSH | Inh | Head, anor, nau, vomit, | Eye: | Resp sys, CNS |
| Goggles: | Reason prob | v: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | diarr, irrit resp sys, | Skin: | Irr immed |
| Wash: | N.R. | Escape: SCBAE | Ing | [carc] | Breath: | Soap wash prompt |
| Change: | N.R. | | | | Swallow: | Resp support |
| Remove: | Immed wet (flamm) | | | | | Medical attention |
| | | | | | | immed |

2-Nitropropane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|----------|---|---|---|---|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| N-Nitrosodimethylamine (CH ₃) ₂ N ₂ O 62-75-9 IQ0525000 | Dimethylnitrosamine; N,N-Dimethylnitrosamine; DMNA; N-Methyl-N-nitroso- methanamine; NDMA; N-Nitrosodimethylamine | NIOSH Ca See Appendix A OSHA [1910.1016] See Appendix B ACGIH A2 [skin] | Ca | Yellow, oily liquid with a faint, character- istic odor. | MW: 74.1 BP: 308°F Sol: Soluble Fl.P: ? IP: 8.69 eV | VP: 3 mm FRZ: ? UEL: ? LEL: ? Sp.Gr: 1.00 Combustible Liquid | Strong oxidizers [Note: Should be stored in dark bottles.] | T-Sorb; Methanol/ CH ₃ Cl; GC/FID; III [#2522] |
| Nitrotoluene NO ₂ C ₆ H ₄ CH ₃ o: 88-72-2 XT3150000 m: 99-08-1 XT2975000 p: 99-99-0 XT3325000 1684 55 | Methyl nitrobenzene, Nitrotoluol o: ortho-Nitrotoluene 2-Nitrotoluene m: meta-Nitrotoluene 3-Nitrotoluene p: para-Nitrotoluene 4-Nitrotoluene | NIOSH/OSHA 2 ppm (11 mg/m ³) [skin] | 200 ppm | Yellow liquids (o-, m-isomers) or crystalline solid (p-isomer) with a weak, aromatic odor. | MW: 137.1 BP: 432/450/ 460°F Sol: 0.07/ 0.05/0.04% Fl.P: 223/232/ 223°F IP: 9.43/9.48/9.50 eV Sp.Gr: 1.16/1.16/1.12 Class IIIB Combustible Liquids | VP(122°F): 1/1/1 mm FRZ/MLT: 25/59/126°F UEL: ? LEL: ? | Strong oxidizers, sulfuric acid | Si gel; Methanol; GC/FID; III [#2005, Nitro- benzenes] |
| Octachloronaphthalene C ₁₀ Cl ₈ 2234-13-1 QK0250000 | Halowax® 1051; 1,2,3,4,5,6,7,8- Octachloronaphthalene; Perchloronaphthalene | NIOSH/OSHA 0.1 mg/m ³ ST 0.3 mg/m ³ [skin] | Unknown | Waxy, pale-yellow solid with an aromatic odor. | MW: 403.7 BP: 824°F Sol: Insoluble Fl.P: NA IP: ? Sp.Gr: 2.00 Noncombustible Solid | VP: ? MLT: 378°F UEL: NA LEL: NA | Strong oxidizers | Filter; Hexane; GC/FID; II(2) [#S97] |
| Octane CH ₃ (CH ₂) ₆ CH ₃ 111-65-9 RG8400000 1262 27 | n-Octane, normal-Octane | NIOSH 75 ppm (350 mg/m ³) C 385 ppm (1800 mg/m ³) (15-min) OSHA 300 ppm (1450 mg/m ³) ST 375 ppm (1800 mg/m ³) | 5000 ppm | Colorless liquid with a gasoline- like odor. | MW: 114.2 BP: 258°F Sol: Insoluble Fl.P: 56°F IP: 9.82 eV Sp.Gr: 0.70 Class IB Flammable Liquid | VP: 10 mm FRZ: -70°F UEL: 6.5% LEL: 1.0% | Strong oxidizers | Char; CS ₂ ; GC/FID; III [#1500, Hydro- carbons] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|---|--------------------------|---|--------------------------------------|---|---------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Abs Ing Con | Nau, vomit, diarr, abdom cramps; head; fever; enlarged liver, jaun; reduced function of liver, kidneys, lungs; [canc] | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Liver, kidneys, lungs |
| Goggles: | Any poss | | | | | | |
| Wash: | Immed contam/daily | | | | | | |
| Change: | After work if any poss contam | | | | | | |
| Remove: | Immed contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 20 ppm: SA*/SCBA* 50 ppm: SA:CF* 100 ppm: SCBAF/SAF/SAT:CF* 200 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Anoxia, cyan; head, weak, dizz; ataxia; dysp; tacar; nau, vomit | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Blood, CNS, CVS, skin, GI tract |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt contam | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| | | | | | | | |
| Clothing: | Any poss molt/ Reason prob sol-liq | NIOSH/OSHA 1 mg/m ³ : SA/SCBA §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Acne-form derm; liver damage, jaun | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | Skin, liver |
| Goggles: | Any poss molt/ Reason prob sol-liq | | | | | | |
| Wash: | Prompt contam/daily | | | | | | |
| Change: | After work if reason prob contam | | | | | | |
| Remove: | Immed non-imperv contam molt/ Prompt non-imperv contam sol-liq | | | | | | |
| | | | | | | | |
| Clothing: | Repeat | NIOSH 750 ppm: SA*/SCBA* 1875 ppm: SA:CF* 3750 ppm: SCBAF/SAF 5000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh Con Ing | Irrit eyes, nose; drow; derm; chemical pneu | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Skin, eyes, resp sys |
| Goggles: | Reason prob | | | | | | |
| Wash: | Prompt wet | | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | Immed wet (flamm) | | | | | | |
| | | | | | | | |
| Octane | | | | | | | |

Octane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|-----------------------|---|--|--|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Oil mist (mineral) 8012-95-1 PY8030000 | Heavy mineral oil mist, Paraffin oil mist, White mineral oil mist | NIOSH 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³ | N.E. | Colorless, oily liquid aerosol dispersed in air. [Note: Has an odor like burned lubricating oil.] | MW: Varies BP: 680°F Sol: Insoluble Fl.P(oc): 275-500°F IP: ? Sp.Gr: 0.90 Class IIIB Combustible Liquid | VP: ? FRZ: ? UEL: ? LEL: ? | None reported | Filter; CFC-113; IR; III [#5026] |
| Osmium tetroxide (as Os) OsO ₄ 20816-12-0 RN1140000 2471 55 | Osmic acid anhydride, Osmium oxide | NIOSH/OSHA 0.002 mg/m ³ (0.0002 ppm) ST 0.006 mg/m ³ (0.0006 ppm) | 1 mg/m ³ | Colorless, crystalline solid or pale-yellow mass with an unpleasant, acrid, chlorine-like odor. [Note: A liquid above 105°F.] | MW: 254.2 BP: 266°F Sol(77°F): 6% Fl.P: NA IP: 12.60 eV Sp.Gr: 5.10 Noncombustible Solid | VP(81°F): 11 mm MLT: 105°F UEL: NA LEL: NA | Hydrochloric acid, easily oxidized organic materials [Note: Begins to sublime below BP.] | None available |
| Oxalic acid HOCCOOH·2H ₂ O 144-62-7 RO2450000 2449 54 | Ethanedioic acid, Oxalic acid (aqueous), Oxalic acid dihydrate | NIOSH/OSHA 1 mg/m ³ ST 2 mg/m ³ | 500 mg/m ³ | Colorless, odorless powder or granular solid. [Note: The anhydrous form (COOH) ₂ is an odorless, white solid.] | MW: 126.1 BP: Sublimes Sol: 14% Fl.P: ? IP: ? Sp.Gr: 1.65 Combustible Solid | VP: <0.001 mm MLT: 373°F (Sublimes) UEL: ? LEL: ? | Strong oxidizers, silver compounds | None available |
| Oxygen difluoride OF ₂ 7783-41-7 RS2100000 2190 20 | Difluorine monoxide, Fluorine monoxide, Oxygen fluoride | NIOSH/OSHA C 0.05 ppm (0.1 mg/m ³) | 0.5 ppm | Colorless gas with a peculiar, foul odor. | MW: 54.0 BP: -230°F Sol: 0.02% Fl.P: NA IP: 13.11 eV Nonflammable Gas, but a strong oxidizer. | VP: >1 atm FRZ: -371°F UEL: NA LEL: NA | Combustible materials, chlorine, bromine, iodine, platinum, metal oxides, moist air, hydrogen sulfide, hydrocarbons, water [Note: Reacts very slowly with water to form hydrofluoric acid.] | None available |

1 ppm = 2.24 mg/m³

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|----------------------------------|--|----------------|----------------------------|-------------------------|-------------------------|-----------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | None reported | Skin: | Soap wash | Resp sys, skin |
| Goggles: | N.R. | 50 mg/m ³ : SA/SCBA/HIE | | | Breath: | Fresh air | |
| Wash: | Prompt wet | 125 mg/m ³ : SA/CF/PAPRHIE | | | | | |
| Change: | N.R. | 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBAF/SAF | | | | | |
| Remove: | Prompt non-imperv wet | 2500 mg/m ³ : SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Lac, vis dist, conj; head; | Eye: | Irr immed | Eyes, resp sys, |
| Goggles: | Any poss | 0.1 mg/m ³ : SCBAF/SAF/CCRFSHIE/GMFSHIE | Ing | cough; dysp; derm | Skin: | Soap wash immed | skin |
| Wash: | Prompt contam | 1 mg/m ³ : SAF:PD,PP | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFSHIE/SCBAE | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Provide: | Eyewash | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, muc memb, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 25 mg/m ³ : PAPRDM ⁵ /SA:CF ² | Ing | skin; eye burns; local | Skin: | Water flush prompt | kidneys, eyes |
| Wash: | Prompt contam | 50 mg/m ³ : HIEF/SCBAF/SAF | Con | pain, cyan; shock, | Breath: | Resp support | |
| Change: | After work if reason prob contam | 500 mg/m ³ : SAF:PD,PP | | collapse, convuls | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Intractable head; | Eye: | Irr immed | Lungs, eyes |
| Goggles: | N.R. | 0.5 ppm: SCBA/SA | Abs | resp sys irrit, pulm | Skin: | Water flush immed | |
| Wash: | N.R. | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | edema; eye, skin burns | Breath: | Resp support | |
| Change: | N.R. | Escape: GMFS ⁴ /SCBAE | | | | | |
| Remove: | N.R. | | | | | | |

Oxygen difluoride

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|-----------------------|---|---|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Ozone O_3 10028-15-6 RS8225000 | Triatomic oxygen | NIOSH C 0.1 ppm (0.2 mg/m ³) OSHA 0.1 ppm (0.2 mg/m ³) ST 0.3 ppm (0.6 mg/m ³) | 10 ppm | Colorless to blue gas with a very pungent odor. | MW: 48.0 BP: -169°F Sol: Insoluble Fl.P: NA IP: 12.52 eV | VP: >1 atm FRZ: -315°F UEL: NA LEL: NA | All oxidizable materials (both organic & inorganic) | Imp; Reagent; Vis; II(1) [P&CAM #154] |
| 1 ppm = 2.00 mg/m ³ | | | | | Nonflammable Gas, but a powerful oxidizer. | | | |
| Paraquat (CH ₃ (C ₅ H ₄ N) ₂ CH ₃) ₂ Cl 1910-42-5 DW2275000 | 1,1'-Dimethyl-4,4'- bipyridinium dichloride; N,N'-Dimethyl-4,4'- bipyridinium dichloride; Paraquat chloride; Paraquat dichloride | NIOSH/OSHA 0.1 mg/m ³ (resp) [skin] | 1.5 mg/m ³ | Yellow solid with a faint ammonia- like odor. [herbicide] [Note: Paraquat may also be found commercially as a methyl sulfate salt C ₁₂ H ₁₄ N ₂ ·2CH ₃ SO ₄ .] | MW: 257.2 BP: 347-356°F (Decomposes) Sol: Miscible Fl.P: NA IP: ? Sp.Gr: 1.24 Noncombustible Solid | VP: Low MLT: ? UEL: NA LEL: NA | Strong oxidizers, alkylaryl-sulfonate wetting agents [Note: Corrosive to metals. Decomposes in presence of ultraviolet light.] | Filter; Water; HPLC/UVD; III [#5003] |
| 2588 53 (solid pesticides) | | | | | | | | |
| Parathion (C ₂ H ₅ O) ₂ P(S)OC ₆ H ₄ NO ₂ 56-38-2 TF4550000 | O,O-Diethyl-O(p-nitrophenyl) phosphorothioate; Diethyl parathion; Ethyl parathion; Parathion-ethyl | NIOSH 0.05 mg/m ³ [skin] OSHA 0.1 mg/m ³ [skin] | 20 mg/m ³ | Pale-yellow to dark brown liquid with a garlic- like odor. [Note: A solid below 43°F. Pesticide that may be absorbed on a dry carrier.] | MW: 291.3 BP: 707°F Sol: 0.001% Fl.P: ? IP: ? Sp.Gr: 1.27 Combustible Liquid, but may be difficult to ignite. | VP: 0.00004 mm FRZ: 43°F UEL: ? LEL: ? | Strong oxidizers | Filter; Isocetane; GC/FPD; III [#5012] |
| 2783 55 (liquid/dry) | | | | | | | | |
| Pentaborane B ₅ H ₉ 19624-22-7 RY8925000 | Pentaboron nonahydride, Stable pentaborane | NIOSH/OSHA 0.005 ppm (0.01 mg/m ³) ST 0.015 ppm (0.03 mg/m ³) | 3 ppm | Colorless liquid with a pungent odor like sour milk. | MW: 63.1 BP: 140°F Sol: Reacts Fl.P: 86°F IP: 9.90 eV Sp.Gr: 0.62 Class IC Flammable Liquid | VP(77°F): 200 mm FRZ: -52°F UEL: ? LEL: 0.42% | Oxidizers, halogens, water, halogenated hydrocarbons [Note: May ignite SPONTANEOUSLY in moist air. Corrosive to natural rubber. Hydrolyzes slowly with heat in water to form boric acid.] | None available |
| 1380 75 | | | | | | | | |
| 1 ppm = 2.62 mg/m ³ | | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|--|--|---|--------------------------|---|--|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R. | | NIOSH/OSHA 1 ppm: SA/SCBA/CCRS+ 2.5 ppm: SA:CF/PAPRS+ 5 ppm: CCRFS+GMFS+SCBAF/SAF/ SAT:CF 10 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS+SCBAE | Inh | Irrit eyes, muc memb; pulm edema; chronic resp disease | Eye: Breath: Medical attention Fresh air, 100% O ₂ | Eyes, resp sys |
| Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench | | NIOSH/OSHA 1 mg/m ³ : CCROVDMFu*/SA*/SCBA* 1.5 mg/m ³ : CCRFOVDMFu/SA:CF*/ SCBAF/SAF/PAPROVDMFu* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Irrit eyes, nose, epis; derm; fingernail damage; irrit GI tract; heart, liver, kidney damage; acute pulm inflam | Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed | Eyes, resp sys, heart, liver, kidneys, GI tract |
| Clothing: Repeat Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench | | NIOSH 0.5 mg/m ³ : CCROVDMFu/SA/SCBA 1.25 mg/m ³ : SA:CF/PAPROVDMFu 2.5 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ PAPRTOVHIE/SAT:CF 20 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Miosis; rhin; head; tight chest, wheez, lar spasm, salv, cyan; anor, nau, vomit, abdom cramps, diarr; sweat; musc fasc, weak, para; gidd, conf, ataxia; convuls, coma; low BP; card irregularities; skin, eye irrit | Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed | Resp sys, CNS, CVS, eyes, skin, blood chol |
| Clothing: Reason prob Goggles: Any poss Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench | | NIOSH/OSHA 0.05 ppm: SA/SCBA 0.125 ppm: SA:CF 0.25 ppm: SCBAF/SAF/SAT:CF 3 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | Inh Abs Ing Con | Dizz, head, drow, li-head; inco, tremor, tonic spasm face, neck, abdom, limbs; convuls; irrit eyes, skin | Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed | CNS, eyes, skin |

Pentaborane

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| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|--|----------------|--|----------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss molt/Repeat sol-liq | NIOSH/OSHA 5 mg/m ³ : SA*/SCBA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Head, fig, verti, anor; pruritus, acne-form skin eruptions; jaun, liver nec | Eye: | Irr immed | Skin, liver, CNS |
| Goggles: | Any poss molt/Reason prob sol-liq | | Abs | | Skin: | Soap prompt/Molten | |
| Wash: | Prompt contam | | Ing | | Breath: | Flush immed | |
| Change: | After work if reason prob contam | | Con | | Swallow: | Resp support Medical Attention immed | |
| Remove: | Immed non-imperv contam molt/ Prompt non-imperv contam sol-liq | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA 5 mg/m ³ : CCROVDMFu*/SA*/SCBA* 12.5 mg/m ³ : SA:CF*/PAPROVDMFu* 25 mg/m ³ : CCRFOVHIE/SCBAF/SAF 150 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Irrit eyes, nose, throat; sneezing, cough; weak, anor, low-wgt; sweat; head, dizz; nau, vomit; dysp, chest pain; high fever; dermat | Eye: | Irr immed | CVS, resp sys, eyes, liver, kidneys, skin, CNS |
| Goggles: | Any poss | | Abs | | Skin: | Soap wash immed | |
| Wash: | Immed contam | | Ing | | Breath: | Resp support | |
| Change: | After work if any poss contam | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH 1200 ppm: SA/SCBA 3000 ppm: SA:CF 6000 ppm: SCBAF/SAF/SAT:CF 15,000 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Drow; irrit eyes, nose; dermat; chemical pneu | Eye: | Irr immed | Skin, eyes, resp sys |
| Goggles: | Reason prob | | Ing | | Skin: | Water wash prompt | |
| Wash: | Prompt wet | | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | NIOSH 1000 ppm: CCROV*/PAPROV* 1500 ppm: SA*/SCBA* 3750 ppm: SA:CF* 5000 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, muc memb; head; dermat; narco, coma | Eye: | Irr immed | Resp sys, eyes, skin, CNS |
| Goggles: | Reason prob | | Ing | | Skin: | Water flush | |
| Wash: | Prompt wet | | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |

2-Pentanone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|---------------|---|---|---|---|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Perchloromethyl mercaptan Cl ₃ CSCl 594-42-3 PB0370000 | PMM, Trichloromethane sulfonyl chloride, Trichloromethyl sulfur chloride | NIOSH/OSHA 0.1 ppm (0.8 mg/m ³) | 10 ppm | Pale-yellow, oily liquid with an unbearable acrid odor. | MW: 185.9 BP: 297°F (Decomposes) Sol: Insoluble FLP: NA IP: ? | VP: 65 mm FRZ: ? UEL: NA LEL: NA | Alkalies, amines, hot iron, water [Note: Corrosive to most metals.] | None available |
| 1670 55 | 1 ppm = 7.73 mg/m ³ | | | | Sp.Gr: 1.69 Noncombustible Liquid, but will support combustion. | | | |
| Perchloryl fluoride ClO ₃ F 7616-94-6 SD1925000 | Chlorine fluoride oxide, Chlorine oxyfluoride, Trioxychlorofluoride | NIOSH/OSHA 3 ppm (14 mg/m ³) ST 6 ppm (28 mg/m ³) | 385 ppm | Colorless gas with a characteristic, sweet odor. [Note: Shipped as a liquefied compressed gas.] | MW: 102.5 BP: -52°F Sol: 0.06% FLP: NA IP: 13.60 eV | VP: >1 atm FRZ: -234°F UEL: NA LEL: NA | Combustibles, strong bases, amines, finely divided metals, oxidizable materials, reducing agents, alcohols | None available |
| 1955 15 | 1 ppm = 4.26 mg/m ³ | | | | Nonflammable Gas, but will support combustion. | | | |
| Petroleum distillates (naphtha) 8002-05-9 SE7449000 | Aliphatic petroleum naphtha, Petroleum naphtha | NIOSH 350 mg/m ³ C 1800 mg/m ³ [15-min] OSHA 400 ppm (1600 mg/m ³) | 10,000 ppm | Colorless liquid with a gasoline- or kerosene-like odor. [Note: A mixture of paraffins (C ₅ to C ₁₃) that may contain a small amount of aromatic hydrocarbons.] | MW: 99(approx) BP: 86-460°F Sol: Insoluble FLP: -40 to -86°F IP: ? | VP: 40 mm (approx) FRZ: ? UEL: 5.9% LEL: 1.1% | Strong oxidizers | Char; CS; GC/FID; IIR [#1550, Naphthas] |
| 1255 27 | 1 ppm = 4.11 mg/m ³ (approx) | | | | Sp.Gr: 0.63-0.66 Flammable Liquid | | | |
| Phenol C ₆ H ₅ OH 108-95-2 SJ3325000 | Carbolic acid, Hydroxybenzene, Monohydroxy benzene, Phenyl alcohol, Phenyl hydroxide | NIOSH 5 ppm (19 mg/m ³) C 15.6 ppm (60 mg/m ³) [15-min] [skin] OSHA 5 ppm (19 mg/m ³) [skin] | 250 ppm | Colorless to light-pink, crystalline solid with a sweet, acrid odor. [Note: Phenol liquefies by mixing with about 8% water.] | MW: 94.1 BP: 359°F Sol(77°F): 9% FLP: 175°F IP: 8.50 eV | VP: 0.4 mm MLT: 109°F UEL: ? LEL: 1.8% | Strong oxidizers, calcium hypochlorite, aluminum chloride, acids | XAD-7; Methanol; HPLC/UVD; OSHA [#32] |
| 1671 55 (solid) 2312 55 (molten) 2821 55 (soln) | | | | | Sp.Gr: 1.06 Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|--|---|--------------------------|---|--------------------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet | | NIOSH/OSHA 1 ppm: SA/SCBA*CCROV* 2.5 ppm: SA-CF*/PAPROV* 5 ppm: CCRFOV/GMFOV/SCBAF/SAF/ SAT:CF*/PAPRTOV* 10 ppm: SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Lac, eye inflam; irrit nose, throat; cough; dysp, deep breath pain; coarse rales; vomit; pallor, tacar; acidosis; anuria | Eye: Skin: Breath: Swallow: | Irr Immed Soap wash Immed Resp support Medical attention Immed | Eyes, resp sys, liver, kidneys, skin |
| Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed non-imperv contam | | NIOSH/OSHA 30 ppm: SA/SCBA 75 ppm: SA-CF* 150 ppm: SCBAF/SAF 385 ppm: SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFS/SCBAE | Inh Con | Resp irrit; skin burns; in animals: methemoglobin; anoxia; cyan; weak, dizz, head; pulm edema; pneumitis | Eye: Breath: | Irr Immed Resp support | Resp sys, skin, blood |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH 850 ppm: SCBA/SA 2125 ppm: SA-CF* 4250 ppm: SCBAF/SAF/SAT:CF* 10,000 ppm: SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh Ing Con | Dizz, drow, head, nau; Irrit eyes, nose, throat; dry cracked skin | Eye: Skin: Breath: Swallow: | Irr Immed Soap wash prompt Resp support Medical Attention Immed | Skin, eyes, resp sys, CNS |
| Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench | | NIOSH/OSHA 50 ppm: CCROVDM/SA/SCBA 125 ppm: SA-CF/PAPROVDM 250 ppm: SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/PAPRTOVHIE §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Irrit eyes, nose, throat; anor, low-wgt; weak; muscle ache, pain; dark urine; cyan; liver, kidney damage; skin burns; derm; ochronosis; tremor; convuls, twitch | Eye: Skin: Breath: Swallow: | Irr Immed Soap wash Immed Resp support Medical attention Immed | Liver, kidneys, skin |

Phenol

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|-----------------|--|--|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| p-Phenylene diamine <chem>C6H4(NH2)2</chem> 106-50-3 SS8050000 | 4-Amino aniline; 1,4-Benzenediamine; p-Diaminobenzene; 1,4-Diaminobenzene | NIOSH/OSHA 0.1 mg/m ³ [skin] | Unknown | White to slightly red crystalline solid. | MW: 108.2 BP: 513°F Sol: 5% Fl.P: 312°F IP: 6.89 eV | VP: <1 mm MLT: 295°F UEL: ? LEL: ? | Strong oxidizers | None available |
| 1673 53 | | | | | Combustible Solid | | | |
| Phenyl ether (vapor) <chem>C6H5OC6H5</chem> 101-84-8 KN8970000 | Diphenyl ether, Diphenyl oxide, Phenoxy benzene, Phenyl oxide | NIOSH/OSHA 1 ppm (7 mg/m ³) | N.E. | Colorless, crystalline solid or liquid (above 82°F) with a geranium-like odor. | MW: 170.2 BP: 498°F Sol: Insoluble Fl.P: 234°F IP: 8.09 eV | VP(77°F): 0.02 mm MLT: 82°F UEL: 1.5% LEL: 0.8% | Strong oxidizers | Char; CS ₂ ; GC/FID; II(2) [#S72] |
| | 1 ppm = 7.08 mg/m ³ | | | | Sp.Gr: 1.08 Class IIIB Combustible Liquid | | | |
| Phenyl ether-biphenyl mixture (vapor) <chem>C6H5OC6H5/C6H5C6H5</chem> 8004-13-5 DV1500000 | Diphenyl oxide-diphenyl mixture, Dowtherm® A | NIOSH/OSHA 1 ppm (7 mg/m ³) | N.E. | Colorless to straw-colored liquid or solid (below 54°F) with a disagreeable, aromatic odor. [Note: A mixture typically contains 75% phenyl ether & 25% biphenyl.] | MW: 166(approx) BP: 495°F Sol: Insoluble Fl.P(oc): 255°F IP: ? | VP(77°F): 0.08 mm FRZ: 54°F UEL: ? LEL: ? | Strong oxidizers | Si gel; Benzene; GC/FID; II(2) [#S73] |
| | 1 ppm = 6.90 mg/m ³ | | | | Sp.Gr(77°F): 1.06 Class IIIB Combustible Liquid | | | |
| Phenyl glycidyl ether <chem>C6H10O2</chem> 122-60-1 TZ3675000 | 1,2-Epoxy-3-phenoxy propane; Glycidyl phenyl ether; PGE; Phenyl 2,3-epoxypropyl ether | NIOSH Ca See Appendix A C 1 ppm (6 mg/m ³) [15-min] | Ca [Unknown] | Colorless liquid. [Note: A solid below 38°F.] | MW: 150.1 BP: 473°F Sol: 0.2% Fl.P: 248°F IP: ? | VP: 0.01 mm FRZ: 38°F UEL: ? LEL: ? | Strong oxidizers, amines, strong acids, strong bases | Char; CS ₂ ; GC/FID; II(2) [#S74] |
| | 1 ppm = 6.24 mg/m ³ | OSHA 1 ppm (6 mg/m ³) | | | Sp.Gr: 1.11 Class IIIB Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|---------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit pharynx, larynx; | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Reason prob | 2.5 mg/m ³ : SA:CF ^e | Abs | bronchial asthma; sens | Skin: | Soap wash prompt | |
| Wash: | Prompt contam/daily | 5 mg/m ³ : SCBAF/SAF | Ing | derm | Breath: | Resp support | |
| Change: | After work if reason prob contam | 25 mg/m ³ : SAF:PD,PP | Con | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFSHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Nau; Irrit eyes, nose, | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 25 ppm: SA:CF ^e /PAPROVDM ^e | Con | skin | Skin: | Soap wash prompt | sys |
| Wash: | Prompt contam | 50 ppm: CCRFOVHIE/GMFOVHIE/ | Ing | | Breath: | Resp support | |
| Change: | N.R. | SCBAF/SAF | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 100 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Nau; Irrit eyes, nose, | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | 25 ppm: SA:CF ^e /PAPROVDM ^e | Con | skin | Skin: | Soap wash prompt | sys |
| Wash: | Prompt contam | 50 ppm: CCRFOVHIE/GMFOVHIE/ | Ing | | Breath: | Resp support | |
| Change: | N.R. | SCBAF/SAF | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | 100 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Skin irrit, sens; Irrit | Eye: | Irr immed | Skin, eyes, CNS |
| Goggles: | Reason prob | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Con | eyes, upper resp sys; | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | Ing | narco; [carc] | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |

Phenyl glycidyl ether

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|------------------------------------|--|---|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Phenylhydrazine <chem>C6H5NHNH2</chem> 100-63-0 MW8925000 | Hydrazinobenzene, Monophenylhydrazine | NIOSH Ca See Appendix A C 0.14 ppm (0.6 mg/m ³) [2-hr] OSHA 5 ppm (20 mg/m ³) ST 10 ppm (45 mg/m ³) [skin] | Ca [295 ppm] ACGIH A2 | Colorless to pale- yellow liquid or solid (below 67°F) with a faint, aromatic odor. | MW: 108.1 BP: 470°F (Decomposes) Sol: Slight Fl.P: 190°F IP: 7.64 eV | VP(161°F): 1 mm FRZ: 67°F UEL: ? LEL: ? | Strong oxidizers, lead dioxide | Bub; Pho-acid; Vis; II(3) [#S160] |
| 2572 53 | 1 ppm = 4.49 mg/m ³ | | | | Sp.Gr: 1.10 Class IIIA Combustible Liquid | | | |
| Phosdrin® <chem>C7H13O4PO2</chem> 7786-34-7 GQ5250000 | 2-Carbomethoxy-1-methylvinyl dimethyl phosphate, Mevinphos | NIOSH/OSHA 0.01 ppm (0.1 mg/m ³) ST 0.03 ppm (0.3 mg/m ³) [skin] | 4 ppm | Pale-yellow to orange liquid with a weak odor. [Note: Insecticide that may be absorbed on a dry carrier.] | MW: 224.2 BP: Decomposes Sol: Miscible Fl.P(oc): 347°F IP: ? | VP: 0.003 mm FRZ: -69°F UEL: ? LEL: ? | Strong oxidizers [Note: Corrosive to cast iron, some stainless steels, and brass.] | Chrom-102; Toluene; GC/FPD; III [#2503] |
| 2783 55 | 1 ppm = 9.32 mg/m ³ | | | | Sp.Gr: 1.25 Class IIIB Combustible Liquid | | | |
| Phosgene <chem>COCl2</chem> 75-44-5 SY5600000 | Carbon oxychloride, Carbonyl chloride, Chloroformyl chloride | NIOSH 0.1 ppm (0.4 mg/m ³) C 0.2 ppm (0.8 mg/m ³) [15-min] OSHA 0.1 ppm (0.4 mg/m ³) | 2 ppm | Colorless gas with a suffocating odor like musty hay. [Note: A fuming liquid below 47°F. Shipped as a liquefied compressed gas.] | MW: 98.9 BP: 47°F Sol: Slight Fl.P: NA IP: 11.55 eV | VP: >1 atm FRZ: -198°F UEL: NA LEL: NA | Moisture [Note: Reacts slowly in water to form hydrochloric acid & carbon dioxide.] | Imp; Reagent; Vis; II(1) [P&CAM #219] |
| 1076 15 | 1 ppm = 4.11 mg/m ³ | | | | Sp.Gr: 1.43 (Liquid at 32°F) Nonflammable Gas | | | |
| Phosphine <chem>PH3</chem> 7803-51-2 SY7525000 | Hydrogen phosphide, Phosphorated hydrogen, Phosphorus hydride, Phosphorus trihydride | NIOSH/OSHA 0.3 ppm (0.4 mg/m ³) ST 1 ppm (1 mg/m ³) | 200 ppm | Colorless gas with a fish- or garlic- like odor. [pesticide] [Note: Shipped as a liquefied compressed gas. Pure compound is odorless.] | MW: 34.0 BP: -128°F Sol: Slight Fl.P: NA (Gas) IP: 9.96 eV | VP: >1 atm FRZ: -209°F UEL: ? LEL: ? | Air, oxidizers, chlorine, acids, moisture, halogenated hydrocarbons, copper [Note: May ignite SPONTANEOUSLY on contact with air.] | Si gel; Reagent; Vis; II(5) [#S332] |
| 2199 18 | 1 ppm = 1.41 mg/m ³ | | | | Flammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Skin sens, hemolytic | Eye: | Irr immed | Blood, resp sys, |
| Goggles: | Any poss | ✓: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | anemia, dysp, cyan; jaun; | Skin: | Soap wash immed | liver, kidneys, |
| Wash: | Immed contam/daily | Escape: SCBAE | Ing | kidney damage; vascular | Breath: | Resp support | skin |
| Change: | After work if any poss | | Con | thrombosis; [carc] | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | Immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Miosis; rhin; head; tight | Eye: | Irr immed | Resp sys, CNS, |
| Goggles: | Any poss | 0.1 ppm: SA/SCBA | Abs | chest, wheez, lar spasm, | Skin: | Soap wash immed | CVS, skin, |
| Wash: | Immed contam | 0.25 ppm: SA:CF | Ing | salv, cyan; anor, nau, | Breath: | Resp support | blood chol |
| Change: | N.R. | 0.5 ppm: SCBAF/SAF/SAT:CF | Con | vomit, abdom cramps, diarr; | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 4 ppm: SA:PD,PP | | para; ataxia, convuls; | | Immed | |
| Provide: | Eyewash, quick drench | 8: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | low BP, card irregularities; | | | |
| | | Escape: GMFOVHIE/SCBAE | | irrit skin, eyes | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes; dry burning | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 1 ppm: SA*/SCBA* | Ing | throat; vomit; cough, | Skin: | Water flush immed | eyes |
| Wash: | Immed contam | 2 ppm: SCBAF/SAF | Con | foamy sputum, dysp, | Breath: | Resp support | |
| Change: | N.R. | 8: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | chest pain, cyan; skin | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | Escape: GMFS/SCBAE | | burns | | Immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Nau, vomit, abdom pain, | Breath: | Resp support | Resp sys |
| Goggles: | N.R. | 3 ppm: SA/SCBA | | diarr; thirst; chest | | | |
| Wash: | N.R. | 7.5 ppm: SA:CF | | pressure, dysp; musc pain, | | | |
| Change: | N.R. | 15 ppm: SCBAF/SAF/GMFS | | chills; stupor or syncope | | | |
| Remove: | N.R. | 200 ppm: SA:PD,PP | | | | | |
| | | 8: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |

Phosphine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|-----------------------------|---|---|--|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Phosphoric acid H_3PO_4 7664-38-2 TB6300000 | Metaphosphoric acid, Orthophosphoric acid, Phosphoric acid (aqueous), White phosphoric acid | NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³ | 10,000 mg/m ³ | Thick, colorless, odorless, crystalline solid. [Note: Often used in an aqueous solution.] | MW: 98.0 BP: 415°F Sol: Miscible Fl.P: NA IP: ? Sp.Gr(77°F): 1.87 (Pure) 1.33 (50% soln) Noncombustible Liquid | VP: 0.03 mm MLT: 108°F UEL: NA LEL: NA | Strong caustics, most metals [Note: Readily reacts with metals to form flammable hydrogen gas.] | SI gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids] |
| 1805 60 | 1 ppm = 4.07 mg/m ³ | | | | | | | |
| Phosphorus (yellow) P_4 7723-14-0 TH3500000 | Elemental white phosphorus, White phosphorus | NIOSH/OSHA 0.1 mg/m ³ | N.E. | White to yellow, soft, waxy solid with acid fumes in air. [Note: Usually shipped or stored in water.] | MW: 124.0 BP: 536°F Sol: 0.0003% Fl.P: ? IP: ? Sp.Gr: 1.82 Flammable Solid | VP: 0.03 mm MLT: 111°F UEL: ? LEL: ? | Air, oxidizers including elemental sulfur & strong caustics [Note: Ignites SPONTANEOUSLY in moist air.] | Tenax GC; Xylene; GC/FPD; III [#7905] |
| 1381 38 | | | | | | | | |
| Phosphorus pentachloride PCl_5 10026-13-8 TB6125000 | Pentachlorophosphorus, Phosphoric chloride, Phosphorus perchloride | NIOSH/OSHA 1 mg/m ³ | 200 mg/m ³ | White to pale- yellow, crystal- line solid with a pungent, unpleasant odor. | MW: 208.3 BP: Sublimes Sol: Reacts Fl.P: NA IP: ? Noncombustible Solid | VP(132°F): 1 mm MLT: 324°F (Sublimes) UEL: NA LEL: NA | Water, magnesium oxide, chemically- active metals such as sodium & potassium, alkalis [Note: Hydrolyzes in water (even in humid air) to form hydrochloric acid and phosphoric acid. Corrosive to metals.] | Filter/Bub; Reagent; Vis; II(5) [#S257] |
| 1806 39 | | | | | | | | |
| Phosphorus pentasulfide P_2S_5/P_4S_{10} 1314-80-3 TH4375000 | Phosphorus persulfide, Phosphorus sulfide | NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³ | 750 mg/m ³ | Greenish-gray to yellow, crystal- line solid with an odor of rotten eggs. | MW: 222.3/ 444.6 BP: 957°F Sol: Reacts Fl.P: ? IP: ? Sp.Gr: 2.09 Flammable Solid, which may SPONTANEOUSLY ignite in presence of moisture. | VP(572°F): 1 mm MLT: 550°F UEL: ? LEL: ? | Water, alcohols, strong oxidizers, acids [Note: Reacts with water to form hydrogen sulfide and sulfur dioxide.] | None available |
| 1340 41 | | | | | | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------------------|---|----------------|---|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss >1.6%/Repeat <1.6% | NIOSH/OSHA 25 mg/m ³ : SA:CF* | Inh | Irrit upper resp tract, | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 50 mg/m ³ : SCBAF/SAF/HIEF | Ing | eyes, skin; burns skin, | Skin: | Water flush Immed | skin |
| Wash: | Immed contam | 2000 mg/m ³ : SAF:PD,PP | Con | eyes; derm | Breath: | Resp support | |
| Change: | After work if reason prob contam sol | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | Escape: HIEF/SCBAE | | | | | |
| Provide: | >1.6%: Eyewash, quick drench | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA 1 mg/m ³ : SA | Inh | Irrit eyes, resp tract; | Eye: | Irr immed | Resp sys, liver, |
| Goggles: | Any poss | 2.5 mg/m ³ : SA:CF* | Ing | abdom pain, nau, jaun; | Skin: | Water flush immed | kidneys, jaw, |
| Wash: | Immed contam | 5 mg/m ³ : SCBAF/SAF | Con | anemia, cachexia; dental pain, excess saliv, | Breath: | Resp support | teeth, blood, |
| Change: | N.R. | 200 mg/m ³ : SAF:PD,PP | | jaw pain, swell; burns skin, eyes | Swallow: | Medical attention immed | eyes, skin |
| Remove: | Immed contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Eyewash, quick drench | Escape: SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA 10 mg/m ³ : SA*/SCBA* | Inh | Irrit eyes, resp sys; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | 25 mg/m ³ : SA:CF* | Ing | bron; derm | Skin: | Water flush immed | skin |
| Wash: | Immed contam | 50 mg/m ³ : SCBAF/SAF | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | 200 mg/m ³ : SAF:PD,PP | | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Eyewash, quick drench | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 10 mg/m ³ : SA*/SCBA* | Inh | Apnea, coma, convuls; | Eye: | Irr immed | Resp sys, CNS, |
| Goggles: | Reason prob | 25 mg/m ³ : SA:CF* | Ing | irrit eyes, conj pain, | Skin: | Dust off solid; | eyes, skin |
| Wash: | Prompt contam | 50 mg/m ³ : SCBAF/SAF | Con | lac, photo, kerato-conj, | | water flush | |
| Change: | After work if reason prob contam | 750 mg/m ³ : SAF:PD,PP | | corneal vesic; irrit resp sys; dizz; head; fig; | Breath: | Resp support | |
| Remove: | Prompt non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | irrit, insom; GI dist | Swallow: | Medical attention immed | |
| | | Escape: GMFSHIE/SCBAE | | | | | |

Phosphorus pentasulfide

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|-----------------|---|--|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Phosphorus trichloride <chem>PCl3</chem> 7719-12-2 TH3675000 | Phosphorus chloride | NIOSH/OSHA 0.2 ppm (1.5 mg/m³) ST 0.5 ppm (3 mg/m³) | 50 ppm | Colorless to yellow, fuming liquid with an odor like hydrochloric acid. | MW: 137.4 BP: 169°F Sol: Reacts FLP: NA IP: 9.91 eV | VP(70°F): 100 mm FRZ: -170°F UEL: NA LEL: NA | Water, chemically- active metals such as sodium & potassium, aluminum, strong nitric acid, acetic acid, organic matter [Note: Hydrolyzes in water to form hydrochloric acid and phosphoric acid.] | Sub; Reagent; Vis; III [#6402] |
| 1809 39 | 1 ppm = 5.71 mg/m³ | | | | Sp.Gr: 1.58 Noncombustible Liquid | | | |
| Phthalic anhydride <chem>C6H4(CO)2O</chem> 85-44-9 TI3150000 | 1,2-Benzenedicarboxylic anhydride; PAN; Phthalic acid anhydride | NIOSH/OSHA 8 mg/m³ (1 ppm) | 10,000 mg/m³ | White solid with a characteristic, acid odor. | MW: 148.1 BP: 563°F Sol: 0.6% FLP: 305°F IP: 10.00 eV | VP(206°F): 1 mm MLT: 267°F UEL: 10.5% LEL: 1.7% | Strong oxidizers, water [Note: Converted to phthalic acid in hot water.] | Filter; NH₄OH; HPLC/ULD; II(3) [#S179] |
| 2214 60 | | | | | Sp.Gr: 1.53 Combustible Solid | | | |
| Picric acid <chem>C6H3OH(NO2)3</chem> 88-89-1 TJ7875000 | Phenol trinitrate; 2,4,6-Trinitrophenol | NIOSH 0.1 mg/m³ ST 0.3 mg/m³ [skin] OSHA 0.1 mg/m³ [skin] | 100 mg/m³ | Yellow, odorless solid. [Note: Usually used as an aqueous solution.] | MW: 229.1 BP: Explodes above 572°F Sol: 1% FLP: 302°F IP: ? | VP(383°F): 1 mm MLT: 252°F UEL: ? LEL: ? | Copper, lead, zinc & other metals; salts; plaster; concrete; ammonia [Note: Corrosive to metals. An explosive mixture results when the aqueous solution crystallizes.] | Filter; Methanol/ Water; HPLC/ULD; II(4) [#S228] |
| 1344 33 (>10% water) | 1 ppm = 9.52 mg/m³ | | | | Sp.Gr: 1.76 Class IIIB Combustible Liquid | | | |
| Pindone <chem>C6H5O2C(O)C(CH3)3</chem> 83-28-1 NK6300000 | tert-Butyl valone; 1,3-Dioxo-2-pivaloylindane; Pivalone; Pivalyl; 2-Pivalyl-1,3-indandione | NIOSH/OSHA 0.1 mg/m³ | 200 mg/m³ | Bright yellow powder with almost no odor. [Insecticide] | MW: 230.3 BP: Decomposes Sol(77°F): 0.002% FLP: ? IP: ? | VP: ? MLT: 230°F UEL: ? LEL: ? | None reported | None available |
| 2472 53 | | | | | Sp.Gr: 1.06 | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|----------------------------------|---|----------------|---|----------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Resp sys, eyes, |
| Goggles: | Any poss | 10 ppm: SCBAF/SAF | Ing | pulm edema; burns eyes, | Skin: | skin |
| Wash: | Immed contam | 50 ppm: SAF:PD,PP | Con | skin | Breath: | |
| Change: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | Swallow: | |
| Remove: | Immed non-imperv contam | Escape: GMFS/SCBAE | | | | |
| Provide: | Eyewash, quick drench | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Conj; nasal ulcer bleeding, | Eye: | Resp sys, eyes, |
| Goggles: | Reason prob | 30 mg/m ³ : DM* | Ing | upper resp irrit; bron, | Skin: | skin, liver, |
| Wash: | Prompt contam | 60 mg/m ³ : DMXSO*/SA*/SCBA* | Con | bronchial asthma; derm | Breath: | kidneys |
| Change: | After work if reason prob contam | 150 mg/m ³ : SA:CF*/PAPROM* | | | Swallow: | |
| Remove: | Prompt non-imperv contam | 300 mg/m ³ : SCBAF/SAF/HIEF | | | | |
| | | 10,000 mg/m ³ : SAF:PD,PP | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | |
| | | Escape: HIEF/SCBAE | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes; sens derm: | Eye: | Kidneys, liver, |
| Goggles: | Reason prob | 0.5 mg/m ³ : DM | Abs | yellow-stain hair, skin; | Skin: | blood, skin, eyes |
| Wash: | Prompt contam/daily | 1 mg/m ³ : DMXSO/SA/SCBA | Con | weak, myalgia, anuria, | Breath: | |
| Change: | After work if reason prob contam | 2.5 mg/m ³ : PAPRDM/SA:CF | | polyuria; bitter taste, GI | Swallow: | |
| Remove: | Prompt non-imperv contam | 5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/SA:CF | | dist; hepatitis, hematuria, album, neph | | |
| | | 100 mg/m ³ : SAF:PD,PP | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | |
| | | Escape: HIEF/SCBAE | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Epls, excess bleeding | Eye: | Blood |
| Goggles: | N.R. | 0.5 mg/m ³ : DM | | from minor cuts, bruises; | Swallow: | prothrombin |
| Wash: | N.R. | 1 mg/m ³ : DMXSO/SA/SCBA | | smoky urine, black tarry | | |
| Change: | After work if reason prob contam | 2.5 mg/m ³ : PAPRDM/SA:CF | | stools; pain abdom, back | | |
| Remove: | N.R. | 5 mg/m ³ : PAPRTHIE/SCBAF/SAF/HIEF/SA:CF | | | | |
| | | 200 mg/m ³ : SAF:PD,PP | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | |
| | | Escape: HIEF/SCBAE | | | | |

Pindone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|------------------------|---|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Platinum (soluble salts as Pt) | Synonyms vary depending upon the specific soluble salt. | NIOSH/OSHA 0.002 mg/m ³ | N.E. | Appearance and odor vary depending upon the specific soluble salt. | Properties vary depending upon the specific soluble salt. | | None reported | Filter; Acid/ Reagent; HGA; II(7) [§S191] |
| Portland cement 65997-15-1 VV8770000 | Cement, Hydraulic cement, Portland cement silicate | NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp) | N.E. | Gray, odorless powder. | MW: ? BP: NA Sol: Insoluble FLP: NA IP: NA | VP: 0 mm (approx) MLT: NA UEL: NA LEL: NA | None reported | Filter; none; Grav; III [§0500, Nuisance Dust (total)] |
| Noncombustible Solid | | | | | | | | |
| Propane CH ₃ CH ₂ CH ₃ 74-98-6 TX2275000 | Bottled gas. Dimethyl methane, n-Propane, Propyl hydride | NIOSH/OSHA 1000 ppm (1800 mg/m ³) | 20,000 ppm [LEL] | Colorless, odorless gas. [Note: A foul- smelling odorant is often added when used for fuel purposes. Shipped as a liquefied com- pressed gas.] | MW: 44.1 BP: -44°F Sol: 0.01% FLP: NA (Gas) IP: 11.07 eV | VP: >1 atm FRZ: -306°F UEL: 9.5% LEL: 2.1% | Strong oxidizers | Combustible gas meter; none; none; II(2) [§S87] |
| 1978 22 | 1 ppm = 1.83 mg/m ³ | | | | Flammable Gas | | | |
| beta-Propiolactone C ₃ H ₄ O ₂ 57-57-8 RQ7350000 | BPL; Hydroacrylic acid, beta lactone; 3-Hydroxy-beta-lactone; 3-Hydroxy-propionic acid; beta-Lactone; 2-Oxetanone; 3-Propiolactone 1 ppm = 3.00 mg/m ³ | NIOSH Ca See Appendix A OSHA [1910.1013] See Appendix B ACGIH 0.5 ppm, A2 (1.5 mg/m ³) | Ca | Colorless liquid with a slightly sweet odor. | MW: 72.1 BP: 323°F (Decomposes) Sol: 37% FLP: 165°F IP: ? Sp.Gr: 1.15 Class IIIA Combustible Liquid | VP(77°F): 3 mm FRZ: -28°F UEL: ? LEL: 2.9% | Acetates, halogens, thiocyanates, thiosulfates [Note: May polymerize upon storage.] | None available |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|------------------------|---|----------------|----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Irrit eyes, nose; cough, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 0.05 mg/m ³ : SA:CF ⁺ | Ing | dysp, wheez, cyan; skin | Skin: | Water flush immed | eyes |
| Wash: | Prompt contam | 0.1 mg/m ³ : HIEF/SCBAF/SAF | Con | sens; lymphocytosis | Breath: | Resp support | |
| Change: | After work if reason | 4 mg/m ³ : SAF:PD, PP | | | Swallow: | Medical attention | |
| Remove: | prompt non-imperv | 8: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | immed | |
| | contam | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose; cough, | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 50 mg/m ³ : D | Con | expectoration; exertional | Skin: | Soap wash prompt | skin |
| Wash: | Prompt contam | 100 mg/m ³ : SA/SCBA/DXSQ | Ing | dysp, wheez, chronic bron; | Breath: | Fresh air | |
| Change: | N.R. | 250 mg/m ³ : PAPRD/SA:CF | | derm | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | 500 mg/m ³ : SCBAF/SAF/HIEF/SAT:CF/ | | | | immed | |
| | contam | PAPRTHIE | | | | | |
| | | 5000 mg/m ³ : SA:PD, PP | | | | | |
| | | 8: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Dizz, disorientation, | Eye: | Irr immed | CNS |
| Goggles: | Reason prob | 10,000 ppm: SA/SCBA | Con | excitation, frostbite | Skin: | Water flush immed | |
| Wash: | N.R. | 20,000 ppm: SA:CF/SCBAF/SAF | | | Breath: | Resp support | |
| Change: | N.R. | 8: SCBAF:PD, PP/SAF:PD, PP:ASCBA | | | | | |
| Remove: | Immed wet (flamm) | Escape: SCBAE | | | | | |
| Clothing: | Any poss | NIOSH | Inh | Skin irrit, blistering, | Eye: | Irr immed | Kidney, skin, |
| Goggles: | Any poss | 8: SCBAF:PD, PP/SAF:PD, PP:ASCBA | Abs | burns; corneal opac; | Skin: | Soap wash immed | lungs, eyes |
| Wash: | Immed contam/daily | Escape: GMFOV/SCBAE | Ing | frequent urination; | Breath: | Resp support | |
| Change: | After work if any poss | | Con | dysuria; hema; [carc] | Swallow: | Medical attention | |
| Remove: | contam | | | | | immed | |
| Provide: | Immed contam | | | | | | |
| | Eyewash, quick drench | | | | | | |

beta-Propiolactone

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|--|---|--|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| n-Propyl acetate <chem>CH3COOCH2CH2CH3</chem> 109-60-4 AJ3875000 | Propylacetate, n-Propyl ester of acetic acid | NIOSH/OSHA 200 ppm (840 mg/m³) ST 250 ppm (1050 mg/m³) | 8000 ppm | Colorless liquid with a mild, fruity odor. | MW: 102.2 BP: 215°F Sol: 2% Fl.P: 55°F IP: 10.04 eV | VP(84°F): 40 mm FRZ: -134°F UEL: 8% LEL(100°F): 1.7% | Nitrates; strong oxidizers, alkalis & acids | Char; CS; GC/FID; III [#1450, Esters I] |
| 1276 26 | 1 ppm = 4.25 mg/m³ | | | | Sp.Gr: 0.84 Class IB Flammable Liquid | | | |
| n-Propyl alcohol <chem>CH3CH2CH2OH</chem> 71-23-8 UH8225000 | Ethyl carbinol, 1-Propanol, n-Propanol, Propyl alcohol | NIOSH 200 ppm (500 mg/m³) ST 250 ppm (625 mg/m³) [skin] OSHA 200 ppm (500 mg/m³) ST 250 ppm (625 mg/m³) | 4000 ppm | Colorless liquid with a mild, alcohol-like odor. | MW: 60.1 BP: 207°F Sol: Miscible Fl.P: 72°F IP: 10.15 eV | VP(77°F): 21 mm FRZ: -198°F UEL: 13.7% LEL: 2.2% | Strong oxidizers | Char; 2-Propanol/ CS; GC/FID; III [#1401, Alcohols II] |
| 1274 26 | 1 ppm = 2.50 mg/m³ | | | | Sp.Gr: 0.81 Class IB Flammable Liquid | | | |
| Propylene dichloride <chem>CH3CHClCH2Cl</chem> 78-87-5 TX9825000 | Dichloro-1,2-propane; 1,2-Dichloropropane | NIOSH Ca See Appendix A OSHA 75 ppm (350 mg/m³) ST 110 ppm (510 mg/m³) | Ca [2000 ppm] | Colorless liquid with a chloroform- like odor. [pesticide] | MW: 113.0 BP: 206°F Sol: 0.3% Fl.P: 60°F IP: 10.87 eV | VP: 40 mm FRZ: -149°F UEL: 14.5% LEL: 3.4% | Strong oxidizers, strong acids | Char(pet); Acetone/ Cyclo- hexane; GC/ECD; III [#1013, 1,2-Di- chloro- propane] |
| 1279 27 | 1 ppm = 4.70 mg/m³ | | | | Sp.Gr: 1.16 Class IB Flammable Liquid | | | |
| Propylene imine <chem>C3H7N</chem> 75-55-8 CM8050000 | 2-Methylaziridine, 2-Methylisethylenimine, Propyleneimine, Propylene imine (inhibited) Propylenimine | NIOSH Ca See Appendix A 2 ppm (5 mg/m³) [skin] OSHA 2 ppm (5 mg/m³) [skin] | Ca [500 ppm] ACGIH A2 | Colorless, oily liquid with an ammonia-like odor. | MW: 57.1 BP: 152°F Sol: Miscible Fl.P: 25°F IP: 9.00 eV | VP: 112 mm FRZ: -85°F UEL: ? LEL: ? | Acids, strong oxidizers, water, carbonyl compounds, quinones, sulfonyl halides [Note: Subject to violent polymerization in contact with acids. Hydrolyzes in water to form methylethanofamine.] | None available |
| 1921 30 (inhibited) | 1 ppm = 2.37 mg/m³ | | | | Sp.Gr: 0.80 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------|---|----------------|----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Reason prob | 1000 ppm: PAPROV/CCRFOV | Con | narco; derm | Skin: | Water flush prompt | skin, CNS |
| Wash: | Prompt wet | 5000 ppm: SA-CF* | Ing | | Breath: | Resp support | |
| Change: | N.R. | 8000 ppm: GMFOV/SCBAF/SAF | | | | | |
| Remove: | Immed wet (flamm) | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Mild irrit eyes, nose, | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | 1000 ppm: PAPROV/CCROV* | Abs | throat; dry cracking skin; | Skin: | Water flush | sys, GI tract |
| Wash: | Prompt wet | 2000 ppm: SA*/SCBA* | Ing | drow, head; ataxia, GI | Breath: | Resp support | |
| Change: | N.R. | 4000 ppm: SA-CF*/SCBAF/SAF/GMFOV | Con | pain; abdom cramps; nau, | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | | vomit, diarr | | immed | |
| Clothing: | Repeat | NIOSH | Inh | Eye irrit; drow, li-head; | Eye: | Irr immed | Skin, eyes, resp |
| Goggles: | Reason prob | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Con | irrit skin; [carc]; | Skin: | Soap wash prompt | sys, liver, |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | Ing | in animals: liver, kidney | Breath: | Resp support | kidneys |
| Change: | N.R. | | | disease; skin irrit | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Clothing: | Reason prob | NIOSH | Inh | Eye, skin burns; [carc] | Eye: | Irr immed | Eyes, skin |
| Goggles: | Any poss | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Abs | | Skin: | Water flush immed | |
| Wash: | Immed contam | Escape: GMFS/SCBAE | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Provide: | Eyewash, quick drench | | | | | | |

Propylene imine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|------------------|--|---|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Propylene oxide <chem>C3H6O</chem> 75-56-9 TZ2975000 | 1,2-Epoxy propane; Methyl ethylene oxide; Methyloxirane; Propene oxide; 1,2-Propylene oxide | NIOSH Ca See Appendix A OSHA 20 ppm (50 mg/m³) | Ca [2000 ppm] | Colorless liquid with a benzene- like odor. [Note: A gas above 94°F.] | MW: 58.1 BP: 94°F Sol: 41% FLP: -35°F IP: 9.81 eV | VP: 445 mm FRZ: -170°F UEL: 36% LEL: 2.3% | Anhydrous metal chlorides; iron; strong acids; caustics & peroxides [Note: Polymerization may occur due to high temperatures or contamination with alkalis, aqueous acids, amines & acidic alcohols.] | Char; CS; GC/FID; III [#1612] |
| 1280 26 (inhibited) | 1 ppm = 2.42 mg/m³ | | | | Sp.Gr: 0.83 Class IA Flammable Liquid | | | |
| n-Propyl nitrate <chem>CH3CH2CH2NO3</chem> 827-13-4 UK0350000 | Propyl ester of nitric acid | NIOSH/OSHA 25 ppm (105 mg/m³) ST 40 ppm (170 mg/m³) | 2000 ppm | Colorless to straw-colored liquid with an ether-like odor. | MW: 105.1 BP: 94°F Sol: Insoluble FLP: 68°F IP: 11.07 eV | VP: 18 mm FRZ: -148°F UEL: 100% LEL: 2% | Strong oxidizers, combustible materials | Char; CS; GC/FID; II(3) [#S227] |
| 1865 30 | 1 ppm = 4.37 mg/m³ | | | | Sp.Gr: 1.07 Class IB Flammable Liquid | | | |
| Pyrethrum <chem>C20H28O3</chem> <chem>C21H28O3</chem> <chem>C22H28O3</chem> 8003-34-7 UR4200000 9184 31 | Cinerin I or II, Jasmolin I or II, Pyrethrin I or II, Pyrethrum I or II | NIOSH/OSHA 5 mg/m³ | 5000 mg/m³ | Brown, viscous oil or solid. [insecticide preparations containing pyrethrins] | MW: 316-372 BP: ? Sol: Insoluble FLP: 180 to 190°F IP: ? | VP: Low MLT: ? UEL: ? LEL: ? | Strong oxidizers | Filter; CH ₃ CN; HPLC/UVD; III [#5008] |
| Pyridine <chem>C5H5N</chem> 110-86-1 UR8400000 | Azabenzene, Azine | NIOSH/OSHA 5 ppm (15 mg/m³) | 3600 ppm | Colorless to yellow liquid with a nauseating, fish-like odor. | MW: 79.1 BP: 240°F Sol: Miscible FLP: 68°F IP: 9.27 eV | VP(77°F): 20 mm FRZ: -44°F UEL: 12.4% LEL: 1.8% | Strong oxidizers, strong acids | Char; CH ₃ Cl; GC/FID; III [#1613] |
| 1282 26 | 1 ppm = 3.29 mg/m³ | | | | Sp.Gr: 0.98 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 6) | First aid (See Table 6) | | Target organs (See Table 6) |
| Clothing: | Any poss | NIOSH | Inh | Irrit eyes, upper resp sys, | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | ✓: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Con | lungs; skin irrit, blister, | Skin: | Water flush immed | sys |
| Wash: | Immed contam | Escape: GMFS/SCBAE | Ing | burns; [carc] | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Provide: | Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | In animals: methemoglobin, | Eye: | Irr immed | None known |
| Goggles: | Reason prob | 250 ppm: SA/SCBA | Ing | anoxia, cyan; dysp, weak, | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | 625 ppm: SA:CF | Con | dizz, head; irrit eyes, | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: SCBAF/SAF/SAT:CF | | skin | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 2000 ppm: SA-PD, PP | | | | immed | |
| | | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Erythema, derm, papules, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 50 mg/m ³ : CCROVDMFu*/SA*/SCBA* | Ing | pruritus, rhin; sneezing; | Skin: | Soap wash immed | CNS |
| Wash: | Prompt contam | 125 mg/m ³ : SA:CF*/PAPROVDMFu* | Con | asthma | Breath: | Resp support | |
| Change: | After work if reason prob contam | 250 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | PAPRTOVHIE* | | | | immed | |
| | | 5000 mg/m ³ : SAF-PD, PP | | | | | |
| | | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Head, ner, dizz, | Eye: | Irr immed | CNS, liver, |
| Goggles: | Any poss | 125 ppm: SA:CF*/PAPROV* | Abs | insomnia; nau, anor; urine | Skin: | Water flush immed | kidneys, skin, |
| Wash: | Immed contam | 250 ppm: CCRFOV/GMFOV/SCBAF/SAF | Ing | frequent; eye irrit; derm; | Breath: | Resp support | GI tract |
| Change: | N.R. | 3600 ppm: SAF-PD, PP | Con | liver, kidney damage | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | immed | |
| Provide: | Eyewash, quick drench | Escape: GMFOV/SCBAE | | | | | |

Pyridine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|---------------------------|--|--|--|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Quinone <chem>C6H4O2</chem> 108-51-4 DK2625000 | 1,4-Benzoquinone; p-Benzoquinone; 1,4-Cyclohexadiene dioxide; p-Quinone | NIOSH/OSHA 0.4 mg/m ³ (0.1 ppm) | 300 mg/m ³ | Pale-yellow solid with an acrid, chlorine-like odor. | MW: 108.1 BP: Sublimes Sol: Slight Fl.P: 100 to 200°F IP: 9.68 eV | VP(77°F): 0.1 mm MLT: 240°F UEL: ? LEL: ? | Strong oxidizers | XAD-2; Ethanol/ Hexane; HPLC/UVD; II(4) [#S181] |
| 2587 55 | | | | | Sp.Gr: 1.32 Combustible Solid | | | |
| Rhodium (metal fume and insoluble compounds as Rh) Rh 7440-16-6 (Metal) V19355000 (Metal) | Metal: Elemental rhodium Synonyms of other insoluble compounds vary depend- ing upon the specific com- pound. | NIOSH/OSHA 0.1 mg/m ³ | N.E. | Metal: White, hard, ductile, malleable solid with a bluish-gray luster. | MW: 102.9 BP: 6741°F Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 3571°F UEL: NA LEL: NA | None reported | Filter; Acid; AA; II(3) [#S188] |
| | | | | | Sp.Gr: 12.41 (Metal) Metal: Noncombustible Solid, but flammable in form of dust or powder. | | | |
| Rhodium (soluble compounds as Rh) | Synonyms vary depending upon the specific soluble compound. | NIOSH/OSHA 0.001 mg/m ³ | N.E. | Appearance and odor vary depending upon the specific soluble compound. | Properties vary depending upon the specific soluble compound. | | None reported | Filter; Acid; HGA; II(3) [#S189] |
| Ronnel <chem>(CH3O)2P(S)OC6H4Cl3</chem> 299-84-3 TG0525000 | O,O-Dimethyl O-(2,4,5-tri- chlorophenyl) phosphoro- thioate; Fenchlorophos | NIOSH/OSHA 10 mg/m ³ | 5000 mg/m ³ | White to light tan, crystalline solid. [insecticide] [Note: A liquid above 95°F.] | MW: 321.6 BP: Decomposes Sol(77°F): 0.004% Fl.P: NA IP: ? | VP(77°F): 0.0008 mm MLT: 108°F UEL: NA LEL: NA | Strong oxidizers | Filter/ Chrom- 102; Toluene; GC/FID; II(6) [#S299] |
| | | | | | Sp.Gr(77°F): 1.49 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|-------------------|--|--------------------------------------|--|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Reason prob | NIOSH/OSHA | Inh Ing Con | Eye irrit, conj; kera; skin irrit | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Eyes, skin |
| Goggles: | Any poss | 10 mg/m ³ : SA/CF [†] | | | | | |
| Wash: | Immed contam | 20 mg/m ³ : SCBAF/SAF | | | | | |
| Change: | After work if any poss contam | 300 mg/m ³ : SAF:PD,PP | | | | | |
| Remove: | Immed non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Eyewash, quick drench | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | None known | Breath: Swallow: | Resp support Medical attention immed | None known |
| Goggles: | N.R. | 0.5 mg/m ³ : DM ^Δ | | | | | |
| Wash: | N.R. | 1 mg/m ³ : SA/SCBA/DMXSQ ^Δ | | | | | |
| Change: | N.R. | 2.5 mg/m ³ : PAPRDMFu/SA:CF | | | | | |
| Remove: | N.R. | 5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/ SAT:CF | | | | | |
| | | 100 mg/m ³ : SA:PD,PP | | | | | |
| | | 200 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | In animals: mild eye irrit; CNS damage | Eye: Skin: Breath: Swallow: | Irr immed Water flush Art Resp Medical attention immed | Eyes |
| Goggles: | Reason prob | 0.01 mg/m ³ : HIE*/SA*/SCBA* | | | | | |
| Wash: | Prompt contam | 0.025 mg/m ³ : PAPRHIE*/SA:CF* | | | | | |
| Change: | N.R. | 0.05 mg/m ³ : PAPRTHIE*/HIEF/SCBAF/ SAF | | | | | |
| Remove: | Prompt non-imperv contam | 2 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | In animals: Chol inhibition; eye irrit; liver, kidney damage | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | Skin, liver, kidneys, blood plasma |
| Goggles: | Reason prob | 100 mg/m ³ : CCROVDMFu/SA/SCBA | | | | | |
| Wash: | Promptly contam | 250 mg/m ³ : SA:CF/PAPROVDMFu | | | | | |
| Change: | After work if reason prob contam | 500 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/PAPRTOVHIE* | | | | | |
| Remove: | Prompt non-imperv contam | 5000 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |

Ronnel

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|---------|--|--|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Rotenone $C_{23}H_{22}O_6$ 83-79-4 DJ2800000 | 1,2,12,12a-Tetrahydro-8,9- dimethoxy-2-(1-methyl- ethenyl)-(1-benzopyrano [3,4-b]furo[2,3-h]) benzopyran-6(6aH)-one | NIOSH/OSHA 5 mg/m ³ | Unknown | Colorless to red, odorless, crystalline solid. [insecticide] | MW: 394.4 BP: Decomposes Sol: Insoluble FLP: ? IP: ? | VP: Low MLT: 330°F UEL: ? LEL: ? | Strong oxidizers, alkalis | Filter; CH ₃ CN; HPLC/UVD; III [#5007] |
| | | | | | Sp.Gr: 1.27 Combustible Solid | | | |
| Selenium compounds (as Se) Se 7782-49-2 (element) VS7700000 (element) 2658 53 (powder) 2657 53 (disulfide) | Element: Elemental selenium, Selenium alloy Synonyms of other compounds vary depending upon the specific compound. | NIOSH/OSHA 0.2 mg/m ³ | Unknown | Element: Amor- phous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] | MW: 79.0 BP: 1265°F Sol: Insoluble FLP: ? IP: NA | VP: 0 mm (approx) MLT: 392°F UEL: ? LEL: ? | Acids, strong oxidizers, chromium trioxide, potassium bromate | Filter; Acid; AA; II(7) [#S190] |
| | | | | | Sp.Gr: 4.28 Combustible Solid | | | |
| Selenium hexafluoride (as Se) SeF ₆ 7783-79-1 VS9450000 | Selenium fluoride | NIOSH/OSHA 0.05 ppm (0.4 mg/m ³) | 5 ppm | Colorless gas. | MW: 193.0 BP: -30°F Sol: Insoluble FLP: NA IP: ? | VP: >1 atm FRZ: -59°F UEL: NA LEL: NA | Water [Note: Hydrolyzes very slowly in cold water.] | None available |
| | | | | | Nonflammable Gas | | | |
| Silica, amorphous SiO ₂ 7631-86-9 VV7310000 | Diatomaceous earth, Diatomaceous silica, Diatomite, Silica gel, Silicon dioxide (amorphous) | NIOSH See Appendix D OSHA 6 mg/m ³ See Appendix C | N.E. | Transparent to gray, odorless powder. [Note: Amorphous silica is the non-crystalline form of SiO ₂ .] | MW: 60.1 BP: 4048°F Sol: Insoluble FLP: NA IP: NA | VP: 0 mm (approx) MLT: 3110°F UEL: NA LEL: NA | Fluorine, oxygen difluoride, chlorine trifluoride | Filter; LTA; XRD; III [#7501] |
| | | | | | Sp.Gr: 2.20 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|-------------------------------|---|--------------------------|--|--------------------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh Ing Con | Irrit eyes; numb muc memb; nau, vomit, abdom pain; musc tremor, inco, clonic convuls, stupor; pulm irrit; skin irrit | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | CNS, eyes, resp sys |
| Goggles: | Reason prob | 5 mg/m ³ : CCROVDMFu/SA/SCBA | | | | | |
| Wash: | Prompt contam | 125 mg/m ³ : SA:CF/PAPROVDMFu | | | | | |
| Change: | After work if any poss contam | 250 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/SAT:CF/ PAPROVHIE | | | | | |
| Remove: | Prompt non-imperv contam | 5000 mg/m ³ : SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | | | | | |
| Recommendations vary depending upon the specific compound. | | NIOSH/OSHA | Inh Abs Ing Con | Irrit eyes, nose, throat; vis dist; head; chills, fever; dysp, bron; metallic taste, garlic breath, GI dist; derm; skin, eye burns; in animals: anemia; liver, kidney damage | Eye: Skin: Breath: Swallow: | Irr immed Soap wash immed Resp support Medical attention immed | Upper resp sys, eyes, skin, liver, kidneys, blood |
| | | 2 mg/m ³ : DMFA/SA*/SCBA* | | | | | |
| | | 5 mg/m ³ : PAPRODM*/SA:CF* | | | | | |
| | | 10 mg/m ³ : HIEF/SCBAF/SAF | | | | | |
| | | 100 mg/m ³ : SAF:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh Con | In animals: pulm irrit, edema | Breath: | Resp support | None known in humans |
| Goggles: | N.R. | 0.5 ppm: SA/SCBA | | | | | |
| Wash: | N.R. | 1.25 ppm: SA:CF | | | | | |
| Change: | N.R. | 2.5 ppm: SCBAF/SAF/SAT:CF | | | | | |
| Remove: | N.R. | 5 ppm: SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE | | | | | |
| Clothing: | N.R. | OSHA | Inh | Pneumoconiosis | Eye: | Irr immed | Resp sys |
| Goggles: | N.R. | 30 mg/m ³ : DM | | | | | |
| Wash: | N.R. | 60 mg/m ³ : DMXSO/SA/SCBA | | | | | |
| Change: | N.R. | 150 mg/m ³ : PAPRODM/SA:CF | | | | | |
| Remove: | N.R. | 300 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ SAF/SAT:CF 3000 mg/m ³ : SA:PD,PP g: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |

Silica, amorphous

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|---------------------|---|---|---|---|---|
| | | | | | MW, BP, SOL, F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Silica, crystalline (as respirable dust) SiO ₂ 14808-60-7 VV7330000 | Cristobalite, Quartz, Tridymite, Tripoli | NIOSH Ca See Appendix A 0.05 mg/m ³ OSHA 0.05 mg/m ³ (cristobalite) 0.05 mg/m ³ (tridymite) 0.1 mg/m ³ (quartz) 0.1 mg/m ³ (tripoli) | Ca [N.E.] | Colorless, odorless solid. [Note: A component of many mineral dusts.] | MW: 60.1 BP: 4048°F Sol: Insoluble F.P.: NA IP: NA Sp.Gr: 2.68 Noncombustible Solid | VP: 0 mm (approx) MLT: 3110°F UEL: NA LEL: NA | Powerful oxidizers: fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, hydrogen peroxide, etc.; acetylene; ammonia | Filter; LTA; XRD; III [#7500] |
| Silver (metal dust and soluble compounds as Ag) Ag 7440-22-4 (Metal) VW3500000 (Metal) | Metal: Silver metal Synonyms of soluble compounds vary depending upon the specific compound. | NIOSH/OSHA 0.01 mg/m ³ | N.E. | Metal: White, lustrous solid. | MW: 107.9 BP: 3632°F Sol: Insoluble F.P.: NA IP: NA Sp.Gr: 10.49 (Metal) Metal: Noncombustible Solid, but flammable in form of dust or powder. | VP: 0 mm (approx) MLT: 1761°F UEL: NA LEL: NA | Acetylene, ammonia, hydrogen peroxide, bromazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid | Filter; Acid; ICP; III [#7300, Elements] |
| Soapstone (containing less than 1% quartz) 3MgO·4SiO ₂ ·H ₂ O VV8780000 | Massive talc, Soapstone silicate, Steatite | NIOSH/OSHA 6 mg/m ³ (total) 3 mg/m ³ (resp) | N.E. | Odorless, white- gray powder. | MW: 379.3 BP: ? Sol: Insoluble F.P.: NA IP: NA Sp.Gr: 2.7-2.8 Noncombustible Solid | VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA | None reported | Filter; none; Grav; III [#0500, Nuisance Dust (total)] |
| Sodium fluoroacetate FCH ₂ C(O)ONa 62-74-8 AH9100000 2629 53 | SFA, Sodium monofluoroacetate | NIOSH/OSHA 0.05 mg/m ³ ST 0.15 mg/m ³ [skin] | 5 mg/m ³ | Fluffy, colorless to white (sometimes dyed black), odorless powder. [Note: A liquid above 95°F.] [rodenticide] | MW: 100.0 BP: 332°F Sol: Miscible F.P.: NA IP: ? Noncombustible Solid | VP: Low MLT: 95°F UEL: NA LEL: NA | None reported | Filter; Water; IC; II(5) [#S301] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------|--|----------------|---------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH | Inh | Cough, dysp, wheez; | Eye: | Irr immed | Resp sys |
| Goggles: | N.R. | V: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | impaired pulm func; | Breath: | Fresh air | |
| Wash: | N.R. | Escape: HIEF/SCBAE | | progressive symptoms; [canc] | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| | | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA | Inh | Blue-gray eyes, nasal | Eye: | Irr immed | Nasal septum, |
| Goggles: | Any poss | 0.25 mg/m ³ : SA:CF*/PAPRIHIE* | Ing | septum, throat, skin; irrit | Skin: | Water flush | skin, eyes |
| Wash: | Prompt contam | 0.5 mg/m ³ : HIEF/SCBAF/SAF | Con | skin, ulceration; GI dist | Breath: | Resp support | |
| Change: | After work if reason | 20 mg/m ³ : SAF:PD,PP | | | Swallow: | Medical attention | |
| Remove: | prob contam | 5: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | immed | |
| Provide: | Prompt non-imperv contam | Escape: HIEF/SCBAE | | | | | |
| | Eyewash | | | | | | |
| | | | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Cough, dysp; digital | Eye: | Irr immed | Lungs, CVS |
| Goggles: | N.R. | 30 mg/m ³ : DM | Con | clubbing; cyan; basal | Breath: | Resp support | |
| Wash: | N.R. | 60 mg/m ³ : DMXSO/SA/SCBA | | crackles, cor pulmonale | | | |
| Change: | N.R. | 150 mg/m ³ : PAPRDM/SA/SCBA | | | | | |
| Remove: | N.R. | 300 mg/m ³ : HIEF/SCBAF/SAF/ PAPRIHIE*/SAT:CF* | | | | | |
| | | 3000 mg/m ³ : SAF:PD,PP | | | | | |
| | | 5: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| | | | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Vomit; appre, auditory | Eye: | Irr immed | CVS, lungs, |
| Goggles: | Reason prob | 0.25 mg/m ³ : DM | Abs | hallu; facial pares; twitch | Skin: | Water flush immed | kidneys, CNS |
| Wash: | Immed contam | 0.5 mg/m ³ : DMXSO/SA/SCBA | Ing | face musc; pulsus alternans, | Breath: | Resp support | |
| Change: | After work if any poss | 1.25 mg/m ³ : PAPRDM/SA:CF | Con | ectopic heartbeat, tachard, | Swallow: | Medical attention | |
| Remove: | contam | 2.5 mg/m ³ : HIEF/SCBAF/SAF | | ventilb; pulm edema; | | immed | |
| Provide: | Immed non-imperv contam | 5 mg/m ³ : SAF:PD,PP | | nystagmus; convuls | | | |
| | Quick drench | 5: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Sodium fluoroacetate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-----------------------------|--|--|--|--|---|
| | | | | | MW, BP, SOL, F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Sodium hydroxide NaOH 1310-73-2 WB4900000 1823 60 (solid) 1824 60 (soln) | Caustic soda, Lye, Soda lye, Sodium hydrate | NIOSH/OSHA C 2 mg/m ³ | 250 mg/m ³ | Colorless to white, odorless solid (flakes, beads, granular form). | MW: 40.0 BP: 2534°F Sol: 111% F.P.: NA IP: NA Sp.Gr: 2.13 Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials. | VP: 0 mm (approx) MLT: 605°F UEL: NA LEL: NA | Water; acids; flammable liquids; organic halogens; metals such as aluminum, tin & zinc; nitromethane [Note: Corrosive to metals.] | Filter; HCl; Titrate; III [#7401, Alkaline Dusts] |
| Stibine SbH ₃ 7803-52-3 WJ0700000 2676 18 | Antimony hydride, Antimony trihydride, Hydrogen antimonide | NIOSH/OSHA 0.1 ppm (0.5 mg/m ³) | 40 ppm | Colorless gas with a disagreeable odor like hydrogen sulfide. | MW: 124.8 BP: -1°F Sol: Slight F.P.: NA (Gas) IP: 9.51 eV | VP: >1 atm FRZ: -126°F UEL: ? LEL: ? | Acids, halogenated hydrocarbons, oxidizers, moisture, chlorine, ozone, ammonia | Si gel*; HCl; Via; III [#6008] |
| Stoddard solvent 8052-41-3 WJ8925000 1268 27 (petroleum distillate) | Dry cleaning safety solvent, Mineral spirits, Petroleum solvent, Spotting naphtha | NIOSH 350 mg/m ³ C 1800 mg/m ³ [15-min] OSHA 100 ppm (525 mg/m ³) | 29,500 mg/m ³ | Colorless liquid with a kerosene- like odor. | MW: Varies BP: 428-572°F Sol: Insoluble F.P.: 110°F IP: ? Sp.Gr: 0.78 Class II Combustible Liquid | VP: ? FRZ: ? UEL: ? LEL: ? | Strong oxidizers | Char; CS; GC/FID; III [#1550] |
| Strychnine C ₂₁ H ₂₂ N ₂ O ₂ 57-24-9 WL2275000 1692 53 | None | NIOSH/OSHA 0.15 mg/m ³ | 3 mg/m ³ | Colorless to white, odorless, crystalline solid. [pesticide] | MW: 334.4 BP: Decomposes Sol: 0.02% F.P.: ? IP: ? Sp.Gr: 1.36 Combustible Solid, but difficult to ignite. | VP: Low MLT: 514°F UEL: ? LEL: ? | Strong oxidizers | Filter; Reagent; HPLC/UVD; III [#5016] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Irrit nose; pnueitis; | Eye: | Irr Immed | Eyes, resp sys, |
| Goggles: | Any poss | 50 mg/m ³ : PAPRDM ² /SA:CF ² | Ing | burns eyes, skin; | Skin: | Water flush Immed | skin |
| Wash: | Immed contam | 100 mg/m ³ : SCBAF/SAF/HIEF | Con | temporary loss of hair | Breath: | Resp support | |
| Change: | After work if reason prob contam | 250 mg/m ³ : SAF:PD,PP | | | Swallow: | Medical attention Immed | |
| Remove: | Immed non-imperv contam | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| Provide: | Eyewash, quick drench | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Head, weak; nau, abdom | Breath: | Resp support | Blood, liver |
| Goggles: | N.R. | 1 ppm: SA/SCBA | | pain; lumbar pain, hemog, | | | kidneys, lungs |
| Wash: | N.R. | 2.5 ppm: SA:CF | | hema, hemolytic anemia; | | | |
| Change: | N.R. | 5 ppm: SCBAF/SAF/SAT:CF | | jaun; irrit lung | | | |
| Remove: | N.R. | 40 ppm: SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr Immed | Skin, eyes, resp |
| Goggles: | Reason prob | 3500 mg/m ³ : SA*/SCBA*/CCROV* | Con | dizz; derm | Skin: | Soap wash prompt | sys, CNS |
| Wash: | Prompt wet | 5900 mg/m ³ : PAPROV*/CCRFOV | Ing | | Breath: | Resp support | |
| Change: | N.R. | 8750 mg/m ³ : SA:CF* | | | Swallow: | Medical attention Immed | |
| Remove: | Prompt non-imperv wet | 17,500 mg/m ³ : GMFOV/SCBAF/SAF | | | | | |
| | | 29,500 mg/m ³ : SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Stiff neck, facial musc; | Eye: | Irr Immed | CNS |
| Goggles: | N.R. | 0.75 mg/m ³ : DM | Ing | restless, appre, incr | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | 1.5 mg/m ³ : DMXSO/SA/SCBA | Con | acuity of perception; Incr | Breath: | Resp support | |
| Change: | After work if any poss contam | 3 mg/m ³ : PAPRDM/SA:CF/HIEF/SCBAF/SAF | | reflex excitability; cyan; | Swallow: | Medical attention Immed | |
| Remove: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | tetanic convuls with opisthotonos | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Strychnine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|----------------------|---|---|---|---|--|
| | | | | | MW, BP, SOL, F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Styrene $C_6H_5CH=CH_2$ 100-42-5 WL3675000 | Ethenyl benzene, Phenylethylene, Styrene monomer, Styrol, Vinyl benzene | NIOSH/OSHA 50 ppm (215 mg/m ³) ST 100 ppm (425 mg/m ³) | 5000 ppm | Colorless to yellow, oily liquid with a sweet, floral odor. | MW: 104.2 BP: 293°F Sol: Slight F.P: 88°F IP: 8.40 eV | VP: 5 mm FRZ: -23°F UEL: 7.0% LEL: 1.1% | Oxidizers, catalysts for vinyl polymers, peroxides, strong acids, aluminum chloride [Note: May polymerize if contaminated or subjected to heat. Usually contains an inhibitor such as tert-butylcatechol.] | Char; CS; GC/FID; III [§1501, Aromatic Hydro- carbons] |
| 2055 27 (inhibited) | 1 ppm = 4.33 mg/m ³ | | | | Sp.Gr: 0.91 Class IC Flammable Liquid | | | |
| Sulfur dioxide SO_2 7446-09-5 WS4550000 | Sulfurous acid anhydride, Sulfurous oxide, Sulfur oxide | NIOSH/OSHA 2 ppm (5 mg/m ³) ST 5 ppm (10 mg/m ³) | 100 ppm | Colorless gas with a characteristic, irritating, pungent odor. [Note: A liquid below 14°F. Shipped as a liquefied compressed gas.] | MW: 64.1 BP: 14°F Sol: 10% F.P: NA IP: 12.30 eV | VP: >1 atm FRZ: -104°F UEL: NA LEL: NA | Powdered and alkali metals such as sodium & potassium, water, ammonia, aluminum [Note: Reacts with water to form sulfuric acid.] | Filters(2); NaHCO ₃ / Na ₂ CO ₃ ; IC; III [§6004] |
| 1079 16 | 1 ppm = 2.66 mg/m ³ | | | | Nonflammable Gas | | | |
| Sulfuric acid H_2SO_4 7664-93-9 WS5600000 | Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous) | NIOSH/OSHA 1 mg/m ³ | 80 mg/m ³ | Colorless to dark- brown, oily, odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.] | MW: 98.1 BP: 554°F Sol: Miscible F.P: NA IP: ? | VP(295°F): 1 mm FRZ: 51°F UEL: NA LEL: NA | Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.] | Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [§7903, Inorganic Acids] |
| 1830 39 (51-95% acid) 1831 39 (fuming) 1832 39 (spent) | 1 ppm = 4.08 mg/m ³ | | | | Sp.Gr: 1.84 (98-98% acid) Noncombustible Liquid, but capable of igniting finely divided combustible materials. | | | |
| Sulfur monochloride S_2Cl_2 10025-67-9 WS4300000 | Sulfur chloride, Sulfur subchloride, Thiosulfurous dichloride | NIOSH/OSHA C 1 ppm (6 mg/m ³) | 10 ppm | Light amber to yellow-red, oily liquid with a pungent, nauseating, irritating odor. | MW: 135.0 BP: 280°F Sol: Decom- poses F.P: 245°F IP: 9.40 eV | VP: 7 mm FRZ: -107°F UEL: ? LEL: ? | Peroxides, oxides of phosphorus, organics, water [Note: Decomposes violently in water to form hydrochloric acid, sulfur dioxide, sulfur, sulfite, thiosulfate, and hydrogen sulfide. Corrosive to metals.] | None available |
| 1828 39 | 1 ppm = 5.61 mg/m ³ | | | | Sp.Gr: 1.68 Class IIIB Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------|---|----------------|-----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit eyes, nose; drow, | Eye: | Irr immed | CNS, resp sys, |
| Goggles: | Reason prob | 500 ppm: CCRQV*/SA*/SCBA* | Ing | weak, unsteady gait; | Skin: | Water flush | eyes, skin |
| Wash: | Prompt contam | 1000 ppm: CCRFOV/PAPROV* | Con | narco; defatting derm | Breath: | Resp support | |
| Change: | N.R. | 1250 ppm: SA-CF* | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | 2500 ppm: GMFOV/SCBAF/SAF | | | | Immed | |
| | | 5000 ppm: SAF-PD, PP | | | | | |
| | | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Prevent skin freezing | NIOSH/OSHA | Inh | Irrit eyes, nose, throat, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 20 ppm: CCRS*/SA*/SCBA* | Con | rhin; choking, cough; | Skin: | Water flush immed | eyes |
| Wash: | N.R. | 50 ppm: PAPRS*/SA-CF* | | reflex bronchoconstriction; | Breath: | Resp support | |
| Change: | N.R. | 100 ppm: CCRFS/GMFS/PAPRTS*/ | | eye, skin burns | | | |
| Remove: | Immed wet | SCBAF/SAF/SAT-CF* | | | | | |
| Provide: | Eyewash | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | Any poss >1%/Repeat | NIOSH/OSHA | Inh | Eye, nose, throat irrit; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | <1% | 25 mg/m ³ : PAPRAGHIE [†] /SA-CF [‡] | Ing | pulm edema, bron; | Skin: | Water flush immed | skin, teeth |
| Wash: | Any poss | 50 mg/m ³ : CCRFAGHIE/SCBAF/SAF/ | Con | emphy; conj; stomatis; | Breath: | Resp support | |
| Change: | Immed contam | GMFAGHIE | | dental erosion; trachbronc; | Swallow: | Medical attention | |
| Remove: | N.R. | 80 mg/m ³ : SAF-PD, PP | | skin, eye burns; derm | | Immed | |
| Provide: | Immed non-imperv contam | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | | | |
| | >1%: Eyewash, quick drench | Escape: GMFAGHIE/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Lac; cough; burn eyes, | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Any poss | 10 ppm: PAPRS [†] /CCRFs/GMFS/ | Con | skin; pulm edema | Skin: | Water flush immed | eyes |
| Wash: | Immed contam | SCBAF/SAF | Ing | | Breath: | Resp support | |
| Change: | N.R. | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | Escape: GMFS/SCBAE | | | | Immed | |
| Provide: | Eyewash, quick drench | | | | | | |

Sulfur monochloride

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|----------|---|---|--|--|--|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Sulfur pentafluoride S_2F_{10} 5714-22-7 WS4480000 | Disulfur decafluoride, Sulfur decafluoride | NIOSH/OSHA C 0.01 ppm (0.1 mg/m ³) | 1 ppm | Colorless liquid or gas (above 84°F) with an odor like sulfur dioxide. | MW: 254.1 BP: 84°F Sol: Insoluble F.L.P.: NA IP: ? | VP: 581 mm FRZ: -134°F UEL: NA LEL: NA | None reported | None available |
| | 1 ppm = 10.56 mg/m ³ | | | | Sp.Gr(32°F): 2.08 Noncombustible Liquid | | | |
| Sulfuryl fluoride SO_2F_2 2699-79-8 WT5075000 | Sulfur difluoride dioxide | NIOSH/OSHA 5 ppm (20 mg/m ³) ST 10 ppm (40 mg/m ³) | 1000 ppm | Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas.] [insecticide/ fumigant] | MW: 102.1 BP: -68°F Sol(32°): 0.2% F.L.P.: NA IP: 13.04 eV | VP: >1 atm FRZ: -212°F UEL: NA LEL: NA | None reported | None available |
| 2191 15 | 1 ppm = 4.24 mg/m ³ | | | | Nonflammable Gas | | | |
| 2,4,5-T $C_6H_2Cl_3OCH_2COOH$ 93-78-5 AJ8400000 | 2,4,5-Trichlorophenoxyacetic acid | NIOSH/OSHA 10 mg/m ³ | Unknown | Colorless to tan, odorless, crystalline solid. [herbicide] | MW: 255.5 BP: Decomposes Sol: 0.03% F.L.P.: ? IP: ? | VP: Low MLT: 307°F UEL: ? LEL: ? | None reported | Filter; Methanol; HPLC/UV; III [#5001] |
| 2765 55 | | | | | Sp.Gr: 1.80 Combustible Solid, but burns with difficulty. | | | |
| Talc (containing no asbestos and less than 1% quartz) $Mg_3H_2(SiO_3)_4$ 14807-96-8 WW2710000 | Hydrous magnesium silicate, Steatite talc | NIOSH/OSHA 2 mg/m ³ (resp) | N.E. | Odorless, white powder. | MW: Varies BP: ? Sol: Insoluble F.L.P.: NA IP: NA | VP: 0 mm (approx) MLT: 1652 to 1832°F UEL: NA LEL: NA | None reported | Filter; none; Grav; III [#0600, Nuisance Dust (resp)] |
| | | | | | Sp.Gr: 2.70-2.80 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-------------------------|---|----------------|-----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inj | In animals: pulm edema, | Eye: | Irr immed | Resp sys, CNS |
| Goggles: | Any poss | 0.1 ppm: SA/SCBA | Con | hemorr | Skin: | Soap wash immed | |
| Wash: | N.R. | 0.25 ppm: SA/CF | | | Breath: | Resp support | |
| Change: | N.R. | 0.5 ppm: SCBAF/SAF/SAT:CF | | | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 1 ppm: SA:PD,PP | | | | Immed | |
| Provide: | Eyewash, quick drench | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFAG/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Conj, rhin, phar; pares; | Eye: | Irr immed | Resp sys, CNS |
| Goggles: | N.R. | 50 ppm: SA/SCBA* | Con | in animals: narco, tremor, | Breath: | Resp support | |
| Wash: | N.R. | 125 ppm: SA:CF* | | convuls; pulm edema; kidney | | | |
| Change: | N.R. | 250 ppm: SCBAF/SAF | | inj | | | |
| Remove: | N.R. | 1000 ppm: SAF:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | In animals: ataxia; skin | Eye: | Irr immed | Skin, liver, GI |
| Goggles: | N.R. | 50 mg/m ³ : DM | Inj | irrit, acne-like rash | Skin: | Soap wash | tract |
| Wash: | N.R. | 100 mg/m ³ : DMXSQ/SA/SCBA | Con | | Breath: | Resp support | |
| Change: | N.R. | 250 mg/m ³ : SA:CF/PAPRDM | | | Swallow: | Medical attention | |
| Remove: | N.R. | 500 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE/SAT:CF | | | | Immed | |
| | | 5000 mg/m ³ : SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Fibrotic pneumoconiosis | Eye: | Irr immed | Lungs, CVS |
| Goggles: | N.R. | 10 mg/m ³ : DM | Con | | | | |
| Wash: | N.R. | 20 mg/m ³ : DMXSQ/SA/SCBA | | | | | |
| Change: | N.R. | 50 mg/m ³ : PAPRDM/SA:CF | | | | | |
| Remove: | N.R. | 100 mg/m ³ : HIEF/PAPRTHIE/SAT:CF | | | | | |
| | | SCBAF/SAF | | | | | |
| | | 1000 mg/m ³ : SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Talc (containing no asbestos and less than 1% quartz)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|--|----------------------|---|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Tantalum (metal and oxide dust as Ta) Ta 7440-25-7 (Metal) WW5505000 (Metal) | Metal: Tantalum-181 Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³ | N.E. | Metal: Steel-blue to gray solid or black powder. | MW: 180.9 BP: 9797°F Sol: Insoluble FLP: NA IP: NA Sp.Gr: 16.65 (Metal) 14.40 (Powder) Noncombustible Solid in bulk form, but powder ignites SPONTANEOUSLY in air. | VP: 0 mm (approx) MLT: 5425°F UEL: NA LEL: NA | Strong oxidizers, bromine trifluoride, fluorine | Filter; none; Grav; III [#0500, Nuisance Dust (total)] |
| TEDP (C ₂ H ₅) ₄ P ₂ S ₂ O ₆ 3689-24-5 XN4375000 | Dithion, Suifotep, Tetraethyl dithiono- pyrophosphate, Tetraethyl dithiopyro- phosphate | NIOSH/OSHA 0.2 mg/m ³ [skin] | 35 mg/m ³ | Pale-yellow liquid with a garlic-like odor. [Note: A pesticide that may be absorbed on a solid carrier or mixed in a more flammable liquid.] | MW: 322.3 BP: Decomposes Sol: 0.0007% FLP: ? IP: ? Sp.Gr(77°F): 1.20 Combustible Liquid | VP: 0.0002 mm FRZ: ? UEL: ? LEL: ? | Strong oxidizers, iron [Note: Corrosive to iron.] | None available |
| 1704 55 | 1 ppm = 13.40 mg/m ³ | | | | | | | |
| Tellurium and com- pounds (as Te) Te 13494-80-9 (Metal) WY2625000 (Metal) | Metal: Aurum paradoxum, Metallum problematicum Synonyms of other com- pounds vary depending upon the specific compound. | NIOSH/OSHA 0.1 mg/m ³ | N.E. | Metal: Odorless, dark-gray to brown, amorphous powder or grayish- white, brittle solid. | MW: 127.6 BP: 1814°F Sol: Insoluble FLP: ? IP: NA Sp.Gr: 6.24 Combustible Solid | VP: 0 mm (approx) MLT: 842°F UEL: ? LEL: ? | Oxidizers, chlorine | Filter; Acid; AA; II(3) [#S204] |
| Tellurium hexafluoride (as Te) TeF ₆ 7783-80-4 WY2800000 | Tellurium fluoride | NIOSH/OSHA 0.02 ppm (0.2 mg/m ³) | 1 ppm | Colorless gas with a repulsive odor. | MW: 241.6 BP: Sublimes Sol: Decom- poses FLP: NA IP: ? | VP: >1 atm FRZ: -36°F (Sublimes) UEL: NA LEL: NA | Water [Note: Hydrolyzes slowly in water to telluric acid.] | Char; NaOH; AA; II(3) [#S187] |
| 2195 15 | 1 ppm = 10.04 mg/m ³ | | | | Nonflammable Gas | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|-------------------------|---|----------------|------------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | In animals: pulm irrit | Breath: | Resp support | None known in humans |
| Goggles: | N.R. | 25 mg/m ³ : DM ^A | | | | | |
| Wash: | N.R. | 50 mg/m ³ : DMXSO ^A /DMFu/SA/SCBA | | | | | |
| Change: | N.R. | 125 mg/m ³ : PAPRDM ^A /SA:CF | | | | | |
| Remove: | N.R. | 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF | | | | | |
| | | SCBAF/SAF | | | | | |
| | | 2500 mg/m ³ : SA:PD,PP | | | | | |
| | | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Eye pain, blurred vision, | Eye: | Irr immed | CNS, resp sys, |
| Goggles: | Any poss | 2 mg/m ³ : SA/SCBA | Abs | lac, rhin; head; cyan; anor, | Skin: | Soap wash immed | CVS |
| Wash: | Immed contam | 5 mg/m ³ : SA:CF | Ing | nau, vomit, diarr; local | Breath: | Resp support | |
| Change: | N.R. | 10 mg/m ³ : SCBAF/SAF | Con | sweat, weak, twitch, | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 35 mg/m ³ : SA:PD,PP | | para, Cheyne-Stokes resp, | | immed | |
| Provide: | Eyewash, quick drench | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | convuls, low BP, card | | | |
| | | Escape: GMFOVHIE/SCBAE | | irregularities; skin, eye | | | |
| | | | | irrit | | | |
| Recommendations vary depending upon the specific compound. | | NIOSH/OSHA | Inh | Garlic odor on breath, | Eye: | Irr immed | Skin, CNS |
| | | 0.5 mg/m ³ : DM ^A | Abs | sweat; dry mouth, metal | Skin: | Soap wash prompt | |
| | | 1 mg/m ³ : SA/SCBA/DMXSO ^A /DMFu | Ing | taste; som; anor; | Breath: | Resp support | |
| | | 2.5 mg/m ³ : PAPRDM ^A /SA:CF | Con | nau, no sweat; derm | Swallow: | Medical attention | |
| | | 5 mg/m ³ : PAPRTHIE/SCBAF/SAF/ | | | | immed | |
| | | SAT:CF/HIEF | | | | | |
| | | 50 mg/m ³ : SA:PD,PP | | | | | |
| | | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Head; dysp; garlic odor | Breath: | Resp support | Resp sys |
| Goggles: | N.R. | 0.2 ppm: SA/SCBA | | on breath; | | | |
| Wash: | N.R. | 0.5 ppm: SA:CF | | in animals: pulm edema | | | |
| Change: | N.R. | 1 ppm: SCBAF/SAF/SAT:CF | | | | | |
| Remove: | N.R. | ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFS/SCBAE | | | | | |

Tellurium hexafluoride (as Te)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|----------------------|--|--|---|--|---|
| | | | | | MW, BP, SOL F.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| TEPP ($C_2H_5)_4P_2O_7$ 107-49-3 UX6825000 | Ethyl pyrophosphate, Tetraethyl pyrophosphate | NIOSH/OSHA 0.05 mg/m ³ [skin] | 10 mg/m ³ | Colorless to amber liquid with a faint, fruity odor. [Note: A solid below 32°F.] [insecticide] | MW: 290.2 BP: Decomposes Sol: Miscible F.P.: NA IP: ? | VP(88°F): 0.0005 mm FRZ: 32°F UEL: NA LEL: NA | Strong oxidizers, alkalis, water [Note: Hydrolyzes quickly in water to form pyrophosphoric acid.] | Chrom-102 (2); Toluene; GC/FPD; III [#2504, Tetraethyl Pyrophos- phate] |
| 2783 55 (dry) | 1 ppm = 12.06 mg/m ³ | | | | Sp.Gr: 1.19 Noncombustible Liquid | | | |
| Terphenyls $C_6H_5C_6H_4C_6H_5$ 28140-80-3 WZ6450000 | Diphenylbenzenes; Phenyl biphenyls; ortho-, meta-, or para-Terphenyl | NIOSH/OSHA C 5 mg/m ³ (0.5 ppm) | Unknown | Colorless or light-yellow solid. [Note: Consists of 3 different isomers.] | MW: 230.3 BP: 630-761°F Sol: Insoluble Fl.P(oc): 325 to 405°F IP: 7.99 eV(o) 8.01 eV(m) 7.78 eV(p) Sp.Gr: 1.10-1.23 Combustible Solid | VP: ? MLT: 136 to 415°F UEL: ? LEL: ? | None reported | Filter; CS; GC/FID; III [#5021] |
| 1,1,2,2-Tetrachloro- 1,2-difluoroethane CCl_2FCCl_2F 78-12-0 KI1420000 | 1,2-Difluoro-1,1,2,2- tetrachloroethane; Freon® 112; Halocarbon 112; Refrigerant 112 | NIOSH/OSHA 500 ppm (4170 mg/m ³) | 15,000 ppm | Colorless solid or liquid (above 77°F) with a slight, ether-like odor. | MW: 203.8 BP: 199°F Sol(77°F): 0.01% F.P.: NA IP: 11.30 eV | VP: 40 mm MLT: 77°F UEL: NA LEL: NA | Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, magnesium & sodium; acids | Char; CS; GC/FID; III [#1016] |
| 1078 12 (refrigerant) | 1 ppm = 8.47 mg/m ³ | | | | Sp.Gr: 1.65 Noncombustible Solid | | | |
| 1,1,1,2-Tetrachloro- 2,2-difluoroethane CCl_3CClF_2 78-11-9 KI1425000 | 2,2-Difluoro-1,1,1,2- tetrachloroethane; Freon® 112a; Halocarbon 112a; Refrigerant 112a | NIOSH/OSHA 500 ppm (4170 mg/m ³) | 15,000 ppm | Colorless solid with a slight, ether-like odor. [Note: A liquid above 105°F.] | MW: 203.8 BP: 197°F Sol: 0.01% F.P.: NA IP: ? | VP: ? MLT: 105°F UEL: NA LEL: NA | Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, magnesium & sodium; acids | Char; CS; GC/FID; III [#1016] |
| | 1 ppm = 8.47 mg/m ³ | | | | Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|-----------------------------------|---|----------------|--|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH/OSHA | Inh | Eye pain, blurred vision, | Eye: | Irr immed | CNS, resp sys, |
| Goggles: | Any poss | 0.5 mg/m ³ : SA/SCBA | Abs | lac, rhin, head, tight | Skin: | Water flush immed | CVS, GI tract |
| Wash: | Immed contam | 1.25 mg/m ³ : SA/CF | Ing | chest, cyan; anor, nau, | Breath: | Resp support | |
| Change: | N.R. | 2.5 mg/m ³ : SCBAF/SAF/SAT/CF | Con | vomit, diarr; weak, twitch, | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | 10 mg/m ³ : SA/PD,PP | | para, Cheyne-Stokes resp, | | immed | |
| Provide: | Eyewash, quick drench | 8: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | | convuls; low BP, card irregularities; local sweating | | | |
| Clothing: | Any poss molt/Repeat liq-sol | NIOSH/OSHA | Inh | Irrit eyes, skin; thermal | Eye: | Irr immed | Skin, resp sys, |
| Goggles: | Any poss molt/Reason prob liq-sol | 25 mg/m ³ : DM ⁺ | Ing | skin burns; head; sore | Skin: | Water flush immed | eyes |
| Wash: | Prompt contam | 50 mg/m ³ : DMXSO ⁺ /SA ⁺ /SCBA | Con | throat | Breath: | Resp support | |
| Change: | After work if reason prob contam | 125 mg/m ³ : PAPRDM ⁺ /SA:CF ⁺ | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 250 mg/m ³ : SCBAF/SAF/HIEF | | | | immed | |
| Provide: | Eyewash, quick drench | 500 mg/m ³ : SAF/PD,PP 8: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: HIEF/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Irrit skin; conj; pulm | Eye: | Irr immed | Lungs, skin |
| Goggles: | Reason prob | 5000 ppm: SA/SCBA | Ing | edema | Skin: | Resp support | |
| Wash: | Prompt wet | 12,500 ppm: SA/CF | Con | | Breath: | Resp support | |
| Change: | N.R. | 15,000 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 8: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | CNS depres; pulm | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Reason prob | 5000 ppm: SA/SCBA | Ing | edema; skin, eye irrit; | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | 12,500 ppm: SA/CF | Con | drow; dysp | Breath: | Resp support | |
| Change: | N.R. | 15,000 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | 8: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE | | | | immed | |

1,1,1,2-Tetrachloro-2,2-difluoroethane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|--|----------------------|--|--|---|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| 1,1,2,2- Tetrachloroethane CHCl ₂ CHCl ₂ 79-34-5 K18575000 | Acetylene tetrachloride, Symmetrical tetrachloro- ethane | NIOSH Ca See Appendix A 1 ppm (7 mg/m ³) [skin] OSHA 1 ppm (7 mg/m ³) [skin] | Ca [150 ppm] | Colorless to pale- yellow liquid with a pungent, chloroform-like odor. | MW: 167.9 BP: 296°F Sol: 0.3% FLP: NA IP: 11.10 eV | VP(86°F): 9 mm FRZ: -33°F UEL: NA LEL: NA | Chemically-active metals, strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.] | Char(pet); CS ₂ ; GC/FID; III [#1019] |
| 1702 55 | 1 ppm = 7.00 mg/m ³ | | | | Sp.Gr(77°F): 1.59 Noncombustible Liquid | | | |
| Tetrachloroethylene Cl ₂ C=CCl ₂ 127-18-4 KX3850000 | Perchloroethylene, Perchloroethylene, Perk, Tetrachloroethylene | NIOSH Ca See Appendix A Minimize workplace exposure concentrations; limit number of workers exposed. OSHA 25 ppm (170 mg/m ³) [skin] | Ca [500 ppm] | Colorless liquid with a mild, chloroform-like odor. | MW: 165.8 BP: 250°F Sol(77°F): 0.02% FLP: NA IP: 9.32 eV | VP: 14 mm FRZ: -2°F UEL: NA LEL: NA | Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash | Char; CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 1897 74 | 1 ppm = 6.89 mg/m ³ | | | | Sp.Gr: 1.62 Noncombustible Liquid | | | |
| Tetrachloronaphthalene C ₁₀ H ₄ Cl ₄ 1335-88-2 QK3700000 | Halowax®, Nibren wax, Seekay wax | NIOSH/OSHA 2 mg/m ³ [skin] | Unknown | Colorless to pale- yellow solid with an aromatic odor. | MW: 265.9 BP: 593-590°F Sol: Insoluble FLP(oc): 410°F IP: ? | VP: <1 mm FRZ: 360°F UEL: ? LEL: ? | Strong oxidizers | Filter/Bub; none; GC/FID; II(2) [#S130] |
| | | | | | Sp.Gr: 1.59-1.65 Combustible Solid | | | |
| Tetraethyl lead (as Pb) Pb(C ₂ H ₅) ₄ 78-00-2 TP4550000 | Lead tetraethyl, TEL | NIOSH/OSHA 0.075 mg/m ³ [skin] | 40 mg/m ³ | Colorless liquid (unless dyed red, orange, or blue) with a pleasant, sweet odor. [Note: Main usage is in anti-knock additives for gasoline.] | MW: 323.5 BP: 228°F (Decomposes) Sol: Insoluble FLP: 200°F IP: 11.10 eV | VP: 0.2 mm FRZ: -202°F UEL: ? LEL: 1.8% | Strong oxidizers, sulfuryl chloride, rust, potassium permanganate [Note: Decomposes slowly at room temperature and more rapidly at higher tempera- tures.] | XAD-2; Pentane; GC/PID; III [#2533] |
| 1649 56 | 1 ppm = 13.45 mg/m ³ | | | | Sp.Gr: 1.65 Class IIIB Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|---|----------------|-----------------------------|----------------------------|-------------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Nau, vomit, abdom pain; | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Any poss | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Abs | tremor fingers; jaun, | Skin: | Soap wash prompt | CNS |
| Wash: | Immed contam | Escape: GMFOV/SCBAE | Ing | enlarged tend liver; derm; | Breath: | Resp support | |
| Change: | N.R. | | Con | monocy; kidney damage | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Liver, kidneys, |
| Goggles: | Reason prob | V: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Ing | nau; flush face, neck; | Skin: | Soap wash prompt | eyes, upper resp |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | Con | verti, dizz, inco; head, | Breath: | Resp support | sys, CNS |
| Change: | N.R. | | | som; skin eryt; liver | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | damage; [carc] | | | |
| Clothing: | Any poss molt/Repeat liq-sol | NIOSH/OSHA | Inh | Acne-form derm; head, | Eye: | Irr immed | Liver, skin |
| Goggles: | Any poss molt/Reason prob liq-sol | 20 mg/m ³ : SCBAF/SAF | Abs | fig, anor, verti; jaun, | Skin: | Soap wash immed | |
| Wash: | Prompt contam | 3: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Ing | liver inj | Breath: | Resp support | |
| Change: | After work if any poss contam | Escape: GMFOVHIE/SCBAE | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam molt/ Prompt non-imperv contam sol | | | | | | |
| Clothing: | Any poss >0.1% | NIOSH/OSHA | Inh | Insom, lass, anxiety; | Eye: | Irr immed | CNS, CVS, |
| Goggles: | Reason prob | 0.75 mg/m ³ : SA/SCBA | Abs | tremor, hyper-reflexia, | Skin: | Soap wash immed | kidneys, eyes |
| Wash: | N.R. | 1.875 mg/m ³ : SA/CF | Ing | spastic; bradycardia, | Breath: | Resp support | |
| Change: | After work if any poss contam >0.1% | 3.75 mg/m ³ : SCBAF/SAF/SAT:CF | Con | hypotension, hypothermia, | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam (>0.1%) | 40 mg/m ³ : SA-PD, PP | | pallor, nau, anor, low-wgt; | | | |
| Provide: | Quick drench (>0.1%) | 3: SCBAF-PD, PP/SAF-PD, PP:ASCBA | | disorientation, halu, | | | |
| | | Escape: GMFOV/SCBAE | | psychosis, mania, convuls, | | | |
| | | | | coma; eye irrit | | | |

Tetraethyl lead (as Pb)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|------------------------|---|--|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Tetrahydrofuran C ₄ H ₈ O 109-99-9 LUS950000 | Diethylene oxide; 1,4-Epoxybutane; Tetramethylene oxide; THF | NIOSH/OSHA 200 ppm (590 mg/m ³) ST 250 ppm (735 mg/m ³) | 20,000 ppm [LEL] | Colorless liquid with an ether-like odor. | MW: 72.1 BP: 151°F Sol: Miscible Fl.P: 6°F IP: 9.45 eV | VP: 132 mm FRZ: -183°F UEL: 11.8% LEL: 2% | Strong oxidizers, lithium-aluminum alloys [Note: Peroxides may accumulate upon prolonged storage in presence of air.] | Char; CS; GC/FID; II [#1609] |
| 2058 26 | 1 ppm = 3.00 mg/m ³ | | | | Sp.Gr: 0.89 Class IB Flammable Liquid | | | |
| Tetramethyl lead (as Pb) Pb(CH ₃) ₄ 75-74-1 TP4725000 | Lead tetramethyl, TML | NIOSH/OSHA 0.075 mg/m ³ [skin] | 40 mg/m ³ | Colorless liquid (unless dyed red, orange, or blue) with a fruity odor. [Note: Main usage is in anti-knock additives for gasoline.] | MW: 287.3 BP: 212°F (Decomposes) Sol: Insoluble Fl.P: 100°F IP: 8.50 eV | VP: 23 mm FRZ: -15°F UEL: ? LEL: ? | Strong oxidizers such as sulfuryl chloride or potassium permanganate | XAD-2; Pentane; GC/PID; III [#2534] |
| 1649 56 | 1 ppm = 11.11 mg/m ³ | | | | Sp.Gr: 2.00 Class II Combustible Liquid | | | |
| Tetramethyl succinonitrile (CH ₃) ₂ C(CN)C(CN)(CH ₃) ₂ 3333-52-6 WN4025000 | Tetramethyl succino- dinitrile, TMSN | NIOSH/OSHA 3 mg/m ³ (0.5 ppm) [skin] | 5 ppm | Colorless, odorless solid. | MW: 136.2 BP: Sublimes Sol: Insoluble Fl.P: ? IP: ? | VP: ? MLT: 338°F (Sublimes) UEL: ? LEL: ? | Strong oxidizers | Char; CS; GC/FID; II(3) [#S155] |
| | | | | | Sp.Gr: 1.07 Combustible Solid | | | |
| Tetranitromethane C(NO ₂) ₄ 509-14-8 PB4025000 | Tetan, TNM | NIOSH/OSHA 1 ppm (8 mg/m ³) | 5 ppm | Colorless to pale- yellow liquid or solid (below 57°F) with a pungent odor. | MW: 198.0 BP: 259°F Sol: Insoluble Fl.P: ? IP: ? | VP: 8 mm FRZ: 57°F UEL: ? LEL: ? | Hydrocarbons, alkalis, metals, oxidizers, aluminum, toluene, cotton [Note: May decom- pose explosively if contaminated with combustible material.] | Imp; none; GC/Alk-FID; II(3) [#S224] |
| 1510 47 | 1 ppm = 8.15 mg/m ³ | | | | Sp.Gr: 1.82 Combustible Liquid, but difficult to ignite. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|----------------|-----------------------------|----------------------------|--------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: PAPROV ⁵ /CCRFOV 5000 ppm: SA-CF ¹ 10,000 ppm: GMFOV/SCBAF/SAF 20,000 ppm: SAF-PD, PP g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, upper resp sys; | Eye: | Irr immed | Eyes, skin, resp |
| Goggles: | Reason prob | | Con | nau, dizz, head | Skin: | Water flush prompt | sys, CNS |
| Wash: | Prompt wet | | ing | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Clothing: | Any poss >1.06% | NIOSH/OSHA 0.75 mg/m ³ : SA/SCBA 1.875 mg/m ³ : SA-CF 3.75 mg/m ³ : SCBAF/SAF/SAT:CF 40 mg/m ³ : SA-PD, PP g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh | Insom, bad dreams, | Eye: | Irr immed | CNS, CVS, kidneys |
| Goggles: | Reason prob | | Abs | restless, anxious; | Skin: | Soap wash immed | |
| Wash: | N.R. | | ing | hypotension; nau, anor; | Breath: | Resp support | |
| Change: | N.R. | | Con | delirium, mania, convuls; | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | coma | | immed | |
| Provide: | >1.06%: Quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 30 mg/m ³ : SA/SCBA g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Head, nau; convuls, | Eye: | Irr immed | CNS |
| Goggles: | Reason prob | | Abs | coma | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | | ing | | Breath: | Resp support | |
| Change: | After work if reason prob contam | | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | | | | | immed | |
| Clothing: | Reason prob | NIOSH/OSHA 5 ppm: SA-CF ¹ /PAPRS ⁴ /CCRFS ⁴ / GMFS ⁴ /SCBAF/SAF g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFS ⁴ /SCBAE | Inh | Irrit eyes, nose, throat; | Eye: | Irr immed | Resp sys, eyes, |
| Goggles: | Any poss | | ing | dizz, head; chest pain, | Skin: | Soap wash prompt | skin, blood, CNS |
| Wash: | Prompt contam | | Con | dysp; methemoglobinuria, | Breath: | Resp support | |
| Change: | After work if reason prob contam | | | cyan; skin burns | Swallow: | Medical attention | |
| Remove: | Immed wet (flamm) | | | | | immed | |
| Provide: | Eyewash | | | | | | |

Tetranitromethane

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|---------------------------|---|---|--|--|--|
| | | | | | MW, BP, SOL Fl.P., IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Tetryl (NO ₂) ₃ C ₆ H ₂ N(NO ₂)CH ₃ 479-45-8 BY6300000 | N-Methyl-N,2,4,6- tetranitroaniline; Nitramine; 2,4,6-Tetryl; 2,4,6-Trinitrophenyl- N-methylnitramine | NIOSH/OSHA 1.5 mg/m ³ [skin] | N.E. | Colorless to yellow, odorless, crystalline solid. | MW: 287.2 BP: 356-374°F (Explodes) Sol: Insoluble Fl.P: Explodes IP: ? Sp.Gr: 1.57 Combustible Solid | VP: Low MLT: 268°F UEL: ? LEL: ? | Oxidizable materials, hydrazine | Filter; Reagent; Vis; II(3) [#S225] |
| Thallium (soluble compounds as TI) 7440-28-0 XG3425000 | Synonyms vary depending upon the specific soluble compound. | NIOSH/OSHA 0.1 mg/m ³ [skin] | 20 mg/m ³ | Appearance and odor vary depend- ing upon the specific soluble compound. | Properties vary depending upon the specific soluble compound. | | None reported | Filter; Acid; AA; II(3) [#S306] |
| 1707 53 (cmpds) | | | | | | | | |
| Thiram (CH ₃) ₂ NC(S)SSC- (S)N(CH ₃) ₂ 137-26-8 JO1400000 | bis(Dimethylthiocarbamoyl) disulfide, Tetramethylthiuram disulfide | NIOSH/OSHA 5 mg/m ³ | 1500 mg/m ³ | Colorless to yellow, crystalline solid. [Note: Commercial pesticide products may be dyed blue.] | MW: 240.4 BP: Decomposes Sol: Insoluble Fl.P: ? IP: ? Sp.Gr: 1.29 Combustible Solid | VP: Low MLT: 312°F UEL: ? LEL: ? | Strong oxidizers, strong acids, oxidizable materials | Filter; CH ₃ CN; HPLC/UV; III [#5005] |
| 2771 55 | | | | | | | | |
| Tin (inorganic compounds except oxides, as Sn) Sn 7440-31-5 (Metal) XP7320000 (Metal) | Metal: Metallic tin, Tin flake, Tin powder Synonyms of other inorganic compounds vary depending upon the specific compound. | NIOSH/OSHA 2 mg/m ³ | 400 mg/m ³ | Metal: Gray to almost silver- white, ductile, malleable, lustrous solid. | MW: 118.7 BP: 4545°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 7.26 (Metal) Metal: Noncombustible Solid, but powdered form may ignite. | VP: 0 mm (approx) MLT: 449°F UEL: NA LEL: NA | Chlorine, turpentine, acids, alkalis | Filter; Acid; AA; I(3) [#S183] |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|--|----------------------------------|--|----------------|---|----------------------------|---|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 7.5 mg/m ³ : DM 15 mg/m ³ : DMXSO*/SA*/SCBA* 37.5 mg/m ³ : PAPRDM*/SA/CF* 75 mg/m ³ : HIEF/SCBAF/SAF 3000 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Sens derm, itch, eryt, edema on nasal folds, cheeks, neck; kera; sneezing; anemia; fig; cough, coryza; irrity; mal, head, lass, insom; nau, vomit | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, eyes, CNS, skin; in animals: liver, kidneys |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | Prompt contam/daily | | Ing | | Breath: | | |
| Change: | After work if reason prob contam | | Con | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA 0.5 mg/m ³ : DM* 1 mg/m ³ : DMXSO*/SA/SCBA 2.5 mg/m ³ : PAPRDM*/SA/CF 5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/ SAT:CF 20 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Nau, diarr, abdom pain, vomit; ptosis, strabismus; peri neuritis, tremor; restler lightness, chest pain, pulm edema; sez, chores, psychosis; liver, kidney damage; alopecia; pares legs | Eye: | Irr immed Water flush prompt Resp support Medical attention immed | Eyes, CNS, lungs; liver, kidneys, GI tract, body hair |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | Prompt contam | | Ing | | Breath: | | |
| Change: | After work if reason prob contam | | Con | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Clothing: | Reason prob | NIOSH/OSHA 50 mg/m ³ : CCROVDMFu*/SA*/SCBA* 125 mg/m ³ : PAPROVDMFu*/SA/CF* 250 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ PAPRTOVHIE*/GMFOVHIE 1500 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Irrit muc memb; derm; with ethanol consumption: flush, eryt, pruritus, urticaria, head, nau, vomit, diarr, weak, dizz, dysp | Eye: | Irr immed Soap wash prompt Medical attention immed | Resp sys, skin |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt contam | | Con | | Breath: | | |
| Change: | After work if reason prob contam | | | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Recommendations vary depending upon the specific compound. | | NIOSH/OSHA 10 mg/m ³ : DM* 20 mg/m ³ : DMXSO*/SA*/SCBA* 50 mg/m ³ : PAPRDM*/SA/CF* 100 mg/m ³ : HIEF/SCBAF/SAF 400 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Irrit eyes, skin | Eye: | Irr immed Soap wash immed Resp support Medical attention immed | Eyes, skin, resp sys |
| | | | Ing | | Skin: | | |
| | | | Con | | Breath: | | |
| | | | | | Swallow: | | |

Tin (Inorganic compounds except oxides, as Sn)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|---|----------------|---|--|--|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Tin (organic compounds as Sn) | Synonyms vary depending upon the specific organic compound. | NIOSH/OSHA 0.1 mg/m ³ [skin] | Unknown | Appearance and odor vary depending upon the specific organic compound. | Properties vary depending upon the specific organic compound. | | Strong oxidizers | Filter/ XAD-2; HPLC; AA; III [#5504] |
| Titanium dioxide TiO ₂ 13463-67-7 XR2275000 | Rutile, Titanium oxide, Titanium peroxide | NIOSH Ca See Appendix A OSHA 10 mg/m ³ | Ca [N.E.] | White, odorless powder. | MW: 79.9 BP: 4532 to 5432°F Sol: Insoluble FLP: NA IP: NA | VP: 0 mm (approx) MLT: 3326 to 3362°F UEL: NA LEL: NA | None reported | Filter; Acid; AA; III(3) [#S385] |
| | | | | | Sp.Gr: 4.26 Noncombustible Solid | | | |
| Toluene C ₆ H ₅ CH ₃ 108-88-3 XS5250000 | Methyl benzene, Methyl benzol, Phenyl methane, Toluol | NIOSH/OSHA 100 ppm (375 mg/m ³) ST 150 ppm (560 mg/m ³) | 2000 ppm | Colorless liquid with a sweet, pungent, benzene- like odor. | MW: 92.1 BP: 232°F Sol(61°F): 0.05% FLP: 40°F IP: 8.82 eV | VP(65°F): 20 mm FRZ: -139°F UEL: 7.1% LEL: 1.2% | Strong oxidizers | Char; CS; GC/FID; III [#1500, Hydro- carbons] |
| 1294 27 | 1 ppm = 3.83 mg/m ³ | | | | Sp.Gr: 0.87 Class IB Flammable Liquid | | | |
| Toluene-2,4- diisocyanate CH ₃ C ₆ H ₃ (NCO) ₂ 584-84-9 CZ6300000 | TDI; 2,4-TDI; 2,4-Toluene diisocyanate | NIOSH Ca See Appendix A 0.005 ppm (0.04 mg/m ³) ST 0.02 ppm (0.15 mg/m ³) OSHA 0.005 ppm (0.04 mg/m ³) ST 0.02 ppm (0.15 mg/m ³) | Ca [10 ppm] | Colorless to pale- yellow solid or liquid (above 71°F) with a sharp, pungent odor. | MW: 174.2 BP: 484°F Sol: Insoluble FLP: 260°F IP: ? | VP(77°F): 0.01 mm MLT: 71°F UEL: 9.5% LEL: 0.9% | Strong oxidizers, water, acids, bases & amines may cause foam and spatter; alcohols [Note: Reacts slowly with water to form carbon dioxide and polyureas.] | Coated glass wool; Methanol; HPLC/UV/D; III [#2535] |
| 2078 57 | 1 ppm = 7.24 mg/m ³ | | | | Sp.Gr: 1.22 Class IIIB Combustible Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------------------|---|--------------------------|--|--------------------------------------|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) | |
| Recommendations vary depending upon the specific compound. | | NIOSH/OSHA 1 mg/m ³ : CCROVDM/SA/SCBA 2.5 mg/m ³ : SA-CF/PAPROVDM 5 mg/m ³ : CCRFOVHIE/SCBAF/SAF/GMFOVHIE/PAPRTOVHIE/SAT-CF 200 mg/m ³ : SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh Abs Ing Con | Head, verti; irrit eyes; psycho-neurologic dist; sore throat, cough; abdom pain, vomit; urine retention; paresis, focal anes; skin burns; pruritus; in animals: hemolysis, hepatic nec | Eye: Skin: Breath: Swallow: | Irr immed Water flush immed Resp support Medical attention immed | CNS, eyes, liver, urinary tract, skin, blood |
| Clothing: | N.R. | NIOSH | Inh | Slight lung fib; [carc] | Breath: | Resp support | Lungs |
| Goggles: | N.R. | §: SCBAF-PD/PP/SAF-PD, PP:ASCBA | | | | | |
| Wash: | N.R. | Escape: HIEF/SCBAE | | | | | |
| Change: | N.R. | | | | | | |
| Remove: | N.R. | | | | | | |
| Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) | | NIOSH/OSHA 1000 ppm: CCROV*/SA*/PAPROV*/SCBA* 2000 ppm: SA-CF*/SCBAF/SAF/GMFOV §: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh Abs Ing Con | Fig, weak; conf, euph, dizz, head; dilated pupils, lac; ner, musc fig, insom; pares; derm | Eye: Skin: Breath: Swallow: | Irr immed Soap wash prompt Resp support Medical attention immed | CNS, liver, kidneys, skin |
| Clothing: | Repeat | NIOSH | Inh | Irrit nose, throat; choke, paroxysmal cough; chest pain, resteter soreness; nau, vomit, abdom pain; bron spasm, pulm edema; dysp, asthma; conj, lac; derm, skin sens; [carc] | Eye: | Irr immed | Resp sys, skin |
| Goggles: | Any poss | §: SCBAF-PD, PP/SAF-PD, PP:ASCBA | Ing | | Skin: | Soap wash immed | |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | Con | | Breath: | Resp support | |
| Change: | After work if reason prob contam | | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Toluene-2,4-diisocyanate | | | | | | | |

Toluene-2,4-diisocyanate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|---|--|------------------------------------|--|--|--|--|---|
| | | | | | MW, BP, SOL, FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| o-Toluidine <chem>CH3C6H4NH2</chem> 95-53-4 XU2975000 | o-Aminotoluene, 2-Aminotoluene, 1-Methyl-2-aminobenzene, o-Methylaniline, 2-Methylaniline, ortho-Toluidine | NIOSH Ca See Appendix A 2 ppm (9 mg/m ³) (skin) OSHA 5 ppm (22 mg/m ³) (skin) | Ca [100 ppm] ACGIH A2 | Colorless to pale- yellow liquid with an aromatic, aniline-like odor. | MW: 107.2 BP: 392°F Sol: 2% FLP: 185°F IP: 7.44 eV | VP: 0.3 mm FRZ: 8°F UEL: ? LEL: ? | Strong oxidizers, nitric acid | Sl gel; Ethanol; GC/FID; III [#2002, Aromatic Amines] |
| 1708 55 | 1 ppm = 4.46 mg/m ³ | | | | Sp.Gr: 1.01 Class IIIA Combustible Liquid | | | |
| Tributyl phosphate <chem>(CH3(CH2)2O)3PO</chem> 126-73-8 TC7700000 | Butyl phosphate, TBP Tributyl ester of phosphoric acid, tri-n-Butyl phosphate | NIOSH/OSHA 0.2 ppm (2.5 mg/m ³) | 125 ppm | Colorless to pale- yellow, odorless liquid. | MW: 266.3 BP: 552°F (Decomposes) Sol: 0.6% FLP(oc): 295°F IP: ? | VP(351°F): 127 mm FRZ: -112°F UEL: ? LEL: ? | None reported | Filter; Diethyl ether; GC/FPD; II(3) [#S208] |
| | 1 ppm = 11.07 mg/m ³ | | | | Sp.Gr: 0.98 Class IIIB Combustible Liquid | | | |
| 1,1,2-Trichloroethane <chem>CHCl2CH2Cl</chem> 79-00-5 KJ3150000 | beta-Trichloroethane, Vinyl trichloride | NIOSH Ca See Appendix A 10 ppm (45 mg/m ³) (skin) OSHA 10 ppm (45 mg/m ³) (skin) | Ca [500 ppm] | Colorless liquid with a sweet, chloroform-like odor. | MW: 133.4 BP: 237°F Sol: 0.4% FLP: NA IP: 11.00 eV | VP: 19 mm FRZ: -34°F UEL: NA LEL: NA | Strong oxidizers & caustics; chemically-active metals such as aluminum, magnesium powders, sodium & potassium | Char; CS; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| 2831 74 | 1 ppm = 5.55 mg/m ³ | | | | Sp.Gr: 1.44 Noncombustible Liquid | | | |
| Trichloroethylene <chem>CICH=CCl2</chem> 79-01-8 KX4550000 | Ethylene trichloride, Triclene, Trichloroethene | NIOSH Ca See Appendix A 25 ppm OSHA 50 ppm (270 mg/m ³) ST 200 ppm (1080 mg/m ³) | Ca [1000 ppm] | Colorless liquid (unless dyed blue) with a chloroform- like odor. | MW: 131.4 BP: 189°F Sol(77°F): 0.1% FLP: 90°F IP: 9.45 eV | VP: 58 mm FRZ: -99°F UEL(77°F): 10.5% LEL(77°F): 8% | Strong caustics & alkalis; chemically- active metals such as barium, lithium, sodium, magnesium, titanium & beryllium | Char; CS; GC/FID; III [#1022] |
| 1710 74 | 1 ppm = 5.46 mg/m ³ | | | | Sp.Gr: 1.46 Class IC Flammable Liquid, but burns with difficulty. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--------------------------|---|----------------|---------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss | NIOSH | Inh | Anoxia, head, cyan; | Eye: | Irr immed | Blood, kidneys, |
| Goggles: | Any poss | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | weak, dizz, drow; micro | Skin: | Soap wash immed | liver, CVS, skin, |
| Wash: | Immed contam | Escape: GMFOV/SCBAE | Ing | hematuria, eye burns; | Breath: | Resp support | eyes |
| Change: | N.R. | | Con | derm; [carc] | Swallow: | Medical attention | |
| Remove: | Immed non-imperv contam | | | | | Immed | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Eyes, resp, skin irrit; | Eye: | Irr immed | Resp sys, skin, |
| Goggles: | Reason prob | 2 ppm: SA/SCBA | Con | head; nau | Skin: | Soap wash prompt | eyes |
| Wash: | Prompt wet | 5 ppm: SA/CF | Ing | | Breath: | Resp support | |
| Change: | N.R. | 10 ppm: SCBAF/SAF | | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | 125 ppm: SAF:PD,PP | | | | Immed | |
| | | g: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOVHIE/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH | Inh | Irrit nose, eyes; CNS | Eye: | Irr immed | CNS, eyes, nose, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Abs | depres; liver, kidney | Skin: | Soap wash prompt | liver, kidneys |
| Wash: | Prompt contam | Escape: GMFOV/SCBAE | Ing | damage; [carc] | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv contam | | | | | Immed | |
| Clothing: | Repeat | NIOSH | Inh | Head, verti; vis dist, | Eye: | Irr immed | Resp sys, heart, |
| Goggles: | Reason prob | Y: SCBAF:PD,PP/SAF:PD,PP:ASCBA | Ing | tremors, som, nau, | Skin: | Soap wash prompt | liver, kidneys, |
| Wash: | Prompt wet | Escape: GMFOV/SCBAE | Con | vomit; irrit eyes; derm; | Breath: | Resp support | CNS, skin |
| Change: | N.R. | | | card arrhy, pares; [carc] | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv wet | | | | | Immed | |

Trichloroethylene

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|------------------|---|--|---|--|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Trichloronaphthalene <chem>C10H5Cl3</chem> 1321-65-9 QK4025000 | Halowax®, Nibren wax, Seekay wax | NIOSH/OSHA 5 mg/m³ [skin] | Unknown | Colorless to pale- yellow solid with an aromatic odor. | MW: 231.5 BP: 579-689°F Sol: Insoluble FLP(oc): 392°F IP: ? | VP: <1 mm MLT: 199°F UEL: ? LEL: ? | Strong oxidizers | Filter/Bub; none; GC/FID; II(2) [#S128] |
| | | | | | Sp.Gr: 1.58 Combustible Solid | | | |
| 1,2,3-Trichloropropane <chem>CH2ClCHClCH2Cl</chem> 96-18-4 TZ9275000 | Allyl trichloride, Glycerol trichlorohydrin, Glyceryl trichlorohydrin, Trichlorohydrin | NIOSH Ca See Appendix A 10 ppm (60 mg/m³) [skin] OSHA 10 ppm (60 mg/m³) | Ca [1000 ppm] | Colorless liquid with a chloroform- like odor. | MW: 147.4 BP: 314°F Sol: 0.1% FLP(oc): 180°F IP: ? | VP(115°F): 10 mm FRZ: 6°F UEL: ? LEL: ? | Chemically-active metals, strong caustics & oxidizers | Char; CS; GC/FID; III [#1003, Haloge- nated Hydro- carbons] |
| | 1 ppm = 6.13 mg/m³ | | | | Sp.Gr: 1.39 Class IIIA Combustible Liquid | | | |
| 1,1,2-Trichloro-1,2,2- trifluoroethane <chem>CCl2FCClF2</chem> 78-13-1 KJ4000000 | Chlorofluorocarbon-113, CFC-113, Freon® 113, Genetron® 113, Halocarbon 113, Refrigerant 113, TTE | NIOSH/OSHA 1000 ppm (7600 mg/m³) ST 1250 ppm (9500 mg/m³) | 4500 ppm | Colorless to water-white liquid with an odor like carbon tetrachloride at high concentra- tions. [Note: A gas above 118°F.] | MW: 187.4 BP: 118°F Sol(77°F): 0.02% FLP: ? IP: 11.99 eV Sp.Gr(77°F): 1.58 Noncombustible Liquid at ordinary temperatures, but the gas will ignite and burn weakly at 1256°F | VP: 285 mm FRZ: -31°F UEL: ? LEL: ? | Chemically-active metals such as calcium, powdered aluminum, zinc, magnesium & beryllium [Note: Decomposes if in contact with alloys containing >2% magnesium.] | Char; CS; GC/FID; III [#1020] |
| | 1 ppm = 7.79 mg/m³ | | | | | | | |
| Triethylamine <chem>(C2H5)3N</chem> 121-44-8 YEO175000 | TEA | NIOSH See Appendix D OSHA 10 ppm (40 mg/m³) ST 15 ppm (60 mg/m³) | 1000 ppm | Colorless liquid with a strong, ammonia-like odor. | MW: 101.2 BP: 193°F Sol: 2% FLP(oc): 16°F IP: 7.50 eV | VP: 54 mm FRZ: -175°F UEL: 8.0% LEL: 1.2% | Strong oxidizers, strong acids | Bub; NaOH; GC/FID; II(3) [#S152] |
| 1298 68 | 1 ppm = 4.21 mg/m³ | | | | Sp.Gr: 0.73 Class IB Flammable Liquid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|---|--|----------------|---|----------------------------|----------------------------|-------------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Any poss molt-fume/ Repeat liq-sol | NIOSH/OSHA 50 mg/m ³ : SCBAF/SAF g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE | Inh | Acne-form derm; anor, nau; verti; jaun, liver inj | Eye: | Irr immed | Skin, liver |
| Goggles: | Any poss molt/Reason prob liq-sol | | Abs | | Skin: | Soap wash prompt | |
| Wash: | Prompt contam | | Ing | | Breath: | Resp support | |
| Change: | After work if reason prob contam sol | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam molt/Prompt non-imperv contam sol | | | | | | |
| Clothing: | Repeat | NIOSH V: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, throat; CNS depres; liver inj; skin irrit; [carc] | Eye: | Irr immed | Eyes, resp sys, skin, CNS, liver |
| Goggles: | Any poss | | Abs | | Skin: | Soap wash prompt | |
| Wash: | Immed contam | | Ing | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed non-imperv contam | | | | | | |
| Provide: | Eyewash, quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 4500 ppm: SA/SCBA g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit throat, drow, derm; in animals: card arrhy | Eye: | Irr immed | Skin, heart |
| Goggles: | Any poss | | Ing | | Skin: | Soap wash prompt | |
| Wash: | Prompt wet | | Con | | Breath: | Resp support | |
| Change: | N.R. | | | | Swallow: | Medical attention immed | |
| Remove: | Prompt non-imperv wet | | | | | | |
| Clothing: | Repeat | OSHA 250 ppm: SA/CFE 500 ppm: SCBAF/SAF 1000 ppm: SAF-PD,PP g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE | Inh | Irrit eyes, resp sys, skin | Eye: | Irr immed | Resp sys, eyes, skin |
| Goggles: | Any poss | | Ing | | Skin: | Soap wash immed | |
| Wash: | Immed contam | | Abs | | Breath: | Resp support | |
| Change: | N.R. | | Con | | Swallow: | Medical attention immed | |
| Remove: | Immed wet (flamm) | | | | | | |
| Provide: | >1%: Eyewash, quick drench | | | | | | |

Triethylamine

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|---------------|--|--|--|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Trifluorobromomethane CBrF ₃ 75-63-8 PA5425000 | Bromotrifluoromethane, Fluorocarbon 1301, Freon® 13B1, Halocarbon 13B1, Halon® 1301, Monobromotrifluoromethane, Refrigerant 13B1, Trifluoromonobromomethane | NIOSH/OSHA 1000 ppm (6100 mg/m³) | 50,000 ppm | Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas.] | MW: 148.9 BP: -72°F Sol: 0.03% Fl.P: NA IP: 11.78 eV | VP: >1 atm FRZ: -267°F UEL: NA LEL: NA | Chemically-active metals such as calcium, powdered aluminum, zinc & magnesium | Char(2); CH ₂ Cl ₂ ; GC/FID; III [#1017] |
| 1009 12 | 1 ppm = 6.19 mg/m³ | | | | Nonflammable Gas | | | |
| 2,4,6-Trinitrotoluene CH ₃ C ₆ H ₂ (NO ₂) ₃ 118-96-7 XU0175000 | 1-Methyl-2,4,6- trinitrobenzene; TNT; Trinitrotoluene; sym-Trinitrotoluene; Trinitrotoluiol | NIOSH/OSHA 0.5 mg/m³ [skin] | N.E. | Colorless to pale- yellow, odorless solid or crushed flakes. [Note: Classified as a high explosive.] | MW: 227.1 BP: 464°F (Explodes) Sol(77°F): 0.01% Fl.P: ? (Explodes) IP: 10.59 eV Sp.Gr: 1.65 Combustible Solid | VP(180°F): 0.05 mm MLT: 176°F UEL: ? LEL: ? | Strong oxidizers, ammonia, strong alkalis, combustible materials, heat [Note: Rapid heating will result in detonation.] | Tenax GC; Acetone; GC/TEA; OSHA [#44] |
| 1356 33 (wet) | | | | | | | | |
| Triorthocresyl phosphate (CH ₃ C ₆ H ₄) ₃ PO 78-30-8 TD0350000 | TCP, TOCP, Tri-o-cresyl ester of phosphoric acid, Tri-o-cresyl phosphate, o-Trinitrotoluiol | NIOSH/OSHA 0.1 mg/m³ [skin] | 40 mg/m³ | Colorless to pale- yellow, odorless liquid or solid (below 52°F). | MW: 388.4 BP: 770°F (Decomposes) Sol: Slight Fl.P: 437°F IP: ? | VP(77°F): 0.00002 mm FRZ: 52°F UEL: ? LEL: ? | Oxidizers | Filter; Diethyl ether; GC/FPD; II(3) [#S209] |
| 2574 55 | 1 ppm = 15.31 mg/m³ | | | | Sp.Gr: 1.20 Class IIIB Combustible Liquid | | | |
| Triphenyl phosphate (C ₆ H ₅ O) ₃ PO 115-86-8 TC8400000 | Phenyl phosphate, TPP, Triphenyl ester of phosphoric acid | NIOSH/OSHA 3 mg/m³ | N.E. | Colorless, crystalline powder with a phenol-like odor. | MW: 326.3 BP: 776°F Sol: Insoluble Fl.P: 428°F IP: ? | VP(380°F): 1 mm MLT: 120°F UEL: ? LEL: ? | None reported | Filter; Diethyl ether; GC/FPD; II(3) [#S210] |
| | | | | | Sp.Gr: 1.29 Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|----------------------|---|----------------|----------------------------|----------------------------|-------------------|--------------------------------|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 6) |
| Clothing: | N.R. | NIOSH/OSHA | Inh | LI-head; card arrhy | Breath: | Resp support | Heart, CNS |
| Goggles: | N.R. | 10,000 ppm: SA/SCBA | Con | | | | |
| Wash: | N.R. | 25,000 ppm: SA/CF | (liq) | | | | |
| Change: | N.R. | 50,000 ppm: SCBAF/SAF/SAT/CF | | | | | |
| Remove: | N.R. | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: GMFOV/SCBAE | | | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | Liver damage, jaun; cyan; | Eye: | Irr immed | Blood, liver, |
| Goggles: | Reason prob | 5 mg/m ³ : SA*/SCBA* | Abs | aneezing; cough, sore | Skin: | Soap wash prompt | eyes, CVS, CNS, |
| Wash: | Prompt contam/daily | 12.5 mg/m ³ : SA/CF* | Ing | throat; peri neur, musc | Breath: | Resp support | kidneys, skin |
| Change: | After work if reason | 25 mg/m ³ : SCBAF/SAF | Con | pain; kidney damage; | Swallow: | Medical attention | |
| | prob contam | 1000 mg/m ³ : SAF:PD,PP | | cataract; sens derm; | | immed | |
| Remove: | Prompt non-imperv | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | leucyt; anemia; card | | | |
| | contam | Escape: GMFOVHIE/SCBAE | | irregularities | | | |
| Clothing: | Repeat | NIOSH/OSHA | Inh | GI dist; peri neur; | Eye: | Irr immed | PNS, CNS |
| Goggles: | N.R. | 0.5 mg/m ³ : DM | Abs | cramps in calves, pares in | Skin: | Soap wash immed | |
| Wash: | Prompt contam | 1 mg/m ³ : DMXSO/SA/SCBA | Ing | feet or hands; weak feet, | Breath: | Resp support | |
| Change: | N.R. | 2.5 mg/m ³ : PAPRDM/SA/CF | Con | wrist drop, para | Swallow: | Medical attention | |
| Remove: | Prompt non-imperv | 5 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/ SAT/CF | | | | immed | |
| | contam | 40 mg/m ³ : SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |
| Clothing: | N.R. | NIOSH/OSHA | Inh | Minor changes in blood | Breath: | Resp support | Blood |
| Goggles: | N.R. | 15 mg/m ³ : D | Ing | enzymes; | Swallow: | Medical attention | |
| Wash: | N.R. | 30 mg/m ³ : DXSQ/SA/SCBAHIE | | in animals: musc weak, | | immed | |
| Change: | N.R. | 75 mg/m ³ : PAPRDM/SA/CF | | para | | | |
| Remove: | N.R. | 150 mg/m ³ : HIEF/PAPRTHIE/SAT/CF | | | | | |
| | | SCBAF/SAF | | | | | |
| | | 1500 mg/m ³ : SA:PD,PP | | | | | |
| | | §: SCBAF:PD,PP/SAF:PD,PP:ASCBA | | | | | |
| | | Escape: HIEF/SCBAE | | | | | |

Triphenyl phosphate

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|--|---|-------------------------------|--|--|--|---|---|
| | | | | | MW, BP, SOL FLP, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Turpentine C ₁₀ H ₁₆ (approx) 8008-64-2 Y06400000 | Gumspirits, Gum turpentine, Spirits of turpentine, Steam distilled turpentine, Sulfate wood turpentine, Turps, Wood turpentine | NIOSH/OSHA 100 ppm (560 mg/m ³) | 1500 ppm | Colorless liquid with a characteristic odor. | MW: 136(approx) BP: 309-338°F Sol: Insoluble FLP: 95°F IP: ? | VP(77°F): 5 mm FRZ: -58 to -76°F UEL: ? LEL: 0.8% | Strong oxidizers, chlorine, chromic anhydride, stannic chloride | Char; CS; GC/FID; III [#1551] |
| 1299 27 | 1 ppm = 5.65 mg/m ³ | | | | Sp.Gr: 0.86 Class IC Flammable Liquid | | | |
| Uranium (insoluble compounds as U) U 7440-81-1 (Metal) YR3490000 (Metal) 2979 65 (Metal) 9175 65 (Metal) | Metal: Uranium I Synonyms of other insoluble compounds vary depending upon the specific compound. | NIOSH Ca See Appendix A 0.2 mg/m ³ ST 0.6 mg/m ³ OSHA 0.2 mg/m ³ ST 0.6 mg/m ³ | Ca [30 mg/m ³] | Metal: Silver- white, malleable, ductile, lustrous solid. [Note: Weakly radioactive.] | MW: 238.0 BP: 6895°F Sol: Insoluble FLP: ? IP: NA | VP: 0 mm (approx) MLT: 2097°F UEL: ? LEL: ? | Carbon dioxide, carbon tetrachloride, nitric acid, fluorine [Note: Complete coverage of uranium metal scrap with oil is essential for prevention of fire.] | None available |
| | | | | | Sp.Gr(77°F): 19.05 (Metal) Metal: Combustible Solid, especially turnings and powder. | | | |
| Uranium (soluble compounds as U) | Synonyms vary depending upon the specific soluble compound. | NIOSH Ca See Appendix A 0.05 mg/m ³ OSHA 0.05 mg/m ³ | Ca [20 mg/m ³] | Appearance and odor vary depending upon the specific soluble compound. | Properties vary depending upon the specific soluble compound. | | Uranyl nitrates: combustibles. Uranium hexafluoride: water. | None available |
| Vanadium pentoxide (respirable dust as V ₂ O ₅) V ₂ O ₅ 1314-62-1 YW2450000 2862 55 | Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentoxide | NIOSH C 0.05 mg/m ³ [15-min] OSHA 0.05 mg/m ³ | 70 mg/m ³ | Yellow-orange powder or dark gray, odorless flakes dispersed in air. | MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.8% FLP: NA IP: NA | VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA | Lithium, chlorine trifluoride | Filter; THF; XRD; III [#7504] |
| | | | | | Sp.Gr: 3.36 Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials. | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | | |
|---|--|--|----------------|---|----------------------------|--|---|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV [†] 1500 ppm: SA-CF [†] /GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, nose, throat; head, vert; hema, album; skin irrit, sens | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Skin, eyes, kidneys, resp sys |
| Goggles: | Reason prob | | Abs | | Skin: | | |
| Wash: | Prompt contam | | Ing | | Breath: | | |
| Change: | N.R. | | Con | | Swallow: | | |
| Remove: | Immed wet (flamm) | | | | | | |
| Clothing: | Repeat | NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Derm; [carc]; in animals: lung, lymph node damage; dermat | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Skin, bone marrow, lymphatics |
| Goggles: | Any poss | | Con | | Skin: | | |
| Wash: | Prompt contam | | Ing | | Breath: | | |
| Change: | After work if reason prob contam | | | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |
| Provide: | Eyewash | | | | | | |
| Clothing: | Any poss UF _g /Repeat | NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape(Halides): GMFAGHIE/SCBAE Escape(Non-halides): HIEF/SCBAE | Inh | Lac, conj; short breath, cough, chest rales; nau, vomit; skin burns; RBC, casts in urine; album; high BUN; [carc] | Eye: | Irr immed Water flush immed Resp support Medical attention immed | Resp sys, blood, liver, kidneys, lymphatics, skin, bone marrow |
| Goggles: | Any poss | | Con | | Skin: | | |
| Wash: | Prompt contam/UF _g : Immed contam and daily | | Ing | | Breath: | | |
| Change: | After work if reason prob contam/UF _g : After work if any poss contam | | | | Swallow: | | |
| Remove: | Prompt non-imperv contam/ UF _g : Immed non-imperv contam | | | | | | |
| Provide: | Eyewash (UF _g), quick drench | | | | | | |
| Clothing: | Repeat | NIOSH/OSHA 0.5 mg/m ³ : HIE [†] /SA [†] /SCBA [†] 1.25 mg/m ³ : SA-CF [†] /PAPRHIE [†] 2.5 mg/m ³ : HIEF/SCBAF/SAF/ PAPRHIE [†] 70 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Irrit eyes; green tongue, metallic taste, eczema; cough; fine rales, wheez, bron, dysp; irrit throat | Eye: | Irr immed Soap wash prompt Resp support Medical attention immed | Resp sys, skin, eyes |
| Goggles: | Reason prob | | Ing | | Skin: | | |
| Wash: | Prompt contam | | Con | | Breath: | | |
| Change: | N.R. | | | | Swallow: | | |
| Remove: | Prompt non-imperv contam | | | | | | |

Vanadium pentoxide (respirable dust as V₂O₅)

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|--|-----------------------|---|---|---|--|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Vanadium pentoxide (respirable fume as V_2O_5) V ₂ O ₅ 1314-62-1 YW2460000 2862 55 | Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentaoxide | NIOSH C 0.05 mg/m ³ [15-min] OSHA 0.05 mg/m ³ | 70 mg/m ³ | Finely divided particulate dispersed in air. | MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.1% Fl.P: NA IP: NA Sp.Gr: 3.38 Noncombustible Solid | VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA | Lithium, chlorine trifluoride | Filter; THF; XRD; IN [#7504] |
| Vinyl chloride CH ₂ =CHCl 75-01-4 KU9625000 1086 17 | Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM) 1 ppm = 2.60 mg/m ³ | NIOSH Ca See Appendix A Lowest reliably detectable concentration. OSHA [1910.1017] 1 ppm C 5 ppm [15-min] | Ca ACGIH A1 | Colorless gas or liquid (below 56°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.] | MW: 62.5 BP: 7°F Sol(77°F): 0.1% Fl.P: NA (Gas) IP: 9.99 eV Flammable Gas | VP: >1 atm FRZ: -256°F UEL: 33.0% LEL: 3.6% | Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibi- tors such as phenol. Attacks iron & steel in presence of moisture.] | Char(2); CS; GC/FID; IN [#1007] |
| Vinyl toluene CH ₂ =CHC ₆ H ₄ CH ₃ 25013-15-4 WL5075000 2618 27 | Ethenylmethylbenzene, Methylstyrene, Tolylethylene 1 ppm = 4.91 mg/m ³ | NIOSH/OSHA 100 ppm (480 mg/m ³) ACGIH 50 ppm (240 mg/m ³) | 5000 ppm | Colorless liquid with a strong, disagreeable odor. | MW: 118.2 BP: 339°F Sol: 0.009% Fl.P: 120°F IP: 8.20 eV Sp.Gr: 0.89 Class II Combustible Liquid | VP: 1 mm FRZ: -106°F UEL: 11.0% LEL: 0.8% | Oxidizers, peroxides, strong acids, iron or aluminum salts [Note: Usually inhibited with tert-butyl catechol to prevent polymerization.] | Char; CS; GC/FID; IN [#1501, Aromatic Hydro- carbons] |
| Warfarin C ₁₉ H ₁₆ O ₄ 81-81-2 GN4550000 | 3-(alpha-Acetonyl)-benzyl- 4-hydroxycoumarin, 4-Hydroxy-3-(3-oxo-1-phenyl butyl)-2H-1-benzopyran- 2-one, WARF | NIOSH/OSHA 0.1 mg/m ³ | 350 mg/m ³ | Colorless, odorless, crystalline powder, [pesticide] | MW: 308.3 BP: Decomposes Sol: 0.002% Fl.P: ? IP: ? | VP(71°F): 0.09 mm MLT: 322°F UEL: ? LEL: ? | Strong oxidizers | Filter; Methanol; HPLC/UV;D; IN [#5002] |
| 3027 55 (Coumarin derivative pesticide) | | | | | Combustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|----------------------------------|--|----------------|--|----------------------------|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: | N.R. | NIOSH/OSHA 0.5 mg/m ³ : HIE*/SA*/SCBA* 1.25 mg/m ³ : SA:CF*/PAPR/HIE* 2.5 mg/m ³ : HIEF/SCBAF/SAF/ PAPR/HIE* 70 mg/m ³ : SAF-PD, PP g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: HIEF/SCBAE | Inh | Irrit eye; green tongue, metallic taste; irrit throat, cough, fine rales, wheez, bron, dysp; eczema | Breath: | Resp sys, skin, eyes |
| Goggles: | N.R. | | Con | | Resp support | |
| Wash: | N.R. | | | | | |
| Change: | N.R. | | | | | |
| Remove: | N.R. | | | | | |
| Clothing: | Any poss | NIOSH V: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFS/SCBAE | Inh | Weak; abdom pain, GI bleeding; hepatomegaly; pallor or cyan of extremities; [carc] | Breath: | Liver, CNS, blood, resp sys, lymphatic sys |
| Goggles: | Any poss | | | | Resp support | |
| Wash: | Immed contam/daily | | | | | |
| Change: | After work if any poss contam | | | | | |
| Remove: | Immed contam | | | | | |
| Provide: | Eyewash, quick drench | | | | | |
| Clothing: | Repeat | ACGIH 500 ppm: CCROV*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA:CF* 2500 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF-PD, PP g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: GMFOV/SCBAE | Inh | Irrit eyes, skin, upper resp sys; drow | Eye: | Eyes, skin, resp sys |
| Goggles: | Reason prob | | Con | | Skin: | |
| Wash: | Prompt contam | | | | Breath: | |
| Change: | N.R. | | | | Swallow: | |
| Remove: | Prompt non-imperv contam | | | | Immed | |
| Clothing: | Repeat | NIOSH/OSHA 0.5 mg/m ³ : DM 1 mg/m ³ : DMXSO/SA/SCBA 2.5 mg/m ³ : PAPRODM/SA:CF 5 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/ SA:CF 100 mg/m ³ : SA-PD, PP 200 mg/m ³ : SAF-PD, PP g: SCBAF-PD, PP/SAF-PD, PP:ASCBA Escape: HIEF/SCBAE | Inh | Hema, back pain; hematoma arms, legs; epis, bleeding lips, muc memb hemorr; abdom pain, vomit, fecal blood; petechial rash; abnormal hematologic indices | Eye: | Blood, CVS |
| Goggles: | N.R. | | Ads | | Skin: | |
| Wash: | Prompt contam | | Ing | | Breath: | |
| Change: | After work if any poss contam | | Con | | Swallow: | |
| Remove: | Prompt non-imperv contam | | | | Immed | |

Wartarin

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|---|--|---|---------------------------|---|---|--|--|---|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Xylenes (o-, m-, p- isomers) <chem>C6H4(CH3)2</chem> 1330-20-7 ZE2100000 | o: 1,2-Dimethylbenzene; o-Xylol, m: 1,3-Dimethylbenzene; m-Xylol, p: 1,4-Dimethylbenzene; p-Xylol | NIOSH/OSHA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³) | 1000 ppm | Colorless liquids with an aromatic odor. [Note: Pure p-xylene is a solid below 56°F.] | MW: 106.2 BP: 292/269/ 281°F Sol: Insoluble Fl.P: 63/84/ 81°F IP: 8.56/8.56/8.44 eV Sp.Gr: 0.88/0.86/0.86 Class IB Flammable Liquid (o) Class IC Flammable Liquids (m,p) | VP: 7/9/9 mm FRZ: -13/ -54/56°F UEL: 7.0/7.0/7.0% LEL: 1.1/1.0/1.1% | Strong oxidizers | Char; CS; GC/FID; III [#1501, Aromatic Hydro- carbons] |
| 1307 27 | 1 ppm = 4.41 mg/m ³ | | | | | | | |
| Xylidine <chem>(CH3)2C6H3NH2</chem> 1300-73-8 ZE8575000 | Aminodimethylbenzene, Aminoxylene, Dimethylaminobenzene, Dimethylaniline, Xylidine isomers, Xylidine (mixed o-, m-, p-) | NIOSH/OSHA 2 ppm (10 mg/m ³) [skin] | 150 ppm | Pale-yellow to brown liquid with a weak, aromatic, amine-like odor. | MW: 121.2 BP: 292/269°F Sol: Slight Fl.P: 206°F IP: ? | VP: <1 mm FRZ: ? UEL: ? LEL: 1.0% | Strong oxidizers, hypochlorite bleaches | Si gel; Ethanol; GC/FID; III [#2002] |
| 1711 55 | 1 ppm = 5.04 mg/m ³ | | | | Sp.Gr: 0.98 Class IIIB Combustible Liquid | | | |
| Yttrium compounds (as Y) Y 7440-65-5 (Metal) ZG2980000 (Metal) | Metal: Yttrium metal Synonyms of other com- pounds vary depending upon the specific com- pound. | NIOSH/OSHA 1 mg/m ³ | N.E. | Metal: Dark gray to black solid. | MW: 88.9 BP: 5301°F Sol: ? Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 2732°F UEL: NA LEL: NA | Oxidizers | Filter; Acid; ICP; III [#7300, Elements] |
| | | | | | Sp.Gr: 4.47 Noncombustible Solid in bulk form. | | | |
| Zinc chloride fume <chem>ZnCl2</chem> 7646-85-7 ZH1400000 | None | NIOSH/OSHA 1 mg/m ³ ST 2 mg/m ³ | 4800 mg/m ³ | White particulate dispersed in air. | MW: 136.3 BP: 1350°F Sol(77°F): 432% Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 554°F UEL: NA LEL: NA | Potassium | None available |
| | | | | | Sp.Gr(77°F): 2.91 Noncombustible Solid | | | |

| Personal protection and sanitation (See Table 3) | | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|-------------------------|--|----------------|---|---|--|
| | | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: | Repeat | NIOSH/OSHA 1000 ppm: CCROV*/PAPROV*/SA*/SCBA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Dizz, excitement, drow, inco, staggering gait; irrit eyes, nose, throat; corneal vacuolization; anor, nau, vomit, abdom pain; derm | Eye: | CNS, eyes, GI tract, blood, liver, kidneys, skin |
| Goggles: | Reason prob | | Abs | | Skin: | |
| Wash: | Prompt contam | | Ing | | Breath: | |
| Change: | N.R. | | Con | | Swallow: | |
| Remove: | Immed wet (flamm) | | | | Irr immed Soap wash prompt Resp support Medical attention immed | |
| Clothing: | Any poss | NIOSH/OSHA 20 ppm: CCROV/SA/SCBA 50 ppm: SA:CF/PAPROV 100 ppm: CCRFOV/PAPRTOV/GMFOV/SCBAF/SAF 150 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE | Inh | Anoxia, cyan; lung, liver, kidney damage | Eye: | Blood, lungs, liver, kidneys, CVS |
| Goggles: | Any poss | | Abs | | Skin: | |
| Wash: | Immed contam | | Ing | | Breath: | |
| Change: | N.R. | | Con | | Swallow: | |
| Remove: | Immed non-imperv contam | | | | Irr immed Soap wash immed Resp support Medical attention immed | |
| Provide: | Eyewash, quick drench | | | | | |
| Clothing: | N.R. | NIOSH/OSHA 5 mg/m ³ : DM 10 mg/m ³ : DMXSO/SA/SCBA 25 mg/m ³ : PAPRDM/SA:CF 50 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBAF/SAF 500 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Irrit eyes; in animals: pulm irrit; eye inj; possible liver damage | Eye: | Eyes, lungs |
| Goggles: | Any poss | | Ing | | Skin: | |
| Wash: | N.R. | | Con | | Breath: | |
| Change: | N.R. | | | | Swallow: | |
| Remove: | N.R. | | | | Irr immed Soap wash prompt Resp support Medical attention immed | |
| Provide: | Eyewash | | | | | |
| Clothing: | N.R. | NIOSH/OSHA 10 mg/m ³ : DMFu*/SA*/SCBA* 25 mg/m ³ : PAPRDMFu*/SA:CF* 50 mg/m ³ : HIEF/PAPRTHIE*/SCBAF/SAF 2000 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Conj; irrit nose, throat; cough, copious sputum; dysp, chest pain, pulm edema, broncopneu; pulm fib, cor pulmonale; fever; cyan; tachypnea; burn skin; irrit skin, eyes | Breath: | Resp sys, skin, eyes |
| Goggles: | N.R. | | Con | | Resp support | |
| Wash: | N.R. | | | | | |
| Change: | N.R. | | | | | |
| Remove: | N.R. | | | | | |

Zinc chloride fume

| Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos. | Synonyms, trade names, and conversion factors | Exposure limits (TWA unless noted otherwise) | IDLH | Physical description | Chemical and physical properties | | Incompatibilities and reactivities | Measurement method (See Table 1) |
|--|---|---|-----------------------|--|---|---|---|--|
| | | | | | MW, BP, SOL Fl.P, IP, Sp.Gr, flammability | VP, FRZ UEL, LEL | | |
| Zinc oxide fume ZnO 1314-13-2 ZH4810000 | None | NIOSH/OSHA 5 mg/m ³ ST 10 mg/m ³ | N.E. | Fine white, odorless particulate dispersed in air. | MW: 81.4 BP: ? Sol: Insoluble Fl.P: NA IP: NA | VP: 0 mm (approx) MLT: 3587°F UEL: NA LEL: NA | Chlorinated rubber (at 419°F) | Filter; none; XRD; III [#7502] |
| Sp.Gr: 5.61 Noncombustible Solid | | | | | | | | |
| Zirconium compounds (as Zr) Zr 7440-67-7 (Metal) ZH7070000 (Metal) 2008 37 (metal powder, dry) 1358 32 (metal powder, wet) | Metal: Zirconium metal Synonyms of other com- pounds vary depending upon the specific compound. | NIOSH 5 mg/m ³ ST 10 mg/m ³ [Zr compounds excluding Zirconium tetrachloride.] OSHA 5 mg/m ³ ST 10 mg/m ³ | 500 mg/m ³ | Metal: Soft, malleable, ductile, solid or gray to gold amorphous powder. | MW: 91.2 BP: 6471°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 6.51 Metal: Combustible, but solid form is difficult to ignite; however, powder form may ignite SPONTANEOUSLY and can continue burning under water. | VP: 0 mm (approx) MLT: 3375°F UEL: NA LEL: NA | Potassium nitrate, oxidizers [Note: Fine powder may be stored completely immersed in water.] | Filter Acid; ICP; III [#7300, Elements] |

| Personal protection and sanitation (See Table 3) | Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4) | Health hazards | | | |
|---|---|----------------|--|---|--------------------------------|
| | | Route | Symptoms (See Table 5) | First aid (See Table 6) | Target organs (See Table 5) |
| Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R. | NIOSH/OSHA 50 mg/m ³ : DMFu/SA/SCBA 125 mg/m ³ : PAPRDMFu/SA:CF 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBA/SAF 2500 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh | Sweet, metallic taste; dry throat, cough; chills, fever; tight chest, dysp, rales, reduced pulm func; head; blurred vision; musc cramps, low back pain; nau, vomit; fig, lass, mal | Breath: Resp support | Resp sys |
| Recommendations vary depending upon the specific compound. | NIOSH/OSHA 25 mg/m ³ : DM 50 mg/m ³ : DMXSO/SA/SCBA 125 mg/m ³ : PAPRDM/SA:CF 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/SCBAF/SAF 500 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE | Inh Con | Skin granulomas; in animals: X-ray evidence of retention in lungs; irrit skin, muc memb | Eye: Irr immed Skin: Soap wash Breath: Resp support Swallow: Medical attention immed | Resp sys, skin |

Zirconium compounds (as Zr)

APPENDIX A — NIOSH OCCUPATIONAL CARCINOGENS

NIOSH has identified numerous chemicals that should be treated as occupational carcinogens even though OSHA has not identified them as such. In determining their carcinogenicity, NIOSH uses a classification outlined in 29 CFR 1990.103, which states in part:

Potential occupational carcinogen means any substance, or combination or mixture of substances, which causes an increased incidence of benign and/or malignant neoplasms, or a substantial decrease in the latency period between exposure and onset of neoplasms in humans or in one or more experimental mammalian species as the result of any oral, respiratory or dermal exposure, or any other exposure which results in the induction of tumors at a site other than the site of administration. This definition also includes any substance which is metabolized into one or more potential occupational carcinogens by mammals.

NIOSH has not identified thresholds for carcinogens that will protect 100% of the population. NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration. To ensure maximum protection from carcinogens through the use of respiratory protection, only the most reliable and protective respirators are recommended. These include (1) a self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a positive-pressure mode, or (2) a supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode.

APPENDIX B — THIRTEEN OSHA-REGULATED CARCINOGENS

Without establishing PELs, OSHA promulgated standards in 1974 to regulate the industrial use of 13 chemicals identified as occupational carcinogens (2-acetylaminofluorene, 4-aminodiphenyl, benzidine, bis-chloromethyl ether, 3,3'-dichlorobenzidine, 4-dimethylaminoazobenzene, ethyleneimine, methyl chloromethyl ether, alpha-naphthylamine, beta-naphthylamine, 4-nitrobiphenyl, N-nitrosodimethylamine, and beta-propiolactone). Exposures of workers to these 13 chemicals are to be controlled through the required use of engineering controls, work practices, and personal protective equipment, including respirators. See 29 CFR 1910.1003–1910.1016 for specific details of these requirements.

Respirator selections in the *Pocket Guide* are based on NIOSH policy, which considers the 13 chemicals to be potential occupational carcinogens.

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS

Asbestos

NIOSH considers asbestos to be a carcinogen and recommends that exposures be reduced to the lowest possible concentration. For asbestos fibers >5 micrometers in length, NIOSH recommends an REL of 100,000 fibers per cubic meter of air (100,000 fibers/m³), which is equal to 0.1 fiber per cubic centimeter of air (0.1 fiber/cm³), as determined by a 400-liter air sample and NIOSH Analytical Method #7400.

The OSHA PEL for asbestos fibers is an 8-hour TWA airborne concentration of 0.2 fiber (longer than 5 micrometers and having a length-to-diameter ratio of at least 3 to 1) per cubic centimeter of air (0.2 fiber/cm³), as determined by the membrane filter method at approximately 400X magnification with phase contrast illumination. An "action level" of 0.1 fiber/cm³ as an 8-hour TWA was established as the concentration above which employers must initiate compliance activities such as worker training and medical surveillance.

ACGIH designates asbestos as a confirmed human carcinogen (A1) with the following TLVs: amosite, 0.5 fiber/cm³; chrysotile, 2 fibers/cm³; crocidolite, 0.2 fiber/cm³; and other forms, 2 fibers/cm³. ACGIH considers "fibers" to be those particles >5 micrometers in length with an aspect ratio equal to or greater than 3:1 as determined by the membrane filter method at 400 to 450X magnification (4-mm objective) with phase contrast illumination.

Chromic Acid and Chromates (as CrO₃), Chromium(II) and Chromium(III) Compounds (as Cr), and Chromium Metal (as Cr)

The NIOSH REL (10-hour TWA) is 0.001 mg Cr(VI)/m³ for all hexavalent chromium [Cr(VI)] compounds. NIOSH considers all Cr(VI) compounds (including chromic acid) to be potential

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS (Continued)

occupational carcinogens. The NIOSH REL (8-hour TWA) is 0.5 mg Cr/m³ for chromium metal and chromium(II) and chromium(III) compounds.

The OSHA PEL is 0.1 mg CrO₃/m³ (ceiling) for chromic acid and chromates; 0.5 mg Cr/m³ (8-hour TWA) for chromium(II) and chromium(III) compounds; and 1 mg Cr/m³ (8-hour TWA) for chromium metal.

ACGIH has various TLVs for chromium compounds. The 8-hour TWA is 0.5 mg Cr/m³ for chromium metal, for chromium(II) compounds (e.g., chromous chloride and chromous sulfate), and for chromium(III) compounds (e.g., chromic oxide, chromic sulfate, chromic chloride, chromic potassium sulfate, and chromite ore). The 8-hour TWA is 0.05 mg Cr(VI)/m³ for water-soluble Cr(VI) compounds, which include chromic acid and its anhydride, and the monochromates and dichromates of sodium, potassium, ammonium, lithium, cesium, and rubidium. The 8-hour TWA is 0.05 mg Cr/m³ for certain water-insoluble Cr(VI) compounds that are designated as confirmed human carcinogens (A1) (including zinc chromate, calcium chromate, lead chromate, barium chromate, strontium chromate, and sintered chromium trioxide).

Coal Tar Pitch Volatiles

The OSHA PEL (8-hour TWA) for coal tar pitch volatiles is 0.2 mg/m³ (benzene-soluble fraction). OSHA defines "coal tar pitch volatiles" as the fused polycyclic hydrocarbons that volatilize from the distillation residues of coal, petroleum, wood, and other organic matter such as anthracene, benzo(a)pyrene (BaP), phenanthrene, acridine, chrysene, pyrene, etc. Asphalt is not covered under the OSHA standard for coal tar pitch volatiles.

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS (Continued)

NIOSH considers coal tar products (i.e., coal tar, coal tar pitch, or creosote) to be carcinogenic (Ca); the NIOSH REL (10-hour TWA) for coal tar products is 0.1 mg/m³ (cyclohexane-extractable fraction).

ACGIH designates coal tar pitch volatiles as a confirmed human carcinogen (A1) with an 8-hour TWA of 0.2 mg/m³ (benzene-solubles).

Cotton Dust (raw)

The NIOSH REL for cotton dust is 0.200 mg/m³ (lint-free cotton dust).

As found in the OSHA Table Z-1-A (29 CFR 1910.1000), the PEL for cotton dust (raw) is 1 mg/m³ for the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and ginning. PELs for other sectors (as found in 29 CFR 1910.1043) are 0.200 mg/m³ for yarn manufacturing and cotton washing operations, 0.500 mg/m³ for textile mill waste house operations or for dust from "lower grade washed cotton" used during yarn manufacturing, and 0.750 mg/m³ for textile slashing and weaving operations. The OSHA standard in 29 CFR 1910.1043 does not apply to cotton harvesting, ginning, or the handling and processing of woven or knitted materials and washed cotton. All PELs for cotton dust are mean concentrations of lint-free, respirable cotton dust collected by the vertical elutriator or an equivalent method and averaged over an 8-hour period.

The ACGIH TLV for cotton dust (raw) is 0.200 mg/m³ (lint-free dust) as an 8-hour TWA measured by the vertical elutriator cotton-dust sampler.

APPENDIX D — SUBSTANCES WITH NO ESTABLISHED RELs

After reviewing available published literature, NIOSH provided comments to OSHA on August 1, 1988, regarding the "Proposed Rule on Air Contaminants" (29 CFR 1910, Docket No. H-020). In these comments, NIOSH questioned whether the PELs proposed for the following substances included in the *Pocket Guide* were adequate to protect workers from recognized health hazards: acetylene tetrabromide, chlorobenzene, ethyl bromide, ethyl chloride, ethyl ether, furfural, isopropyl acetate, isopropylamine, molybdenum (soluble compounds as Mo), nitromethane, and silica (amorphous). At that time, NIOSH also conducted a limited evaluation of the literature on magnesium oxide fume and molybdenum (insoluble compounds as Mo) and concluded that the documentation cited by OSHA was inadequate to support the proposed PELs of 10 mg/m³.

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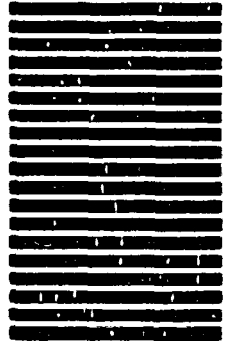
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