

**SCIENTIFIC
NOTEBOOK # 185E
Volume 9**

**SCIENTIFIC
NOTEBOOK # 185*E*
Volume 9**

Robert Pabalan
9/14/2001

The entries in this electronic scientific notebook #185, Volume 9, document activities conducted during the Period January 1, 2001, through September 13, 2001, under the Evolution of the Near-field Environment Key Technical Issue (Project Number 20-1402-561). No entries were made during the period January 1, 2001 through June 17, 2001.

June 18, 2001

The following entries document the installation testing of SOLCALC Version 1.0, a Fortran program developed by Roberto T. Pabalan (owner of this scientific notebook) while he was at the University of California at Berkeley. The CNWRA copy of SOLCALC was installed on the author's PC with a Windows NT operating system. The installation involved copying the Fortran source code onto a subdirectory on the d: drive, compiling the SOLCALC.FOR file using LAHEY Fortran-77 compiler (command: d:\f7713\bin\f7713 solcalc.for /q1), and linking the SOLCALC object code using LAHEY Fortran-77 compiler (command: d:\f7713\bin\386link SOLCALC). Because the original SOLCALC code was developed in a VAX FORTRAN environment, numerous error messages (both fatal and warning messages) were generated upon compiling with the LAHEY compiler. It was necessary to make changes to the SOLCALC source code to eliminate all the fatal error messages. The final compiled version generated a few warning messages pertaining to unused variable names. These warning messages were not important to the proper execution of the program and were not corrected.

Below is a description of SOLCALC taken from the source code:

Program SOLCALC Version 1.0: This program calculates the solubility of salts in mixed electrolyte systems using a matrix inversion technique for solving a series of mass-action and mass-balance equations. Activity coefficients are calculated using the Pitzer equations for mixed systems. The program also calculates osmotic coefficients, vapor pressures, and relative humidities of salt mixtures.

A series of calculations were done to verify correct installation of SOLCALC. There is no user guide available for SOLCALC. However, it is an interactive program, and the user is prompted for entries that are required by the program. To verify that SOLCALC runs as intended, the results of the calculations were compared with the results published in Pabalan and Pitzer (1984; Thermodynamics of concentrated electrolyte mixtures and the prediction of mineral solubilities to high temperatures for mixtures in the system Na-K-Mg-Cl-SO₄-OH-H₂O, Geochim. Cosmochim.

Chapter 7 in Activity Coefficients in Electrolyte Solutions, 2nd ed., Pitzer, K.S. (ed.), CRC Press, Boca Raton, FL, 435-490).

1. Verification case 1: NaCl solubility as a function of temperature

The following is the output file of SOLCALC showing the results of calculating the solubility of NaCl from 25 to 300 C.

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 25.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
THE NUMBER OF ITERATIONS IS 6

EQUATION LOG K
20 1.5810

IONIC STRENGTH = 6.1390

ACTIVITY ACT.COEFF. MOLALITY %ERROR
CATION # 1 0.61729E+01 0.10055E+01 0.61390E+01 0.0009
ANION # 1 0.61729E+01 0.10055E+01 0.61390E+01 0.0009
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 50.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
20 1.6132

IONIC STRENGTH = 6.2732

ACTIVITY ACT.COEFF. MOLALITY %ERROR
CATION # 1 0.64061E+01 0.10212E+01 0.62732E+01 0.0009
ANION # 1 0.64061E+01 0.10212E+01 0.62732E+01 0.0009
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 75.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K
20 1.6074

IONIC STRENGTH = 6.4479
```

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.63637E+01	0.98694E+00	0.64479E+01	0.0009
ANION #	1	0.63637E+01	0.98694E+00	0.64479E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
20	1.5731

IONIC STRENGTH = 6.6601

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.61172E+01	0.91849E+00	0.66601E+01	0.0009
ANION #	1	0.61172E+01	0.91849E+00	0.66601E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 125.00 PRESS(BARS) = 2.33

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5149

IONIC STRENGTH = 6.9099

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.57206E+01	0.82788E+00	0.69099E+01	0.0004
ANION #	1	0.57206E+01	0.82788E+00	0.69099E+01	0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.4343

IONIC STRENGTH = 7.2007

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.52135E+01	0.72403E+00	0.72007E+01	0.0007
ANION #	1	0.52135E+01	0.72403E+00	0.72007E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 175.00 PRESS(BARS) = 8.93
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
 20 1.3312

IONIC STRENGTH = 7.5419

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.46304E+01	0.61395E+00	0.75419E+01	0.0006
ANION # 1	0.46304E+01	0.61395E+00	0.75419E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 200.00 PRESS(BARS) = 15.55
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 20 1.2045

IONIC STRENGTH = 7.9500

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.40017E+01	0.50336E+00	0.79500E+01	0.0007
ANION # 1	0.40017E+01	0.50336E+00	0.79500E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 225.00 PRESS(BARS) = 25.49
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K
 20 1.0512

IONIC STRENGTH = 8.4480

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.33544E+01	0.39707E+00	0.84480E+01	0.0007
ANION # 1	0.33544E+01	0.39707E+00	0.84480E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 250.00 PRESS(BARS) = 39.75
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 THE NUMBER OF ITERATIONS IS 23

```

EQUATION      LOG K
    20         0.8666

IONIC STRENGTH =  9.0622

ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION #  1  0.27119E+01      0.29926E+00      0.90622E+01      0.0006
ANION #   1  0.27119E+01      0.29926E+00      0.90622E+01      0.0006

```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```

TEMP(C) =  275.00      PRESS(BARS) =  59.44

NUMBER CORRESPONDING TO SATURATED SOLID      20

THE NUMBER OF ITERATIONS IS      27

```

```

EQUATION      LOG K
    20         0.6416

IONIC STRENGTH =  9.7972

ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION #  1  0.20932E+01      0.21366E+00      0.97972E+01      0.0010
ANION #   1  0.20932E+01      0.21366E+00      0.97972E+01      0.0010

```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```

TEMP(C) =  300.00      PRESS(BARS) =  85.84

NUMBER CORRESPONDING TO SATURATED SOLID      20

THE NUMBER OF ITERATIONS IS      32

```

```

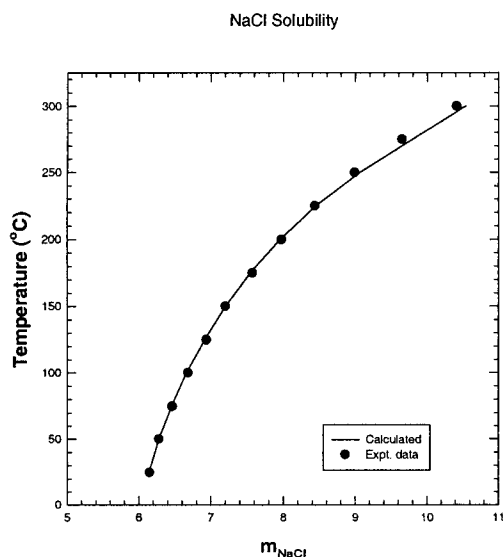
EQUATION      LOG K
    20         0.3591

IONIC STRENGTH = 10.5346

ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION #  1  0.15119E+01      0.14352E+00      0.10535E+02      0.0008
ANION #   1  0.15119E+01      0.14352E+00      0.10535E+02      0.0008

```

The following are two figures. One is the plot comparing calculated and experimental solubilities of NaCl. The other plot is a similar figure taken from Pabalan and Pitzer (1987).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer.
 "Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 2.

2. Verification case 2: KCl solubility as a function of temperature

The following are the output file of SOLCALC for the KCl solubility calculations as a function of temperature.

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 10.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
53	0.7350

IONIC STRENGTH = 4.1942

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.23306E+01	0.55567E+00	0.41942E+01	0.0006
ANION # 1	0.23306E+01	0.55567E+00	0.41942E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 25.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
----------	-------

Notebook#185, Vol. 9; p. 6
 RTP; June 18, 2001

53 0.9073

IONIC STRENGTH = 4.8159

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.28422E+01	0.59017E+00	0.48159E+01	0.0008
ANION #	1	0.28422E+01	0.59017E+00	0.48159E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 50.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.1148

IONIC STRENGTH = 5.7545

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.36091E+01	0.62717E+00	0.57545E+01	0.0009
ANION #	1	0.36091E+01	0.62717E+00	0.57545E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3272

IONIC STRENGTH = 7.4256

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.46088E+01	0.62067E+00	0.74256E+01	0.0005
ANION #	1	0.46088E+01	0.62067E+00	0.74256E+01	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 130.00 PRESS(BARS) = 2.71

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
53	1.3615

IONIC STRENGTH = 8.3547

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.47945E+01	0.57387E+00	0.83547E+01	0.0007
ANION #	1	0.47945E+01	0.57387E+00	0.83547E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
53	1.3524

IONIC STRENGTH = 8.9529

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.47448E+01	0.52997E+00	0.89529E+01	0.0008
ANION #	1	0.47448E+01	0.52997E+00	0.89529E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 180.00 PRESS(BARS) = 10.03

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
53	1.2941

IONIC STRENGTH = 9.8251

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.44364E+01	0.45153E+00	0.98251E+01	0.0009
ANION #	1	0.44364E+01	0.45153E+00	0.98251E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 200.00 PRESS(BARS) = 15.55

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
53	1.2258

IONIC STRENGTH = 10.3991

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	2	0.41011E+01	0.39437E+00	0.10399E+02	0.0009
ANION #	1	0.41011E+01	0.39437E+00	0.10399E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 220.00 PRESS(BARS) = 23.19
NUMBER CORRESPONDING TO SATURATED SOLID 53
THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K
53 1.1339

IONIC STRENGTH = 10.9887

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.36892E+01	0.33573E+00	0.10989E+02	0.0008
ANION # 1	0.36892E+01	0.33573E+00	0.10989E+02	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 250.00 PRESS(BARS) = 39.75
NUMBER CORRESPONDING TO SATURATED SOLID 53
THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
53 0.9504

IONIC STRENGTH = 12.0364

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.29867E+01	0.24814E+00	0.12036E+02	0.0009
ANION # 1	0.29867E+01	0.24814E+00	0.12036E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

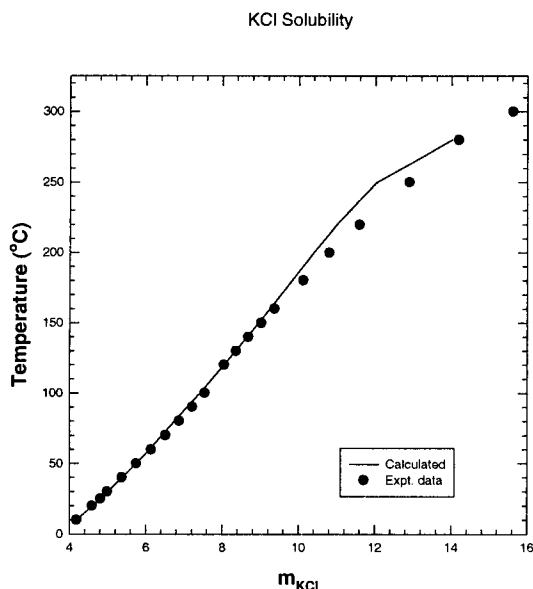
TEMP(C) = 280.00 PRESS(BARS) = 64.14
NUMBER CORRESPONDING TO SATURATED SOLID 53
THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
53 0.7099

IONIC STRENGTH = 14.0096

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.22644E+01	0.16163E+00	0.14010E+02	0.0010
ANION # 1	0.22644E+01	0.16163E+00	0.14010E+02	0.0010

The following are two figures. One is the plot comparing calculated and experimental solubilities of KCl.
The other plot is a similar figure taken from Pabalan and Pitzer (1987).



Information potentially subject to copyright protection was redacted from this location. The redacted material (plot) is from the following reference:

Pabalan, R.T. and K.S. Pitzer.
 "Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O.
 Geochimica et Cosmochimica Acta. Vol. 51. pp. 2,429-2,443.

FIG. 3.

3. Verification case 3: MgCl₂ solubility as a function of temperature

The following are the output file of SOLCALC for the calculated solubilities of MgCl₂.nH₂O solids as a function of temperature.

```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

      TEMP(C) =      0.00      PRESS(BARS) =      1.00

NUMBER CORRESPONDING TO SATURATED SOLID      5

      THE NUMBER OF ITERATIONS IS      9

      EQUATION      LOG K
      5      4.7226

      IONIC STRENGTH = 15.9065

      ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION # 3      0.23089E+03      0.43546E+02      0.53022E+01      0.0006
ANION # 1      0.32382E+03      0.30536E+02      0.10604E+02      0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

      TEMP(C) =     10.00      PRESS(BARS) =      1.00

NUMBER CORRESPONDING TO SATURATED SOLID      5

      THE NUMBER OF ITERATIONS IS      8

      Notebook#185, Vol. 9; p. 10
      RTP; June 18, 2001
  
```

EQUATION LOG K
5 4.6272

IONIC STRENGTH = 16.3020

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.20879E+03	0.38423E+02	0.54340E+01	-.0006
ANION # 1	0.32143E+03	0.29576E+02	0.10868E+02	-.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 15.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K
5 4.5778

IONIC STRENGTH = 16.5078

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.19804E+03	0.35989E+02	0.55026E+01	-.0003
ANION # 1	0.32027E+03	0.29102E+02	0.11005E+02	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 20.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
5 4.5277

IONIC STRENGTH = 16.7219

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.18779E+03	0.33690E+02	0.55740E+01	0.0005
ANION # 1	0.31942E+03	0.28653E+02	0.11148E+02	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 25.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
5 4.4772

IONIC STRENGTH = 16.9462

Notebook#185, Vol. 9; p. 11
RTP; June 18, 2001

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.17820E+03	0.31548E+02	0.56487E+01	0.0002
ANION #	1	0.31907E+03	0.28242E+02	0.11297E+02	0.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 6

EQUATION	LOG K
5	4.4265

IONIC STRENGTH = 17.1828

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.16936E+03	0.29569E+02	0.57276E+01	-.0003
ANION #	1	0.31934E+03	0.27877E+02	0.11455E+02	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 35.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
5	4.3758

IONIC STRENGTH = 17.4336

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.16128E+03	0.27753E+02	0.58112E+01	0.0007
ANION #	1	0.32036E+03	0.27564E+02	0.11622E+02	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
5	4.3251

IONIC STRENGTH = 17.7005

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.15403E+03	0.26107E+02	0.59002E+01	0.0001
ANION #	1	0.32231E+03	0.27314E+02	0.11800E+02	0.0001

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 50.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
 5 4.2243

IONIC STRENGTH = 18.2917

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.14205E+03	0.23297E+02	0.60972E+01	0.0001
ANION # 1	0.32953E+03	0.27023E+02	0.12194E+02	0.0001

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 60.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 THE NUMBER OF ITERATIONS IS 6

EQUATION LOG K
 5 4.1240

IONIC STRENGTH = 18.9774

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.13359E+03	0.21118E+02	0.63258E+01	0.0001
ANION # 1	0.34251E+03	0.27073E+02	0.12652E+02	0.0001

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 70.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
 5 4.0243

IONIC STRENGTH = 19.7877

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.12919E+03	0.19586E+02	0.65959E+01	0.0005
ANION # 1	0.36382E+03	0.27579E+02	0.13192E+02	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 80.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 THE NUMBER OF ITERATIONS IS 9

EQUATION LOG K
5 3.9248

IONIC STRENGTH = 20.7727

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.13035E+03	0.18825E+02	0.69242E+01	0.0005
ANION # 1	0.39848E+03	0.28774E+02	0.13848E+02	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
5 3.8251

IONIC STRENGTH = 22.0309

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.14146E+03	0.19262E+02	0.73436E+01	0.0005
ANION # 1	0.45840E+03	0.31211E+02	0.14687E+02	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
5 3.7249

IONIC STRENGTH = 23.8335

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.18064E+03	0.22737E+02	0.79445E+01	0.0010
ANION # 1	0.58435E+03	0.36777E+02	0.15889E+02	0.0010

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 116.70 PRESS(BARS) = 1.80

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 32

THE NUMBER OF ITERATIONS IS 76

EQUATION LOG K
5 3.5537

Notebook#185, Vol. 9; p. 14
RTP; June 18, 2001

32 5.2167

IONIC STRENGTH = 27.1813

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.42838E+02	0.43722E+01	0.97979E+01	0.1430
ANION #	1	0.12347E+04	0.81386E+02	0.15171E+02	0.1430

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 130.00 PRESS(BARS) = 2.71

NUMBER CORRESPONDING TO SATURATED SOLID 32

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
32	4.9203

IONIC STRENGTH = 29.7702

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.28194E+03	0.28412E+02	0.99234E+01	-.0002
ANION #	1	0.10677E+04	0.53798E+02	0.19847E+02	-.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 32

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
32	4.4760

IONIC STRENGTH = 32.1090

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.16039E+03	0.14986E+02	0.10703E+02	0.0009
ANION #	1	0.99884E+03	0.46662E+02	0.21406E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 170.00 PRESS(BARS) = 7.92

NUMBER CORRESPONDING TO SATURATED SOLID 32

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
32	4.0273

IONIC STRENGTH = 35.9457

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
--	--	----------	------------	----------	--------

Notebook#185, Vol. 9; p. 15
RTP; June 18, 2001

CATION #	3	0.11022E+03	0.91991E+01	0.11982E+02	0.0008
ANION #	1	0.10871E+04	0.45366E+02	0.23964E+02	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 181.50 PRESS(BARS) = 10.38

NUMBER CORRESPONDING TO SATURATED SOLID 32

NUMBER CORRESPONDING TO SATURATED SOLID 31

THE NUMBER OF ITERATIONS IS 76

EQUATION	LOG K
----------	-------

32	3.7643
31	6.0679

IONIC STRENGTH = 38.5294

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.50776E+02	0.38715E+01	0.13115E+02	0.0787
ANION #	1	0.12976E+04	0.52752E+02	0.24598E+02	0.0787

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 186.00 PRESS(BARS) = 11.49

NUMBER CORRESPONDING TO SATURATED SOLID 31

THE NUMBER OF ITERATIONS IS 8

EQUATION	LOG K
----------	-------

31	5.8985
----	--------

IONIC STRENGTH = 40.6902

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.91640E+02	0.67565E+01	0.13563E+02	-.0004
ANION #	1	0.12983E+04	0.47861E+02	0.27127E+02	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 200.00 PRESS(BARS) = 15.55

NUMBER CORRESPONDING TO SATURATED SOLID 31

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
----------	-------

31	5.3708
----	--------

IONIC STRENGTH = 41.5061

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	3	0.37632E+02	0.27200E+01	0.13835E+02	0.0004

ANION # 1 0.98263E+03 0.35512E+02 0.27671E+02 0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 220.00 PRESS(BARS) = 23.19

NUMBER CORRESPONDING TO SATURATED SOLID 31

THE NUMBER OF ITERATIONS IS 4

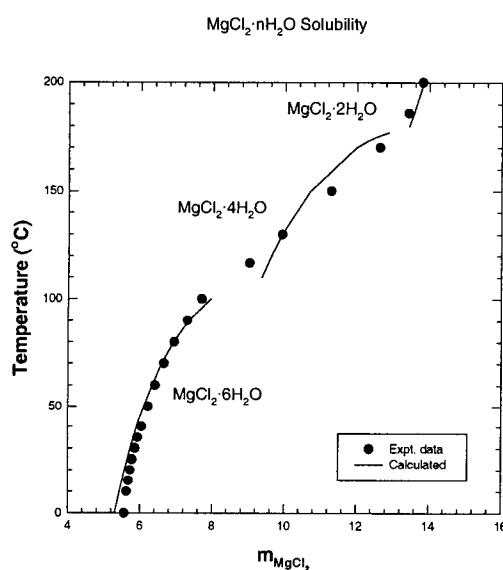
EQUATION LOG K

31 4.6082

IONIC STRENGTH = 42.2653

	ACTIVITY	ACT. COEFF.	MOLALITY	%ERROR
CATION # 3	0.10149E+02	0.72039E+00	0.14088E+02	0.0005
ANION # 1	0.65701E+03	0.23317E+02	0.28177E+02	0.0005

The following are two figures. One is the plot comparing calculated and experimental solubilities of $\text{MgCl}_2 \cdot n\text{H}_2\text{O}$ solids. The other plot is a similar figure taken from Pabalan and Pitzer (1987).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference.

Pabalan, R.T. and K.S. Pitzer.
"Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 4.

4. Verification case 4: Solubility in the NaCl-KCl-MgCl₂ system

The following is the output file of SOLCALC for solubility calculations in the NaCl-KCl-MgCl₂ system
[two solids saturated: NaCl(s) and KCl(s) in an aqueous solution containing K⁺, Na⁺, Mg²⁺, and Cl⁻ ions].

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 90.00    PRESS(BARS) = 0.71

NUMBER CORRESPONDING TO SATURATED SOLID    20
NUMBER CORRESPONDING TO SATURATED SOLID    53

THE NUMBER OF ITERATIONS IS    15

EQUATION    LOG K
    20      1.5899
    53      1.3018

IONIC STRENGTH = 9.0981

ACTIVITY    ACT.COEFF.    MOLALITY    %ERROR
CATION # 1  0.48702E+01    0.10400E+01    0.46829E+01    -.0003
CATION # 2  0.25087E+01    0.56820E+00    0.44152E+01    0.0008
ANION # 1   0.79856E+01    0.87773E+00    0.90981E+01    -.0003
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 90.00    PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID    20
NUMBER CORRESPONDING TO SATURATED SOLID    53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY    3

THE NUMBER OF ITERATIONS IS    13

EQUATION    LOG K
    20      1.5899
    53      1.3018

CATION #    TOTAL
    3        0.1300

IONIC STRENGTH = 9.2405

ACTIVITY    ACT.COEFF.    MOLALITY    %ERROR
CATION # 1  0.46471E+01    0.10319E+01    0.45034E+01    -.0004
CATION # 2  0.23935E+01    0.55060E+00    0.43471E+01    0.0010
CATION # 3  0.13625E+00    0.10481E+01    0.13000E+00    0.0000
ANION # 1   0.83699E+01    0.91871E+00    0.91105E+01    -.0004
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 90.00    PRESS(BARS) = 1.00
```

Notebook#185, Vol. 9; p. 18
RTP; June 18, 2001

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.4000

IONIC STRENGTH = 9.5389

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.42092E+01	0.10169E+01	0.41393E+01	-.0003
CATION # 2	0.21680E+01	0.51625E+00	0.41996E+01	0.0007
CATION # 3	0.40956E+00	0.10239E+01	0.40000E+00	0.0000
ANION # 1	0.92404E+01	0.10111E+01	0.91389E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.6600

IONIC STRENGTH = 9.8300

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.38188E+01	0.10048E+01	0.38005E+01	-.0004
CATION # 2	0.19669E+01	0.48572E+00	0.40495E+01	0.0009
CATION # 3	0.66427E+00	0.10065E+01	0.66000E+00	0.0000
ANION # 1	0.10185E+02	0.11107E+01	0.91700E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.9200

IONIC STRENGTH = 10.1259

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.34564E+01	0.99488E+00	0.34742E+01	-.0003
CATION # 2	0.17803E+01	0.45745E+00	0.38917E+01	0.0006
CATION # 3	0.91527E+00	0.99486E+00	0.92000E+00	0.0000
ANION # 1	0.11253E+02	0.12224E+01	0.92059E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.1800

IONIC STRENGTH = 10.4277

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.31201E+01	0.98712E+00	0.31608E+01	-.0003
CATION # 2	0.16071E+01	0.43121E+00	0.37268E+01	0.0006
CATION # 3	0.11674E+01	0.98932E+00	0.11800E+01	0.0000
ANION # 1	0.12466E+02	0.13480E+01	0.92477E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
----------	-------

20 1.5899
53 1.3018

CATION # TOTAL
3 1.4400

IONIC STRENGTH = 10.7366

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.28082E+01	0.98150E+00	0.28611E+01	-.0003
CATION # 2	0.14464E+01	0.40681E+00	0.35555E+01	0.0007
CATION # 3	0.14260E+01	0.99027E+00	0.14400E+01	0.0000
ANION # 1	0.13851E+02	0.14899E+01	0.92966E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K
20 1.5899
53 1.3018

CATION # TOTAL
3 1.6700

IONIC STRENGTH = 11.0170

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.25513E+01	0.97833E+00	0.26079E+01	-.0004
CATION # 2	0.13141E+01	0.38660E+00	0.33991E+01	0.0007
CATION # 3	0.16650E+01	0.99703E+00	0.16700E+01	0.0000
ANION # 1	0.15245E+02	0.16310E+01	0.93470E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K
20 1.5899
53 1.3018

CATION # TOTAL

3 1.9300

IONIC STRENGTH = 11.3433

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.22814E+01	0.97682E+00	0.23356E+01	-.0003
CATION # 2	0.11751E+01	0.36519E+00	0.32178E+01	0.0007
CATION # 3	0.19535E+01	0.10122E+01	0.19300E+01	0.0000
ANION # 1	0.17049E+02	0.18111E+01	0.94133E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

53	1.3018
----	--------

CATION #	TOTAL
----------	-------

3	2.1800
---	--------

IONIC STRENGTH = 11.6681

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.20414E+01	0.97750E+00	0.20884E+01	-.0004
CATION # 2	0.10514E+01	0.34590E+00	0.30397E+01	0.0008
CATION # 3	0.22569E+01	0.10353E+01	0.21800E+01	0.0000
ANION # 1	0.19053E+02	0.20081E+01	0.94881E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

53	1.3018
----	--------

CATION #	TOTAL
----------	-------

3	2.4300
---	--------

IONIC STRENGTH = 12.0052

ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
----------	------------	----------	--------

CATION #	1	0.18195E+01	0.98036E+00	0.18560E+01	-.0004
CATION #	2	0.93716E+00	0.32776E+00	0.28593E+01	0.0008
CATION #	3	0.25956E+01	0.10682E+01	0.24300E+01	0.0000
ANION #	1	0.21377E+02	0.22325E+01	0.95752E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

53	1.3018
----	--------

CATION #	TOTAL
----------	-------

3	2.6700
---	--------

IONIC STRENGTH = 12.3421

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.16229E+01	0.98523E+00	0.16472E+01	-.0005
CATION # 2	0.83589E+00	0.31133E+00	0.26849E+01	0.0010
CATION # 3	0.29655E+01	0.11107E+01	0.26700E+01	0.0000
ANION # 1	0.23967E+02	0.24779E+01	0.96721E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

53	1.3018
----	--------

CATION #	TOTAL
----------	-------

3	2.9000
---	--------

IONIC STRENGTH = 12.6785

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.14489E+01	0.99194E+00	0.14607E+01	-.0005
CATION # 2	0.74630E+00	0.29641E+00	0.25178E+01	0.0009
CATION # 3	0.33739E+01	0.11634E+01	0.29000E+01	0.0000
ANION # 1	0.26844E+02	0.27452E+01	0.97785E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.1200

IONIC STRENGTH = 13.0140

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.12954E+01	0.10003E+01	0.12950E+01	-.0004
CATION # 2	0.66719E+00	0.28282E+00	0.23590E+01	0.0008
CATION # 3	0.38283E+01	0.12270E+01	0.31200E+01	0.0000
ANION # 1	0.30027E+02	0.30349E+01	0.98940E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.3900

IONIC STRENGTH = 13.4458

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.11233E+01	0.10133E+01	0.11086E+01	-.0004
CATION # 2	0.57857E+00	0.26696E+00	0.21672E+01	0.0007
CATION # 3	0.44975E+01	0.13267E+01	0.33900E+01	0.0000
ANION # 1	0.34626E+02	0.34434E+01	0.10056E+02	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.6400

IONIC STRENGTH = 13.8670

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.97950E+00	0.10280E+01	0.95279E+00	-.0004
CATION # 2	0.50451E+00	0.25299E+00	0.19942E+01	0.0007
CATION # 3	0.52612E+01	0.14454E+01	0.36400E+01	0.0000
ANION # 1	0.39709E+02	0.38828E+01	0.10227E+02	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.8800

IONIC STRENGTH = 14.2919

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.85489E+00	0.10448E+01	0.81827E+00	-.0004
CATION # 2	0.44033E+00	0.24014E+00	0.18336E+01	0.0008
CATION # 3	0.61668E+01	0.15894E+01	0.38800E+01	0.0000
ANION # 1	0.45497E+02	0.43697E+01	0.10412E+02	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.1600

IONIC STRENGTH = 14.8143

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.72533E+00	0.10674E+01	0.67951E+00	-.0004
CATION # 2	0.37359E+00	0.22576E+00	0.16548E+01	0.0009
CATION # 3	0.75088E+01	0.18050E+01	0.41600E+01	0.0000
ANION # 1	0.53624E+02	0.50331E+01	0.10654E+02	-.0004

For the triple point:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

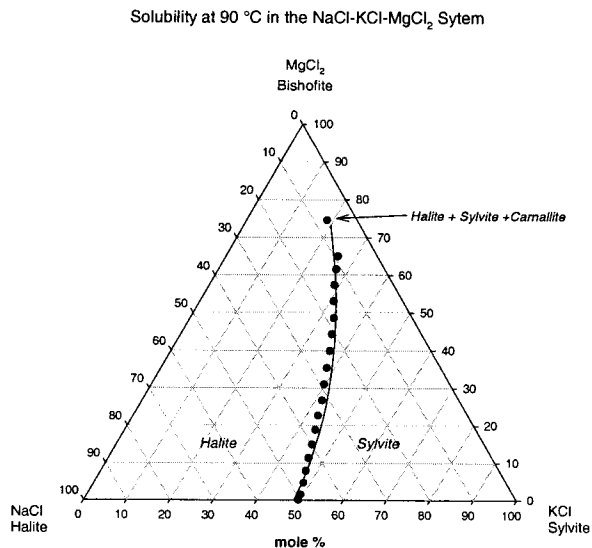
THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
14	4.1989 (solid: carnallite)
20	1.5899 (solid: halite)
53	1.3018 (solid: sylvite)

IONIC STRENGTH = 16.0363

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.49993E+00	0.11274E+01	0.44346E+00	-.0009
CATION # 2	0.25750E+00	0.19668E+00	0.13092E+01	0.0003
CATION # 3	0.12004E+02	0.25212E+01	0.47612E+01	0.0000
ANION # 1	0.77801E+02	0.69003E+01	0.11275E+02	-.0009

The following are two figures. One is the plot comparing calculated and experimental solubilities in the NaCl-KCl-MgCl₂ system. The other plot is a similar figure taken from Pabalan and Pitzer (1991).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer. "Prediction of High-Temperature Thermodynamic Properties of Mixed Electrolyte Solutions Including Solubility Equilibria, Vapor Pressure Depression, and Boiling Point Elevation. R.M. Izatt, J.L. Oscarson, and G.C. Lindh, eds. Proceedings of the 1987 Symposium on chemistry in High-Temperature Water. Electric Power Research Institute. pp. D4f-1 through D4f-13. 1990.

FIGURE 35.

5. Verification case 5: Solubility in the NaCl-NaOH system

The following is the output file of SOLCALC for calculations of NaCl solubility in NaCl-NaOH solutions:

```
SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00    PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID    20

THE NUMBER OF ITERATIONS IS    7

EQUATION    LOG K
20          1.5913

IONIC STRENGTH = 6.1621

ACTIVITY    ACT.COEFF.    MOLALITY    %ERROR
CATION # 1  0.62468E+01    0.10137E+01    0.61621E+01    0.0003
ANION # 1   0.62468E+01    0.10137E+01    0.61621E+01    0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00    PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID    20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY    4

THE NUMBER OF ITERATIONS IS    9
```

EQUATION LOG K
 20 1.5913
 ANION # TOTAL
 4 1.7200

IONIC STRENGTH = 6.9857

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.81544E+01	0.11673E+01	0.69857E+01	0.0004
ANION # 1	0.47854E+01	0.90879E+00	0.52657E+01	0.0004
ANION # 4	0.12396E+01	0.72072E+00	0.17200E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
 20 1.5913
 ANION # TOTAL
 4 3.4800

IONIC STRENGTH = 7.8549

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.11009E+02	0.14016E+01	0.78549E+01	0.0001
ANION # 1	0.35445E+01	0.81020E+00	0.43749E+01	0.0001
ANION # 4	0.33738E+01	0.96947E+00	0.34800E+01	0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
 20 1.5913
 ANION # TOTAL
 4 5.3100

IONIC STRENGTH = 8.8020

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15574E+02	0.17694E+01	0.88020E+01	0.0003

Notebook#185, Vol. 9; p. 28
 RTP; June 18, 2001

ANION #	1	0.25055E+01	0.71750E+00	0.34920E+01	0.0003
ANION #	4	0.71855E+01	0.13532E+01	0.53100E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5913

ANION #	TOTAL
4	7.2300

IONIC STRENGTH = 9.8666

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.23438E+02	0.23755E+01	0.98666E+01	0.0001
ANION # 1	0.16649E+01	0.63147E+00	0.26366E+01	0.0001
ANION # 4	0.14311E+02	0.19794E+01	0.72300E+01	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 30.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 32

EQUATION	LOG K
20	1.5913

ANION #	TOTAL
4	9.2600

IONIC STRENGTH = 11.1038

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.38262E+02	0.34459E+01	0.11104E+02	0.0001
ANION # 1	0.10199E+01	0.55314E+00	0.18438E+01	0.0001
ANION # 4	0.28490E+02	0.30767E+01	0.92600E+01	0.0007

The following results are for T = 120 C:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

Notebook#185, Vol. 9; p. 29
RTP; June 18, 2001

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5283

ANION #	TOTAL
4	1.8000

IONIC STRENGTH = 7.7620

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.71476E+01	0.92085E+00	0.77620E+01	0.0006
ANION # 1	0.47225E+01	0.79211E+00	0.59620E+01	0.0006
ANION # 4	0.92806E+00	0.51559E+00	0.18000E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5283

ANION #	TOTAL
4	3.5900

IONIC STRENGTH = 8.7093

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.87743E+01	0.10075E+01	0.87093E+01	0.0006
ANION # 1	0.38471E+01	0.75148E+00	0.51193E+01	0.0006
ANION # 4	0.22016E+01	0.61326E+00	0.35900E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5283

ANION #	TOTAL
4	5.5000

IONIC STRENGTH = 9.7774

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.10943E+02	0.11192E+01	0.97774E+01	0.0003
ANION #	1	0.30847E+01	0.72116E+00	0.42774E+01	0.0003
ANION #	4	0.40811E+01	0.74202E+00	0.55000E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5283
ANION #	TOTAL
4	7.5000

IONIC STRENGTH = 10.9677

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.13870E+02	0.12647E+01	0.10968E+02	0.0001
ANION #	1	0.24336E+01	0.70179E+00	0.34677E+01	0.0001
ANION #	4	0.68334E+01	0.91112E+00	0.75000E+01	0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 33

EQUATION	LOG K
20	1.5283
ANION #	TOTAL
4	9.6900

IONIC STRENGTH = 12.3684

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.18176E+02	0.14696E+01	0.12368E+02	0.0001
ANION #	1	0.18571E+01	0.69337E+00	0.26784E+01	0.0001
ANION #	4	0.11127E+02	0.11482E+01	0.96900E+01	0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO ANION WITH FIXED MOLALITY 4

THE NUMBER OF ITERATIONS IS 34

EQUATION	LOG K
20	1.5283
ANION #	TOTAL
4	12.1000

IONIC STRENGTH = 14.0431

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.24897E+02	0.17729E+01	0.14043E+02	0.0001
ANION # 1	0.13558E+01	0.69777E+00	0.19431E+01	0.0001
ANION # 4	0.18064E+02	0.14929E+01	0.12100E+02	0.0006

Pure NaCl:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 120.00 PRESS(BARS) = 1.99

NUMBER CORRESPONDING TO SATURATED SOLID 20

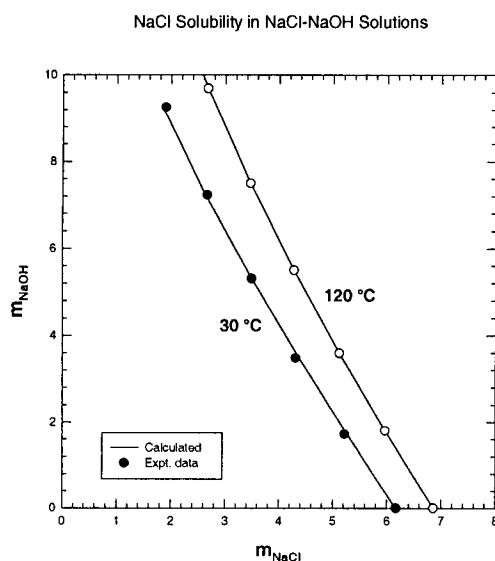
THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5283

IONIC STRENGTH = 6.8569

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.58099E+01	0.84731E+00	0.68569E+01	0.0009
ANION # 1	0.58099E+01	0.84731E+00	0.68569E+01	0.0009

The following are two figures. One is the plot comparing calculated and experimental solubilities in the NaCl-NaOH system. The other plot is a similar figure taken from Pabalan and Pitzer (1987).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer.
 "Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 8.

6. Verification case 6: Solubility in the NaCl-NaOH system

The following is the output of SOLCALC for solubility calculations in the NaCl-NaOH system:

a) NaCl solubility:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```

TEMP(C) = 40.00    PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
THE NUMBER OF ITERATIONS IS 7

EQUATION    LOG K
20          1.6058

IONIC STRENGTH = 6.2139

ACTIVITY    ACT.COEFF.    MOLALITY    %ERROR
CATION # 1  0.63517E+01    0.10222E+01    0.62139E+01    0.0005
ANION # 1   0.63517E+01    0.10222E+01    0.62139E+01    0.0005
  
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```

TEMP(C) = 40.00    PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
  
```

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
20 1.6058

CATION # TOTAL
2 0.8700

IONIC STRENGTH = 6.6563

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.60543E+01	0.10463E+01	0.57863E+01	-.0005
CATION # 2	0.46351E+00	0.53277E+00	0.87000E+00	0.0000
ANION # 1	0.66639E+01	0.10011E+01	0.66563E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K
20 1.6058

CATION # TOTAL
2 1.4070

IONIC STRENGTH = 6.9380

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.58744E+01	0.10621E+01	0.55310E+01	0.0006
CATION # 2	0.76311E+00	0.54236E+00	0.14070E+01	0.0000
ANION # 1	0.68678E+01	0.98989E+00	0.69380E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
20 1.6058

CATION # TOTAL
2 1.7330

IONIC STRENGTH = 7.1122

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
--	----------	------------	----------	--------

Notebook#185, Vol. 9; p. 34
RTP; June 18, 2001

CATION #	1	0.57667E+01	0.10720E+01	0.53792E+01	0.0009
CATION #	2	0.95020E+00	0.54830E+00	0.17330E+01	0.0000
ANION #	1	0.69960E+01	0.98366E+00	0.71122E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 7

EQUATION	LOG K
----------	-------

20	1.6058
----	--------

CATION #	TOTAL
----------	-------

2	2.5660
---	--------

IONIC STRENGTH = 7.5690

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.54968E+01	0.10987E+01	0.50030E+01	-.0003
CATION # 2	0.14467E+01	0.56381E+00	0.25660E+01	0.0000
ANION # 1	0.73397E+01	0.96970E+00	0.75690E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
----------	-------

20	1.5731
----	--------

IONIC STRENGTH = 6.6601

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.61172E+01	0.91849E+00	0.66601E+01	0.0009
ANION # 1	0.61172E+01	0.91849E+00	0.66601E+01	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
----------	-------

20	1.5731
----	--------

Notebook#185, Vol. 9; p. 35
RTP; June 18, 2001

CATION # TOTAL

2 2.0460

IONIC STRENGTH = 7.7679

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.54608E+01	0.95436E+00	0.57219E+01	-.0005
CATION # 2	0.10746E+01	0.52523E+00	0.20460E+01	0.0000
ANION # 1	0.68528E+01	0.88219E+00	0.77679E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K

20 1.5731

CATION # TOTAL

2 4.0240

IONIC STRENGTH = 8.9574

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.48878E+01	0.99074E+00	0.49334E+01	-.0007
CATION # 2	0.22114E+01	0.54954E+00	0.40240E+01	0.0000
ANION # 1	0.76562E+01	0.85473E+00	0.89574E+01	-.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K

20 1.5731

CATION # TOTAL

2 4.0860

IONIC STRENGTH = 8.9967

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.48708E+01	0.99187E+00	0.49107E+01	-.0007
CATION # 2	0.22483E+01	0.55025E+00	0.40860E+01	0.0000
ANION # 1	0.76828E+01	0.85396E+00	0.89967E+01	-.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.4343

IONIC STRENGTH = 7.2007

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.52135E+01	0.72403E+00	0.72007E+01	0.0007
ANION # 1	0.52135E+01	0.72403E+00	0.72007E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.4343

CATION #	TOTAL
2	4.0240

IONIC STRENGTH = 9.5997

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.41787E+01	0.74945E+00	0.55757E+01	-.0007
CATION # 2	0.18438E+01	0.45820E+00	0.40240E+01	0.0000
ANION # 1	0.65047E+01	0.67759E+00	0.95997E+01	-.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
20	1.4343

CATION #	TOTAL
2	5.3650

IONIC STRENGTH = 10.5313

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.38983E+01	0.75455E+00	0.51663E+01	0.0005
CATION # 2	0.24841E+01	0.46303E+00	0.53650E+01	0.0000
ANION # 1	0.69724E+01	0.66207E+00	0.10531E+02	0.0005

b) NaCl + KCl solubility:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.6058
53	1.0420

IONIC STRENGTH = 7.6121

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.54722E+01	0.11013E+01	0.49691E+01	-.0002
CATION # 2	0.14940E+01	0.56527E+00	0.26430E+01	0.0006
ANION # 1	0.73727E+01	0.96854E+00	0.76121E+01	-.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5731
53	1.3272

IONIC STRENGTH = 9.4399

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.46882E+01	0.10043E+01	0.46683E+01	-.0003
CATION # 2	0.26612E+01	0.55771E+00	0.47716E+01	0.0007
ANION # 1	0.79820E+01	0.84556E+00	0.94399E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

Notebook#185, Vol. 9; p. 38
RTP; June 18, 2001

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.4343
53	1.3524

IONIC STRENGTH = 11.4302

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.36768E+01	0.75567E+00	0.48656E+01	0.0001
CATION # 2	0.30454E+01	0.46392E+00	0.65646E+01	0.0009
ANION # 1	0.73924E+01	0.64674E+00	0.11430E+02	0.0001

c) KCl solubility:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
53	1.0420

IONIC STRENGTH = 5.3909

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.33189E+01	0.61564E+00	0.53909E+01	0.0008
ANION # 1	0.33189E+01	0.61564E+00	0.53909E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.0420

CATION #	TOTAL
1	1.7480

IONIC STRENGTH = 6.0490

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15105E+01	0.86412E+00	0.17480E+01	0.0000
CATION # 2	0.25588E+01	0.59492E+00	0.43010E+01	0.0005
ANION # 1	0.43048E+01	0.71165E+00	0.60490E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
 53 1.0420
 CATION # TOTAL
 1 1.8270

IONIC STRENGTH = 6.0817

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15869E+01	0.86859E+00	0.18270E+01	0.0000
CATION # 2	0.25275E+01	0.59406E+00	0.42547E+01	0.0005
ANION # 1	0.43580E+01	0.71658E+00	0.60817E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
 53 1.0420
 CATION # TOTAL
 1 3.4860

IONIC STRENGTH = 6.8308

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.34044E+01	0.97659E+00	0.34860E+01	0.0000
CATION # 2	0.19322E+01	0.57766E+00	0.33448E+01	0.0008
ANION # 1	0.57009E+01	0.83459E+00	0.68308E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K

53 1.0420

CATION # TOTAL

1 3.5920

IONIC STRENGTH = 6.8830

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.35364E+01	0.98452E+00	0.35920E+01	0.0000
CATION # 2	0.18980E+01	0.57671E+00	0.32910E+01	0.0009
ANION # 1	0.58036E+01	0.84318E+00	0.68830E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 40.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K

53 1.0420

CATION # TOTAL

1 5.2360

IONIC STRENGTH = 7.7645

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.59018E+01	0.11272E+01	0.52360E+01	0.0000
CATION # 2	0.14241E+01	0.56323E+00	0.25285E+01	0.0010
ANION # 1	0.77345E+01	0.99613E+00	0.77645E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K

53 1.3272

IONIC STRENGTH = 7.4256

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.46088E+01	0.62067E+00	0.74256E+01	0.0008
ANION # 1	0.46088E+01	0.62067E+00	0.74256E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 1.7170

IONIC STRENGTH = 8.0612

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.14993E+01	0.87323E+00	0.17170E+01	0.0000
CATION # 2	0.37902E+01	0.59743E+00	0.63442E+01	0.0006
ANION # 1	0.56043E+01	0.69522E+00	0.80612E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 1.7440

IONIC STRENGTH = 8.0721

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15248E+01	0.87431E+00	0.17440E+01	0.0000
CATION # 2	0.37783E+01	0.59706E+00	0.63281E+01	0.0006
ANION # 1	0.56219E+01	0.69646E+00	0.80721E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 2.5670

IONIC STRENGTH = 8.4187

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.23313E+01	0.90817E+00	0.25670E+01	0.0000
CATION # 2	0.34297E+01	0.58610E+00	0.58517E+01	0.0009
ANION # 1	0.61934E+01	0.73567E+00	0.84187E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 3.4220

IONIC STRENGTH = 8.8096

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.32359E+01	0.94561E+00	0.34220E+01	0.0000
CATION # 2	0.30962E+01	0.57469E+00	0.53876E+01	0.0010
ANION # 1	0.68604E+01	0.77874E+00	0.88096E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 3.4780

IONIC STRENGTH = 8.8364

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.32976E+01	0.94814E+00	0.34780E+01	0.0000
CATION # 2	0.30754E+01	0.57394E+00	0.53584E+01	0.0010
ANION # 1	0.69069E+01	0.78164E+00	0.88364E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 53

Notebook#185, Vol. 9; p. 43
RTP; June 18, 2001

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K

53 1.3272

CATION # TOTAL

1 4.2780

IONIC STRENGTH = 9.2346

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.42155E+01	0.98539E+00	0.42780E+01	0.0000
CATION # 2	0.27910E+01	0.56309E+00	0.49566E+01	0.0006
ANION # 1	0.76107E+01	0.82415E+00	0.92346E+01	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K

53 1.3524

IONIC STRENGTH = 8.9531

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.47449E+01	0.52997E+00	0.89531E+01	-.0009
ANION # 1	0.47449E+01	0.52997E+00	0.89531E+01	-.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K

53 1.3524

CATION # TOTAL

1 1.7110

IONIC STRENGTH = 9.6823

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.12096E+01	0.70698E+00	0.17110E+01	0.0000
CATION # 2	0.40507E+01	0.50816E+00	0.79713E+01	-.0007

Notebook#185, Vol. 9; p. 44
RTP; June 18, 2001

ANION # 1 0.55579E+01 0.57403E+00 0.96823E+01 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
53 1.3524

CATION # TOTAL
1 2.5670

IONIC STRENGTH = 10.1005

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.18525E+01	0.72167E+00	0.25670E+01	0.0000
CATION # 2	0.37433E+01	0.49689E+00	0.75335E+01	- .0009
ANION # 1	0.60143E+01	0.59545E+00	0.10100E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
53 1.3524

CATION # TOTAL
1 3.4220

IONIC STRENGTH = 10.5576

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.25170E+01	0.73552E+00	0.34220E+01	0.0000
CATION # 2	0.34622E+01	0.48520E+00	0.71356E+01	0.0010
ANION # 1	0.65025E+01	0.61590E+00	0.10558E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 150.00 PRESS(BARS) = 4.77

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K

53 1.3524

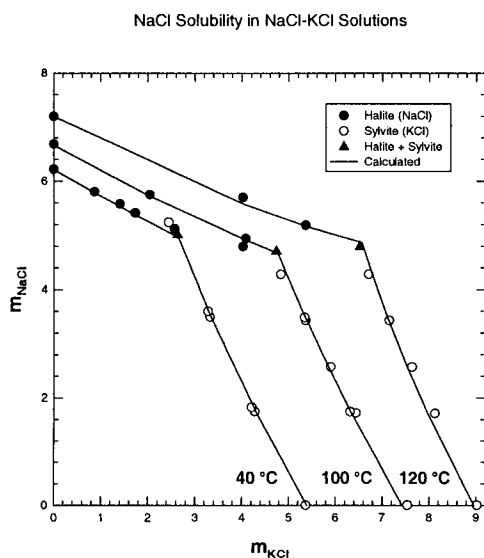
CATION # TOTAL

1 4.2780

IONIC STRENGTH = 11.0590

	ACTIVITY	ACT. COEFF.	MOLALITY	%ERROR
CATION # 1	0.32004E+01	0.74811E+00	0.42780E+01	0.0000
CATION # 2	0.32065E+01	0.47286E+00	0.67810E+01	-.0009
ANION # 1	0.70213E+01	0.63490E+00	0.11059E+02	0.0000

The following are two figures. One is the plot comparing calculated and experimental solubilities in the NaCl-KCl system. The other plot is a similar figure taken from Pabalan and Pitzer (1991).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer.
"Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 15.

7. Verification case 6: Solubility in the NaCl-MgCl₂ system

The following is the output of SOLCALC for solubility calculations in the NaCl-MgCl₂ system:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
20 1.5731 (Halite solubility in water)

IONIC STRENGTH = 6.6601

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.61173E+01	0.91849E+00	0.66601E+01	0.0003
ANION # 1	0.61173E+01	0.91849E+00	0.66601E+01	0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
20 1.5731

CATION # TOTAL
3 1.0500

IONIC STRENGTH = 7.9625

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.40468E+01	0.84088E+00	0.48125E+01	0.0006
CATION # 3	0.62501E+00	0.59525E+00	0.10500E+01	0.0000
ANION # 1	0.92471E+01	0.13377E+01	0.69125E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
20 1.5731

CATION # TOTAL
 3 3.1500

IONIC STRENGTH = 11.2607

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15323E+01	0.84624E+00	0.18107E+01	0.0010
CATION # 3	0.18447E+01	0.58563E+00	0.31500E+01	0.0000
ANION # 1	0.24421E+02	0.30110E+01	0.81107E+01	0.0010

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K
 20 1.5731

CATION # TOTAL
 3 5.2500

IONIC STRENGTH = 16.1402

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.41701E+00	0.10688E+01	0.39019E+00	0.0009
CATION # 3	0.94208E+01	0.17944E+01	0.52500E+01	0.0000
ANION # 1	0.89736E+02	0.82401E+01	0.10890E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION LOG K
 20 1.5731

CATION # TOTAL
 3 7.3500

IONIC STRENGTH = 22.1200

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.96508E-01	0.13782E+01	0.70027E-01	0.0007
CATION # 3	0.92750E+02	0.12619E+02	0.73500E+01	0.0000
ANION # 1	0.38775E+03	0.26253E+02	0.14770E+02	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 THE NUMBER OF ITERATIONS IS 26

EQUATION	LOG K
20	1.5731
5	3.7249

IONIC STRENGTH = 23.8776

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.63713E-01	0.14464E+01	0.44048E-01	-.0006
CATION # 3	0.18503E+03	0.23290E+02	0.79445E+01	0.0000
ANION # 1	0.58735E+03	0.36863E+02	0.15933E+02	-.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K	
53	1.3272	(Sylvite solubility in water)

IONIC STRENGTH = 10.4241

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 3	0.98382E+00	0.28314E+00	0.34747E+01	0.0009
ANION # 1	0.21241E+02	0.30566E+01	0.69494E+01	0.0009

Additional calculations of NaCl solubility in NaCl-MgCl₂ solutions:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5731

CATION #	TOTAL
3	0.2500

IONIC STRENGTH = 6.9580

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.55528E+01	0.89446E+00	0.62080E+01	0.0004
CATION # 3	0.18311E+00	0.73243E+00	0.25000E+00	0.0000
ANION # 1	0.67392E+01	0.10047E+01	0.67080E+01	0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5731
CATION #	TOTAL
3	0.5000

IONIC STRENGTH = 7.2627

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.50371E+01	0.87410E+00	0.57627E+01	0.0007
CATION # 3	0.34014E+00	0.68028E+00	0.50000E+00	0.0000
ANION # 1	0.74290E+01	0.10985E+01	0.67627E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5731
CATION #	TOTAL
3	0.7500

IONIC STRENGTH = 7.5753

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.45644E+01	0.85711E+00	0.53253E+01	0.0004
CATION # 3	0.47772E+00	0.63696E+00	0.75000E+00	0.0000
ANION # 1	0.81985E+01	0.12012E+01	0.68253E+01	0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02
NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
20 1.5731

CATION # TOTAL
3 1.5000

IONIC STRENGTH = 8.5729

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.33583E+01	0.82456E+00	0.40729E+01	0.0007
CATION # 3	0.82720E+00	0.55146E+00	0.15000E+01	0.0000
ANION # 1	0.11143E+02	0.15754E+01	0.70729E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
20 1.5731

CATION # TOTAL
3 2.0000

IONIC STRENGTH = 9.3023

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.26992E+01	0.81738E+00	0.33023E+01	0.0007
CATION # 3	0.10551E+01	0.52756E+00	0.20000E+01	0.0000
ANION # 1	0.13864E+02	0.18985E+01	0.73023E+01	0.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
20 1.5731

CATION # TOTAL
3 2.5000

IONIC STRENGTH = 10.0993

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.21363E+01	0.82189E+00	0.25993E+01	0.0006
CATION # 3	0.13271E+01	0.53082E+00	0.25000E+01	0.0000
ANION # 1	0.17516E+02	0.23050E+01	0.75993E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K

20 1.5731

CATION # TOTAL

3 3.5000

IONIC STRENGTH = 11.9537

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.12625E+01	0.86848E+00	0.14537E+01	0.0006
CATION # 3	0.22672E+01	0.64777E+00	0.35000E+01	0.0000
ANION # 1	0.29641E+02	0.35063E+01	0.84537E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K

20 1.5731

CATION # TOTAL

3 4.0000

IONIC STRENGTH = 13.0314

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.94015E+00	0.91149E+00	0.10314E+01	0.0006
CATION # 3	0.31843E+01	0.79608E+00	0.40000E+01	0.0000
ANION # 1	0.39803E+02	0.44072E+01	0.90314E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

Notebook#185, Vol. 9; p. 52
RTP; June 18, 2001

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION LOG K

20 1.5731

CATION # TOTAL

3 4.5000

IONIC STRENGTH = 14.2101

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.68668E+00	0.96697E+00	0.71014E+00	0.0006
CATION # 3	0.47305E+01	0.10512E+01	0.45000E+01	0.0000
ANION # 1	0.54495E+02	0.56122E+01	0.97101E+01	0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 100.00 PRESS(BARS) = 1.02

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION LOG K

20 1.5731

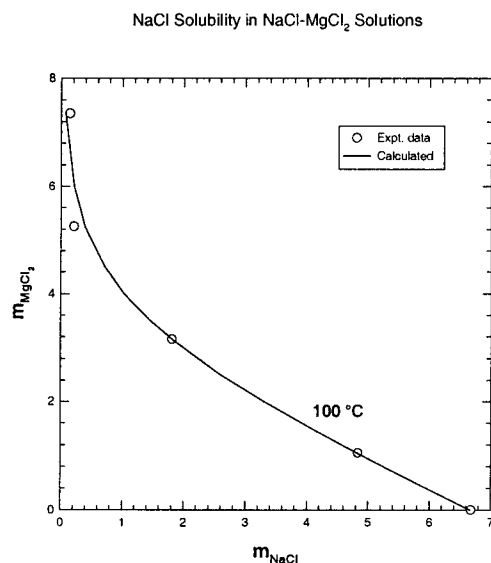
CATION # TOTAL

3 6.0000

IONIC STRENGTH = 18.2101

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.24844E+00	0.11827E+01	0.21006E+00	0.0008
CATION # 3	0.20438E+02	0.34064E+01	0.60000E+01	0.0000
ANION # 1	0.15063E+03	0.12336E+02	0.12210E+02	0.0008

The following are two figures. One is the plot comparing calculated and experimental NaCl solubilities in the NaCl-MgCl₂ system. The other plot is a similar figure taken from Pabalan and Pitzer (1991).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer. "Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 10.

8. Verification case 6: Solubility in the KCl-MgCl₂ system

The following is the output of SOLCALC for solubility calculations in the KCl-MgCl₂ system:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
THE NUMBER OF ITERATIONS IS 13

	EQUATION	LOG K
	53	1.2488

IONIC STRENGTH = 6.6144

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.42113E+01	0.63669E+00	0.66144E+01	0.0008
ANION # 1	0.42113E+01	0.63669E+00	0.66144E+01	0.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 15

	EQUATION	LOG K
	53	1.2488

	CATION #	TOTAL
	3	1.1500

IONIC STRENGTH = 8.3441

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.22661E+01	0.46302E+00	0.48941E+01	-.0005
CATION # 3	0.48665E+00	0.42317E+00	0.11500E+01	0.0000
ANION # 1	0.78267E+01	0.10879E+01	0.71941E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
 53 1.2488
 CATION # TOTAL
 3 1.9260

IONIC STRENGTH = 9.5778

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.14527E+01	0.38231E+00	0.37998E+01	-.0006
CATION # 3	0.10225E+01	0.53088E+00	0.19260E+01	0.0000
ANION # 1	0.12209E+02	0.15955E+01	0.76518E+01	-.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 9

EQUATION LOG K
 53 1.2488
 CATION # TOTAL
 3 3.2210

IONIC STRENGTH = 11.9190

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.64108E+00	0.28417E+00	0.22560E+01	0.0010
CATION # 3	0.30843E+01	0.95756E+00	0.32210E+01	0.0000
ANION # 1	0.27665E+02	0.31806E+01	0.86980E+01	0.0010

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
 53 1.2488
 CATION # TOTAL
 3 4.5460

IONIC STRENGTH = 14.8374

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.25064E+00	0.20898E+00	0.11994E+01	0.0009

Notebook#185, Vol. 9; p. 56
 RTP; June 18, 2001

CATION #	3	0.11121E+02	0.24463E+01	0.45460E+01	0.0000
ANION #	1	0.70759E+02	0.68756E+01	0.10291E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
----------	-------

14	4.2569
----	--------

53	1.2488
----	--------

IONIC STRENGTH = 15.0075

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.23790E+00	0.20537E+00	0.11584E+01	0.0009
CATION # 3	0.11984E+02	0.25959E+01	0.46164E+01	0.0000
ANION # 1	0.74550E+02	0.71744E+01	0.10391E+02	0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
----------	-------

14	4.2569
----	--------

CATION #	TOTAL
----------	-------

2	0.9310
---	--------

IONIC STRENGTH = 15.2080

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.18462E+00	0.19831E+00	0.93100E+00	0.0000
CATION # 3	0.13212E+02	0.27763E+01	0.47590E+01	-0.0001
ANION # 1	0.81930E+02	0.78410E+01	0.10449E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 5

EQUATION	LOG K
----------	-------

14 4.2569

CATION # TOTAL

2 0.6170

IONIC STRENGTH = 15.6664

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.11477E+00	0.18601E+00	0.61700E+00	0.0000
CATION # 3	0.16350E+02	0.32593E+01	0.50165E+01	-.0001
ANION # 1	0.98134E+02	0.92145E+01	0.10650E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K

14 4.2569

CATION # TOTAL

2 0.3590

IONIC STRENGTH = 16.3987

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.61320E-01	0.17081E+00	0.35900E+00	0.0000
CATION # 3	0.22770E+02	0.42588E+01	0.53466E+01	-.0001
ANION # 1	0.12546E+03	0.11351E+02	0.11052E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K

14 4.2569

CATION # TOTAL

2 0.1710

IONIC STRENGTH = 17.5966

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.25677E-01	0.15016E+00	0.17100E+00	0.0000
CATION # 3	0.38938E+02	0.67035E+01	0.58085E+01	0.0001
ANION # 1	0.17960E+03	0.15236E+02	0.11788E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K

14 4.2569

CATION # TOTAL

2 0.1250

IONIC STRENGTH = 18.1669

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.17648E-01	0.14119E+00	0.12500E+00	0.0000
CATION # 3	0.50264E+02	0.83578E+01	0.60140E+01	0.0000
ANION # 1	0.21124E+03	0.17382E+02	0.12153E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K

5 3.9745

14 4.2569

IONIC STRENGTH = 20.2979

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.50499E-02	0.11054E+00	0.45683E-01	-.0007
CATION # 3	0.13102E+03	0.19408E+02	0.67507E+01	0.0000
ANION # 1	0.37941E+03	0.28007E+02	0.13547E+02	-.0007

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 75.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K

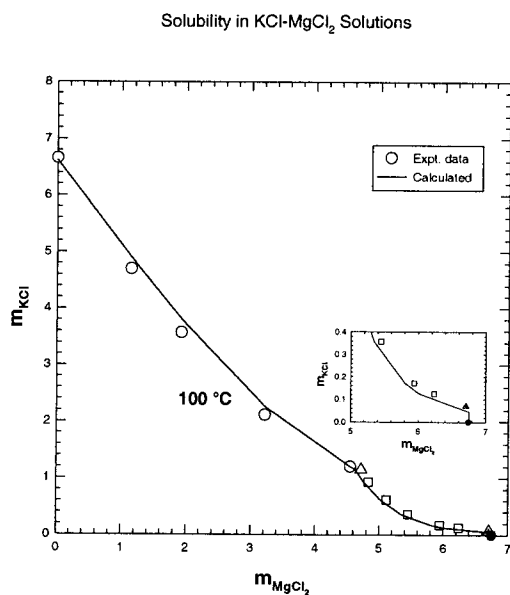
5 3.9745

IONIC STRENGTH = 20.2539

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
--	----------	------------	----------	--------

CATION #	3	0.12891E+03	0.19094E+02	0.67513E+01	0.0009
ANION #	1	0.37899E+03	0.28068E+02	0.13503E+02	0.0009

The following are two figures. One is the plot comparing calculated and experimental solubilities in the KCl-MgCl₂ system. The other plot is a similar figure taken from Pabalan and Pitzer (1991).



Information potentially subject to copyright protection was redacted from this location. The redacted material (graph) is from the following reference:

Pabalan, R.T. and K.S. Pitzer.
 "Thermodynamics of Concentrated Electrolyte Mixtures and the Prediction of Mineral Solubilities to High Temperatures for Mixtures in the System Na-K-Mg-Cl-SO₄-OH-H₂O. *Geochimica et Cosmochimica Acta*. Vol. 51. pp. 2,429-2,443.

FIG. 12.

August 8, 2001

Table 17 in DOE's In-Drift Precipitates/Salts Analysis AMR (ANL-EBS-MD-000045 Rev 00 ICN 01; page 63) lists a comparison of aqueous solubilities of Na and K salts at 100 C with values taken from a handbook with those calculated using EQ3/6. The values from that table are listed in the first three columns of the following:

Salt	Handbook value (molal)	EQ3/6 HRH model	SOLCALC value
NaCl	6.70	7.21	6.66
KCl	7.60	6.12	7.43
Na2SO4	3.01	1.55	3.06
K2SO4	1.38	0.83	1.50

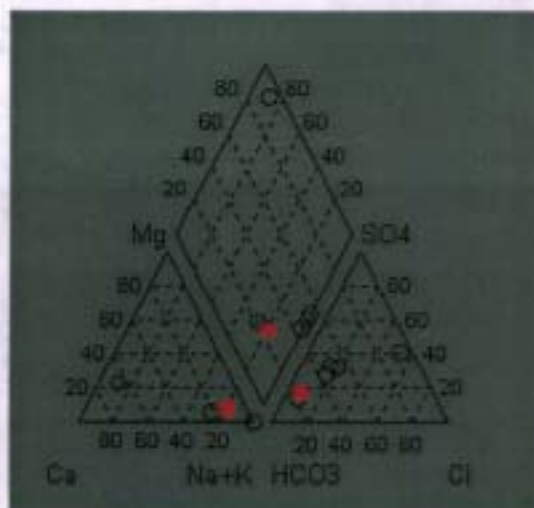
SOLCALC Ver. 1 was used to calculate the salt solubility. The SOLCALC results are given in the last column of the above table.

August 17, 2001

In the following pages, compositions of Yucca Mountain-type waters are tabulated and plotted. The compositions are taken from DOE Analysis and Model Reports and from OLI Environmental Simulation input/output files. The latter are documented in Lietai Yang's scientific notebook.

Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate Analysis\SALT ANALYSES.HC3

SampleID	S-J13	
Water Type	Na-HCO3	
Reference	ANL-EBS-MD-000045 Rev 00 ICN 01, p14	
Ph (Lab)	7.84	
Cations	(mg/l)	(meq/l)
Na+	4.600E+01	2.001E+00
K+	5.300E+00	1.355E-01
Mg++	2.200E+00	1.810E-01
Ca++	6.400E+00	3.194E-01
Anions	(mg/l)	(meq/l)
F-	2.200E+00	1.158E-01
Cl-	6.900E+00	1.946E-01
SO4--	1.810E+01	3.769E-01
NO3-	8.000E+00	1.290E-01
HCO3-	1.080E+02	1.770E+00
Uncharged	(mg/l)	
SiO2	11.3	



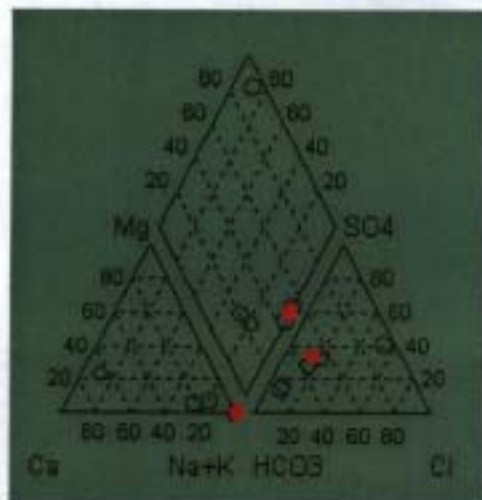
Database: D:\Workdir\Documents\NEARPLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID E-S-J13
Water Type Na-HCO3
Reference ANL-EBS-MD-000045 Rev 00 ICN 01, p. 14

Cations	(mg/l)	(meq/l)
Na+	4.408E+04	1.917E+03
K+	4.792E+03	1.226E+02
Mg++	1.400E-01	1.152E-02
Ca++	2.986E+01	1.490E+00

Anions	(mg/l)	(meq/l)
F-	1.550E+03	8.159E+01
Cl-	4.835E+03	1.364E+02
SO4--	1.293E+04	2.691E+02
NO3-	5.532E+03	8.921E+01
HCO3-	2.488E+04	4.078E+02

Uncharged	(mg/l)
SiO2	18008

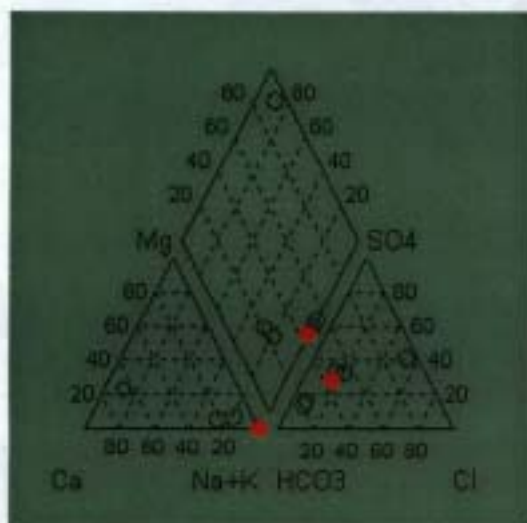


Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID S-100x-J13
Water Type Na-HCO3
Reference ANL-EBS-MD-000045 Rev 00 ICN 01, p15

Cations	(mg/l)	(meq/l)
Na+	4.032E+03	1.754E+02
K+	5.130E+02	1.312E+01
Mg++	2.000E+00	1.645E-01
Ca++	5.000E+00	2.495E-01

Anions	(mg/l)	(meq/l)
F-	2.080E+02	1.095E+01
Cl-	7.300E+02	2.059E+01
SO4--	1.632E+03	3.398E+01
NO3-	7.320E+02	1.180E+01
HCO3-	4.142E+03	6.789E+01

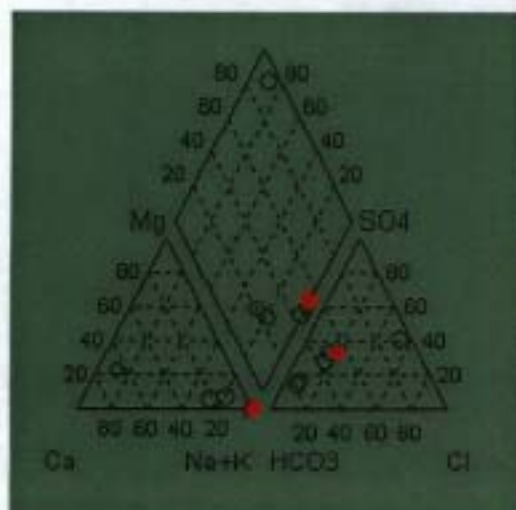


Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID E-S-100x-J13
Water Type Na-HCO3-SO4
Reference ANL-EBS-MD-000045 Rev 00 ICN 01, p15

Cations	(mg/l)	(meq/l)
Na+	7.631E+04	3.319E+03
K+	1.083E+04	2.770E+02
Mg++	0.000E+00	0.000E+00
Ca++	3.600E+01	1.796E+00

Anions	(mg/l)	(meq/l)
F-	3.630E+03	1.911E+02
Cl-	1.442E+04	4.067E+02
SO4--	2.978E+04	6.201E+02
NO3-	1.409E+04	2.271E+02
HCO3-	5.461E+04	8.952E+02



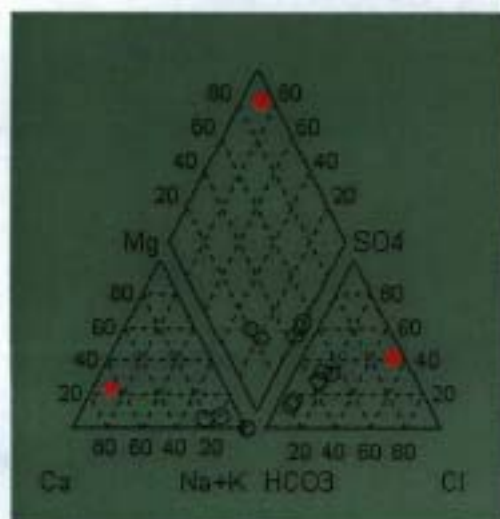
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID S-Pore
Water Type Ca-Mg-Cl-SO4
Reference ANL-EBS-MD-00045 Rev 00 ICN 01, p16
Ph (Lab) 7.68

Cations	(mg/l)	(meq/l)
Na+	8.200E+00	3.567E-01
K+	4.200E+00	1.074E-01
Mg++	1.170E+01	9.626E-01
Ca++	5.720E+01	2.854E+00

Anions	(mg/l)	(meq/l)
F-	2.300E+00	1.211E-01
Cl-	7.800E+01	2.200E+00
SO4--	8.170E+01	1.701E+00
NO3-	1.100E+01	1.774E-01
HCO3-	1.620E+01	2.655E-01

Uncharged	(mg/l)
SiO2	9.8



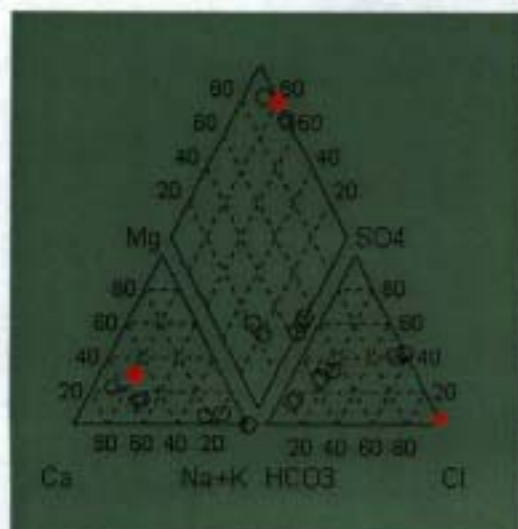
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	E-S-Pore
Water Type	Ca-Mg-Cl
Reference	ANL-EBS-MD-000045 Rev 00 ICN 01, p16
Ph (Lab)	6.25

Cations	(mg/l)	(meq/l)
Na+	5.961E+03	2.593E+02
K+	2.779E+03	7.107E+01
Mg++	5.478E+03	4.507E+02
Ca++	1.563E+04	7.799E+02

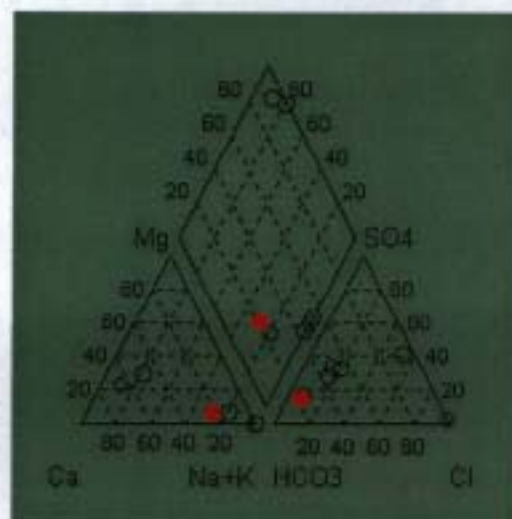
Anions	(mg/l)	(meq/l)
F-	5.770E+02	3.037E+01
Cl-	5.308E+04	1.497E+03
SO4--	2.077E+03	4.325E+01
NO3-	0.000E+00	0.000E+00
HCO3-	3.500E+01	5.737E-01

Uncharged	(mg/l)
SiO2	513



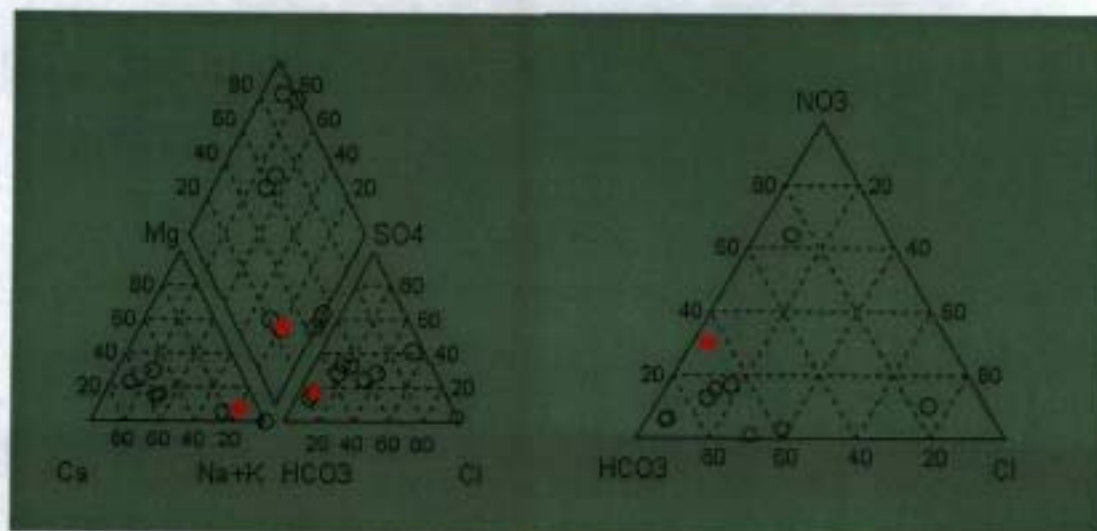
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	Ave-J13 Harrar	
Water Type	Na-Ca-HCO3	
Reference	Harrar et al. 1990	
Ph (Lab)	7.41	
Cations	(mg/l)	(meq/l)
Na+	4.580E+01	1.992E+00
K+	5.040E+00	1.289E-01
Mg++	2.010E+00	1.654E-01
Ca++	1.300E+01	6.487E-01
Anions	(mg/l)	(meq/l)
F-	2.180E+00	1.147E-01
Cl-	7.140E+00	2.014E-01
SO4--	1.840E+01	3.831E-01
NO3-	8.780E+00	1.416E-01
HCO3-	1.289E+02	2.113E+00
Uncharged	(mg/l)	
SiO2	61	



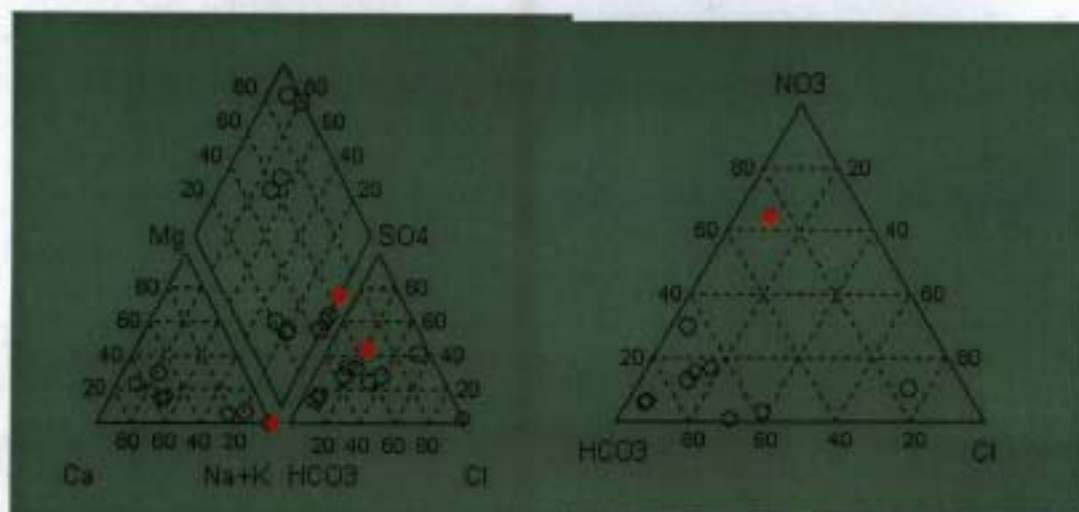
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	S-J13-OLI	
Water Type	Na-HCO3-NO3	
Reference	LYang notebook	
Ph (Lab)	8.09	
Cations	(mg/l)	(meq/l)
Na+	5.350E+01	2.327E+00
K+	6.170E+00	1.578E-01
Mg++	2.560E+00	2.106E-01
Ca++	7.450E+00	3.718E-01
Anions	(mg/l)	(meq/l)
F-	2.200E+00	1.158E-01
Cl-	6.900E+00	1.946E-01
SO4--	1.810E+01	3.769E-01
NO3-	4.600E+01	7.418E-01
HCO3-	1.000E+02	1.639E+00
Uncharged	(mg/l)	
SiO2	11.3	



Database: D:\Workdir\Documents\NEARFLD\WF Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	ESJ13-OLI-101C	
Water Type	Na-NO3	
Reference	LYang notebook	
Ph (Lab)	11.8	
Cations	(mg/l)	(meq/l)
Na+	2.920E+04	1.270E+03
K+	3.360E+03	8.593E+01
Mg++	0.000E+00	0.000E+00
Ca++	6.760E+00	3.373E-01
Anions	(mg/l)	(meq/l)
F-	1.200E+03	6.316E+01
Cl-	3.760E+03	1.061E+02
SO4--	9.870E+03	2.055E+02
NO3-	2.510E+04	4.048E+02
HCO3-	1.010E+04	1.656E+02
Uncharged	(mg/l)	
SiO2	6160	



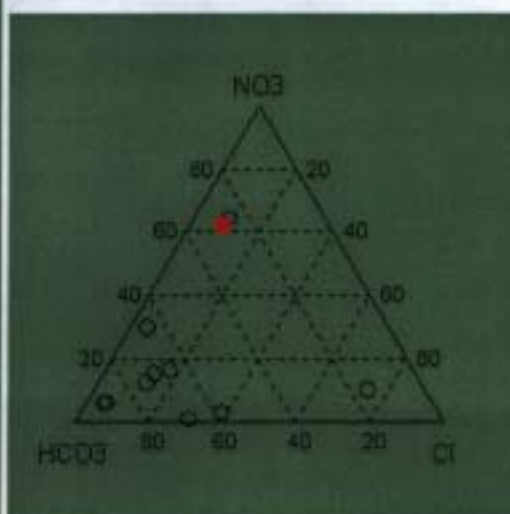
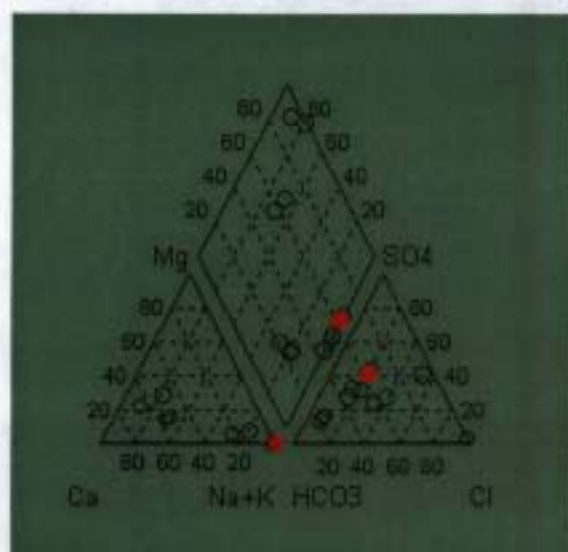
Database: D:\Workdir\Documents\NEARPLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	ESJ13-OLI-104
Water Type	Na-NO3
Reference	LYang notebook
Ph (Lab)	12.1

Cations	(mg/l)	(meq/l)
Na+	1.150E+05	5.002E+03
K+	1.320E+04	3.376E+02
Mg++	0.000E+00	0.000E+00
Ca++	2.600E+01	1.297E+00

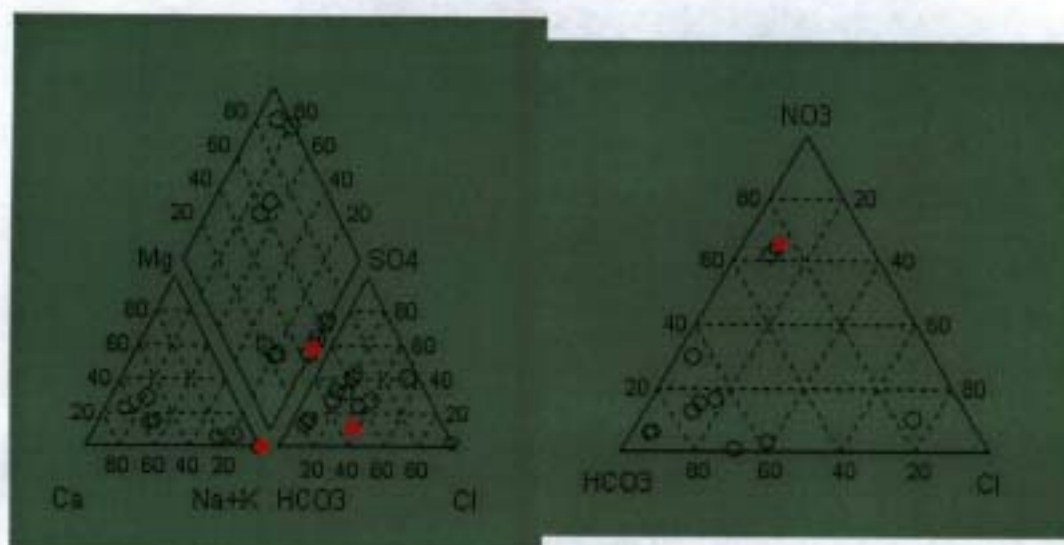
Anions	(mg/l)	(meq/l)
F-	2.780E+03	1.463E+02
Cl-	1.480E+04	4.175E+02
SO4--	3.880E+04	8.079E+02
NO3-	9.870E+04	1.592E+03
HCO3-	4.510E+04	7.392E+02

Uncharged	(mg/l)
SiO2	24200



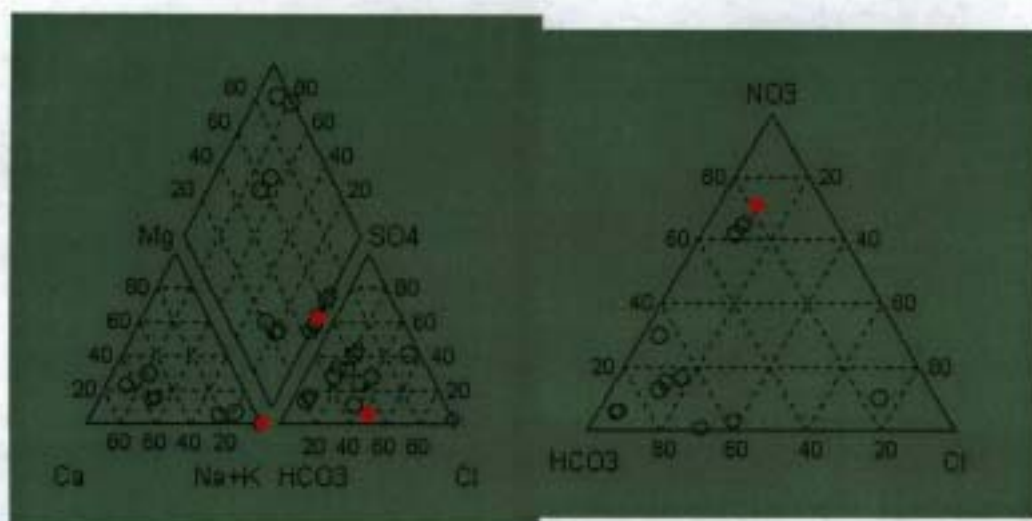
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	ESJ13-OLI-108	
Water Type	Na-NO3	
Reference	LYang notebook	
Ph (Lab)	12.4	
Cations	(mg/l)	(meq/l)
Na+	1.800E+05	7.829E+03
K+	2.600E+04	6.650E+02
Mg++	0.000E+00	0.000E+00
Ca++	4.940E+01	2.465E+00
Anions	(mg/l)	(meq/l)
F-	3.550E+03	1.869E+02
Cl-	2.910E+04	8.208E+02
SO4--	1.300E+04	2.707E+02
NO3-	1.940E+05	3.129E+03
HCO3-	7.250E+04	1.188E+03
Uncharged	(mg/l)	
SiO2	47600	



Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	ESJ13-OLI-112	
Water Type	Na-NO3	
Reference	LYang notebook	
Ph (Lab)	12.7	
Cations	(mg/l)	(meq/l)
Na+	2.290E+05	9.961E+03
K+	3.760E+04	9.616E+02
Mg++	0.000E+00	0.000E+00
Ca++	7.340E+01	3.663E+00
Anions	(mg/l)	(meq/l)
F-	3.590E+03	1.890E+02
Cl-	4.210E+04	1.187E+03
SO4--	7.030E+03	1.464E+02
NO3-	2.800E+05	4.515E+03
HCO3-	7.290E+04	1.195E+03
Uncharged	(mg/l)	
SiO2	68900	



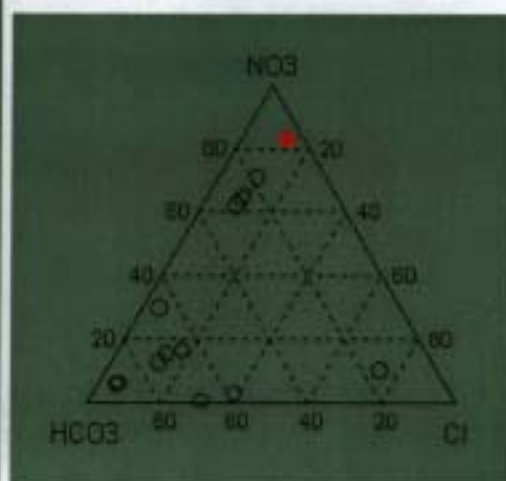
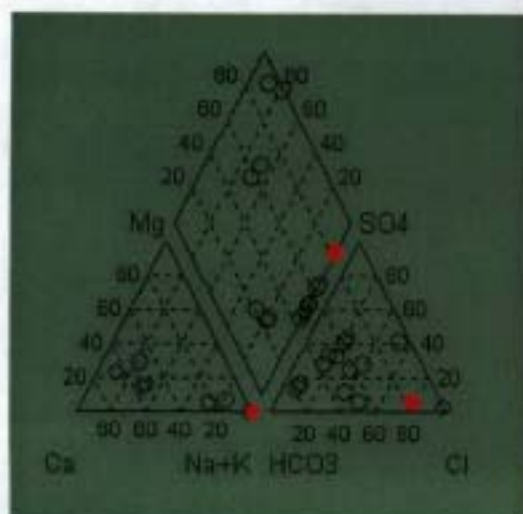
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	ESJ13-OLI-120
Water Type	Na-NO3
Reference	LYang notebook
Ph (Lab)	12.7

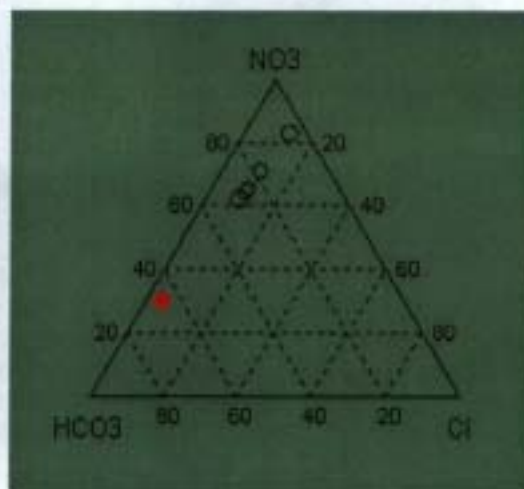
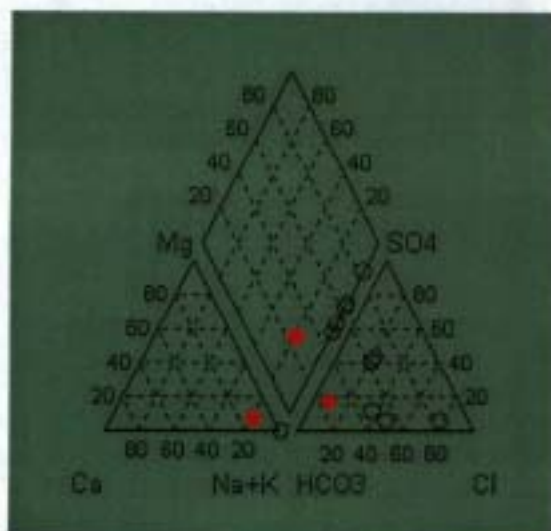
Cations	(mg/l)	(meq/l)
Na+	2.880E+05	1.253E+04
K+	5.990E+04	1.532E+03
Mg++	0.000E+00	0.000E+00
Ca++	1.170E+02	5.838E+00

Anions	(mg/l)	(meq/l)
F-	2.320E+03	1.221E+02
Cl-	6.700E+04	1.890E+03
SO4--	6.400E+03	1.333E+02
NO3-	4.470E+05	7.209E+03
HCO3-	2.440E+04	3.999E+02

Uncharged	(mg/l)
SiO2	110000

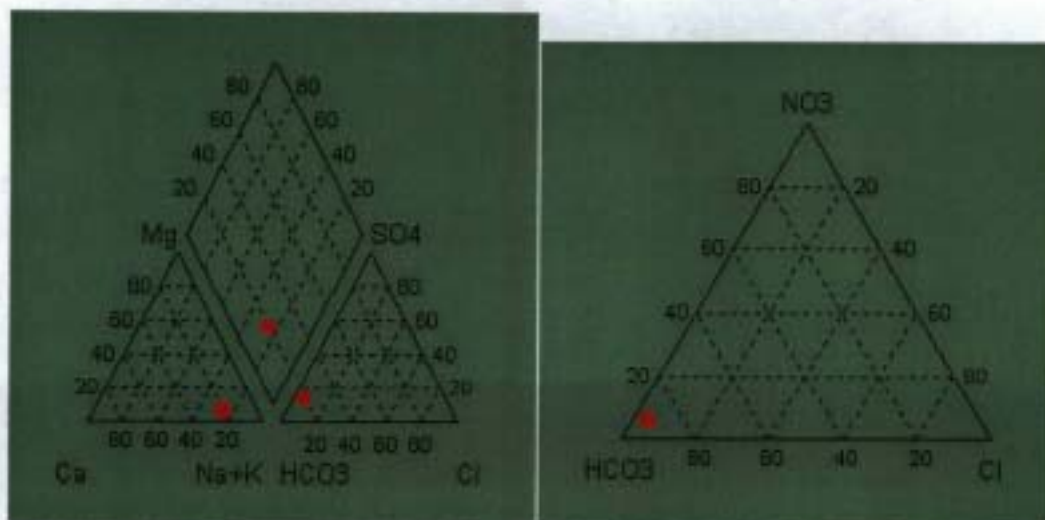


Evolution of synthetic J-13 well water composition as evaporation occurs at 101, 104, 108, 112, and 120 °C (simulation using OLI Environmental Simulation Program, conducted by Lietai Yang, documented in L. Yang's scientific notebook). Red symbol is the initial synthetic J-13 water composition.



Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	AvJ13-OLI	
Water Type	Na-Ca-HCO ₃	
Reference	LYang notebook	
Ph (Lab)	7.92	
Cations	(mg/l)	(meq/l)
Na+	5.110E+01	2.223E+00
K+	5.220E+00	1.335E-01
Mg++	2.110E+00	1.736E-01
Ca++	1.330E+01	6.637E-01
Anions	(mg/l)	(meq/l)
F-	4.400E+00	2.316E-01
Cl-	6.700E+00	1.890E-01
SO ₄ --	1.700E+01	3.540E-01
NO ₃ -	8.800E+00	1.419E-01
HCO ₃ -	1.390E+02	2.278E+00
Uncharged	(mg/l)	
SiO ₂	57.3	



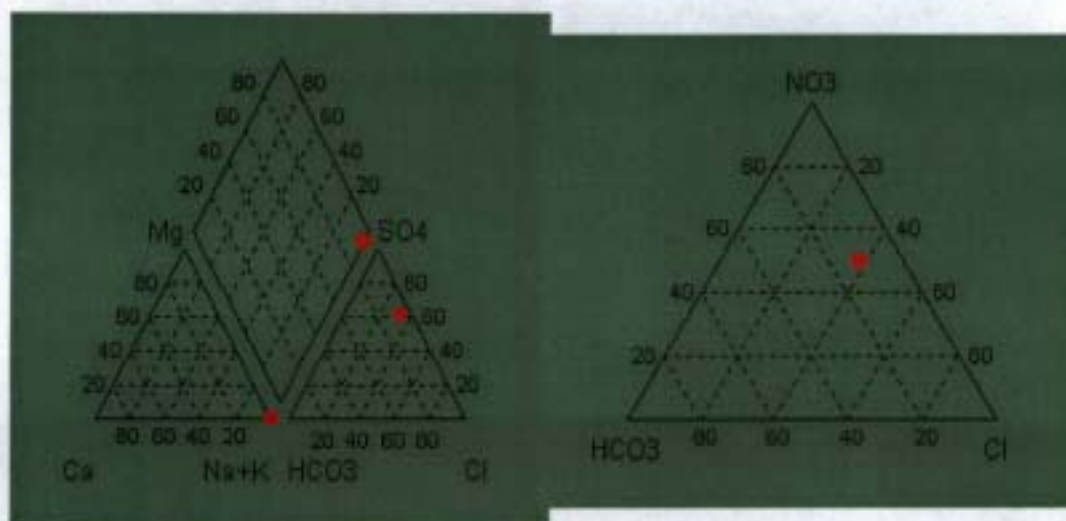
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvJ13-OLI-101
Water Type	Na-SO4
Reference	LYang notebook
Ph (Lab)	10.9

Cations	(mg/l)	(meq/l)
Na+	2.980E+04	1.296E+03
K+	3.040E+03	7.775E+01
Mg++	0.000E+00	0.000E+00
Ca++	1.330E+01	6.637E-01

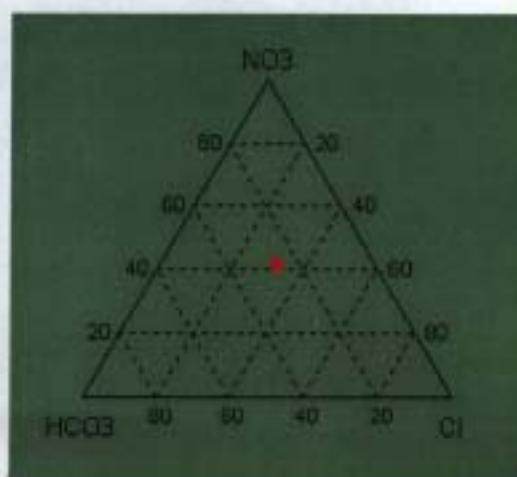
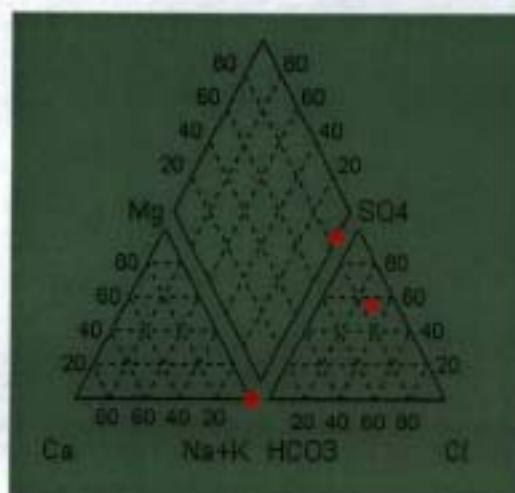
Anions	(mg/l)	(meq/l)
F-	5.390E+02	2.837E+01
Cl-	3.910E+03	1.103E+02
SO4--	9.910E+03	2.063E+02
NO3-	5.130E+03	8.273E+01
HCO3-	1.200E+03	1.967E+01

Uncharged	(mg/l)
SiO2	25700



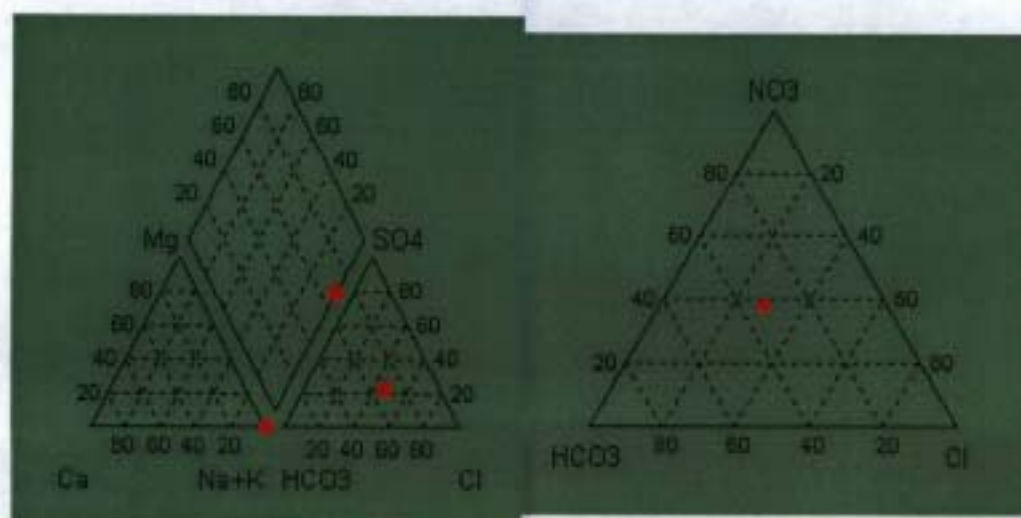
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvJ13-OLI-104	
Water Type	Na-SO4	
Reference	LYang notebook	
Ph (Lab)	11.2	
Cations	(mg/l)	(meq/l)
Na+	1.250E+05	5.437E+03
K+	1.270E+04	3.248E+02
Mg++	0.000E+00	0.000E+00
Ca++	5.380E+01	2.685E+00
Anions	(mg/l)	(meq/l)
P-	1.680E+03	8.843E+01
Cl-	1.630E+04	4.598E+02
SO4--	4.150E+04	8.641E+02
NO3-	2.150E+04	3.467E+02
HCO3-	1.370E+04	2.246E+02
Uncharged	(mg/l)	
SiO2	99300	



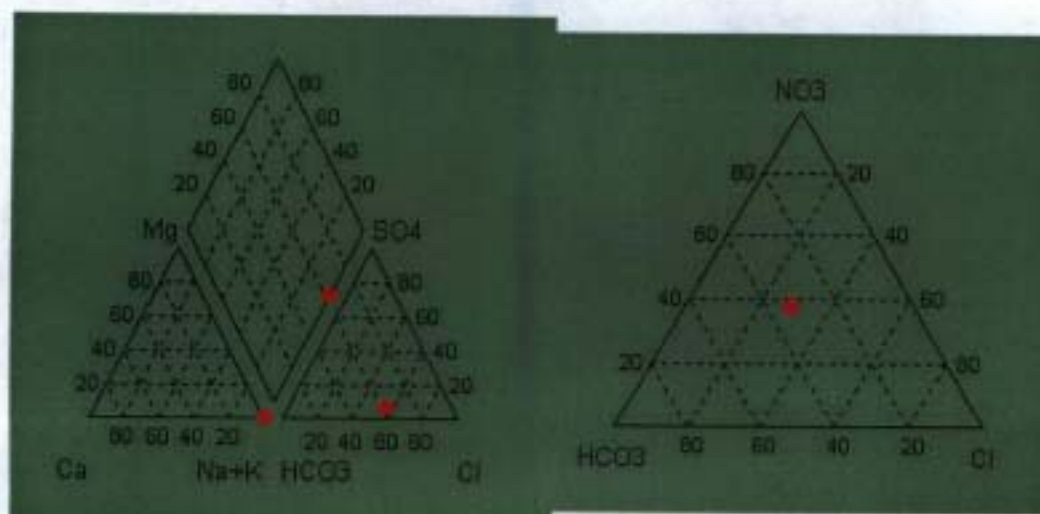
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvJ13-OLI-108	
Water Type	Na	
Reference	LYang notebook	
Ph (Lab)	11.5	
Cations	(mg/l)	(meq/l)
Na+	2.140E+05	9.308E+03
K+	2.490E+04	6.368E+02
Mg++	0.000E+00	0.000E+00
Ca++	1.040E+02	5.190E+00
Anions	(mg/l)	(meq/l)
F-	2.840E+03	1.495E+02
Cl-	3.190E+04	8.998E+02
SO4--	2.070E+04	4.310E+02
NO3-	4.190E+04	6.757E+02
HCO3-	3.690E+04	6.048E+02
Uncharged	(mg/l)	
SiO2	185000	



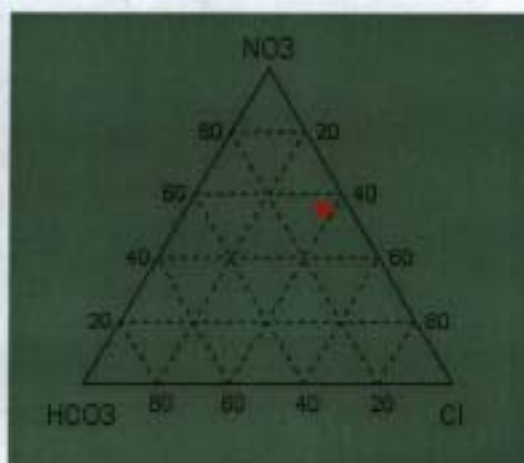
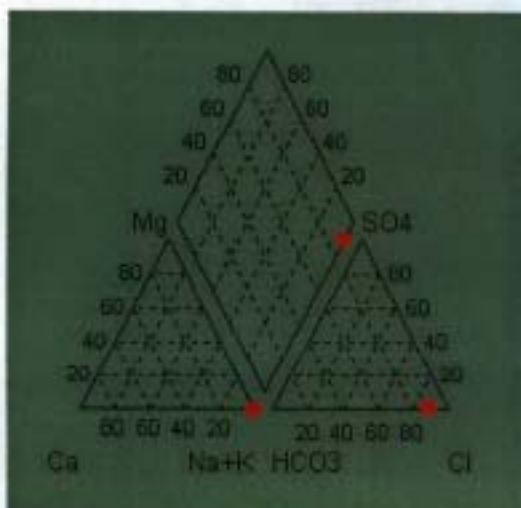
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate Analysis\SALT ANALYSES.HC3

SampleID	EAvJ13-OLI-112	
Water Type	Na	
Reference	LYang notebook	
Ph (Lab)	11.6	
Cations	(mg/l)	(meq/l)
Na+	2.840E+05	1.235E+04
K+	3.750E+04	9.591E+02
Mg++	0.000E+00	0.000E+00
Ca++	1.560E+02	7.784E+00
Anions	(mg/l)	(meq/l)
F-	3.630E+03	1.911E+02
Cl-	4.810E+04	1.357E+03
SO4--	7.500E+03	1.562E+02
NO3-	6.320E+04	1.019E+03
HCO3-	5.590E+04	9.163E+02
Uncharged	(mg/l)	
SiO2	246000	

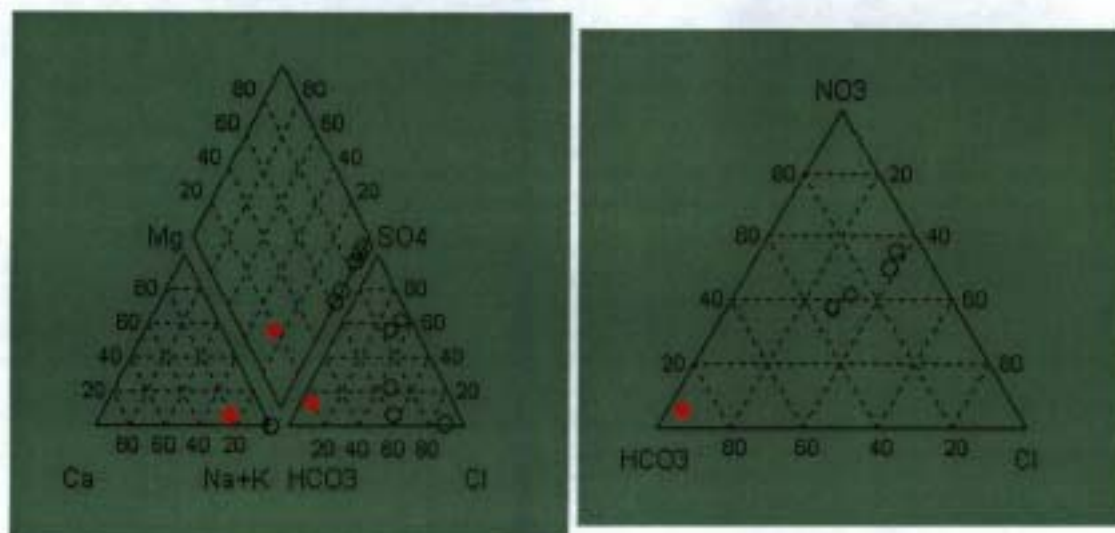


Database: D:\Workdir\Documents\NEARPLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvJ13-OLI-120	
Water Type	Na-K-Cl-NO3	
Reference	LYang notebook	
Ph (Lab)	11.6	
Cations	(mg/l)	(meq/l)
Na+	2.910E+05	1.266E+04
K+	1.150E+05	2.941E+03
Mg++	0.000E+00	0.000E+00
Ca++	4.790E+02	2.390E+01
Anions	(mg/l)	(meq/l)
F-	2.660E+03	1.400E+02
Cl-	1.290E+05	3.639E+03
SO4--	2.380E+03	4.955E+01
NO3-	1.930E+05	3.112E+03
HCO3-	2.510E+04	4.114E+02
Uncharged	(mg/l)	
SiO2	220000	



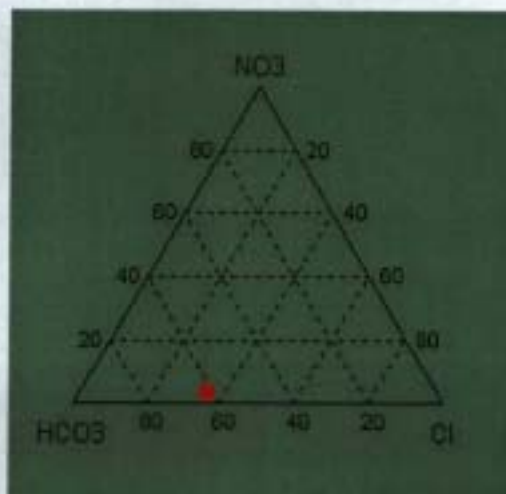
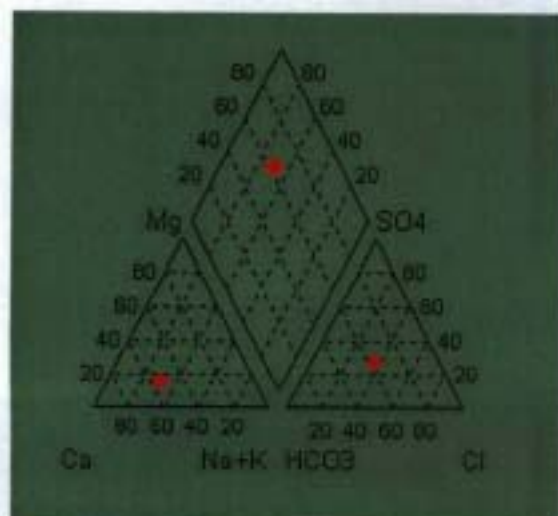
Evolution of average J-13 well water composition as evaporation occurs at 101, 104, 108, 112, and 120 °C (simulation using OLI Environmental Simulation Program, conducted by Lietai Yang, documented in L. Yang's scientific notebook). Red symbol is the initial average J-13 water composition.



SampleID	AvPore	
Water Type	Ca-Na-HCO3-Cl-SO4	
Reference	LYang notebook	
Ph (Lab)	7.32	
Cations	(mg/l)	(meq/l)
Na+	6.130E+01	2.666E+00
K+	8.000E+00	2.046E-01
Mg++	1.700E+01	1.399E+00
Ca++	1.010E+02	5.040E+00
Anions	(mg/l)	(meq/l)
F-	8.600E-01	4.527E-02
Cl-	1.170E+02	3.300E+00
SO4--	1.160E+02	2.415E+00
NO3-	1.000E+01	1.613E-01
HCO3-	2.070E+02	3.393E+00
Uncharged	(mg/l)	
SiO2	70.6	

Also ANL-EB5-MD
- 000033
Rev 001CN 1
p. 57

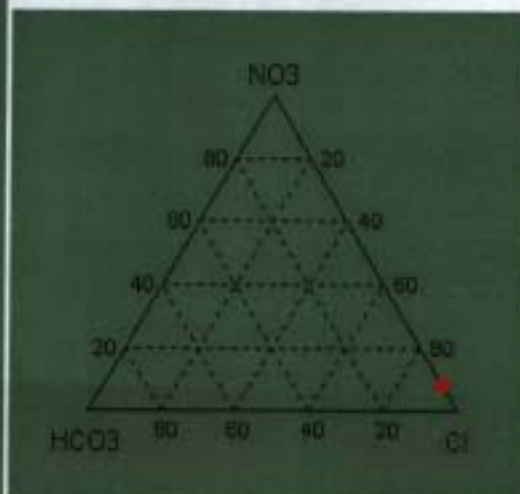
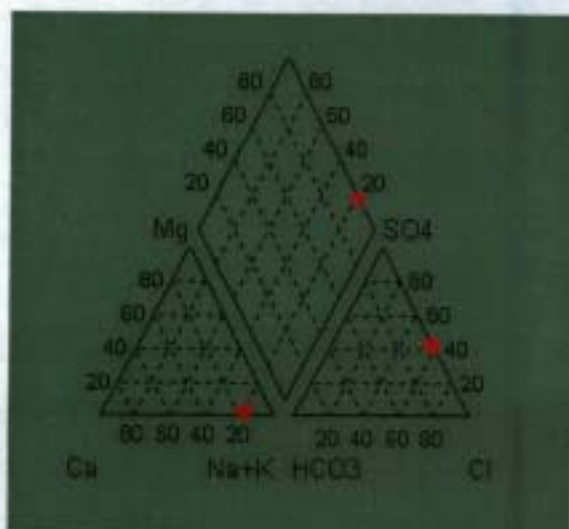
assumed?
(not analyzed)



Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate Analysis\SALT ANALYSES.HC3

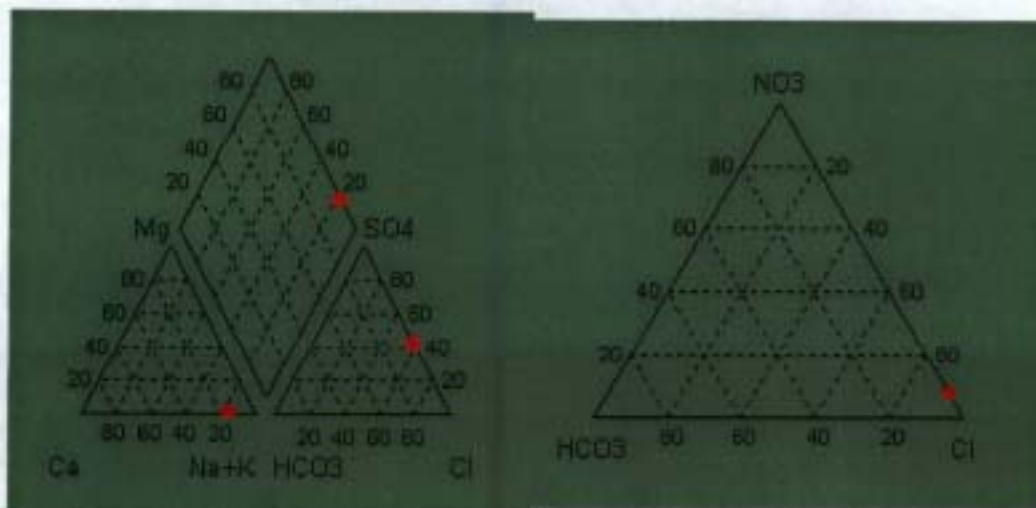
101°C

SampleID	EAvPore	
Water Type	Na-Cl-SO ₄	
Reference	LYang notebook	
Ph (Lab)	8.39	
Cations	(mg/l)	(meq/l)
Na+	1.820E+04	7.916E+02
K+	2.380E+03	6.087E+01
Mg++	2.950E+02	2.427E+01
Ca++	3.410E+03	1.702E+02
Anions	(mg/l)	(meq/l)
F-	2.330E+00	1.226E-01
Cl-	3.470E+04	9.788E+02
SO ₄ --	3.450E+04	7.183E+02
NO ₃ -	2.970E+03	4.790E+01
HCO ₃ -	0.000E+00	0.000E+00
Uncharged	(mg/l)	
SiO ₂	1050	



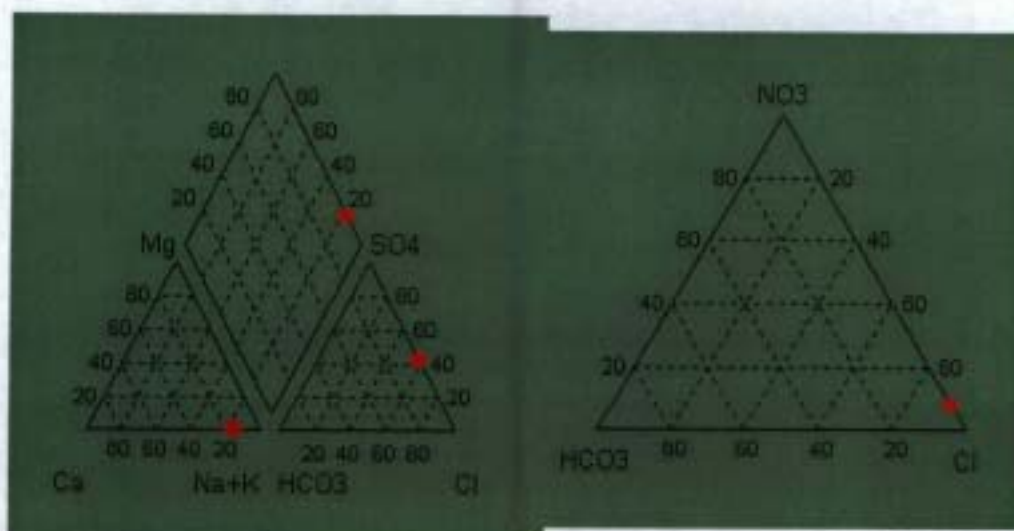
Database: D:\Workdir\Documents\NEARPLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvPore-104	
Water Type	Na-Cl-SO4	
Reference	LYang notebook	
Ph (Lab)	7.86	
Cations	(mg/l)	(meq/l)
Na+	6.110E+04	2.658E+03
K+	7.980E+03	2.041E+02
Mg++	5.930E+02	4.879E+01
Ca++	1.110E+04	5.539E+02
Anions	(mg/l)	(meq/l)
F-	1.110E+00	5.843E-02
Cl-	1.170E+05	3.300E+03
SO4--	1.160E+05	2.415E+03
NO3-	9.970E+03	1.608E+02
HCO3-	0.000E+00	0.000E+00
Uncharged	(mg/l)	
SiO2	619	



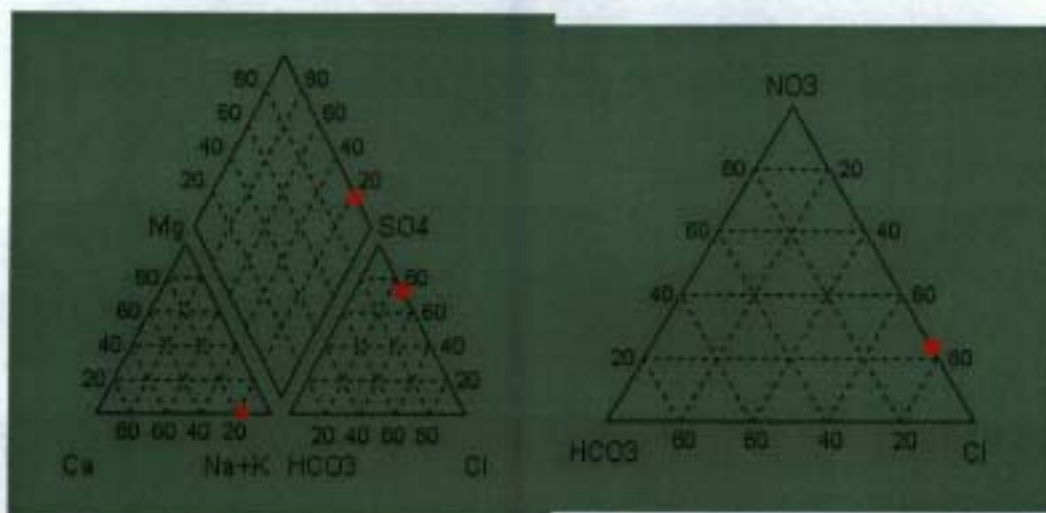
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate Analysis\SALT ANALYSES.HC3

SampleID	EAvPore-108	
Water Type	Na-Cl-SO4	
Reference	LYang notebook	
Ph (Lab)	7.95	
Cations	(mg/l)	(meq/l)
Na+	9.990E+04	4.345E+03
K+	1.300E+04	3.325E+02
Mg++	5.970E+02	4.912E+01
Ca++	1.850E+04	9.232E+02
Anions	(mg/l)	(meq/l)
F-	1.530E+00	8.053E-02
Cl-	1.910E+05	5.387E+03
SO4--	1.890E+05	3.935E+03
NO3-	1.630E+04	2.629E+02
HCO3-	0.000E+00	0.000E+00
Uncharged	(mg/l)	
SiO2	360	



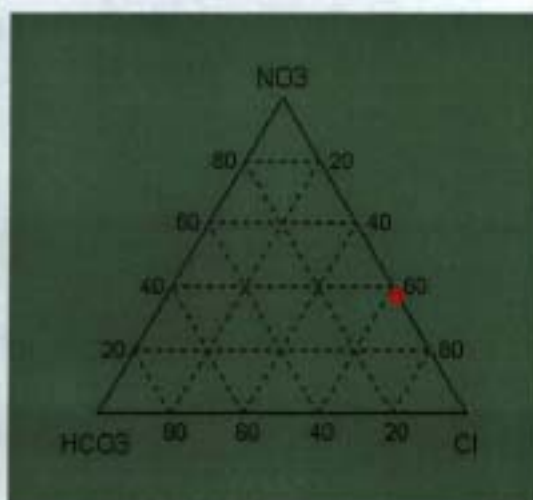
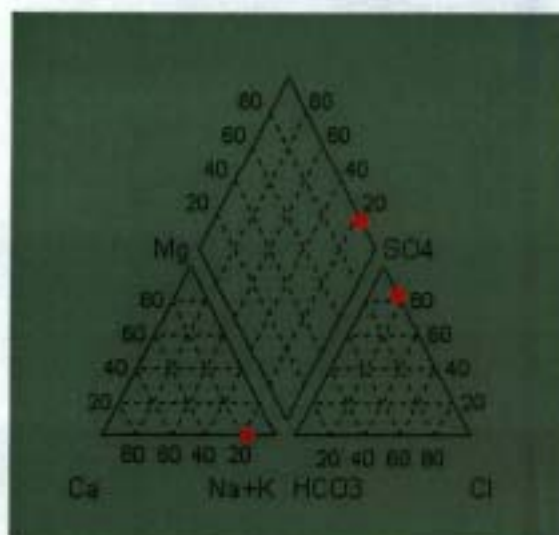
Database: D:\Workdir\Documents\NEARFLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvPore-112	
Water Type	Na-SO4-Cl	
Reference	LYang notebook	
Ph (Lab)	7.86	
Cations	(mg/l)	(meq/l)
Na+	4.880E+05	2.123E+04
K+	6.370E+04	1.629E+03
Mg++	1.090E+03	8.968E+01
Ca++	9.310E+04	4.646E+03
Anions	(mg/l)	(meq/l)
F-	2.460E+00	1.295E-01
Cl-	2.550E+05	7.193E+03
SO4--	9.240E+05	1.924E+04
NO3-	7.960E+04	1.284E+03
HCO3-	0.000E+00	0.000E+00
Uncharged	(mg/l)	
SiO2	258	

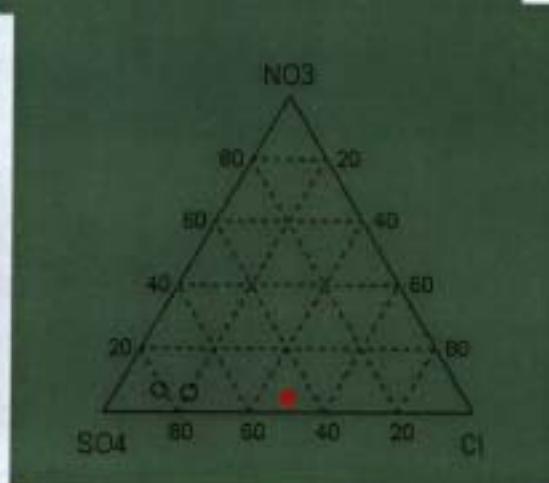
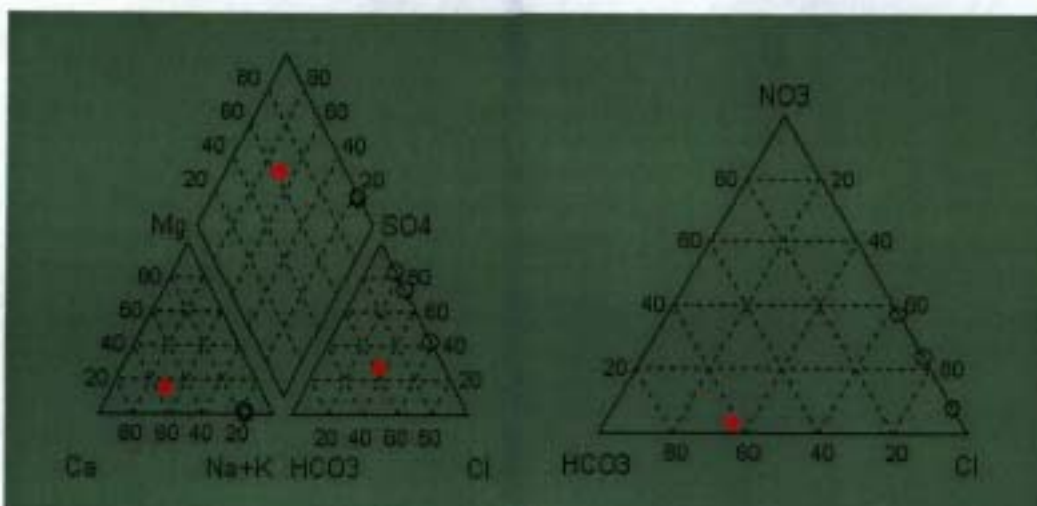


Database: D:\Workdir\Documents\NEARPLD\WP Water Chem\Salt Precipitate
Analysis\SALT ANALYSES.HC3

SampleID	EAvPore-120	
Water Type	Na-SO4	
Reference	LYang notebook	
Ph (Lab)	8.05	
Cations	(mg/l)	(meq/l)
Na+	1.320E+06	5.742E+04
K+	1.720E+05	4.399E+03
Mg++	1.030E+03	8.474E+01
Ca++	2.530E+05	1.262E+04
Anions	(mg/l)	(meq/l)
F-	2.390E+01	1.258E+00
Cl-	3.600E+05	1.015E+04
SO4--	2.490E+06	5.184E+04
NO3-	2.150E+05	3.467E+03
HCO3-	0.000E+00	0.000E+00
Uncharged	(mg/l)	
SiO2	362	



Evolution of average pore water composition as evaporation occurs at 101, 104, 108, 112, and 120 °C (simulation using OLI Environmental Simulation Program, conducted by Lietai Yang, documented in L. Yang's scientific notebook). Red symbol is the initial average pore water composition.



August 27, 2001

The following table and plot of YM water composition were taken from the DOE FY 01 Supplemental Science and Performance Analyses Volume 1: Scientific Bases and Analyses (2001; TDR-MGR-MD-000007 REV 00).

Table 6.3.1.5-2. Composition of Selected Pore Water and Other Waters from Yucca Mountain

Parameter	Units	HD-PERM-1 Tptpmn	HD-PERM-2 Tptpmn	HD-PERM-3 Tptpmn	DXD042 Tptplb	SD-6 Pin	T5w-Avg T5w	UZ-14-Pore Tptpln/ Tptprv	UZ-14-Perch Tptpln/ Tptprv	J-13 T5w/ CHn
pH	pH	7.79	8.32	8.31	8.10 ^a	7.52 ^a (7.2)	8.2	7.66 ^a	7.8	7.41
Na ⁺	mg/L	61	61	62	47.3	51.6	91	67	35	45.6
K ⁺	mg/L	6	7	9	0.2 ^a (<0.5)	1.6	4 ^c	2 ^a	4.1	5.04
Ca ²⁺	mg/L	96	106	97	15.5 ^a (8.1)	62.4	27	43	31	13
Mg ²⁺	mg/L	25.7	16.6	17.4	0.96	12	5	3.7	2.5	2.01
SiO ₂	mg/L	79	66	75	85.6	92.6	60	35	40.7	60.1
Cl ⁻	mg/L	123	110	123	16.4	33	41	66	7	7.14
SO ₄ ²⁻	mg/L	124	111	120	8.5	101	40	19	24.2	18.4
HCO ₃ ⁻	mg/L	211 ^a	233 ^a	176 ^a	128 ^a	154 ^a (86)	219 ^a (191)	144 ^a (170)	146.4	136 ^a (128.9)
NO ₃ ⁻	mg/L	22	3	10	10 ^c	57	13	16	17.1	8.78
F ⁻	mg/L	0.36	0.66	0.76	N/A	N/A	N/A	N/A	N/A	2.16
log(P _{CO2}) ^b	bars	-2.51	-3.00	-3.1	-3.00 ^b	-2.37	-2.66	-2.53	-2.65	-2.29
CO ₂ (approx.) ^{a, c}	ppmv	3500	1100	900	1100	4800	1500	3400	2500	5800
Calcite S.I. ^{a, d}	log(Q/K)	0.56	1.16	1.00	0.00 ^b	0.00 ^b	0.50	0.00 ^b	0.03	-0.75

Sources: HD-PERM-x (DTN: MO0005PORMWATER.000 [DIRS 150930]); UZ-14D (Yang et al. 1996 [DIRS 100194], Table 6, Sample UZ-14D, 8/21/93); DXD042 (DTN: LA8906JF831222.004 [DIRS 145666]; LA8906JF831222.006 [DIRS 146231]); SD-6 (DTN: LA0002JF12213U.001 [DIRS 154780]); T5w-Avg (CRWMS M&O 1999 [DIRS 128261], Table 4.5.1); UZ-14-Pore (DTN: LA0002JF12213U.001 [DIRS 154780]); UZ-14-Perch (Yang et al. 1996 [DIRS 100194], Table 6, Sample UZ-14D); mean J-13 (DTN: MO0006J13WTRCM.000 [DIRS 151028]).

NOTES: ^a Calculated (values in parenthesis, if any, are the original data) - See text and Bodvarsson 2001 [DIRS 154666], Attachment 5, pp. 36 to 43, 47 to 49, 55 to 56.

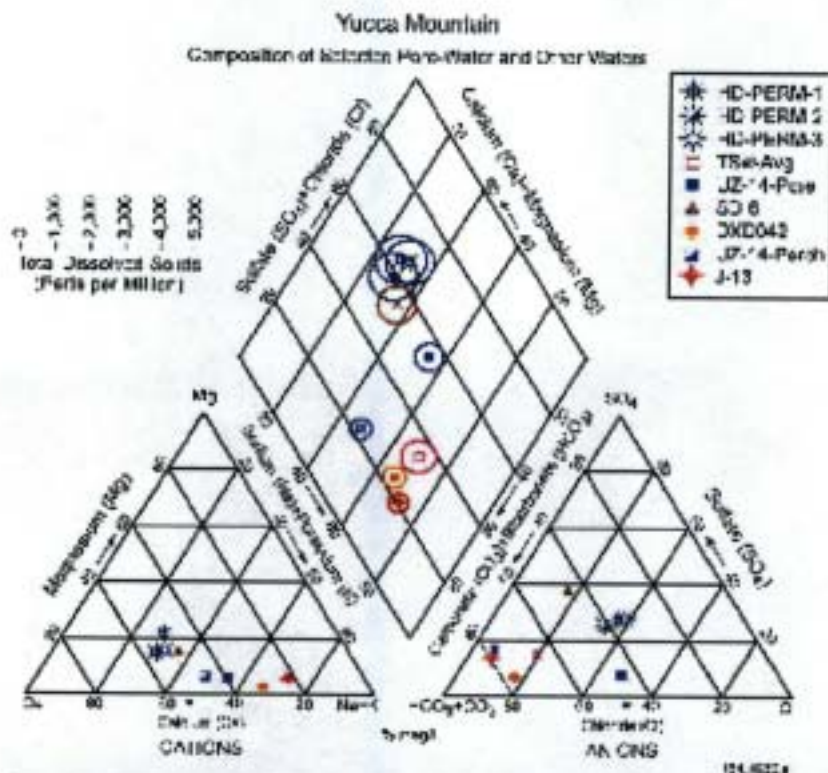
^b Fixed condition in order to compute pH - See text.

^c Assumed.

^d Saturation index at 25°C.

^e At the drill atmospheric pressure (near 0.86 bars).

N/A = Not Available.



104_0202

Source: MO0006P0R0WATER.000 [DIRS 150830]; LA9608JF831222.004 [DIRS 145568]; LA9608JF831222.006 [DIRS 146231]; LA0002JF12213U.001 [DIRS 154760]; CRWMS M&O 1999 [DIRS 129261], Table 4.5.1; Yang et al. 1999 [DIRS 100194], Table 6; MO0006J13WTRCM.000 [DIRS 151028]; Bodvarsson 2001 [DIRS 154666], Attachment 5, pp. 38 to 43, 47 to 49, 55 to 58 -- (See text for additional details).

NOTE: The diameters of circles plotted around points on the diamond-shaped part of the diagram are proportional to the total salinity of the samples and drawn at the displayed scale. Samples listed in Table 6.3.1.5-2.

Figure 6.3.1.5-6. Piper Diagram for the Compositions of Selected Pore Water and Other Water

The following is a comparison of the J-13 well water composition tabulated in the DOE SSPA report and the values listed in Harrar et al. (1990):

Parameter	Units	J-13 TSw/CHn (DOE SSPA)	Harrar et al. 1990
pH	pH	7.41	7.41
Na ⁺	mg/L	45.8	45.80
K ⁺	mg/L	5.04	5.04
Ca ²⁺	mg/L	13	13.00
Mg ²⁺	mg/L	2.01	2.01
SiO ₂	mg/L	60.1	61
Cl ⁻	mg/L	7.14	7.14
SO ₄ ²⁻	mg/L	18.4	18.40
HCO ₃ ⁻	mg/L	138 ^a (128.9)	128.90
NO ₃ ⁻	mg/L	8.78	8.78
F ⁻	mg/L	2.18	2.18
Log (P _{CO2}) ^a	bars	-2.29	
CO ₂ (approx) ^{a,*}	ppmv	5800	
Calcite S.I. ^{a,d}	log(Q/K)	-0.75	

NOTES from the DOE SSPA report:

^a Calculated (values in parenthesis, if any, are the original data) - See text and Bodvarsson 2001 [DIRS 154669], Attachment 5, pp. 38 to 43, 47 to 49, 55 to 58.

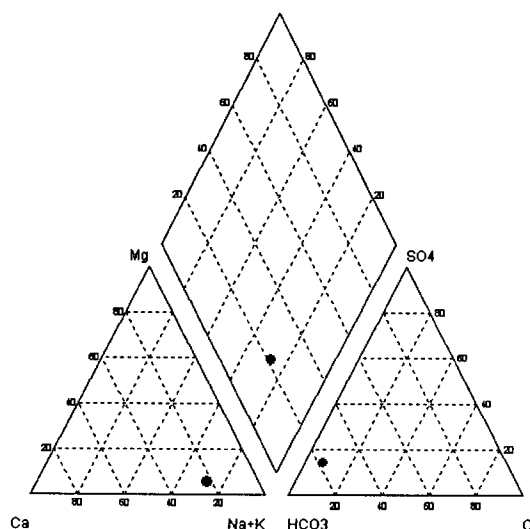
^b Fixed condition in order to compute pH - See text.

^c Assumed.

^d Saturation index at 25.C.

^e At the drift atmospheric pressure (near 0.88 bars).

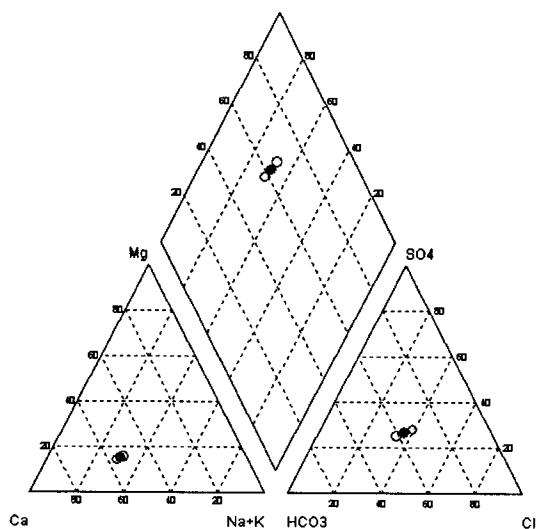
The following is the Aquachem plot of the Harrar et al. J-13 water composition (compare with the DOE SSPA plot shown on page 91) [Na-Ca-HCO₃ water type]:



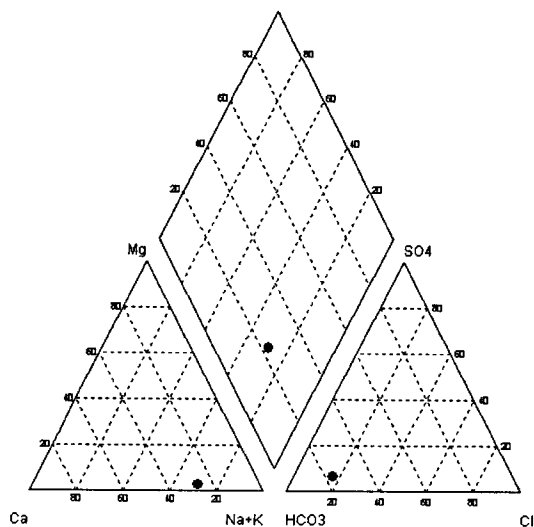
The following are the HD-Perm-2 and HD-Perm-3 water compositions listed in the DOE SSPA (Table 6.3.1.5-2):

Parameter	Units	HD-PERM-2	HD-PERM-3	Average
pH	pH	8.32	8.31	8.32
Na ⁺	mg/L	61.00	62.00	61.50
K ⁺	mg/L	7.00	9.00	8.00
Ca ²⁺	mg/L	106.00	97.00	101.50
Mg ²⁺	mg/L	16.60	17.40	17.00
SiO ₂	mg/L	66.00	75.00	70.50
Cl ⁻	mg/L	110.00	123.00	116.50
SO ₄ ²⁻	mg/L	111.00	120.00	115.50
HCO ₃ ⁻	mg/L	233.00	178.00	205.50
NO ₃ ⁻	mg/L	3.00	10.00	6.50
F ⁻	mg/L	0.96	0.76	0.86
Log (P _{CO2}) ^a	bars	-3.00	-3.1	
CO ₂ (approx) ^{a,*}	ppmv	1100	900	
Calcite S.I. ^{a,d}	log(Q/K)	1.16	1.00	

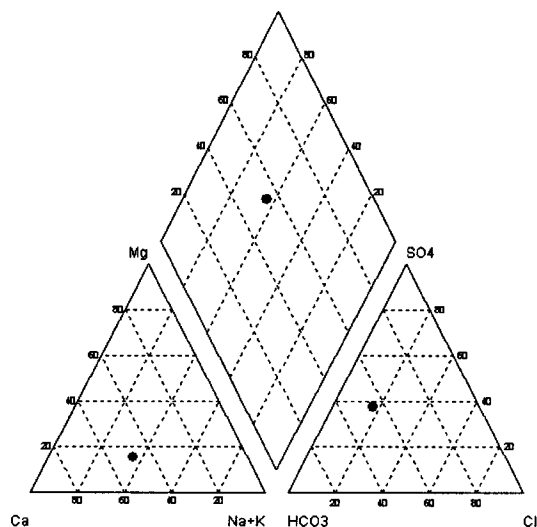
The following figure plots the HD-PERM2 and HD-PERM-3 water composition (and average values, shown in solid symbols). According to the DOE SSPA report, the water samples were centrifuged from core obtained from the Tptpmn geologic unit in Alcove 5. Bicarbonate was not determined and was recalculated from charge balance.



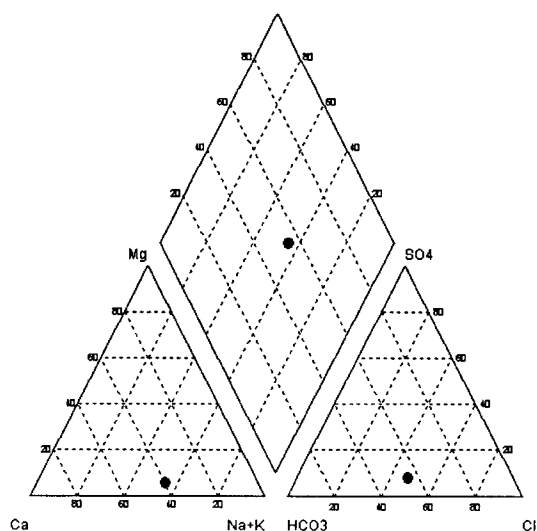
The following is a plot of DXD042 composition (see table 6.3.1.5-2 on page 91). According to the DOE SSPA report, the sample was ultracentrifuged from a core sample collected in the ECRB Cross Drift (CS2150), in the Tptpll unit. The pH and total aqueous carbonate concentration were calculated assuming calcite saturation, at a CO₂ pressure of 10⁻³ bars, consistent with ESF values.



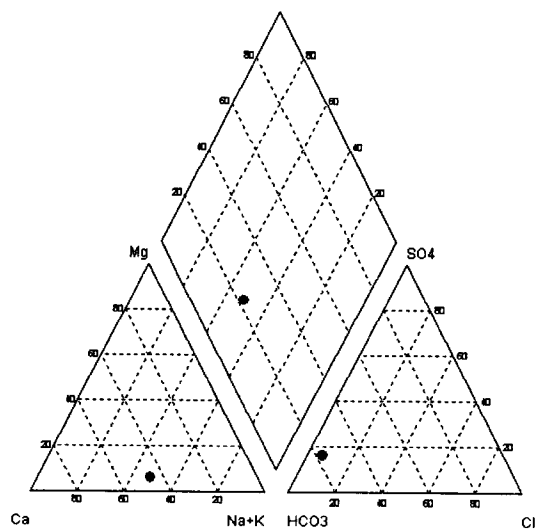
The following is a plot of SD-6 composition (see table 6.3.1.5-2 on page 91). According to the DOE SSPA report, the sample was extracted from core collected in borehole SD-6, interval 443.5 to 443.8 ft, in the upper part of the PTn hydrogeologic unit above the potential repository. This borehole is located (in plan view) near the center of the potential repository footprint. The original water analysis was not in charge balance. The bicarbonate concentration was adjusted for charge balance and the pH was recalculated assuming calcite saturation at 25 C.



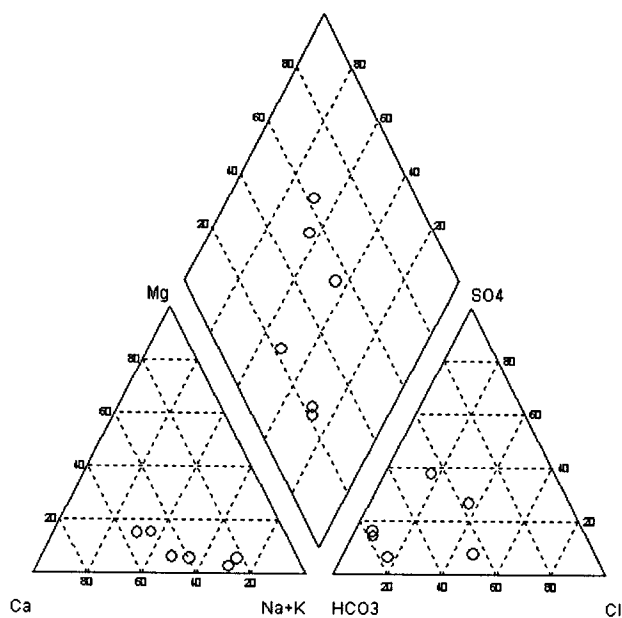
The following is a plot of UZ-14-Pore composition (see table 6.3.1.5-2 on page 91). According to the DOE SSPA report, the sample was extracted from core collected in borehole UZ-14, interval 1258.5 to 1258.8 ft, at the same depth where perched water was collected. The pH was calculated assuming calcite saturation at 25 C and adjusting charge balance on bicarbonate. The potassium in was not determined and was calculated from the illite-microcline equilibrium boundary.



The following is a plot of UZ-14-Perch composition (see table 6.3.1.5-2 on page 91) for perched water collected from borehole UZ-14 in 1993. This analysis is charge balanced and yields almost exact calcite saturation at 25 C. No correction was necessary.



The following are the water compositions of HD-PERM-2&3Average, DXD042,SD-6, UZ-14-Pore, and UZ-14-Perch:

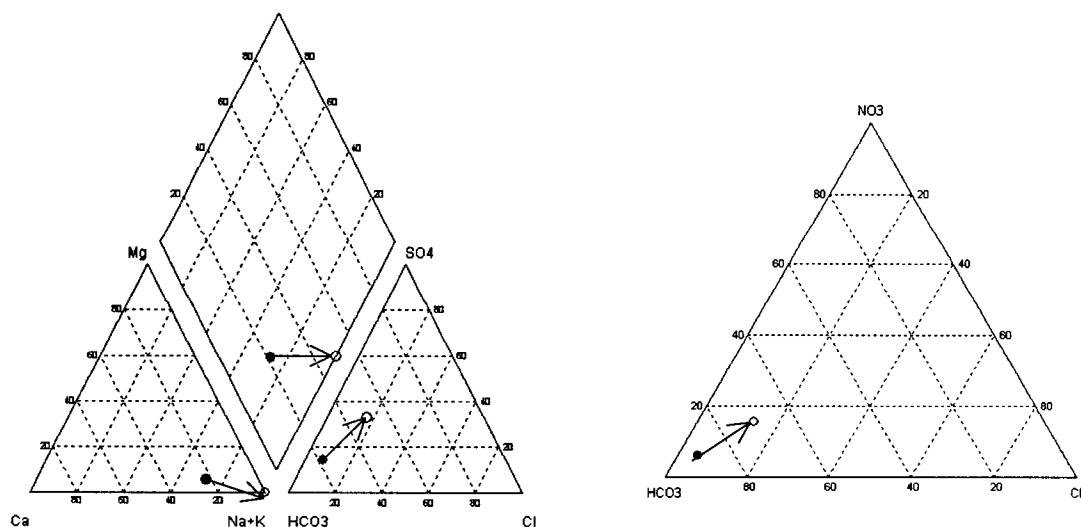


The following is the composition of evaporated J-13 water (956X) reported by Rosenberg et al. (1999a; 2001) based on their experiments.

Database: D:\WORKDIR\DOCUMENTS\NEARFLD\WP WATER CHEM\SALT PRECIPITATE ANALYSIS\SALT ANALYSES.HC3

SampleID	E956x-S-J13	
Water Type	Na-HCO3	
Reference	ANL-EBS-MD-000045 Rev 00 ICN 01, p. 14 (also Rosenberg et al. 1999a; 2001)	
Cations	(mg/l)	(meq/l)
Na+	4.408E+04	1.917E+03
K+	4.792E+03	1.226E+02
Mg++	1.400E-01	1.152E-02
Ca++	2.986E+01	1.490E+00
Anions	(mg/l)	(meq/l)
F-	1.550E+03	8.159E+01
Cl-	4.835E+03	1.364E+02
SO4--	1.293E+04	2.691E+02
NO3-	5.532E+03	8.921E+01
HCO3-	2.488E+04	4.078E+02
Uncharged	(mg/l)	
SiO2	18008	

The following is a plot of the Rosenberg et al. (2001) 956X-J13 composition (open circle), compared with ambient J-13 composition (solid circle):



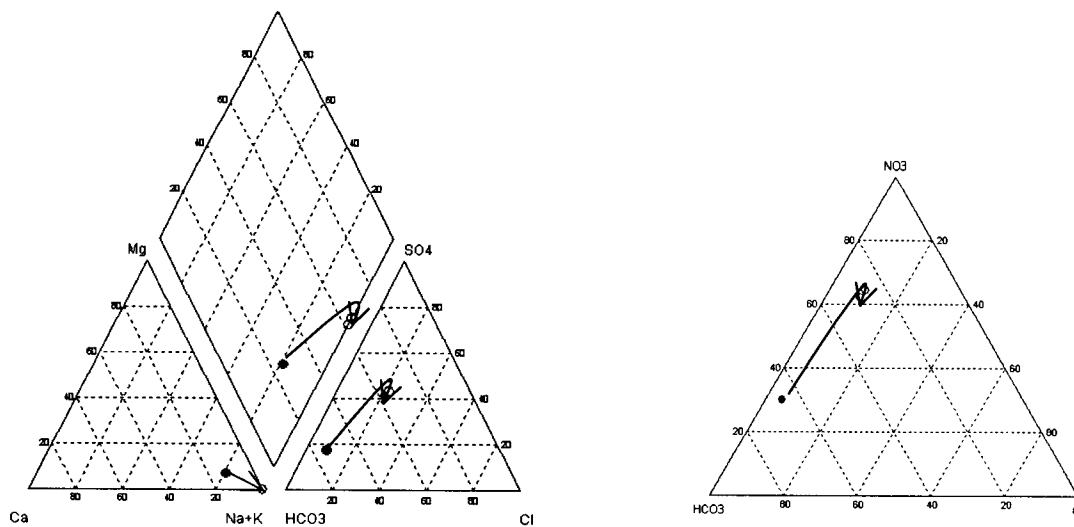
For comparison, below is the figure from Rosenberg et al. (2001):

Information potentially subject to copyright protection was redacted from this location. The redacted material (figure) is from the following reference

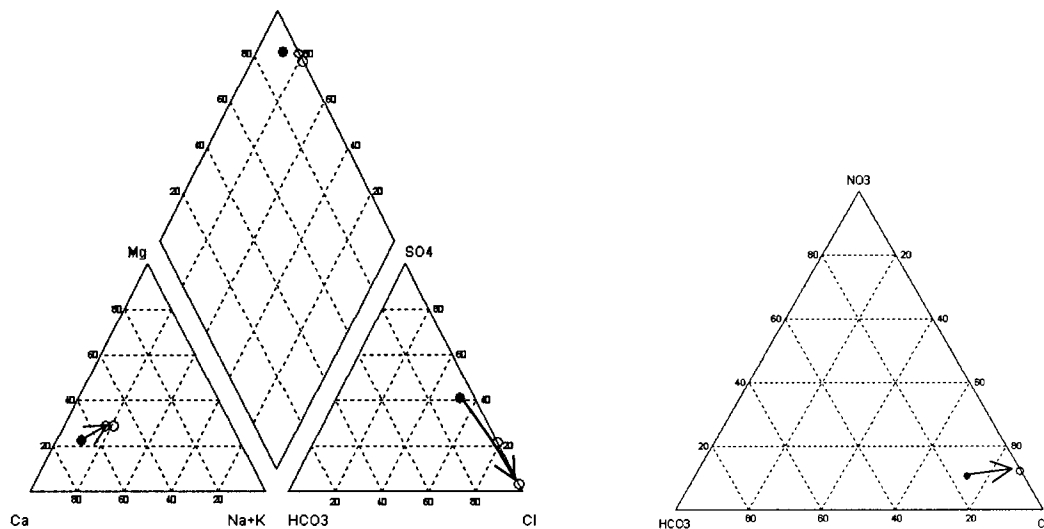
Rosenberg, N.D., G.E. Gdowski, and K.G. Knauss. "Evaporative Chemical Evolution of Natural Waters at Yucca Mountain, Nevada." *Applied Geochemistry*. Vol. 16. pp. 1,231-1,240. 2001.

Fig. 4.

For further comparison, below is an Aquachem plot of the synthetic J-13 water composition used in the OLI calculation (solid symbol) and the resulting composition after evaporation at 101 and 104 C (approximately 545X and 2145X concentration factor, respectively). The OLI simulations are documented in Lietai Yang's laboratory notebook, and transmitted to me in an Excel file dated September 28, 2000.



The following is a plot of synthetic Topopah Spring Tuff pore water composition (solid circles) used by Rosenberg et al. (1999b, 2001) in their evaporation experiments, and the resulting compositions after evaporating a factors of 62X and 1243X. See also the figure from Rosenberg et al. (2001) shown in the preceding page.



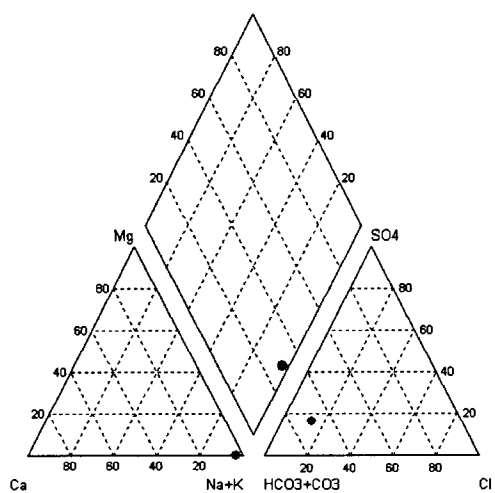
August 30, 2001

The following tables list the chemical compositions of Yucca Mountain waters. The data were taken from: 1). I. C. Yang, P. Yu, G. W. Rattray, J. S. Ferarese, and R. N. Ryan, U.S.G.S. WRIR 98-4132, 1998. and 2) I. C. Yang, G. W. Rattray, and P. Yu, U.S.G.S. WRIR 96-4058, 1996.

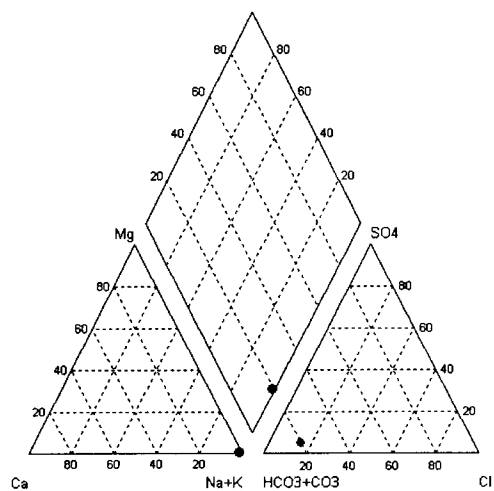
Species	units	SD-12/1558.9-1559.5	UZ-14/1542.3-1542.8	UZ-14/1734.5-1734.7	UZ-14/100.4-100.8	UZ-14/85.2-85.6	SD9/251.8-252.0
Ca ²⁺	mg/L	4.4	3.6	2	51.1	49.9	44
Mg ²⁺	mg/L	0.1	0.5	0.3	13.8	13.2	8
Na ⁺	mg/L	155	207	184	41.3	43.5	53
SiO ₂ (aq)	mg/L	76.1	143	50.7	91.8	89.8	55
Al ³⁺	mg/L	na	13.80	0.10	0.00	0.30	na
HCO ₃ ⁻	mg/L	210	384	211	128	131	92
CO ₃ ²⁻	mg/L	41	46	79	0	0	0
Cl ⁻	mg/L	33	20	39.4	44	60	60
NO ₃ ⁻	mg/L	4.00E-01	4	5.6	23	22	14.2
SO ₄ ²⁻	mg/L	54	28	17.5	83	66	73
pH		8.5	8.6	8.59	7	6.9	7.2
charge bal.		0.72%	1.02%	2.98%	0.40%	-0.91%	2.08%
water type		Na-HCO3	Na-HCO3	Na-HCO3-CO3	Ca-Na-Mg-HCO3-SO4-Cl	Ca-Na-HCO3-Cl-SO4	Na-Ca-Cl-SO4-HCO3

Species	units	UZ-14/1277.7-1278.0	SD-9/94.2-94.4	NRG-6/158.2-158.6	UZ-14/1409.4-1409.8	NRG-6/244.6-245.0	UZ-14/240.8-241.1
Ca ²⁺	mg/L	74	125	122	30	33	32
Mg ²⁺	mg/L	5.1	24	23.3	0.7	4.9	1
Na ⁺	mg/L	45	43	35.6	88	72	103
SiO ₂ (aq)	mg/L	38	74	97.4	57	51	61
Al ³⁺	mg/L	0.00	na	0.00	0.10	0.60	3.00
HCO ₃ ⁻	mg/L	170	37	34	160	61	162
CO ₃ ²⁻	mg/L	ns	0	0	0	0	ns
Cl ⁻	mg/L	130	170	185	75	49	99
NO ₃ ⁻	mg/L	15	11	32	5	40	17
SO ₄ ²⁻	mg/L	38	260	159	106	115	100
pH		na	6.2	6.8	7.8	7.2	7.6
charge bal.		-10.45%	-4.32%	-0.26%	-13.24%	-2.26%	-11.78%
Water type		Ca-Na-Cl-HCO3	Ca-SO4-Cl	Ca-Mg-Cl-SO4	Na-Ca-HCO3-SO4-Cl	Na-Ca-SO4-Cl	Na-Ca-Cl-HCO3-SO4

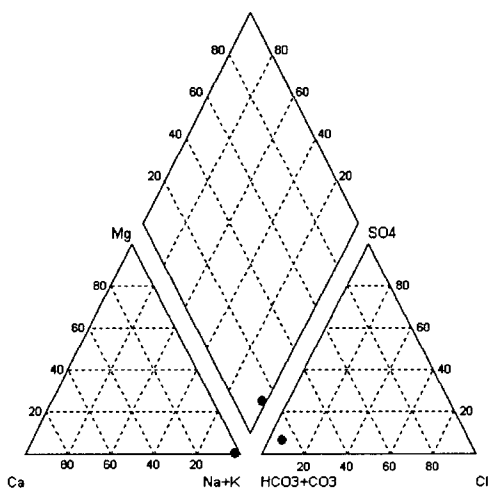
Notebook#185, Vol. 9; p. 100
RTP; August 30, 2001



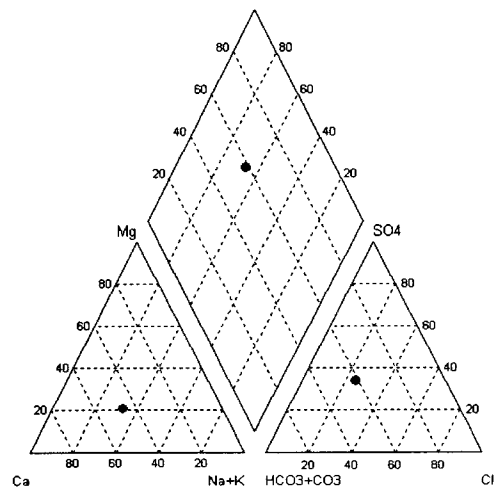
SD-12/1558.9-1559.5



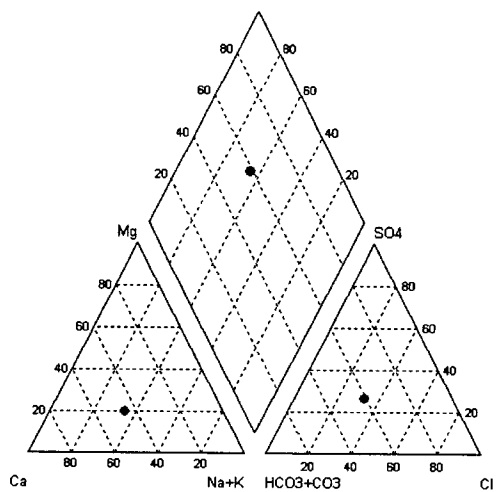
UZ-14/1734.5-1734.78



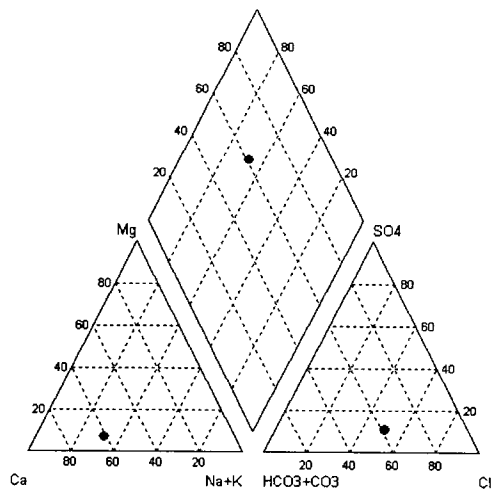
UZ-14/1542.3-1542.8



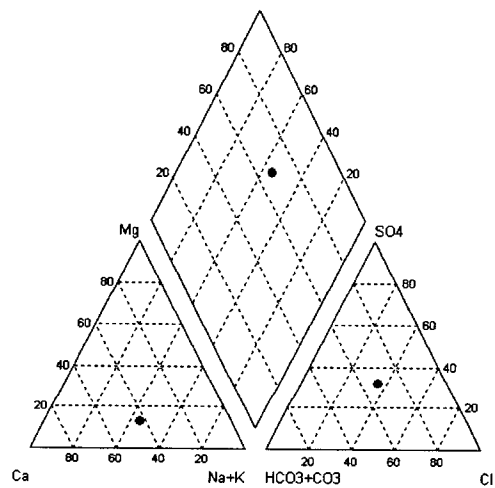
UZ-14/100.4-100.8



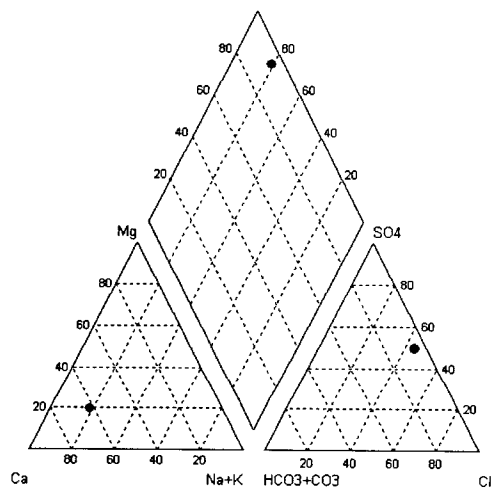
UZ-14/85.2-85.6



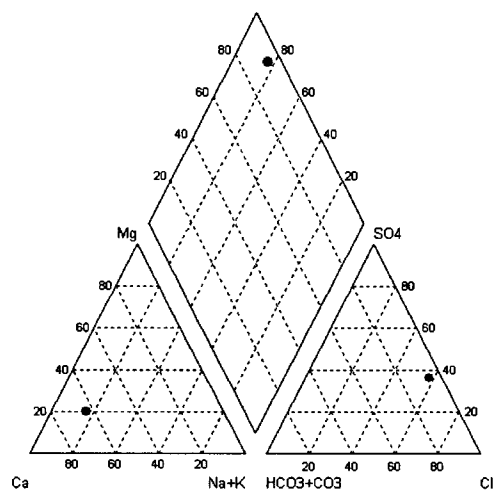
UZ-14/1277.7-1278.0



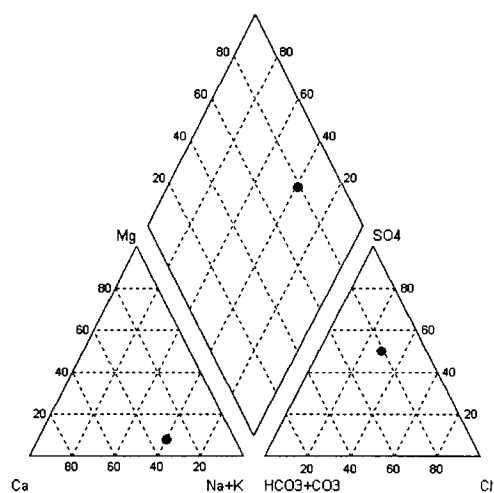
SD9/251.8-252.0



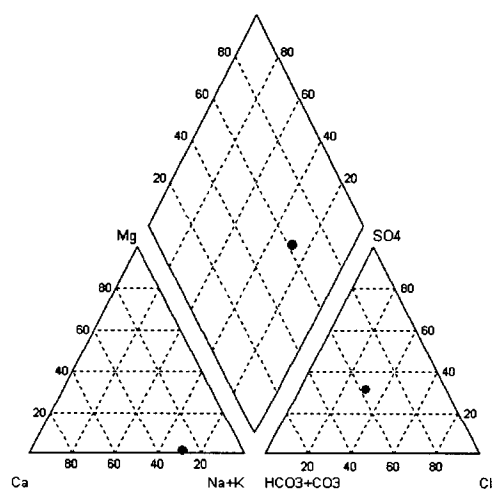
SD-9/94.2-94.4



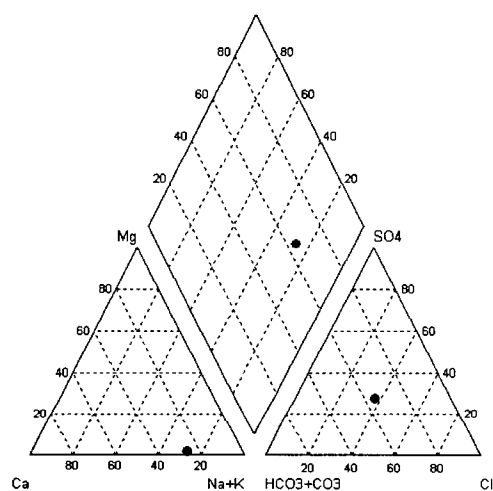
NRG-6/158.2-158.6



NRG-6/244.6-245.0



UZ-14/1409.4-1409.8



UZ-14/240.8-241.1

September 4, 2001

The following compositions of YM waters are selected for evaporative simulation using the OLI ESP software. Four of the listed waters are porewaters (see previous pages of this notebook), and the fifth is the average J-13 well water composition reported by Harrar (1990). The OLI simulation will be conducted by L. Yang and documented in his scientific notebook.

Species	units	UZ-14/1542.3-1542.8	UZ-14/85.2-85.6	NRG-6/158.2-158.6
Ca ²⁺	mg/L	3.6	49.9	122
Mg ²⁺	mg/L	0.5	13.2	23.3
Na ⁺	mg/L	207	43.5	35.6
SiO ₂ (aq)	mg/L	143	89.8	97.4
Al ³⁺	mg/L	13.80	0.30	0.00
HCO ₃ ⁻	mg/L	384	131	34
CO ₃ ²⁻	mg/L	46	0	0
Cl ⁻	mg/L	20	60	185
NO ₃ ⁻	mg/L	4	22	32
SO ₄ ²⁻	mg/L	28	66	159
pH		8.6	6.9	6.8
charge bal.		1.02%	-0.91%	-0.26%
water type		Na-HCO3	Ca-Na-HCO3-Cl-SO4	Ca-Mg-Cl-SO4

Species	units	NRG-6/244.6-245.0	Average J13
Ca ²⁺	mg/L	33	13.00
Mg ²⁺	mg/L	4.9	2.01
Na ⁺	mg/L	72	45.80
K ⁺	mg/L		5.04
SiO ₂ (aq)	mg/L	51	61
Al ³⁺	mg/L	0.60	0
HCO ₃ ⁻	mg/L	61	128.90
CO ₃ ²⁻	mg/L	0	0
Cl ⁻	mg/L	49	7.14
NO ₃ ⁻	mg/L	40	8.78
SO ₄ ²⁻	mg/L	115	18.40
F ⁻	mg/L	na	2.18
pH		7.2	7.41
charge bal.		-2.26%	-0.31%
Water type		Na-Ca-SO4-Cl	Na-Ca-HCO3

September 5, 2001

The following is the output file of SOLCALC for solubility calculations at 90 C in the system NaCl-KCl-MgCl₂ system, under conditions saturated with both sylvite and halite. Experimental data available from Boecke (1910). See figure 35 of Pabalan and Pitzer (1991).

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 90.00    PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID    20
NUMBER CORRESPONDING TO SATURATED SOLID    53

THE NUMBER OF ITERATIONS IS    16

EQUATION      LOG K
    20        1.5899
    53        1.3018

IONIC STRENGTH = 9.0980

ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION # 1    0.48705E+01      0.10400E+01      0.46830E+01      -.0002
CATION # 2    0.25086E+01      0.56821E+00      0.44150E+01      0.0006
ANION # 1     0.79859E+01      0.87776E+00      0.90980E+01      -.0002
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

```
TEMP(C) = 90.00    PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID    20
NUMBER CORRESPONDING TO SATURATED SOLID    53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY    3

THE NUMBER OF ITERATIONS IS    16

EQUATION      LOG K
    20        1.5899
    53        1.3018

CATION #      TOTAL
    3          0.1300

IONIC STRENGTH = 9.2405

ACTIVITY      ACT.COEFF.      MOLALITY      %ERROR
CATION # 1    0.46470E+01      0.10319E+01      0.45034E+01      -.0002
CATION # 2    0.23935E+01      0.55060E+00      0.43471E+01      0.0006
CATION # 3    0.13625E+00      0.10481E+01      0.13000E+00      0.0000
ANION # 1     0.83699E+01      0.91871E+00      0.91105E+01      -.0002
```

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.4000

IONIC STRENGTH = 9.5389

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.42092E+01	0.10169E+01	0.41393E+01	-.0004
CATION # 2	0.21680E+01	0.51624E+00	0.41996E+01	0.0009
CATION # 3	0.40956E+00	0.10239E+01	0.40000E+00	0.0000
ANION # 1	0.92404E+01	0.10111E+01	0.91389E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.6600

IONIC STRENGTH = 9.8300

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.38188E+01	0.10048E+01	0.38005E+01	-.0002
CATION # 2	0.19669E+01	0.48572E+00	0.40495E+01	0.0006
CATION # 3	0.66427E+00	0.10065E+01	0.66000E+00	0.0000
ANION # 1	0.10185E+02	0.11107E+01	0.91700E+01	-.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.9200

IONIC STRENGTH = 10.1259

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.34564E+01	0.99488E+00	0.34742E+01	-.0003
CATION # 2	0.17803E+01	0.45745E+00	0.38917E+01	0.0008
CATION # 3	0.91527E+00	0.99486E+00	0.92000E+00	0.0000
ANION # 1	0.11253E+02	0.12224E+01	0.92059E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.1800

IONIC STRENGTH = 10.4277

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.31201E+01	0.98712E+00	0.31608E+01	-.0004
CATION # 2	0.16071E+01	0.43121E+00	0.37268E+01	0.0008
CATION # 3	0.11674E+01	0.98932E+00	0.11800E+01	0.0000
ANION # 1	0.12466E+02	0.13480E+01	0.92477E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.4400

IONIC STRENGTH = 10.7366

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.28082E+01	0.98150E+00	0.28611E+01	-.0004
CATION # 2	0.14464E+01	0.40681E+00	0.35555E+01	0.0007
CATION # 3	0.14260E+01	0.99027E+00	0.14400E+01	0.0000
ANION # 1	0.13851E+02	0.14899E+01	0.92966E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.6700

IONIC STRENGTH = 11.0170

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.25513E+01	0.97833E+00	0.26079E+01	-.0004
CATION # 2	0.13141E+01	0.38660E+00	0.33991E+01	0.0009
CATION # 3	0.16650E+01	0.99702E+00	0.16700E+01	0.0000
ANION # 1	0.15245E+02	0.16310E+01	0.93470E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K

20 1.5899

53 1.3018

CATION # TOTAL

3 1.9300

IONIC STRENGTH = 11.3433

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.22814E+01	0.97682E+00	0.23356E+01	-.0005
CATION # 2	0.11751E+01	0.36519E+00	0.32178E+01	0.0010
CATION # 3	0.19534E+01	0.10121E+01	0.19300E+01	0.0000
ANION # 1	0.17049E+02	0.18111E+01	0.94133E+01	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K

20 1.5899

53 1.3018

CATION # TOTAL

3 2.1800

IONIC STRENGTH = 11.6681

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.20414E+01	0.97750E+00	0.20884E+01	-.0003
CATION # 2	0.10514E+01	0.34590E+00	0.30398E+01	0.0006
CATION # 3	0.22569E+01	0.10353E+01	0.21800E+01	0.0000
ANION # 1	0.19053E+02	0.20081E+01	0.94881E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.4300

IONIC STRENGTH = 12.0052

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.18195E+01	0.98036E+00	0.18560E+01	-.0003
CATION # 2	0.93716E+00	0.32776E+00	0.28593E+01	0.0006
CATION # 3	0.25956E+01	0.10682E+01	0.24300E+01	0.0000
ANION # 1	0.21377E+02	0.22325E+01	0.95752E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.6700

IONIC STRENGTH = 12.3421

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.16229E+01	0.98523E+00	0.16472E+01	-.0004
CATION # 2	0.83589E+00	0.31133E+00	0.26849E+01	0.0007
CATION # 3	0.29655E+01	0.11107E+01	0.26700E+01	0.0000
ANION # 1	0.23967E+02	0.24779E+01	0.96721E+01	-.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.9000

IONIC STRENGTH = 12.6785

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.14489E+01	0.99194E+00	0.14607E+01	-.0003
CATION # 2	0.74630E+00	0.29641E+00	0.25178E+01	0.0008
CATION # 3	0.33739E+01	0.11634E+01	0.29000E+01	0.0000
ANION # 1	0.26844E+02	0.27452E+01	0.97785E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.1200

IONIC STRENGTH = 13.0140

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.12953E+01	0.10003E+01	0.12950E+01	-.0003
CATION # 2	0.66719E+00	0.28282E+00	0.23590E+01	0.0007
CATION # 3	0.38283E+01	0.12270E+01	0.31200E+01	0.0000
ANION # 1	0.30027E+02	0.30349E+01	0.98940E+01	-.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.3900

IONIC STRENGTH = 13.4458

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.11233E+01	0.10133E+01	0.11086E+01	-.0005
CATION # 2	0.57857E+00	0.26696E+00	0.21672E+01	0.0009
CATION # 3	0.44975E+01	0.13267E+01	0.33900E+01	0.0000
ANION # 1	0.34626E+02	0.34434E+01	0.10056E+02	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.6400

IONIC STRENGTH = 13.8670

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.97951E+00	0.10280E+01	0.95280E+00	-.0010
CATION # 2	0.50451E+00	0.25299E+00	0.19942E+01	0.0007
CATION # 3	0.52612E+01	0.14454E+01	0.36400E+01	0.0000
ANION # 1	0.39709E+02	0.38828E+01	0.10227E+02	-.0010

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.8800

IONIC STRENGTH = 14.2919

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.85489E+00	0.10448E+01	0.81828E+00	-.0005
CATION # 2	0.44033E+00	0.24014E+00	0.18336E+01	0.0008
CATION # 3	0.61668E+01	0.15894E+01	0.38800E+01	0.0000
ANION # 1	0.45497E+02	0.43697E+01	0.10412E+02	-.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.1600

IONIC STRENGTH = 14.8143

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.72533E+00	0.10674E+01	0.67951E+00	0.0003
CATION # 2	0.37359E+00	0.22576E+00	0.16548E+01	0.0007
CATION # 3	0.75088E+01	0.18050E+01	0.41600E+01	0.0000
ANION # 1	0.53624E+02	0.50331E+01	0.10654E+02	0.0003

The following result is for the triple point:
carnallite+sylvite+halite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
14	4.1989
20	1.5899
53	1.3018

IONIC STRENGTH = 16.0363

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.49993E+00	0.11274E+01	0.44345E+00	-.0001
CATION # 2	0.25750E+00	0.19668E+00	0.13093E+01	-.0006
CATION # 3	0.12004E+02	0.25212E+01	0.47612E+01	0.0000
ANION # 1	0.77802E+02	0.69003E+01	0.11275E+02	-.0001

The following is the "osmo.inp" file resulting from SOLCALC calculation, under conditions saturated with both sylvite and halite. Experimental data available from Boecke (1910). See figure 35 of Pabalan and Pitzer (1991).

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	18.195944	1.192213
90.0000	18.090984	1.206607
90.0000	17.877733	1.238701
90.0000	17.680027	1.272593
90.0000	17.491788	1.309647
90.0000	17.315328	1.350100
90.0000	17.153180	1.394198
90.0000	17.023921	1.436450
90.0000	16.896667	1.488103
90.0000	16.796226	1.541874
90.0000	16.720484	1.599870
90.0000	16.674179	1.659671
90.0000	16.656980	1.720878
90.0000	16.667990	1.783045
90.0000	16.721622	1.864194
90.0000	16.813963	1.944034
90.0000	16.943754	2.024799
90.0000	17.148636	2.123848
90.0000	17.789055	2.351998

The last point is for the triple point carnallite+sylvite+halite.

The file "osmo.inp" was used to calculate the vapor pressure of the mixtures using the program VPSOLN.EXE. The result is given below (for solutions saturated with halite+sylvite, except for the last point which is for carnallite+sylvite+halite):

TEMP (C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	18.1959	1.1922	0.47	0.23	0.67375	171.59
90.00	18.0910	1.2066	0.47	0.23	0.67210	172.46
90.00	17.8777	1.2387	0.47	0.23	0.66825	174.48
90.00	17.6800	1.2726	0.47	0.24	0.66396	176.74
90.00	17.4918	1.3096	0.46	0.24	0.65905	179.32
90.00	17.3153	1.3501	0.46	0.24	0.65346	182.26
90.00	17.1532	1.3942	0.45	0.25	0.64709	185.61
90.00	17.0239	1.4365	0.45	0.25	0.64079	188.93
90.00	16.8967	1.4881	0.44	0.26	0.63281	193.12
90.00	16.7962	1.5419	0.44	0.26	0.62421	197.64
90.00	16.7205	1.5999	0.43	0.27	0.61462	202.69
90.00	16.6742	1.6597	0.42	0.28	0.60441	208.06
90.00	16.6570	1.7209	0.42	0.28	0.59362	213.73
90.00	16.6680	1.7830	0.41	0.29	0.58236	219.65
90.00	16.7216	1.8642	0.40	0.30	0.56722	227.62
90.00	16.8140	1.9440	0.39	0.31	0.55185	235.70
90.00	16.9438	2.0248	0.38	0.33	0.53586	244.11
90.00	17.1486	2.1238	0.36	0.34	0.51572	254.70
90.00	17.7891	2.3520	0.33	0.37	0.46748	280.08

The following is the output file of SOLCALC for solubility of halite + carnallite + bischofite in the system NaCl-KCl-MgCl₂ at 90 C.

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

5 3.8251
14 4.1989
20 1.5899

IONIC STRENGTH = 22.1325

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.84331E-01	0.14665E+01	0.57505E-01	-.0003
CATION # 2	0.51275E-02	0.94019E-01	0.54536E-01	0.0007
CATION # 3	0.14822E+03	0.20193E+02	0.73401E+01	0.0000
ANION # 1	0.46122E+03	0.31180E+02	0.14792E+02	-.0003

The following is the resulting "osmo.inp" file (saturation with halite + carnallite + bischofite):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	22.244494	3.517948

The following is the resulting vpcalc.out file from VPSOLN.EXE (saturation with halite + carnallite + bischofite):

TEMP (C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	22.2445	3.5179	0.17	0.53	0.24191	398.71

The following is the output file from SOLCALC for solubility at 90 C for conditions of saturation with halite+carnallite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION	LOG K
----------	-------

14	4.1989
----	--------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

3	5.0000
---	--------

IONIC STRENGTH = 16.3418

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.43426E+00	0.11421E+01	0.38023E+00	-.0002
CATION # 2	0.17899E+00	0.18615E+00	0.96155E+00	0.0009
CATION # 3	0.13709E+02	0.27417E+01	0.50000E+01	0.0000
ANION # 1	0.89567E+02	0.78970E+01	0.11342E+02	-.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION	LOG K
----------	-------

14 4.1989
20 1.5899

CATION # TOTAL
3 5.5000

IONIC STRENGTH = 17.2530

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.31492E+00	0.11925E+01	0.26408E+00	-.0002
CATION # 2	0.80701E-01	0.16506E+00	0.48892E+00	0.0010
CATION # 3	0.19946E+02	0.36265E+01	0.55000E+01	0.0000
ANION # 1	0.12351E+03	0.10509E+02	0.11753E+02	-.0002

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 40

EQUATION LOG K
14 4.1989
20 1.5899

CATION # TOTAL
3 6.0000

IONIC STRENGTH = 18.4258

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.22283E+00	0.12614E+01	0.17665E+00	0.0000
CATION # 2	0.36057E-01	0.14471E+00	0.24916E+00	0.0009
CATION # 3	0.32153E+02	0.53588E+01	0.60000E+01	0.0000
ANION # 1	0.17455E+03	0.14048E+02	0.12426E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 40

EQUATION LOG K
14 4.1989
20 1.5899

CATION # TOTAL
3 6.5000

IONIC STRENGTH = 19.7492

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.15567E+00	0.13387E+01	0.11628E+00	0.0005
CATION # 2	0.16607E-01	0.12497E+00	0.13288E+00	0.0006
CATION # 3	0.55282E+02	0.85050E+01	0.65000E+01	0.0000
ANION # 1	0.24986E+03	0.18859E+02	0.13249E+02	0.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	7.0000

IONIC STRENGTH = 21.1524

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.10816E+00	0.14164E+01	0.76363E-01	0.0009
CATION # 2	0.80720E-02	0.10613E+00	0.76059E-01	0.0009
CATION # 3	0.98660E+02	0.14094E+02	0.70000E+01	0.0000
ANION # 1	0.35961E+03	0.25410E+02	0.14152E+02	0.0009

The following is the resulting "osmo.inp" file (for saturation with halite+carnallite at 90 C):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	17.683561	2.466264
90.0000	18.006018	2.700751
90.0000	18.851625	2.927845
90.0000	19.998337	3.149804
90.0000	21.304844	3.369243

The following is the resulting vpcalc.out file from VPSOLN.Exe (for saturation with halite+carnallite at 90 C):

TEMP(C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	17.6836	2.4663	0.32	0.38	0.45271	287.84
90.00	18.0060	2.7008	0.29	0.41	0.41338	308.53
90.00	18.8516	2.9278	0.26	0.44	0.36707	332.88
90.00	19.9983	3.1498	0.22	0.48	0.31878	358.28
90.00	21.3048	3.3692	0.19	0.51	0.27194	382.92

The following is the output file of SOLCALC for solubility at 90C and saturation with carnallite+sylvite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
1	0.4000

IONIC STRENGTH = 16.0255

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.45002E+00	0.11250E+01	0.40000E+00	0.0000
CATION # 2	0.25734E+00	0.19650E+00	0.13096E+01	0.0008
CATION # 3	0.11872E+02	0.24878E+01	0.47720E+01	0.0000
ANION # 1	0.77850E+02	0.69178E+01	0.11254E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
1	0.3000

IONIC STRENGTH = 16.0008

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.33592E+00	0.11197E+01	0.30000E+00	0.0000
CATION # 2	0.25696E+00	0.19608E+00	0.13105E+01	0.0008
CATION # 3	0.11572E+02	0.24125E+01	0.47968E+01	0.0000
ANION # 1	0.77963E+02	0.69585E+01	0.11204E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
1	0.2000

IONIC STRENGTH = 15.9763

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.22289E+00	0.11144E+01	0.20000E+00	0.0000
CATION # 2	0.25659E+00	0.19565E+00	0.13115E+01	0.0008
CATION # 3	0.11279E+02	0.23394E+01	0.48216E+01	0.0000
ANION # 1	0.78077E+02	0.69995E+01	0.11155E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
1	0.1000

IONIC STRENGTH = 15.9520

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.11091E+00	0.11091E+01	0.10000E+00	0.0000
CATION # 2	0.25621E+00	0.19522E+00	0.13124E+01	0.0007
CATION # 3	0.10994E+02	0.22683E+01	0.48465E+01	0.0000
ANION # 1	0.78191E+02	0.70408E+01	0.11105E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

IONIC STRENGTH = 15.9278

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.25584E+00	0.19479E+00	0.13134E+01	0.0007
CATION # 3	0.10714E+02	0.21994E+01	0.48715E+01	0.0000
ANION # 1	0.78306E+02	0.70825E+01	0.11056E+02	0.0007

The following is the resulting "osmo.inp" file from SOLCALC (sylvite+carnallite saturation):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	17.735150	2.354016
90.0000	17.611371	2.358667
90.0000	17.487790	2.363328
90.0000	17.364407	2.368000
90.0000	17.241220	2.372683

The following is the resulting vpcalc.out file from VPSOLN.EXE (sylvite+carnallite saturation):

TEMP (C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	22.2321	3.5183	0.17	0.53	0.24207	398.63
90.00	22.2155	3.5187	0.17	0.53	0.24228	398.52
90.00	22.1990	3.5191	0.17	0.53	0.24250	398.41
90.00	22.1824	3.5196	0.17	0.53	0.24271	398.29
90.00	22.1659	3.5200	0.17	0.53	0.24292	398.18
90.00	22.1494	3.5204	0.17	0.53	0.24313	398.07

The following is the output file of SOLCALC for solubility at 90 C under conditions of saturation with bischofite+carnallite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
5	3.8251
14	4.1989

CATION #	TOTAL
1	0.4000

IONIC STRENGTH = 22.3597

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.59468E+00	0.14867E+01	0.40000E+00	0.0000
CATION # 2	0.50417E-02	0.92201E-01	0.54682E-01	0.0007
CATION # 3	0.17174E+03	0.23520E+02	0.73017E+01	0.0000
ANION # 1	0.46906E+03	0.31150E+02	0.15058E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
----------	-------

5	3.8251
---	--------

14	4.1989
----	--------

CATION #	TOTAL
----------	-------

1	0.3000
---	--------

IONIC STRENGTH = 22.2928

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.44425E+00	0.14808E+01	0.30000E+00	0.0000
CATION # 2	0.50669E-02	0.92742E-01	0.54635E-01	0.0007
CATION # 3	0.16450E+03	0.22494E+02	0.73127E+01	0.0000
ANION # 1	0.46673E+03	0.31157E+02	0.14980E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
----------	-------

5	3.8251
---	--------

14	4.1989
----	--------

CATION #	TOTAL
----------	-------

1	0.2000
---	--------

IONIC STRENGTH = 22.2263

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.29499E+00	0.14750E+01	0.20000E+00	0.0000
CATION # 2	0.50920E-02	0.93274E-01	0.54591E-01	0.0007
CATION # 3	0.15757E+03	0.21514E+02	0.73239E+01	0.0000
ANION # 1	0.46444E+03	0.31165E+02	0.14902E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
5	3.8251
14	4.1989

IONIC STRENGTH = 22.0949

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.51417E-02	0.94315E-01	0.54516E-01	0.0007
CATION # 3	0.14461E+03	0.19683E+02	0.73468E+01	0.0000
ANION # 1	0.45994E+03	0.31187E+02	0.14748E+02	0.0007

The following is the resulting "osmo.inp" file from SOLCALC (saturation with bischofite+carnallite):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	22.814431	3.503467
90.0000	22.647413	3.507637
90.0000	22.480901	3.511855
90.0000	22.149374	3.520434

The following is the resulting vpcalc.out file from VPSOLN (saturation with bischofite + carnallite):

TEMP(C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	22.8144	3.5035	0.16	0.54	0.23470	402.51
90.00	22.6474	3.5076	0.17	0.54	0.23679	401.41
90.00	22.4809	3.5119	0.17	0.53	0.23889	400.30
90.00	22.1494	3.5204	0.17	0.53	0.24313	398.07

The following is the output file from SOLCALC for solubility at 90 C in the system NaCl-KCl-MgCl₂ of halite+bischofite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
5	3.8251

20 1.5899

CATION # TOTAL

2 0.0500

IONIC STRENGTH = 22.1271

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.84355E-01	0.14663E+01	0.57527E-01	-.0008
CATION # 2	0.47028E-02	0.94056E-01	0.50000E-01	0.0000
CATION # 3	0.14795E+03	0.20157E+02	0.73399E+01	0.0000
ANION # 1	0.46109E+03	0.31182E+02	0.14787E+02	-.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 22

EQUATION LOG K

5 3.8251

20 1.5899

CATION # TOTAL

2 0.0400

IONIC STRENGTH = 22.1154

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.84406E-01	0.14660E+01	0.57576E-01	-.0008
CATION # 2	0.37654E-02	0.94136E-01	0.40000E-01	0.0000
CATION # 3	0.14736E+03	0.20078E+02	0.73393E+01	0.0000
ANION # 1	0.46081E+03	0.31186E+02	0.14776E+02	-.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 22

EQUATION LOG K

5 3.8251

20 1.5899

CATION # TOTAL

2 0.0300

IONIC STRENGTH = 22.1037

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.84458E-01	0.14657E+01	0.57625E-01	-.0010
CATION #	2	0.28265E-02	0.94216E-01	0.30000E-01	0.0000
CATION #	3	0.14677E+03	0.19999E+02	0.73387E+01	0.0000
ANION #	1	0.46053E+03	0.31191E+02	0.14765E+02	-.0010

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
5	3.8251
20	1.5899

CATION #	TOTAL
2	0.0200

IONIC STRENGTH = 22.0919

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.84509E-01	0.14653E+01	0.57674E-01	-.0008
CATION #	2	0.18859E-02	0.94296E-01	0.20000E-01	0.0000
CATION #	3	0.14618E+03	0.19921E+02	0.73381E+01	0.0000
ANION #	1	0.46025E+03	0.31195E+02	0.14754E+02	-.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
5	3.8251
20	1.5899

CATION #	TOTAL
2	0.0100

IONIC STRENGTH = 22.0802

		ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION #	1	0.84561E-01	0.14649E+01	0.57723E-01	-.0008
CATION #	2	0.94376E-03	0.94376E-01	0.10000E-01	0.0000
CATION #	3	0.14559E+03	0.19843E+02	0.73375E+01	0.0000
ANION #	1	0.45997E+03	0.31200E+02	0.14743E+02	-.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 THE NUMBER OF ITERATIONS IS 21

EQUATION	LOG K
5	3.8251
20	1.5899

IONIC STRENGTH = 22.0685

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.84611E-01	0.14646E+01	0.57771E-01	0.0006
CATION # 3	0.14501E+03	0.19765E+02	0.73369E+01	0.0000
ANION # 1	0.45969E+03	0.31205E+02	0.14732E+02	0.0006

The following is the resulting "osmo.inp" file from SOLCALC (saturation with halite+bischofite):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	22.234655	3.518519
90.0000	22.212966	3.519778
90.0000	22.191284	3.521039
90.0000	22.169609	3.522302
90.0000	22.147942	3.523565
90.0000	22.126279	3.524830

The following is the resulting vpcalc.out file from VPSOLN (saturation with halite+bischofite):

TEMP (C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	22.2347	3.5185	0.17	0.53	0.24201	398.66
90.00	22.2130	3.5198	0.17	0.53	0.24222	398.55
90.00	22.1913	3.5210	0.17	0.53	0.24243	398.44
90.00	22.1696	3.5223	0.17	0.53	0.24264	398.33
90.00	22.1479	3.5236	0.17	0.53	0.24285	398.22
90.00	22.1263	3.5248	0.17	0.53	0.24306	398.11

The following is the output file from SOLCALC for solubility at 90 C and saturation with bischofite+carnallite:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
5	3.8251
14	4.1989

CATION #	TOTAL
1	0.0500

IONIC STRENGTH = 22.1275

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.73303E-01	0.14661E+01	0.50000E-01	0.0000
CATION # 2	0.51294E-02	0.94058E-01	0.54535E-01	-.0009
CATION # 3	0.14774E+03	0.20125E+02	0.73410E+01	0.0000
ANION # 1	0.46105E+03	0.31181E+02	0.14787E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
5	3.8251
14	4.1989

CATION #	TOTAL
1	0.0400

IONIC STRENGTH = 22.1210

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.58618E-01	0.14655E+01	0.40000E-01	0.0000
CATION # 2	0.51318E-02	0.94110E-01	0.54530E-01	0.0006
CATION # 3	0.14711E+03	0.20036E+02	0.73422E+01	0.0000
ANION # 1	0.46083E+03	0.31182E+02	0.14779E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
5	3.8251

14 4.1989

CATION # TOTAL

1 0.0300

IONIC STRENGTH = 22.1145

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.43946E-01	0.14649E+01	0.30000E-01	0.0000
CATION # 2	0.51343E-02	0.94161E-01	0.54527E-01	0.0006
CATION # 3	0.14648E+03	0.19947E+02	0.73433E+01	0.0000
ANION # 1	0.46061E+03	0.31183E+02	0.14771E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

5 3.8251

14 4.1989

CATION # TOTAL

1 0.0200

IONIC STRENGTH = 22.1079

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.29285E-01	0.14643E+01	0.20000E-01	0.0000
CATION # 2	0.51368E-02	0.94212E-01	0.54523E-01	0.0006
CATION # 3	0.14585E+03	0.19859E+02	0.73445E+01	0.0000
ANION # 1	0.46039E+03	0.31184E+02	0.14763E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

5 3.8251

14 4.1989

CATION # TOTAL

1 0.0100

IONIC STRENGTH = 22.1014

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 1	0.14637E-01	0.14637E+01	0.10000E-01	0.0000
CATION # 2	0.51393E-02	0.94264E-01	0.54520E-01	0.0006
CATION # 3	0.14523E+03	0.19770E+02	0.73456E+01	0.0000
ANION # 1	0.46016E+03	0.31185E+02	0.14756E+02	0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 14

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
5	3.8251
14	4.1989

IONIC STRENGTH = 22.0949

	ACTIVITY	ACT.COEFF.	MOLALITY	%ERROR
CATION # 2	0.51417E-02	0.94315E-01	0.54517E-01	0.0006
CATION # 3	0.14461E+03	0.19683E+02	0.73468E+01	0.0000
ANION # 1	0.45994E+03	0.31187E+02	0.14748E+02	0.0006

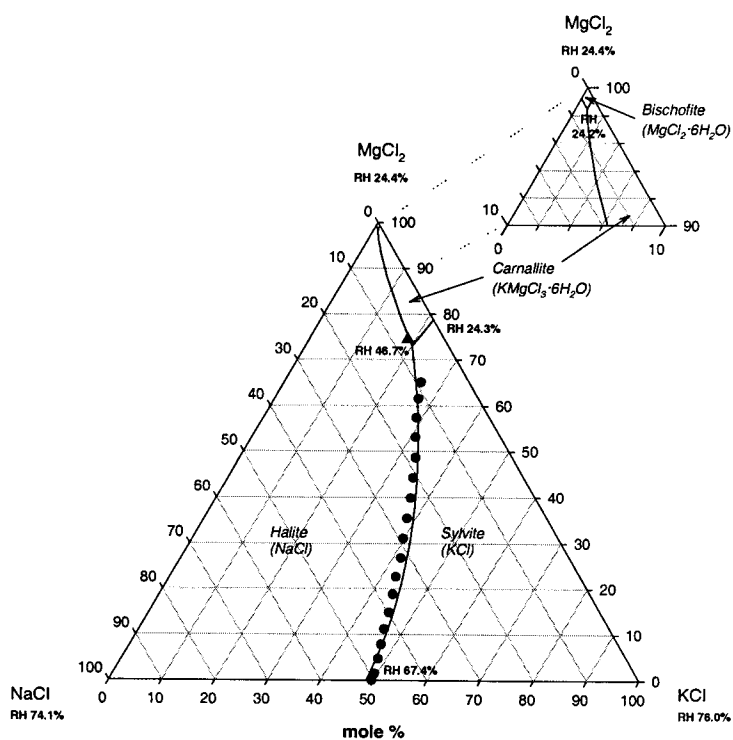
The following is the resulting "osmo.inp" file from SOLCALC (saturation with bischofite+carnallite):

(temp,C)	(total molality)	(osmo. Coeff)
90.0000	22.232077	3.518272
90.0000	22.215522	3.518703
90.0000	22.198978	3.519135
90.0000	22.182438	3.519568
90.0000	22.165904	3.520001
90.0000	22.149375	3.520434

The following is the resulting vpcalc.out file from VPSOLN (saturation with bischofite+carnallite):

TEMP(C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg
90.00	22.2321	3.5183	0.17	0.53	0.24207	398.63
90.00	22.2155	3.5187	0.17	0.53	0.24228	398.52
90.00	22.1990	3.5191	0.17	0.53	0.24250	398.41
90.00	22.1824	3.5196	0.17	0.53	0.24271	398.29
90.00	22.1659	3.5200	0.17	0.53	0.24292	398.18
90.00	22.1494	3.5204	0.17	0.53	0.24313	398.07

The following figure shows the calculated solubilities (plotted as curves) in the system NaCl-KCl-MgCl₂ at 90 C calculated using SOLCALC. Experimental data are also shown (circles: halite+sylvite; triangle: halite+sylvite+carnallite). Also given in the figure are the calculated relative humidities at 90 C for some compositions, calculated using VPSOLN using the osmotic coefficients calculated from SOLCALC. See also the papers by Pabalan and Pitzer (1987 GCA; 1988 EPRI conference proceedings report).



Solubility at 90 °C in the NaCl-KCl-MgCl₂ System*

* (parameters from Pabalan and Pitzer, 1991, 1993)

September 6, 2001

The following is the SOLCALC output for calculations of solubility in the NaCl-MgCl₂ system:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5
THE NUMBER OF ITERATIONS IS 10
EQUATION LOG K
5 3.8251
IONIC STRENGTH = 22.0309

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 3	0.14145E+03	0.19262E+02
0.73436E+01	0.0007	
ANION # 1	0.45839E+03	0.31210E+02
0.14687E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
THE NUMBER OF ITERATIONS IS 11
EQUATION LOG K
5 3.8251
CATION # TOTAL
1 0.0100
IONIC STRENGTH = 22.0375

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14617E-01	0.14617E+01
0.10000E-01	0.0000	
CATION # 3	0.14209E+03	0.19351E+02
0.73425E+01	-0.0006	
ANION # 1	0.45866E+03	0.31212E+02
0.14695E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
THE NUMBER OF ITERATIONS IS 11
EQUATION LOG K
5 3.8251
CATION # TOTAL
1 0.0200
IONIC STRENGTH = 22.0440

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	--------------------	------------

CATION # 1	0.29247E-01	0.14623E+01
0.20000E-01	0.0000	
CATION # 3	0.14270E+03	0.19437E+02
0.73413E+01	-0.0006	
ANION # 1	0.45888E+03	0.31211E+02
0.14703E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
5	3.8251

CATION #	TOTAL
1	0.0300

IONIC STRENGTH = 22.0505

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43888E-01	0.14629E+01
0.30000E-01	0.0000	
CATION # 3	0.14331E+03	0.19524E+02
0.73402E+01	-0.0006	
ANION # 1	0.45910E+03	0.31209E+02
0.14710E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
THE NUMBER OF ITERATIONS IS 11
EQUATION LOG K
5 3.8251
CATION # TOTAL
1 0.0400
IONIC STRENGTH = 22.0570

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.58541E-01	0.14635E+01
0.40000E-01	0.0000	
CATION # 3	0.14392E+03	0.19611E+02
0.73390E+01	-0.0006	
ANION # 1	0.45932E+03	0.31208E+02
0.14718E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 5

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K

5 3.8251

CATION # TOTAL

1 0.0500

IONIC STRENGTH = 22.0635

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.73207E-01	0.14641E+01
0.50000E-01	0.0000	
CATION # 3	0.14454E+03	0.19698E+02
0.73378E+01	-0.0006	
ANION # 1	0.45954E+03	0.31207E+02
0.14726E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K

5 3.8251

20 1.5899

IONIC STRENGTH = 22.0685

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.84611E-01	0.14646E+01
0.57771E-01	0.0006	
CATION # 3	0.14501E+03	0.19765E+02
0.73369E+01	0.0000	
ANION # 1	0.45969E+03	0.31205E+02
0.14732E+02	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 7.0000

IONIC STRENGTH = 21.0767

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10837E+00	0.14137E+01
0.76661E-01	0.0010	
CATION # 3	0.96183E+02	0.13740E+02
0.70000E+01	0.0000	
ANION # 1	0.35890E+03	0.25496E+02
0.14077E+02	0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 6.7500

IONIC STRENGTH = 20.3448

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13022E+00	0.13737E+01
0.94796E-01	0.0010	
CATION # 3	0.71162E+02	0.10543E+02
0.67500E+01	0.0000	
ANION # 1	0.29868E+03	0.21970E+02
0.13595E+02	0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 6.5000

IONIC STRENGTH = 19.6174

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15646E+00	0.13325E+01
0.11742E+00	0.0010	
CATION # 3	0.52834E+02	0.81283E+01
0.65000E+01	0.0000	
ANION # 1	0.24859E+03	0.18951E+02
0.13117E+02	0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 6.2500

IONIC STRENGTH = 18.8956

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18793E+00	0.12903E+01
0.14565E+00	0.0009	

CATION # 3 0.39390E+02 0.63024E+01
 0.62500E+01 0.0000
 ANION # 1 0.20696E+03 0.16366E+02
 0.12646E+02 0.0009

IONIC STRENGTH = 16.7787

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 3 6.0000

IONIC STRENGTH = 18.1808

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22561E+00 0.0009	0.12477E+01
CATION # 3	0.29515E+02 0.0000	0.49191E+01
ANION # 1	0.17240E+03 0.0009	0.14153E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 3 5.7500

IONIC STRENGTH = 17.4745

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27061E+00 0.0008	0.12051E+01
CATION # 3	0.22248E+02 0.0000	0.38692E+01
ANION # 1	0.14373E+03 0.0008	0.12259E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 3 5.5000

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32421E+00 0.0008	0.11631E+01
CATION # 3	0.16891E+02 0.0000	0.30710E+01
ANION # 1	0.11997E+03 0.0008	0.10637E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 3 5.2500

IONIC STRENGTH = 16.0956

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.38777E+00 0.0007	0.11222E+01
CATION # 3	0.12932E+02 0.0000	0.24632E+01
ANION # 1	0.10030E+03 0.0007	0.92484E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 39

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 3 5.0000

IONIC STRENGTH = 15.4274

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46278E+00 0.0005	0.10828E+01
CATION # 3	0.99987E+01 0.0000	0.19997E+01
ANION # 1	0.84047E+02 0.0005	0.80602E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 38

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 4.7500

IONIC STRENGTH = 14.7768

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.55075E+00	0.10454E+01
0.52683E+00	0.0008	
CATION # 3	0.78186E+01	0.16460E+01
0.47500E+01	0.0000	
ANION # 1	0.70622E+02	0.70433E+01
0.10027E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 38

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 4.5000

IONIC STRENGTH = 14.1464

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.65319E+00	0.10105E+01
0.64639E+00	0.0006	
CATION # 3	0.61919E+01	0.13760E+01
0.45000E+01	0.0000	
ANION # 1	0.59546E+02	0.61729E+01
0.96464E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 37

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 4.2500

IONIC STRENGTH = 13.5384

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.77151E+00	0.97854E+00
0.78843E+00	0.0009	
CATION # 3	0.49720E+01	0.11699E+01
0.42500E+01	0.0000	
ANION # 1	0.50414E+02	0.54276E+01
0.92884E+01	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 37

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 4.0000

IONIC STRENGTH = 12.9550

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.90700E+00	0.94977E+00
0.95496E+00	0.0006	
CATION # 3	0.40518E+01	0.10129E+01
0.40000E+01	0.0000	
ANION # 1	0.42883E+02	0.47887E+01
0.89550E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 36

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 3.7500

IONIC STRENGTH = 12.3974

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10607E+01	0.92445E+00
0.11474E+01	0.0008	
CATION # 3	0.33523E+01	0.89394E+00
0.37500E+01	0.0000	
ANION # 1	0.36668E+02	0.42404E+01
0.86474E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 36

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 3.5000

IONIC STRENGTH = 11.8665

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.12336E+01	0.90271E+00
0.13665E+01	0.0005	
CATION # 3	0.28155E+01	0.80444E+00
0.35000E+01	0.0000	
ANION # 1	0.31530E+02	0.37686E+01
0.83665E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 35

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
3	3.2500

IONIC STRENGTH = 11.3624

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14263E+01	0.88459E+00
0.16124E+01	0.0006	
CATION # 3	0.23988E+01	0.73809E+00
0.32500E+01	0.0000	
ANION # 1	0.27270E+02	0.33615E+01
0.81124E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 34

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
3	3.0000

IONIC STRENGTH = 10.8843

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.16395E+01	0.87009E+00
0.18843E+01	0.0008	
CATION # 3	0.20704E+01	0.69013E+00
0.30000E+01	0.0000	
ANION # 1	0.23724E+02	0.30090E+01
0.78843E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 34

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
3	2.7500

IONIC STRENGTH = 10.4310

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18738E+01	0.85912E+00
0.21810E+01	0.0005	
CATION # 3	0.18069E+01	0.65705E+00
0.27500E+01	0.0000	
ANION # 1	0.20758E+02	0.27024E+01
0.76810E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 33

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 10.0010

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.21298E+01	0.85156E+00
0.25010E+01	0.0007	
CATION # 3	0.15906E+01	0.63624E+00
0.25000E+01	0.0000	
ANION # 1	0.18262E+02	0.24346E+01
0.75010E+01	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 33

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
3	2.2500

IONIC STRENGTH = 9.5925

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.24084E+01	0.84730E+00
0.28425E+01	0.0004	
CATION # 3	0.14081E+01	0.62583E+00
0.22500E+01	0.0000	
ANION # 1	0.16150E+02	0.21995E+01
0.73425E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 32

EQUATION	LOG K
----------	-------

20 1.5899

CATION # TOTAL

3 2.0000

IONIC STRENGTH = 9.2032

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27106E+01	0.84621E+00
0.32032E+01	0.0006	
CATION # 3	0.12490E+01	0.62452E+00
0.20000E+01	0.0000	
ANION # 1	0.14349E+02	0.19920E+01
0.72032E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 32

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 1.7500

IONIC STRENGTH = 8.8314

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30378E+01	0.84821E+00
0.35814E+01	0.0004	
CATION # 3	0.11050E+01	0.63144E+00
0.17500E+01	0.0000	
ANION # 1	0.12804E+02	0.18081E+01
0.70814E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 31

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 1.5000

IONIC STRENGTH = 8.4751

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33916E+01	0.85323E+00
0.39751E+01	0.0007	
CATION # 3	0.96914E+00	0.64609E+00
0.15000E+01	0.0000	
ANION # 1	0.11468E+02	0.16441E+01
0.69751E+01	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 31

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 1.2500

IONIC STRENGTH = 8.1324

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.37743E+01	0.86125E+00
0.43824E+01	0.0005	
CATION # 3	0.83538E+00	0.66831E+00
0.12500E+01	0.0000	
ANION # 1	0.10305E+02	0.14973E+01
0.68824E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 31

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 1.0000

IONIC STRENGTH = 7.8016

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.41884E+01	0.87229E+00
0.48016E+01	0.0003	
CATION # 3	0.69816E+00	0.69816E+00
0.10000E+01	0.0000	
ANION # 1	0.92863E+01	0.13653E+01
0.68016E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 30

EQUATION LOG K

20 1.5899

CATION # TOTAL

3 0.7500

IONIC STRENGTH = 7.4814

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46372E+01	0.88642E+00
0.52314E+01	0.0008	
CATION # 3	0.55199E+00	0.73598E+00
0.75000E+00	0.0000	
ANION # 1	0.83874E+01	0.12460E+01
0.67314E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

				EQUATION	LOG K
TEMP(C) = 90.00 PRESS(BARS) = 1.00				20	1.5899
NUMBER CORRESPONDING TO SATURATED SOLID 20				CATION #	TOTAL
3				3	0.2500
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY				IONIC STRENGTH = 6.8671	
THE NUMBER OF ITERATIONS IS 17				MOLALITY	ACTIVITY %ERROR
				ACT.COEFF.	
EQUATION LOG K				CATION # 1	0.56559E+01
20 1.5899				0.61171E+01	0.0004
CATION # TOTAL				CATION # 3	0.20960E+00
3 0.5000				0.25000E+00	0.0000
IONIC STRENGTH = 7.1703				ANION # 1	0.68768E+01
				0.66171E+01	0.0004
				SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS	
				TEMP(C) = 90.00	PRESS(BARS) = 1.00
				NUMBER CORRESPONDING TO SATURATED SOLID 20	
				THE NUMBER OF ITERATIONS IS 9	
				EQUATION	LOG K
				20	1.5899
				IONIC STRENGTH = 6.5708	
				MOLALITY	ACTIVITY %ERROR
				ACT.COEFF.	
				CATION # 1	0.51248E+01
				0.56703E+01	0.0004
				CATION # 3	0.39122E+00
				0.50000E+00	0.0000
				ANION # 1	0.75895E+01
				0.66703E+01	0.0004
				SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS	
				TEMP(C) = 90.00	PRESS(BARS) = 1.00
				NUMBER CORRESPONDING TO SATURATED SOLID 20	
				THE NUMBER OF ITERATIONS IS 16	
				MOLALITY	ACTIVITY %ERROR
				ACT.COEFF.	
				CATION # 1	0.62366E+01
				0.65708E+01	0.0006
				ANION # 1	0.62366E+01
				0.65708E+01	0.0006

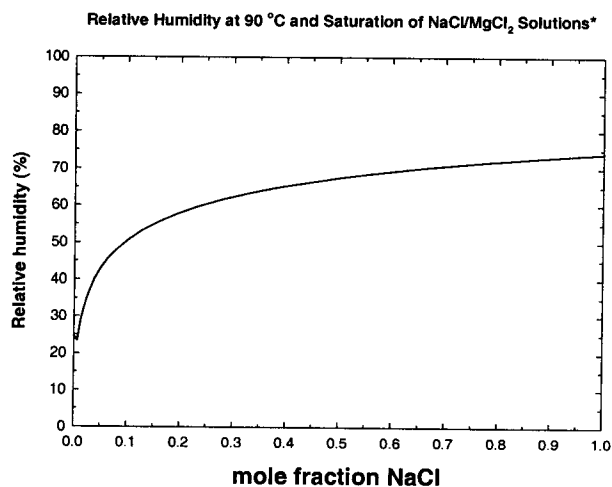
The following is the calculated vapor pressures at 90 C for the NaCl-MgCl₂ system:

TEMP(C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg	molal NaCl	molal MgCl2	RH%	saturated solid phase
90	22.0309	3.5273	0.17	0.53	0.2443	397.46	7.34E+00	0	24.43	bishofite
90	22.0475	3.5269	0.17	0.53	0.24408	397.57	1.00E-02	7.34E+00	24.408	b
90	22.064	3.5265	0.17	0.53	0.24387	397.68	2.00E-02	7.34E+00	24.387	b
90	22.0805	3.5261	0.17	0.53	0.24365	397.8	3.00E-02	7.34E+00	24.365	b
90	22.097	3.5256	0.17	0.53	0.24344	397.91	4.00E-02	7.34E+00	24.344	b
90	22.1135	3.5252	0.17	0.53	0.24323	398.02	5.00E-02	7.34E+00	24.323	b
90	22.1263	3.5248	0.17	0.53	0.24306	398.11	5.78E-02	7.34E+00	24.306	bishofite+halite
90	21.1533	3.3801	0.19	0.51	0.27333	382.19	7.67E-02	7.00E+00	27.333	halite
90	20.4396	3.2732	0.21	0.49	0.29701	369.73	9.48E-02	6.75E+00	29.701	h
90	19.7348	3.1668	0.23	0.48	0.32164	356.78	1.17E-01	6.50E+00	32.164	h
90	19.0413	3.0612	0.24	0.46	0.34708	343.4	1.46E-01	6.25E+00	34.708	h
90	18.3616	2.9563	0.26	0.44	0.37318	329.67	1.81E-01	6.00E+00	37.318	h
90	17.6991	2.8524	0.28	0.42	0.39974	315.7	2.25E-01	5.75E+00	39.974	h
90	17.0575	2.7496	0.3	0.4	0.42653	301.62	2.79E-01	5.50E+00	42.653	h
90	16.4411	2.6483	0.32	0.38	0.45329	287.54	3.46E-01	5.25E+00	45.329	h
90	15.8548	2.5488	0.34	0.36	0.47975	273.62	4.27E-01	5.00E+00	47.975	h
90	15.3037	2.4513	0.35	0.35	0.5056	260.03	5.27E-01	4.75E+00	50.56	h
90	14.7928	2.3563	0.37	0.33	0.53056	246.9	6.46E-01	4.50E+00	53.056	h
90	14.3269	2.2642	0.39	0.31	0.55433	234.4	7.88E-01	4.25E+00	55.433	h
90	13.9099	2.1754	0.4	0.3	0.57668	222.64	9.55E-01	4.00E+00	57.668	h

90	13.5448	2.0902	0.42	0.28	0.59745	211.72	1.15E+00	3.75E+00	59.745
90	13.2331	2.0089	0.43	0.27	0.61648	201.71	1.37E+00	3.50E+00	61.648
90	12.9747	1.9317	0.44	0.26	0.63374	192.63	1.61E+00	3.25E+00	63.374
90	12.7685	1.8586	0.46	0.25	0.64925	184.48	1.88E+00	3.00E+00	64.925
90	12.6121	1.7897	0.46	0.24	0.66307	177.21	2.18E+00	2.75E+00	66.307
90	12.5021	1.7249	0.47	0.23	0.67531	170.77	2.50E+00	2.50E+00	67.531
90	12.4349	1.6639	0.48	0.22	0.68612	165.09	2.84E+00	2.25E+00	68.612
90	12.4065	1.6067	0.49	0.21	0.69564	160.08	3.20E+00	2.00E+00	69.564
90	12.4128	1.553	0.49	0.21	0.70399	155.68	3.58E+00	1.75E+00	70.399
90	12.4501	1.5024	0.5	0.2	0.71134	151.82	3.98E+00	1.50E+00	71.134
90	12.5147	1.4549	0.5	0.2	0.7178	148.42	4.38E+00	1.25E+00	71.78
90	12.6033	1.4101	0.51	0.19	0.7235	145.42	4.80E+00	1.00E+00	72.35
90	12.7128	1.3679	0.51	0.19	0.72855	142.77	5.23E+00	7.50E-01	72.855
90	12.8406	1.3281	0.51	0.19	0.73302	140.41	5.67E+00	5.00E-01	73.302
90	12.9842	1.2904	0.52	0.18	0.73701	138.32	6.12E+00	2.50E-01	73.701
90	13.1415	1.2548	0.52	0.18	0.74057	136.45	6.57E+00	0	74.057

m_{NaCl} m_{MgCl₂} RH %

The following is a plot of the relative humidity vs mole fraction of NaCl for the NaCl-MgCl₂ system:



September 7, 2001

The following are SOLCALC output information for solubility calculations in the NaCl-KCl system:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
53 1.3018

IONIC STRENGTH = 7.1057

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.44759E+01	0.62990E+00
0.71057E+01	0.0005	
ANION # 1	0.44759E+01	0.62990E+00
0.71057E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 9

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 0.5000

IONIC STRENGTH = 7.2770

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42024E+00	0.84049E+00
0.50000E+00	0.0000	
CATION # 2	0.42226E+01	0.62308E+00
0.67770E+01	0.0008	
ANION # 1	0.47443E+01	0.65196E+00
0.72770E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 9

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 1.0000

IONIC STRENGTH = 7.4573

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	-----------------	------------

CATION # 1	0.86060E+00	0.86060E+00
0.10000E+01	0.0000	
CATION # 2	0.39800E+01	0.61636E+00
0.64573E+01	-0.0005	
ANION # 1	0.50337E+01	0.67501E+00
0.74573E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 1.5000

IONIC STRENGTH = 7.6467

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13225E+01	0.88164E+00
0.15000E+01	0.0000	
CATION # 2	0.37478E+01	0.60973E+00
0.61467E+01	-0.0006	
ANION # 1	0.53456E+01	0.69907E+00
0.76467E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 2.0000

IONIC STRENGTH = 7.8458

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18073E+01	0.90366E+00
0.20000E+01	0.0000	
CATION # 2	0.35260E+01	0.60316E+00
0.58458E+01	-0.0005	
ANION # 1	0.56818E+01	0.72419E+00
0.78458E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 2.5000

IONIC STRENGTH = 8.0552

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23167E+01	0.92670E+00
0.25000E+01	0.0000	
CATION # 2	0.33145E+01	0.59665E+00
0.55552E+01	-0.0009	
ANION # 1	0.60444E+01	0.75038E+00
0.80552E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

THE NUMBER OF ITERATIONS IS 9

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 3.0000

IONIC STRENGTH = 8.2751

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.28524E+01	0.95079E+00
0.30000E+01	0.0000	
CATION # 2	0.31132E+01	0.59017E+00
0.52751E+01	-0.0008	
ANION # 1	0.64353E+01	0.77767E+00
0.82751E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 3.5000

IONIC STRENGTH = 8.5059

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.34159E+01	0.97597E+00
0.35000E+01	0.0000	
CATION # 2	0.29219E+01	0.58369E+00
0.50059E+01	0.0008	
ANION # 1	0.68564E+01	0.80607E+00
0.85059E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 4.0000

IONIC STRENGTH = 8.7481

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40091E+01	0.10023E+01
0.40000E+01	0.0000	
CATION # 2	0.27406E+01	0.57719E+00
0.47481E+01	0.0008	
ANION # 1	0.73100E+01	0.83561E+00
0.87481E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 4.5000

IONIC STRENGTH = 9.0020

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46337E+01	0.10297E+01
0.45000E+01	0.0000	
CATION # 2	0.25690E+01	0.57063E+00
0.45020E+01	0.0009	
ANION # 1	0.77982E+01	0.86626E+00
0.90020E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K
20 1.5899
53 1.3018

IONIC STRENGTH = 9.0980

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48705E+01	0.10400E+01
0.46830E+01	0.0003	
CATION # 2	0.25087E+01	0.56821E+00
0.44151E+01	-0.0009	
ANION # 1	0.79859E+01	0.87776E+00
0.90980E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	4.0000

IONIC STRENGTH = 8.8355

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49861E+01	0.10311E+01
0.48355E+01	-.0006	
CATION # 2	0.22519E+01	0.56297E+00
0.40000E+01	0.0000	
ANION # 1	0.78009E+01	0.88290E+00
0.88355E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.5000

IONIC STRENGTH = 8.5264

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.51291E+01	0.10204E+01
0.50264E+01	-.0004	
CATION # 2	0.19475E+01	0.55644E+00
0.35000E+01	0.0000	
ANION # 1	0.75834E+01	0.88939E+00
0.85264E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.0000

IONIC STRENGTH = 8.2252

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.52761E+01	0.10097E+01
0.52252E+01	-.0009	
CATION # 2	0.16491E+01	0.54972E+00
0.30000E+01	0.0000	
ANION # 1	0.73721E+01	0.89628E+00
0.82252E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.5000

IONIC STRENGTH = 7.9315

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.54270E+01	0.99917E+00
0.54315E+01	-.0006	
CATION # 2	0.13571E+01	0.54284E+00
0.25000E+01	0.0000	
ANION # 1	0.71671E+01	0.90362E+00
0.79315E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 8

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.0000

IONIC STRENGTH = 7.6453

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.55817E+01	0.98874E+00
0.56453E+01	-.0009	
CATION # 2	0.10717E+01	0.53584E+00
0.20000E+01	0.0000	
ANION # 1	0.69685E+01	0.91147E+00
0.76453E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 7

EQUATION	LOG K
----------	-------

20 1.5899 TEMP(C) = 90.00 PRESS(BARS) = 1.00

CATION # TOTAL NUMBER CORRESPONDING TO SATURATED SOLID 20

2 1.5000 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

IONIC STRENGTH = 7.3662 THE NUMBER OF ITERATIONS IS 9

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.	EQUATION	LOG K
CATION # 1	0.57401E+01	0.97849E+00	20	1.5899
0.58662E+01	-.0005			
CATION # 2	0.79315E+00	0.52877E+00		
0.15000E+01	0.0000			
ANION # 1	0.67761E+01	0.91989E+00	CATION #	TOTAL
0.73662E+01	-.0005		2	0.5000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

IONIC STRENGTH = 6.8292

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 8

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.	EQUATION	LOG K
CATION # 1	0.60675E+01	0.95866E+00	20	1.5899
0.63292E+01	0.0004			
CATION # 2	0.25725E+00	0.51450E+00		
0.50000E+00	0.0000			
ANION # 1	0.64103E+01	0.93866E+00		
0.68292E+01	0.0004			

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

THE NUMBER OF ITERATIONS IS 9

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.	EQUATION	LOG K
CATION # 1	0.59020E+01	0.96845E+00	20	1.5899
0.60943E+01	0.0005			
CATION # 2	0.52165E+00	0.52165E+00		
0.10000E+01	0.0000			
ANION # 1	0.65901E+01	0.92893E+00		
0.70943E+01	0.0005			

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

IONIC STRENGTH = 6.5708

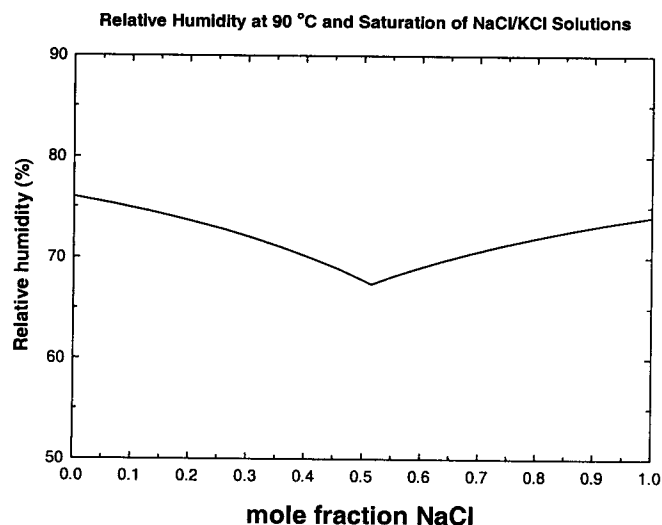
MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.62366E+01	0.94914E+00
0.65708E+01	0.0006	
ANION # 1	0.62366E+01	0.94914E+00
0.65708E+01	0.0006	

The following are the calculated vapor pressures for the system NaCl-KCl system at 90 C:

TEMP(C)	TOTMOL	OSMO	VP bar	P0-VP bar	VP/P0	(P0-VP) mm Hg	molal NaCl	molal KCl	RH%	saturated solid phase sylvite
90.0000	14.2114	1.0596	0.53	0.17	0.7601	126.17	0.0000	7.1057	76.0100	
90.0000	14.5540	1.0704	0.5300	0.1700	0.7529	129.9400	0.5000	6.7770	75.2940	s
90.0000	14.9145	1.0822	0.5200	0.1800	0.7453	133.9700	1.0000	6.4573	74.5280	s
90.0000	15.2934	1.0950	0.5200	0.1800	0.7371	138.2600	1.5000	6.1467	73.7130	s
90.0000	15.6916	1.1086	0.5100	0.1900	0.7285	142.8100	2.0000	5.8458	72.8470	s
90.0000	16.1103	1.1230	0.5000	0.2000	0.7193	147.6300	2.5000	5.5552	71.9310	s
90.0000	16.5501	1.1381	0.5000	0.2000	0.7097	152.7000	3.0000	5.2751	70.9670	s
90.0000	17.0117	1.1537	0.4900	0.2100	0.6995	158.0300	3.5000	5.0059	69.9540	s
90.0000	17.4962	1.1697	0.4800	0.2200	0.6890	163.6000	4.0000	4.7481	68.8950	s
90.0000	18.0041	1.1861	0.4800	0.2300	0.6779	169.4100	4.5000	4.5020	67.7900	s
90.0000	18.1960	1.1922	0.4700	0.2300	0.6738	171.5900	4.6830	4.4151	67.3750	s+h
90.0000	17.6710	1.1964	0.4800	0.2200	0.6806	168.0100	4.8355	4.0000	68.0550	halite
90.0000	17.0529	1.2016	0.4800	0.2200	0.6886	163.7600	5.0264	3.5000	68.8630	h
90.0000	16.4503	1.2073	0.4900	0.2100	0.6966	159.5900	5.2252	3.0000	69.6570	h
90.0000	15.8630	1.2134	0.4900	0.2100	0.7044	155.4900	5.4315	2.5000	70.4360	h
90.0000	15.2905	1.2201	0.5000	0.2000	0.7120	151.4800	5.6453	2.0000	71.1990	h

90.0000	14.7325	1.2274	0.5000	0.2000	0.7194	147.5600	5.8662	1.5000	71.9430	h
90.0000	14.1885	1.2356	0.5100	0.1900	0.7267	143.7500	6.0943	1.0000	72.6680	h
90.0000	13.6584	1.2447	0.5100	0.1900	0.7337	140.0400	6.3292	0.5000	73.3730	h
90.0000	13.1415	1.2548	0.5200	0.1800	0.7406	136.4500	6.5708	0.0000	74.0570	h

The following plots the relative humidity at 90 C versus mole fraction of NaCl for the system NaCl-KCl:



The following is the SOLCALC output for solubility calculations of KCl-MgCl₂ solubility at 90 C:

first point bischofite solubility

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
5 3.8251

IONIC STRENGTH = 22.0308

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 3	0.14145E+03	0.19261E+02
0.73436E+01	0.0010	
ANION # 1	0.45838E+03	0.31210E+02
0.14687E+02	0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 5

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
5 3.8251

CATION # TOTAL
2 0.0200

IONIC STRENGTH = 22.0543

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.

CATION # 2 0.18919E-02 0.94594E-01
 0.20000E-01 0.0000
 CATION # 3 0.14260E+03 0.19415E+02
 0.73448E+01 0.0007
 ANION # 1 0.45895E+03 0.31201E+02
 0.14710E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
 5 3.8251

CATION # TOTAL
 2 0.0400

IONIC STRENGTH = 22.0777

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 2 0.37774E-02 0.94434E-01
 0.40000E-01 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
 14 4.1989

CATION # TOTAL
 2 0.0750

IONIC STRENGTH = 21.1479

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 2 0.79457E-02 0.10594E+00
 0.75000E-01 0.0000
 CATION # 3 0.97284E+02 0.13850E+02
 0.70243E+01 0.0007
 ANION # 1 0.36225E+03 0.25648E+02
 0.14124E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K
 14 4.1989

CATION # TOTAL
 2 0.1000

IONIC STRENGTH = 20.3848

CATION # 3 0.14375E+03 0.19568E+02
 0.73459E+01 0.0007
 ANION # 1 0.45951E+03 0.31192E+02
 0.14732E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 5
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 THE NUMBER OF ITERATIONS IS 21

EQUATION LOG K

bishofite+carallite

5 3.8251
 14 4.1989

IONIC STRENGTH = 22.0949

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 2 0.51418E-02 0.94315E-01
 0.54517E-01 -0.0006
 CATION # 3 0.14461E+03 0.19683E+02
 0.73468E+01 0.0000
 ANION # 1 0.45994E+03 0.31187E+02
 0.14748E+02 -0.0006

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 2 0.11585E-01 0.11585E+00
 0.10000E+00 0.0000
 CATION # 3 0.70727E+02 0.10460E+02
 0.67616E+01 0.0002
 ANION # 1 0.29814E+03 0.21885E+02
 0.13623E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 6

EQUATION LOG K
 14 4.1989

CATION # TOTAL
 2 0.1500

IONIC STRENGTH = 19.4208

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 2 0.19361E-01 0.12908E+00
 0.15000E+00 0.0000
 CATION # 3 0.47301E+02 0.73636E+01
 0.64236E+01 0.0002
 ANION # 1 0.23208E+03 0.17856E+02
 0.12997E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.2000

IONIC STRENGTH = 18.8023

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.27608E-01	0.13804E+00
0.20000E+00	0.0000	
CATION # 3	0.36541E+02	0.58931E+01
0.62008E+01	0.0005	
ANION # 1	0.19684E+03	0.15620E+02
0.12602E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.2500

IONIC STRENGTH = 18.3555

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.36200E-01	0.14480E+00
0.25000E+00	0.0000	
CATION # 3	0.30325E+02	0.50247E+01
0.60352E+01	0.0003	
ANION # 1	0.17428E+03	0.14146E+02
0.12320E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.3000

IONIC STRENGTH = 18.0108

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.45067E-01	0.15022E+00
0.30000E+00	0.0000	
CATION # 3	0.26256E+02	0.44474E+01
0.59036E+01	0.0002	
ANION # 1	0.15831E+03	0.13076E+02
0.12107E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.4000

IONIC STRENGTH = 17.5030

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.63467E-01	0.15867E+00
0.40000E+00	0.0000	
CATION # 3	0.21222E+02	0.37224E+01
0.57010E+01	0.0009	
ANION # 1	0.13674E+03	0.11586E+02
0.11802E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.5000

IONIC STRENGTH = 17.1399

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.82584E-01	0.16517E+00
0.50000E+00	0.0000	
CATION # 3	0.18213E+02	0.32836E+01
0.55466E+01	0.0001	
ANION # 1	0.12252E+03	0.10568E+02
0.11593E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.7000

IONIC STRENGTH = 16.6462

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.12254E+00	0.17505E+00
0.70000E+00	0.0000	
CATION # 3	0.14761E+02	0.27771E+01
0.53154E+01	0.0001	
ANION # 1	0.10436E+03	0.92106E+01
0.11331E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 5

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.6000

IONIC STRENGTH = 16.8641

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.10230E+00	0.17050E+00
0.60000E+00	0.0000	
CATION # 3	0.16203E+02	0.29887E+01
0.54214E+01	-0.0001	
ANION # 1	0.11224E+03	0.98091E+01
0.11443E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE
SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.7500

IONIC STRENGTH = 16.5535

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.13284E+00	0.17711E+00
0.75000E+00	0.0000	
CATION # 3	0.14184E+02	0.26925E+01
0.52678E+01	-0.0004	
ANION # 1	0.10106E+03	0.89544E+01
0.11286E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.8500

IONIC STRENGTH = 16.3934

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.15376E+00	0.18090E+00
0.85000E+00	0.0000	
CATION # 3	0.13231E+02	0.25536E+01
0.51811E+01	-0.0004	
ANION # 1	0.95367E+02	0.85056E+01
0.11212E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 0.9500

IONIC STRENGTH = 16.2603

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.17511E+00	0.18432E+00
0.95000E+00	0.0000	
CATION # 3	0.12477E+02	0.24449E+01
0.51034E+01	-0.0004	
ANION # 1	0.90627E+02	0.81229E+01
0.11157E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
14 4.1989

CATION # TOTAL
2 1.0000

IONIC STRENGTH = 16.2020

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.18593E+00	0.18593E+00
0.10000E+01	0.0000	
CATION # 3	0.12157E+02	0.23992E+01
0.50673E+01	-0.0004	
ANION # 1	0.88534E+02	0.79512E+01
0.11135E+02	0.0000	

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K

14 4.1989
 CATION # TOTAL
 2 1.0500
 IONIC STRENGTH = 16.1484

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.19684E+00	0.18747E+00
0.10500E+01	0.0000	
CATION # 3	0.11868E+02	0.23582E+01
0.50328E+01	-.0007	
ANION # 1	0.86596E+02	0.77905E+01
0.11116E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
 14 4.1989

CATION # TOTAL
 2 1.1500

IONIC STRENGTH = 16.0536

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.21895E+00	0.19039E+00
0.11500E+01	0.0000	
CATION # 3	0.11366E+02	0.22879E+01
0.49679E+01	-.0004	
ANION # 1	0.83111E+02	0.74971E+01
0.11086E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

THE NUMBER OF ITERATIONS IS 4

EQUATION LOG K
 14 4.1989

CATION # TOTAL
 2 1.2500

IONIC STRENGTH = 15.9728

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.24141E+00	0.19313E+00
0.12500E+01	0.0000	
CATION # 3	0.10946E+02	0.22305E+01
0.49076E+01	-.0004	
ANION # 1	0.80058E+02	0.72351E+01
0.11065E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE
 SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K

sylvite+carnallite

14 4.1989
 53 1.3018

IONIC STRENGTH = 15.9278

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.25584E+00	0.19479E+00
0.13134E+01	-.0008	
CATION # 3	0.10714E+02	0.21994E+01
0.48715E+01	0.0000	
ANION # 1	0.78307E+02	0.70825E+01
0.11056E+02	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE
 SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 3 4.5000

IONIC STRENGTH = 15.0522

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.33057E+00	0.21297E+00
0.15522E+01	-.0007	
CATION # 3	0.74731E+01	0.16607E+01
0.45000E+01	0.0000	
ANION # 1	0.60605E+02	0.57434E+01
0.10552E+02	-.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 3 4.0000

IONIC STRENGTH = 13.9371

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2	0.46278E+00	0.23891E+00
0.19371E+01	-.0009	
CATION # 3	0.47217E+01	0.11804E+01
0.40000E+01	0.0000	
ANION # 1	0.43291E+02	0.43565E+01
0.99371E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	3.5000

IONIC STRENGTH = 12.8977

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2 0.23977E+01	0.64040E+00 -.0008	0.26709E+00
CATION # 3 0.35000E+01	0.30682E+01 0.0000	0.87662E+00
ANION # 1 0.93977E+01	0.31284E+02 -.0008	0.33289E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	3.0000

IONIC STRENGTH = 11.9320

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2 0.29320E+01	0.87470E+00 0.0008	0.29833E+00
CATION # 3 0.30000E+01	0.20391E+01 0.0000	0.67969E+00
ANION # 1 0.89320E+01	0.22903E+02 0.0008	0.25642E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 11.0327

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2 0.35327E+01	0.11788E+01 0.0007	0.33367E+00

CATION #	ACTIVITY %ERROR	ACT.COEFF.
3 0.25000E+01	0.13719E+01 0.0000	0.54875E+00
ANION # 1 0.85327E+01	0.16995E+02 0.0007	0.19918E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 10.1886

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2 0.41886E+01	0.15680E+01 0.0008	0.37436E+00
CATION # 3 0.20000E+01	0.91894E+00 0.0000	0.45947E+00
ANION # 1 0.81886E+01	0.12776E+02 0.0008	0.15603E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	1.5000

IONIC STRENGTH = 9.3865

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 2 0.48865E+01	0.20617E+01 0.0007	0.42192E+00
CATION # 3 0.15000E+01	0.59610E+00 0.0000	0.39740E+00
ANION # 1 0.78865E+01	0.97169E+01 0.0007	0.12321E+01

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
3	1.0000

IONIC STRENGTH = 8.6133

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 2	0.26850E+01	0.47833E+00
0.56133E+01	0.0007	
CATION # 3	0.35400E+00	0.35400E+00
0.10000E+01	0.0000	
ANION # 1	0.74612E+01	0.98001E+00
0.76133E+01	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 11

3

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
3	0.5000
IONIC STRENGTH =	7.8567

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 2	0.34728E+01	0.54632E+00
0.63567E+01	0.0006	
CATION # 3	0.16220E+00	0.32441E+00
0.50000E+00	0.0000	
ANION # 1	0.57687E+01	0.78414E+00
0.73567E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 11

3

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
3	0.5000
IONIC STRENGTH =	7.8567

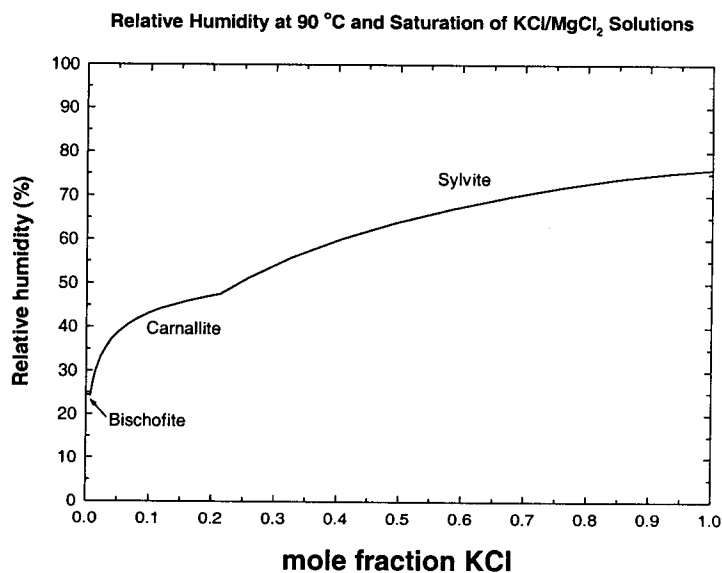
MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 2	0.44759E+01	0.62990E+00
0.71057E+01	0.0005	
ANION # 1	0.44759E+01	0.62990E+00
0.71057E+01	0.0005	

The following are calculated relative humidities at 90 C for the system KCl-MgCl₂:

molal NaCl	molal KCl	molal MgCl ₂	XNaCl	XKCl	XMgCl ₂	RH%	saturated solid
0	0	7.34E+00	0.0000	0.0000	100.0000	24.43	bischofite
0	2.00E-02	7.34E+00	0.0000	0.2716	99.7284	24.387	bischofite
0	4.00E-02	7.35E+00	0.0000	0.5416	99.4584	24.345	bischofite
0	5.45E-02	7.35E+00	0.0000	0.7366	99.2634	24.313	b+carnal.
0	7.50E-02	7.02E+00	0.0000	1.0564	98.9436	27.229	carnall.
0	1.00E-01	6.76E+00	0.0000	1.4574	98.5426	29.734	carnall.
0	1.50E-01	6.42E+00	0.0000	2.2819	97.7181	33.095	carnall.
0	2.00E-01	6.20E+00	0.0000	3.1246	96.8754	35.37	carnall.
0	2.50E-01	6.04E+00	0.0000	3.9776	96.0224	37.073	carnall.
0	3.00E-01	5.90E+00	0.0000	4.8359	95.1641	38.421	carnall.
0	4.00E-01	5.70E+00	0.0000	6.5563	93.4437	40.467	carnall.
0	5.00E-01	5.55E+00	0.0000	8.2691	91.7309	41.98	carnall.
0	6.00E-01	5.42E+00	0.0000	9.9645	90.0355	43.162	carnall.
0	7.00E-01	5.32E+00	0.0000	11.6368	88.3632	44.119	carnall.
0	7.50E-01	5.27E+00	0.0000	12.4630	87.5370	44.534	carnall.
0	0.8500	5.1811	0.0000	14.0936	85.9064	45.265	carnall.
0	0.9500	5.1034	0.0000	15.6937	84.3063	45.888	carnall.
0	1.00E+00	5.07E+00	0.0000	16.4818	83.5182	46.167	carnall.
0	1.0500	5.0328	0.0000	17.2618	82.7382	46.426	carnall.
0	1.1500	4.9679	0.0000	18.7973	81.2027	46.896	carnall.
0	1.25E+00	4.91E+00	0.0000	20.3001	79.6999	47.308	carnall.
0	1.31E+00	4.87E+00	0.0000	21.2356	78.7644	47.544	carnall.+syl
0	1.5522	4.5000	0.0000	25.6469	74.3531	51.2030	vite sylvite

0	1.9371	4.0000	0.0000	32.6270	67.3730	55.8720	sylvite
0	2.3977	3.5000	0.0000	40.6548	59.3452	60.1390	sylvite
0	2.9320	3.0000	0.0000	49.4268	50.5732	63.9180	sylvite
0	3.5327	2.5000	0.0000	58.5592	41.4408	67.1690	sylvite
0	4.1886	2.0000	0.0000	67.6825	32.3175	69.8920	sylvite
0	4.8865	1.5000	0.0000	76.5130	23.4870	72.1030	sylvite
0	5.6133	1.0000	0.0000	84.8790	15.1210	73.8360	sylvite
0	6.3567	0.5000	0.0000	92.7079	7.2921	75.1270	sylvite
0	7.1057	0.0000	0.0000	100.0000	0.0000	76.0100	sylvite

The following is the calculated relative humidity versus mole fraction of KCl at 90 C for the system KCl-MgCl₂:



The following are the calculated solubilities in the NaCl-KCl-MgCl₂ system at the halite+sylvite saturation curve:

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 20 1.5899
 53 1.3018

IONIC STRENGTH = 9.0980

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48705E+01	0.10400E+01
0.46830E+01	-.0002	
CATION # 2	0.25086E+01	0.56821E+00
0.44150E+01	0.0006	
ANION # 1	0.79859E+01	0.87776E+00
0.90980E+01	-.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION LOG K
 20 1.5899
 53 1.3018

CATION # TOTAL
 3 0.1300

IONIC STRENGTH = 9.2405

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46470E+01	0.10319E+01
0.45034E+01	-.0002	
CATION # 2	0.23935E+01	0.55060E+00
0.43471E+01	0.0006	
CATION # 3	0.13625E+00	0.10481E+01
0.13000E+00	0.0000	
ANION # 1	0.83699E+01	0.91871E+00
0.91105E+01	-.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K

20 1.5899
 53 1.3018

CATION # TOTAL
 3 0.2500

IONIC STRENGTH = 9.3727

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44482E+01	0.10249E+01
0.43400E+01	-.0003	
CATION # 2	0.22911E+01	0.53498E+00
0.42826E+01	0.0007	
CATION # 3	0.25914E+00	0.10366E+01
0.25000E+00	0.0000	
ANION # 1	0.87440E+01	0.95849E+00
0.91227E+01	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 20 1.5899
 53 1.3018

CATION # TOTAL
 3 0.4000

IONIC STRENGTH = 9.5389

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42092E+01	0.10169E+01
0.41393E+01	-.0003	
CATION # 2	0.21680E+01	0.51625E+00
0.41996E+01	0.0008	
CATION # 3	0.40956E+00	0.10239E+01
0.40000E+00	0.0000	
ANION # 1	0.92404E+01	0.10111E+01
0.91389E+01	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 20 1.5899
 53 1.3018

CATION # TOTAL
 3 0.6000

IONIC STRENGTH = 9.7624

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.	TEMP(C) = 90.00	PRESS(BARS) = 1.00
CATION # 1	0.39063E+01	0.10074E+01	NUMBER CORRESPONDING TO SATURATED SOLID	20
0.38776E+01	-.0004		NUMBER CORRESPONDING TO SATURATED SOLID	53
CATION # 2	0.20120E+01	0.49256E+00	NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3
0.40848E+01	0.0009			
CATION # 3	0.60599E+00	0.10100E+01	THE NUMBER OF ITERATIONS IS	17
0.60000E+00	0.0000			
ANION # 1	0.99571E+01	0.10867E+01		
0.91624E+01	-.0004			

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00	PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID	20
NUMBER CORRESPONDING TO SATURATED SOLID	53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.7500

IONIC STRENGTH = 9.9318

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.36903E+01	0.10011E+01
0.36862E+01	-.0004	
CATION # 2	0.19007E+01	0.47569E+00
0.39957E+01	0.0009	
CATION # 3	0.75133E+00	0.10018E+01
0.75000E+00	0.0000	
ANION # 1	0.10540E+02	0.11479E+01
0.91818E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00	PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID	20
NUMBER CORRESPONDING TO SATURATED SOLID	53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.0000

IONIC STRENGTH = 10.2181

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33502E+01	0.99226E+00
0.33764E+01	-.0003	
CATION # 2	0.17256E+01	0.44917E+00
0.38417E+01	0.0006	
CATION # 3	0.99249E+00	0.99249E+00
0.10000E+01	0.0000	
ANION # 1	0.11610E+02	0.12595E+01
0.92181E+01	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00	PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID	20
NUMBER CORRESPONDING TO SATURATED SOLID	53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.2500

IONIC STRENGTH = 10.5101

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30338E+01	0.98539E+00
0.30788E+01	-.0003	
CATION # 2	0.15626E+01	0.42447E+00
0.36813E+01	0.0007	
CATION # 3	0.12361E+01	0.98892E+00
0.12500E+01	0.0000	
ANION # 1	0.12821E+02	0.13845E+01
0.92601E+01	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00	PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID	20
NUMBER CORRESPONDING TO SATURATED SOLID	53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.5000

IONIC STRENGTH = 10.8090

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27395E+01	0.98051E+00
0.27939E+01	-.0004	
CATION # 2	0.14110E+01	0.40142E+00
0.35151E+01	0.0007	
CATION # 3	0.14872E+01	0.99147E+00
0.15000E+01	0.0000	
ANION # 1	0.14198E+02	0.15252E+01
0.93090E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00	PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID	20
NUMBER CORRESPONDING TO SATURATED SOLID	53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY	3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899
53	1.3018

CATION # TOTAL
3 1.7500

IONIC STRENGTH = 11.1163

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.24660E+01	0.97763E+00
0.25225E+01	-0.0004	
CATION # 2	0.12702E+01	0.37986E+00
0.33438E+01	0.0008	
CATION # 3	0.17514E+01	0.10008E+01
0.17500E+01	0.0000	
ANION # 1	0.15772E+02	0.16840E+01
0.93663E+01	-0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 11.4332

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22123E+01	0.97680E+00
0.22649E+01	0.0004	
CATION # 2	0.11395E+01	0.35967E+00
0.31683E+01	-0.0008	
CATION # 3	0.20355E+01	0.10177E+01
0.20000E+01	0.0000	
ANION # 1	0.17581E+02	0.18638E+01
0.94332E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.3300

IONIC STRENGTH = 11.8688

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19061E+01	0.97895E+00
0.19471E+01	0.0002	
CATION # 2	0.98179E+00	0.33488E+00
0.29317E+01	-0.0006	
CATION # 3	0.24552E+01	0.10537E+01
0.23300E+01	0.0000	
ANION # 1	0.20406E+02	0.21392E+01
0.95388E+01	0.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.6600

IONIC STRENGTH = 12.3278

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.16308E+01	0.98499E+00
0.16556E+01	0.0003	
CATION # 2	0.83997E+00	0.31200E+00
0.26922E+01	-0.0009	
CATION # 3	0.29491E+01	0.11087E+01
0.26600E+01	0.0000	
ANION # 1	0.23851E+02	0.24671E+01
0.96678E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.0000

IONIC STRENGTH = 12.8293

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13776E+01	0.99550E+00
0.13838E+01	0.0003	
CATION # 2	0.70957E+00	0.29016E+00
0.24455E+01	-0.0007	
CATION # 3	0.35718E+01	0.11906E+01
0.30000E+01	0.0000	
ANION # 1	0.28234E+02	0.28724E+01
0.98293E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	3.3300

IONIC STRENGTH = 13.3479

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11600E+01	0.10101E+01
0.11484E+01	0.0003	
CATION # 2	0.59749E+00	0.27041E+00
0.22095E+01	-0.0006	
CATION # 3	0.43365E+01	0.13023E+01
0.33300E+01	0.0000	
ANION # 1	0.33530E+02	0.33471E+01
0.10018E+02	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	3.6600

IONIC STRENGTH = 13.9016

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.96862E+00	0.10293E+01
0.94101E+00	0.0004	
CATION # 2	0.49892E+00	0.25190E+00
0.19806E+01	-0.0008	
CATION # 3	0.53296E+01	0.14562E+01
0.36600E+01	0.0000	
ANION # 1	0.40155E+02	0.39208E+01
0.10242E+02	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	4.0000

IONIC STRENGTH = 14.5122

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.79733E+00	0.10541E+01
0.75644E+00	0.0004	
CATION # 2	0.41069E+00	0.23390E+00
0.17558E+01	-0.0007	
CATION # 3	0.66992E+01	0.16748E+01
0.40000E+01	0.0000	
ANION # 1	0.48782E+02	0.46405E+01
0.10512E+02	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	4.3300

IONIC STRENGTH = 15.1460

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.65457E+00	0.10829E+01
0.60448E+00	0.0006	
CATION # 2	0.33715E+00	0.21731E+00
0.15515E+01	-0.0006	
CATION # 3	0.85179E+01	0.19672E+01
0.43300E+01	0.0000	
ANION # 1	0.59421E+02	0.54938E+01
0.10816E+02	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 22

EQUATION	LOG K
14	4.1989
20	1.5899
53	1.3018

IONIC STRENGTH = 16.0363

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49992E+00	0.11274E+01
0.44345E+00	0.0007	
CATION # 2	0.25750E+00	0.19668E+00
0.13093E+01	-0.0001	
CATION # 3	0.12004E+02	0.25212E+01
0.47612E+01	0.0000	
ANION # 1	0.77801E+02	0.69003E+01
0.11275E+02	0.0007	

The following are the calculated relative humidity along the halite+sylvite saturation curve at 90 C:

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%	sat. solid
4.6830	4.4150	0.0000	51.4729	48.5271	0.0000	67.375	halite+sylvite
4.5034	4.3471	0.1300	50.1464	48.4060	1.4476	67.21	
4.3400	4.2826	0.2500	48.9146	48.2677	2.8177	67.046	
4.1393	4.1996	0.4000	47.3664	48.0564	4.5772	66.825	
3.8776	4.0848	0.6000	45.2864	47.7063	7.0074	66.5	
3.6862	3.9957	0.7500	43.7173	47.3879	8.8948	66.234	
3.3764	3.8417	1.0000	41.0849	46.7468	12.1683	65.741	
3.0788	3.6813	1.2500	38.4365	45.9582	15.6053	65.183	
2.7939	3.5151	1.5000	35.7779	45.0134	19.2086	64.551	
2.5225	3.3438	1.7500	33.1198	43.9032	22.9770	63.843	
2.2649	3.1683	2.0000	30.4701	42.6236	26.9063	63.05	
1.9471	2.9317	2.3300	27.0100	40.6683	32.3216	61.858	
1.6556	2.6922	2.6600	23.6251	38.4172	37.9577	60.485	
1.3838	2.4455	3.0000	20.2627	35.8089	43.9284	58.862	
1.1484	2.2095	3.3300	17.1713	33.0373	49.7914	57.071	
0.9410	1.9806	3.6600	14.2976	30.0929	55.6095	55.056	
0.7564	1.7558	4.0000	11.6157	26.9615	61.4228	52.742	
0.6045	1.5515	4.3300	9.3198	23.9208	66.7594	50.273	
0.4435	1.3093	4.7612	6.8077	20.0999	73.0924	46.748	

The following is the calculated solubility along the halite+carnallite boundary at 90 C (system NaCl-KCl-MgCl2):

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS			TEMP(C) = 90.00 PRESS(BARS) = 1.00		
TEMP(C) = 90.00 PRESS(BARS) = 1.00			NUMBER CORRESPONDING TO SATURATED SOLID 14		
NUMBER CORRESPONDING TO SATURATED SOLID 14			NUMBER CORRESPONDING TO SATURATED SOLID 20		
NUMBER CORRESPONDING TO SATURATED SOLID 20			NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3		
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3			THE NUMBER OF ITERATIONS IS 18		
THE NUMBER OF ITERATIONS IS 22			EQUATION LOG K		
EQUATION LOG K			14 4.1989		
14 4.1989			20 1.5899		
20 1.5899			CATION # TOTAL		
CATION # TOTAL			3 5.0000		
3 4.7600			IONIC STRENGTH = 16.3418		
IONIC STRENGTH = 16.0350			MOLALITY ACTIVITY ACT.COEFF.		
MOLALITY ACTIVITY ACT.COEFF.			CATION # 1 0.43426E+00 0.11421E+01		
CATION # 1 0.50027E+00 0.11273E+01			0.38023E+00 0.0002		
0.44378E+00 -.0002			CATION # 2 0.17899E+00 0.18615E+00		
CATION # 2 0.25796E+00 0.19673E+00			0.96155E+00 0.0009		
0.13112E+01 0.0008			CATION # 3 0.13709E+02 0.27417E+01		
CATION # 3 0.11997E+02 0.25203E+01			0.50000E+01 0.0000		
0.47600E+01 0.0000			ANION # 1 0.89567E+02 0.78970E+01		
ANION # 1 0.77748E+02 0.68956E+01			0.11342E+02 0.0002		
0.11275E+02 -.0002			SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS		
SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS			TEMP(C) = 90.00 PRESS(BARS) = 1.00		

NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

CATION # TOTAL
 3 6.5000
 IONIC STRENGTH = 19.7492

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K

14 4.1989
 20 1.5899

CATION # TOTAL

3 5.5000

IONIC STRENGTH = 17.2530

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31492E+00	0.11925E+01
0.26408E+00	0.0001	
CATION # 2	0.80702E-01	0.16506E+00
0.48893E+00	0.0006	
CATION # 3	0.19946E+02	0.36265E+01
0.55000E+01	0.0000	
ANION # 1	0.12351E+03	0.10509E+02
0.11753E+02	0.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION LOG K

14 4.1989
 20 1.5899

CATION # TOTAL

3 6.0000

IONIC STRENGTH = 18.4258

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22283E+00	0.12614E+01
0.17665E+00	0.0000	
CATION # 2	0.36057E-01	0.14471E+00
0.24916E+00	0.0009	
CATION # 3	0.32153E+02	0.53588E+01
0.60000E+01	0.0000	
ANION # 1	0.17455E+03	0.14048E+02
0.12426E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 22

EQUATION LOG K

14 4.1989
 20 1.5899

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15567E+00	0.13387E+01
0.11628E+00	0.0001	
CATION # 2	0.16607E-01	0.12497E+00
0.13288E+00	0.0008	
CATION # 3	0.55282E+02	0.85050E+01
0.65000E+01	0.0000	
ANION # 1	0.24986E+03	0.18859E+02
0.13249E+02	0.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 24

EQUATION LOG K

14 4.1989
 20 1.5899

CATION # TOTAL

3 7.0000

IONIC STRENGTH = 21.1524

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10816E+00	0.14164E+01
0.76364E-01	0.0000	
CATION # 2	0.80720E-02	0.10613E+00
0.76059E-01	0.0009	
CATION # 3	0.98660E+02	0.14094E+02
0.70000E+01	0.0000	
ANION # 1	0.35961E+03	0.25410E+02
0.14152E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 24

EQUATION LOG K

14 4.1989
 20 1.5899
 53 1.3018

IONIC STRENGTH = 16.0363

Triple point: halite+sylvite+carnallite

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49993E+00	0.11274E+01
0.44346E+00	-0.0008	
CATION # 2	0.25750E+00	0.19668E+00
0.13092E+01	0.0005	
CATION # 3	0.12004E+02	0.25212E+01
0.47612E+01	0.0000	
ANION # 1	0.77801E+02	0.69003E+01
0.11275E+02	-0.0008	

The following are the calculated RHs along the halite+carnallite boundary:

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.44E-01	1.31E+00	4.76E+00	6.8117	20.1259	73.0624	46.755
3.80E-01	9.62E-01	5.00E+00	5.9956	15.1621	78.8422	45.271
2.64E-01	4.89E-01	5.50E+00	4.2232	7.8191	87.9576	41.338
1.77E-01	2.49E-01	6.00E+00	2.7491	3.8775	93.3734	36.707
1.16E-01	1.33E-01	6.50E+00	1.7229	1.9688	96.3083	31.878
7.64E-02	7.61E-02	7.00E+00	1.0677	1.0634	97.8689	27.194
4.43E-01	1.31E+00	4.76E+00	6.8079	20.0987	73.0934	46.748

The last point is for the triple point halite+sylvite+carnallite

The following is the calculated solubility along the sylvite+carnallite boundary (except for the first point which is for hal+sylv+carn):

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
14	4.1989
20	1.5899
53	1.3018

IONIC STRENGTH = 16.0363

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49993E+00	0.11274E+01
0.44346E+00	-.0008	
CATION # 2	0.25750E+00	0.19668E+00
0.13093E+01	-.0009	
CATION # 3	0.12004E+02	0.25212E+01
0.47612E+01	0.0000	
ANION # 1	0.77802E+02	0.69003E+01
0.11275E+02	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
3	4.7720

IONIC STRENGTH = 16.0255

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44989E+00	0.11250E+01
0.39988E+00	-.0008	
CATION # 2	0.25734E+00	0.19649E+00
0.13096E+01	-.0004	
CATION # 3	0.11871E+02	0.24877E+01
0.47720E+01	0.0000	
ANION # 1	0.77851E+02	0.69179E+01
0.11254E+02	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
 THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
14	4.1989
53	1.3018

CATION #	TOTAL
3	4.7968

IONIC STRENGTH = 16.0008

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33579E+00	0.11197E+01
0.29989E+00	0.0008	
CATION # 2	0.25696E+00	0.19607E+00
0.13105E+01	0.0003	
CATION # 3	0.11572E+02	0.24124E+01
0.47968E+01	0.0000	
ANION # 1	0.77964E+02	0.69585E+01
0.11204E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 14
 NUMBER CORRESPONDING TO SATURATED SOLID 53

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
14	4.1989
53	1.3018
CATION #	TOTAL
3	4.8216

IONIC STRENGTH = 15.9764

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.22300E+00	0.11144E+01
0.20010E+00	0.0006	
CATION # 2	0.25659E+00	0.19565E+00
0.13115E+01	0.0002	
CATION # 3	0.11280E+02	0.23394E+01
0.48216E+01	0.0000	
ANION # 1	0.78077E+02	0.69994E+01
0.11155E+02	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
14	4.1989
53	1.3018

CATION # TOTAL

3 4.8465

IONIC STRENGTH = 15.9520

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.11102E+00	0.11092E+01
0.10010E+00	-.0010	
CATION # 2	0.25622E+00	0.19522E+00
0.13124E+01	-.0001	
CATION # 3	0.10994E+02	0.22684E+01
0.48465E+01	0.0000	
ANION # 1	0.78192E+02	0.70408E+01
0.11106E+02	-.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K

14	4.1989
53	1.3018

IONIC STRENGTH = 15.9278

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 2	0.25584E+00	0.19479E+00
0.13134E+01	-.0006	
CATION # 3	0.10714E+02	0.21994E+01
0.48715E+01	0.0000	
ANION # 1	0.78307E+02	0.70825E+01
0.11056E+02	-.0006	

The following is the calculated relative humidity along the sylvite+carnallite boundary:

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.43E-01	1.31E+00	4.76E+00	6.8078	20.0999	73.0923	46.748
4.00E-01	1.31E+00	4.77E+00	6.1696	20.2053	73.6252	46.825
3.00E-01	1.31E+00	4.80E+00	4.6805	20.4536	74.8659	47.004
2.00E-01	1.31E+00	4.82E+00	3.1595	20.7083	76.1321	47.182
1.00E-01	1.31E+00	4.85E+00	1.5993	20.9682	77.4325	47.363
1.31E+00	4.87E+00	0.00E+00	21.2356	78.7644	0.0000	47.544

The first point is for the triple point halite+sylvite+carnallite

September 9, 2001

Fixed $m_{\text{MgCl}_2} = 0.5$ (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
halite+sylvite boundary	
20	1.5899
53	1.3018
CATION #	TOTAL
3	0.5000

IONIC STRENGTH = 9.6504

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40556E+01	0.10120E+01
0.40075E+01	0.0003	
CATION # 2	0.20889E+01	0.50422E+00
0.41429E+01	-0.0007	
CATION # 3	0.50826E+00	0.10165E+01
0.50000E+00	0.0000	
ANION # 1	0.95906E+01	0.10481E+01
0.91504E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 6

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.5000
3	0.5000

IONIC STRENGTH = 9.2292

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42072E+01	0.99479E+00
0.42292E+01	0.0004	
CATION # 2	0.17380E+01	0.49656E+00
0.35000E+01	0.0000	
CATION # 3	0.48599E+00	0.97199E+00
0.50000E+00	0.0000	
ANION # 1	0.92448E+01	0.10591E+01
0.87292E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.0000
3	0.5000

IONIC STRENGTH = 8.9112

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43291E+01	0.98139E+00
0.44112E+01	0.0004	
CATION # 2	0.14709E+01	0.49028E+00
0.30000E+01	0.0000	
CATION # 3	0.46973E+00	0.93947E+00
0.50000E+00	0.0000	
ANION # 1	0.89844E+01	0.10681E+01
0.84112E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.0000
3	0.5000

IONIC STRENGTH = 8.9112

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43291E+01	0.98139E+00
0.44112E+01	0.0004	
CATION # 2	0.14709E+01	0.49028E+00
0.30000E+01	0.0000	
CATION # 3	0.46973E+00	0.93947E+00
0.50000E+00	0.0000	
ANION # 1	0.89844E+01	0.10681E+01
0.84112E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2 1.5000
3 0.5000

IONIC STRENGTH = 8.0059

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 2.5000
3 0.5000

IONIC STRENGTH = 8.6014

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44544E+01	0.96805E+00
0.46014E+01	0.0005	
CATION # 2	0.12095E+01	0.48379E+00
0.25000E+01	0.0000	
CATION # 3	0.45440E+00	0.90879E+00
0.50000E+00	0.0000	
ANION # 1	0.87317E+01	0.10778E+01
0.81014E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 2.0000
3 0.5000

IONIC STRENGTH = 8.2997

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45828E+01	0.95481E+00
0.47997E+01	0.0007	
CATION # 2	0.95421E+00	0.47710E+00
0.20000E+01	0.0000	
CATION # 3	0.43998E+00	0.87996E+00
0.50000E+00	0.0000	
ANION # 1	0.84871E+01	0.10881E+01
0.77997E+01	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.47142E+01	0.94173E+00
0.50059E+01	0.0009	
CATION # 2	0.70542E+00	0.47028E+00
0.15000E+01	0.0000	
CATION # 3	0.42648E+00	0.85296E+00
0.50000E+00	0.0000	
ANION # 1	0.82505E+01	0.10992E+01
0.75059E+01	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 1.0000
3 0.5000

IONIC STRENGTH = 7.7198

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48484E+01	0.92885E+00
0.52198E+01	0.0009	
CATION # 2	0.46334E+00	0.46334E+00
0.10000E+01	0.0000	
CATION # 3	0.41387E+00	0.82773E+00
0.50000E+00	0.0000	
ANION # 1	0.80221E+01	0.11111E+01
0.72198E+01	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 0.5000
3 0.5000

IONIC STRENGTH = 7.4414

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49853E+01	0.91619E+00
0.54414E+01	0.0006	
CATION # 2	0.22816E+00	0.45633E+00
0.50000E+00	0.0000	
CATION # 3	0.40213E+00	0.80425E+00
0.50000E+00	0.0000	

ANION # 1 0.78018E+01 0.11240E+01 0.69414E+01 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.01E+00	4.14E+00	5.00E-01	46.3273	47.8926	5.7801	66.667
4.23E+00	3.50E+00	5.00E-01	51.3926	42.5315	6.0759	67.766
4.41E+00	3.00E+00	5.00E-01	55.7589	37.9209	6.3202	68.608
4.41E+00	3.00E+00	5.00E-01	55.7589	37.9209	6.3202	68.608
4.60E+00	2.50E+00	5.00E-01	60.5336	32.8887	6.5777	69.436
4.80E+00	2.00E+00	5.00E-01	65.7520	27.3984	6.8496	70.248
5.01E+00	1.50E+00	5.00E-01	71.4526	21.4105	7.1368	71.042
5.22E+00	1.00E+00	5.00E-01	77.6779	14.8814	7.4407	71.817
5.44E+00	5.00E-01	5.00E-01	84.4754	7.7623	7.7623	72.57

Fixed mMgCl2 = 1.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.0000

IONIC STRENGTH = 10.2181

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.33502E+01	0.99226E+00
0.33763E+01	0.0004	
CATION # 2	0.17256E+01	0.44917E+00
0.38418E+01	-.0010	
CATION # 3	0.99250E+00	0.99250E+00
0.10000E+01	0.0000	
ANION # 1	0.11610E+02	0.12594E+01
0.92181E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.5000
3	1.0000

IONIC STRENGTH = 9.9825

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.34179E+01	0.98144E+00
0.34825E+01	-.0006	
CATION # 2	0.15594E+01	0.44553E+00
0.35000E+01	0.0000	
CATION # 3	0.95982E+00	0.95982E+00
0.10000E+01	0.0000	
ANION # 1	0.11380E+02	0.12669E+01
0.89825E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.0000
3	1.0000

IONIC STRENGTH = 9.6452

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.35196E+01	0.96554E+00
0.36452E+01	-.0010	
CATION # 2	0.13198E+01	0.43992E+00
0.30000E+01	0.0000	
CATION # 3	0.91439E+00	0.91439E+00
0.10000E+01	0.0000	
ANION # 1	0.11051E+02	0.12783E+01
0.86452E+01	-.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 1.5000
3 1.0000
IONIC STRENGTH = 8.6854

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 2.5000
3 1.0000

IONIC STRENGTH = 9.3166

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.38425E+01 0.91808E+00
0.41854E+01 0.0006
CATION # 2 0.63226E+00 0.42150E+00
0.15000E+01 0.0000
CATION # 3 0.79469E+00 0.79469E+00
0.10000E+01 0.0000
ANION # 1 0.10122E+02 0.13171E+01
0.76854E+01 0.0006

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.36243E+01 0.94962E+00
0.38166E+01 -.0005
CATION # 2 0.10850E+01 0.43402E+00
0.25000E+01 0.0000
CATION # 3 0.87176E+00 0.87176E+00
0.10000E+01 0.0000
ANION # 1 0.10732E+02 0.12904E+01
0.83166E+01 -.0005

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 1.0000
3 1.0000
IONIC STRENGTH = 8.3825

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 2.0000
3 1.0000

IONIC STRENGTH = 8.9967

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.39555E+01 0.90256E+00
0.43825E+01 0.0004
CATION # 2 0.41498E+00 0.41498E+00
0.10000E+01 0.0000
CATION # 3 0.76009E+00 0.76009E+00
0.10000E+01 0.0000
ANION # 1 0.98331E+01 0.13319E+01
0.73825E+01 0.0004

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.37321E+01 0.93379E+00
0.39967E+01 -.0008
CATION # 2 0.85573E+00 0.42786E+00
0.20000E+01 0.0000
CATION # 3 0.83191E+00 0.83191E+00
0.10000E+01 0.0000
ANION # 1 0.10422E+02 0.13033E+01
0.79967E+01 -.0008

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 0.5000
3 1.0000
IONIC STRENGTH = 8.0880

THE NUMBER OF ITERATIONS IS 9

MOLALITY ACTIVITY %ERROR ACT.COEFF.

CATION # 1 0.40709E+01 0.88729E+00
 0.45880E+01 0.0006
 CATION # 2 0.20416E+00 0.40831E+00
 0.50000E+00 0.0000

CATION # 3 0.72795E+00 0.72795E+00
 0.10000E+01 0.0000
 ANION # 1 0.95544E+01 0.13480E+01
 0.70880E+01 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
3.38E+00	3.84E+00	1.00E+00	41.0837	46.7480	12.1683	65.741
3.48E+00	3.50E+00	1.00E+00	43.6267	43.8459	12.5274	66.362
3.65E+00	3.00E+00	1.00E+00	47.6796	39.2403	13.0801	67.265
3.82E+00	2.50E+00	1.00E+00	52.1636	34.1689	13.6676	68.155
4.00E+00	2.00E+00	1.00E+00	57.1226	28.5849	14.2925	69.032
4.19E+00	1.50E+00	1.00E+00	62.6051	22.4370	14.9580	69.892
4.38E+00	1.00E+00	1.00E+00	68.6643	15.6678	15.6678	70.733
4.59E+00	5.00E-01	1.00E+00	75.3614	8.2129	16.4258	71.553

Fixed mMgCl2 = 1.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K

halite+sylvite boundary

20 1.5899
 53 1.3018

CATION # TOTAL

3 1.5000

IONIC STRENGTH = 10.8091

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27395E+01	0.98051E+00
0.27939E+01	0.0003	
CATION # 2	0.14110E+01	0.40142E+00
0.35152E+01	-0.0007	
CATION # 3	0.14872E+01	0.99148E+00
0.15000E+01	0.0000	
ANION # 1	0.14198E+02	0.15252E+01
0.93091E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 3.0000
 3 1.5000

IONIC STRENGTH = 10.4389

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.28264E+01	0.96169E+00
0.29389E+01	-0.0009	
CATION # 2	0.11895E+01	0.39651E+00
0.30000E+01	0.0000	
CATION # 3	0.13929E+01	0.92859E+00
0.15000E+01	0.0000	
ANION # 1	0.13762E+02	0.15395E+01
0.89389E+01	-0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 7

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 2.5000
 3 1.5000

IONIC STRENGTH = 10.0889

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.29139E+01	0.94333E+00
0.30889E+01	-0.0007	
CATION # 2	0.97843E+00	0.39137E+00
0.25000E+01	0.0000	
CATION # 3	0.13077E+01	0.87182E+00
0.15000E+01	0.0000	
ANION # 1	0.13349E+02	0.15542E+01
0.85889E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 2.0000
3 1.5000

IONIC STRENGTH = 9.7480

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30043E+01	0.92497E+00
0.32480E+01	0.0006	
CATION # 2	0.77183E+00	0.38592E+00
0.20000E+01	0.0000	
CATION # 3	0.12287E+01	0.81915E+00
0.15000E+01	0.0000	
ANION # 1	0.12947E+02	0.15697E+01
0.82480E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 1.5000
3 1.5000

IONIC STRENGTH = 9.4162

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30975E+01	0.90671E+00
0.34162E+01	0.0004	
CATION # 2	0.57028E+00	0.38019E+00
0.15000E+01	0.0000	
CATION # 3	0.11557E+01	0.77046E+00
0.15000E+01	0.0000	
ANION # 1	0.12557E+02	0.15862E+01
0.79162E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 1.0000
3 1.5000

IONIC STRENGTH = 9.0935

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31932E+01	0.88862E+00
0.35935E+01	0.0008	
CATION # 2	0.37423E+00	0.37423E+00
0.10000E+01	0.0000	
CATION # 3	0.10883E+01	0.72551E+00
0.15000E+01	0.0000	
ANION # 1	0.12180E+02	0.16041E+01
0.75935E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 0.5000
3 1.5000

IONIC STRENGTH = 8.7798

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32914E+01	0.87078E+00
0.37798E+01	0.0008	
CATION # 2	0.18404E+00	0.36808E+00
0.50000E+00	0.0000	
CATION # 3	0.10262E+01	0.68413E+00
0.15000E+01	0.0000	
ANION # 1	0.11817E+02	0.16233E+01
0.72798E+01	0.0008	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.79E+00	3.52E+00	1.50E+00	35.7775	45.0142	19.2084	64.551
2.94E+00	3.00E+00	1.50E+00	39.5072	40.3285	20.1643	65.554
3.09E+00	2.50E+00	1.50E+00	43.5738	35.2664	21.1598	66.522
3.25E+00	2.00E+00	1.50E+00	48.1328	29.6384	22.2288	67.478
3.42E+00	1.50E+00	1.50E+00	53.2434	23.3783	23.3783	68.42
3.59E+00	1.00E+00	1.50E+00	58.9727	16.4109	24.6164	69.345
3.78E+00	5.00E-01	1.50E+00	65.3967	8.6508	25.9525	70.25

Fixed mMgCl2 = 2.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 11.4331

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.22123E+01	0.97680E+00
0.22649E+01	-.0004	
CATION # 2	0.11395E+01	0.35966E+00
0.31682E+01	0.0006	
CATION # 3	0.20354E+01	0.10177E+01
0.20000E+01	0.0000	
ANION # 1	0.17581E+02	0.18638E+01
0.94331E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

3

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.0000
3	2.0000

IONIC STRENGTH = 11.3053

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
----------	-----------------	-------------

CATION # 1	0.22359E+01	0.96988E+00
0.23053E+01	-.0005	
CATION # 2	0.10750E+01	0.35834E+00
0.30000E+01	0.0000	
CATION # 3	0.19820E+01	0.99100E+00
0.20000E+01	0.0000	
ANION # 1	0.17396E+02	0.18695E+01
0.93053E+01	-.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.5000
3	2.0000

IONIC STRENGTH = 10.9314

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.23079E+01	0.94918E+00
0.24314E+01	-.0008	
CATION # 2	0.88533E+00	0.35413E+00
0.25000E+01	0.0000	
CATION # 3	0.18315E+01	0.91574E+00
0.20000E+01	0.0000	
ANION # 1	0.16853E+02	0.18870E+01
0.89314E+01	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.0000
3	2.0000

IONIC STRENGTH = 10.5668

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23830E+01	0.92836E+00
0.25668E+01	-.0005	
CATION # 2	0.69906E+00	0.34953E+00
0.20000E+01	0.0000	
CATION # 3	0.16931E+01	0.84655E+00
0.20000E+01	0.0000	
ANION # 1	0.16322E+02	0.19053E+01
0.85668E+01	-.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	2.0000

IONIC STRENGTH = 10.2116

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.24610E+01	0.90755E+00
0.27116E+01	-.0006	
CATION # 2	0.51687E+00	0.34458E+00
0.15000E+01	0.0000	
CATION # 3	0.15663E+01	0.78317E+00
0.20000E+01	0.0000	
ANION # 1	0.15805E+02	0.19247E+01
0.82116E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.26E+00	3.17E+00	2.00E+00	30.4705	42.6229	26.9067	63.05
2.31E+00	3.00E+00	2.00E+00	31.5565	41.0661	27.3774	63.403
2.43E+00	2.50E+00	2.00E+00	35.0781	36.0677	28.8542	64.453
2.57E+00	2.00E+00	2.00E+00	39.0875	30.4562	30.4562	65.499
2.71E+00	1.50E+00	2.00E+00	43.6538	24.1484	32.1978	66.537
2.87E+00	1.00E+00	2.00E+00	48.8570	17.0477	34.0954	67.563
3.03E+00	5.00E-01	2.00E+00	54.7904	9.0419	36.1677	68.574

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	2.0000

IONIC STRENGTH = 9.8659

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.25417E+01	0.88686E+00
0.28659E+01	0.0008	
CATION # 2	0.33933E+00	0.33933E+00
0.10000E+01	0.0000	
CATION # 3	0.14505E+01	0.72525E+00
0.20000E+01	0.0000	
ANION # 1	0.15303E+02	0.19455E+01
0.78659E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	2.0000

IONIC STRENGTH = 9.5298

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.26250E+01	0.86639E+00
0.30298E+01	0.0006	
CATION # 2	0.16691E+00	0.33383E+00
0.50000E+00	0.0000	
CATION # 3	0.13450E+01	0.67249E+00
0.20000E+01	0.0000	
ANION # 1	0.14817E+02	0.19678E+01
0.75298E+01	0.0006	

Fixed mMgCl2 = 2.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 12.1021

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17605E+01	0.98156E+00
0.17936E+01	0.0004	
CATION # 2	0.90680E+00	0.32287E+00
0.28085E+01	-0.0007	
CATION # 3	0.26984E+01	0.10794E+01
0.25000E+01	0.0000	
ANION # 1	0.22093E+02	0.23009E+01
0.96021E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.5000
3	2.5000

IONIC STRENGTH = 11.8569

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17965E+01	0.96744E+00
0.18569E+01	-0.0008	
CATION # 2	0.80220E+00	0.32088E+00
0.25000E+01	0.0000	
CATION # 3	0.25449E+01	0.10180E+01
0.25000E+01	0.0000	
ANION # 1	0.21651E+02	0.23139E+01
0.93569E+01	-0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.0000
3	2.5000

IONIC STRENGTH = 11.4668

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18573E+01	0.94430E+00
0.19668E+01	-0.0007	
CATION # 2	0.63455E+00	0.31728E+00
0.20000E+01	0.0000	
CATION # 3	0.23141E+01	0.92563E+00
0.25000E+01	0.0000	
ANION # 1	0.20942E+02	0.23355E+01
0.89668E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	2.5000

IONIC STRENGTH = 11.0859

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19211E+01	0.92100E+00
0.20859E+01	0.0005	
CATION # 2	0.46988E+00	0.31326E+00
0.15000E+01	0.0000	
CATION # 3	0.21045E+01	0.84180E+00
0.25000E+01	0.0000	
ANION # 1	0.20246E+02	0.23580E+01
0.85859E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 1.0000

3 2.5000

IONIC STRENGTH = 10.7145

ACTIVITY ACT.COEFF.

MOLALITY %ERROR

CATION # 1 0.19879E+01 0.89769E+00

0.22145E+01 0.0009

CATION # 2 0.30886E+00 0.30886E+00

0.10000E+01 0.0000

CATION # 3 0.19150E+01 0.76599E+00

0.25000E+01 0.0000

ANION # 1 0.19565E+02 0.23818E+01

0.82145E+01 0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 0.5000

3 2.5000

IONIC STRENGTH = 10.3528

ACTIVITY ACT.COEFF.

MOLALITY %ERROR

CATION # 1 0.20575E+01 0.87450E+00

0.23528E+01 0.0006

CATION # 2 0.15207E+00 0.30414E+00

0.50000E+00 0.0000

CATION # 3 0.17442E+01 0.69766E+00

0.25000E+01 0.0000

ANION # 1 0.18903E+02 0.24072E+01

0.78528E+01 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.79E+00	2.81E+00	2.50E+00	25.2545	39.5446	35.2009	61.175
1.86E+00	2.50E+00	2.50E+00	27.0808	36.4596	36.4596	61.874
1.97E+00	2.00E+00	2.50E+00	30.4138	30.9272	38.6590	63.012
2.09E+00	1.50E+00	2.50E+00	34.2743	24.6471	41.0786	64.153
2.21E+00	1.00E+00	2.50E+00	38.7523	17.4993	43.7484	65.289
2.35E+00	5.00E-01	2.50E+00	43.9546	9.3409	46.7045	66.417

Fixed mMgCl2 = 3.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K

20 1.5899

53 1.3018

CATION # TOTAL

3 3.0000

IONIC STRENGTH = 12.8293

ACTIVITY ACT.COEFF.

MOLALITY %ERROR

CATION # 1 0.13776E+01 0.99550E+00

0.13838E+01 0.0003

CATION # 2 0.70957E+00 0.29016E+00

0.24455E+01 -.0007

CATION # 3 0.35718E+01 0.11906E+01

0.30000E+01 0.0000

ANION # 1 0.28234E+02 0.28724E+01

0.98293E+01 0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 2.0000

3 3.0000

IONIC STRENGTH = 12.4592

ACTIVITY ACT.COEFF.

MOLALITY %ERROR

CATION # 1 0.14200E+01 0.97311E+00

0.14592E+01 -.0005

CATION # 2 0.57587E+00 0.28793E+00

0.20000E+01 0.0000

CATION # 3 0.32357E+01 0.10786E+01

0.30000E+01 0.0000

ANION # 1 0.27392E+02 0.28958E+01

0.94592E+01 -.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	3.0000

IONIC STRENGTH = 12.0517

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14704E+01	0.94757E+00
0.15517E+01	-.0009	
CATION # 2	0.42748E+00	0.28498E+00
0.15000E+01	0.0000	
CATION # 3	0.28939E+01	0.96462E+00
0.30000E+01	0.0000	
ANION # 1	0.26453E+02	0.29224E+01
0.90517E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.38E+00	2.45E+00	3.00E+00	20.2627	35.8089	43.9284	58.862
1.46E+00	2.00E+00	3.00E+00	22.5910	30.9636	46.4454	59.95
1.55E+00	1.50E+00	3.00E+00	25.6407	24.7864	49.5728	61.185
1.65E+00	1.00E+00	3.00E+00	29.2436	17.6891	53.0673	62.43
1.76E+00	5.00E-01	3.00E+00	33.5094	9.4987	56.9920	63.678

CATION # TOTAL

2	1.0000
3	3.0000

IONIC STRENGTH = 11.6532

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15238E+01	0.92176E+00
0.16532E+01	-.0006	
CATION # 2	0.28159E+00	0.28159E+00
0.10000E+01	0.0000	
CATION # 3	0.25874E+01	0.86246E+00
0.30000E+01	0.0000	
ANION # 1	0.25525E+02	0.29498E+01
0.86532E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	3.0000

IONIC STRENGTH = 11.2639

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15802E+01	0.89588E+00
0.17639E+01	-.0004	
CATION # 2	0.13890E+00	0.27779E+00
0.50000E+00	0.0000	
CATION # 3	0.23138E+01	0.77126E+00
0.30000E+01	0.0000	
ANION # 1	0.24614E+02	0.29785E+01
0.82639E+01	-.0004	

Fixed mMgCl2 = 3.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.5000

IONIC STRENGTH = 13.6285

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10582E+01	0.10194E+01
0.10380E+01	0.0003	
CATION # 2	0.54507E+00	0.26074E+00
0.20905E+01	-0.0007	
CATION # 3	0.48141E+01	0.13754E+01
0.35000E+01	0.0000	
ANION # 1	0.36755E+02	0.36289E+01
0.10129E+02	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	3.5000

IONIC STRENGTH = 13.1168

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11027E+01	0.98736E+00
0.11168E+01	-0.0009	
CATION # 2	0.38806E+00	0.25870E+00
0.15000E+01	0.0000	
CATION # 3	0.41462E+01	0.11846E+01
0.35000E+01	0.0000	
ANION # 1	0.35275E+02	0.36680E+01
0.96168E+01	-0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	3.5000

IONIC STRENGTH = 12.6917

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11434E+01	0.95948E+00
0.11917E+01	-0.0007	
CATION # 2	0.25644E+00	0.25644E+00
0.10000E+01	0.0000	
CATION # 3	0.36474E+01	0.10421E+01
0.35000E+01	0.0000	
ANION # 1	0.34018E+02	0.37009E+01
0.91917E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	3.5000

IONIC STRENGTH = 12.2748

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11870E+01	0.93119E+00
0.12748E+01	-0.0005	
CATION # 2	0.12686E+00	0.25371E+00
0.50000E+00	0.0000	
CATION # 3	0.32053E+01	0.91581E+00
0.35000E+01	0.0000	
ANION # 1	0.32767E+02	0.37342E+01
0.87748E+01	-0.0005	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.04E+00	2.09E+00	3.50E+00	15.6597	31.5381	52.8023	56.061
1.12E+00	1.50E+00	3.50E+00	18.2579	24.5226	57.2195	57.596
1.19E+00	1.00E+00	3.50E+00	20.9375	17.5694	61.4931	58.928
1.27E+00	5.00E-01	3.50E+00	24.1677	9.4790	66.3532	60.281

Fixed mMgCl2 = 4.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.0000

IONIC STRENGTH = 14.5122

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.79734E+00	0.10541E+01
0.75645E+00	-.0006	
CATION # 2	0.41069E+00	0.23390E+00
0.17558E+01	-.0010	
CATION # 3	0.66993E+01	0.16748E+01
0.40000E+01	0.0000	
ANION # 1	0.48782E+02	0.46405E+01
0.10512E+02	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	4.0000

IONIC STRENGTH = 14.2805

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.81135E+00	0.10396E+01
0.78046E+00	-.0005	
CATION # 2	0.35034E+00	0.23356E+00
0.15000E+01	0.0000	
CATION # 3	0.62383E+01	0.15596E+01
0.40000E+01	0.0000	

ANION # 1 0.47939E+02 0.46632E+01
 0.10280E+02 -.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	4.0000

IONIC STRENGTH = 13.8319

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.84063E+00	0.10104E+01
0.83194E+00	-.0009	
CATION # 2	0.23251E+00	0.23251E+00
0.10000E+01	0.0000	
CATION # 3	0.54151E+01	0.13538E+01
0.40000E+01	0.0000	
ANION # 1	0.46270E+02	0.47061E+01
0.98319E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	4.0000

IONIC STRENGTH = 13.3899

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.87249E+00	0.98043E+00
0.88990E+00	-.0007	

CATION # 2 0.11548E+00 0.23095E+00
 0.50000E+00 0.0000
 CATION # 3 0.46887E+01 0.11722E+01
 0.40000E+01 0.0000

ANION # 1 0.44580E+02 0.47477E+01
 0.93899E+01 -.0007

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
7.56E-01	1.76E+00	4.00E+00	11.6158	26.9615	61.4227	52.742
7.80E-01	1.50E+00	4.00E+00	12.4268	23.8836	63.6896	53.427
8.32E-01	1.00E+00	4.00E+00	14.2652	17.1470	68.5878	54.8
8.90E-01	5.00E-01	4.00E+00	16.5105	9.2766	74.2129	56.216

Fixed mMgCl2 = 4.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.5000

IONIC STRENGTH = 15.4886

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.58948E+00	0.10995E+01	
0.53614E+00 0.0001		
CATION # 2 0.30363E+00	0.20905E+00	
0.14524E+01 -.0006		
CATION # 3 0.97123E+01	0.21583E+01	
0.45000E+01 0.0000		
ANION # 1 0.65982E+02	0.60046E+01	
0.10989E+02 0.0001		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION # TOTAL

2	1.0000
3	4.5000

IONIC STRENGTH = 15.0661

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.60742E+00	0.10730E+01	
0.56609E+00 -.0008		
CATION # 2 0.20915E+00	0.20915E+00	
0.10000E+01 0.0000		
CATION # 3 0.84711E+01	0.18825E+01	
0.45000E+01 0.0000		
ANION # 1 0.64034E+02	0.60604E+01	
0.10566E+02 -.0008		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	4.5000

IONIC STRENGTH = 14.6036

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.62921E+00	0.10424E+01	
0.60364E+00 -.0008		
CATION # 2 0.10439E+00	0.20879E+00	
0.50000E+00 0.0000		
CATION # 3 0.72553E+01	0.16123E+01	
0.45000E+01 0.0000		
ANION # 1 0.61816E+02	0.61182E+01	
0.10104E+02 -.0008		

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
5.36E-01	1.45E+00	4.50E+00	8.2629	22.3841	69.3530	48.921
5.66E-01	1.00E+00	4.50E+00	9.3320	16.4851	74.1829	50.154
6.04E-01	5.00E-01	4.50E+00	10.7723	8.9228	80.3049	51.576

Fixed mMgCl2 = 0.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.5000

IONIC STRENGTH = 9.6503

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40556E+01	0.10120E+01
0.40076E+01	-0.0004	
CATION # 2	0.20889E+01	0.50422E+00
0.41428E+01	0.0009	
CATION # 3	0.50826E+00	0.10165E+01
0.50000E+00	0.0000	
ANION # 1	0.95905E+01	0.10481E+01
0.91503E+01	-0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	3.5000
3	0.5000

IONIC STRENGTH = 9.3817

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.34388E+01	0.98251E+00
0.35000E+01	0.0000	
CATION # 2	0.22335E+01	0.50973E+00
0.43817E+01	0.0006	
CATION # 3	0.43467E+00	0.86935E+00
0.50000E+00	0.0000	
ANION # 1	0.89697E+01	0.10099E+01
0.88817E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	3.0000
3	0.5000

IONIC STRENGTH = 9.1295

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.28641E+01	0.95469E+00
0.30000E+01	0.0000	
CATION # 2	0.23844E+01	0.51505E+00
0.46295E+01	0.0007	
CATION # 3	0.37387E+00	0.74774E+00
0.50000E+00	0.0000	
ANION # 1	0.84020E+01	0.97364E+00
0.86295E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	2.5000
3	0.5000

IONIC STRENGTH = 8.8893

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23202E+01	0.92807E+00
0.25000E+01	0.0000	
CATION # 2	0.25438E+01	0.52029E+00
0.48893E+01	0.0007	
CATION # 3	0.32266E+00	0.64531E+00
0.50000E+00	0.0000	
ANION # 1	0.78753E+01	0.93873E+00
0.83893E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 2.0000
3 0.5000

IONIC STRENGTH = 8.6609

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18052E+01	0.90261E+00
0.20000E+01	0.0000	
CATION # 2	0.27120E+01	0.52548E+00
0.51609E+01	0.0007	
CATION # 3	0.27939E+00	0.55877E+00
0.50000E+00	0.0000	
ANION # 1	0.73871E+01	0.90518E+00
0.81609E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 1.5000
3 0.5000

IONIC STRENGTH = 8.4439

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13174E+01	0.87829E+00
0.15000E+01	0.0000	
CATION # 2	0.28888E+01	0.53066E+00
0.54439E+01	0.0007	
CATION # 3	0.24272E+00	0.48544E+00
0.50000E+00	0.0000	
ANION # 1	0.69348E+01	0.87297E+00
0.79439E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 1.0000
3 0.5000

IONIC STRENGTH = 8.2378

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.85508E+00	0.85508E+00
0.10000E+01	0.0000	
CATION # 2	0.30746E+01	0.53584E+00
0.57378E+01	0.0008	
CATION # 3	0.21155E+00	0.42309E+00
0.50000E+00	0.0000	
ANION # 1	0.65159E+01	0.84208E+00
0.77378E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018

CATION # TOTAL
1 0.5000
3 0.5000

IONIC STRENGTH = 8.0422

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.41646E+00	0.83293E+00
0.50000E+00	0.0000	
CATION # 2	0.32692E+01	0.54106E+00
0.60422E+01	0.0008	
CATION # 3	0.18496E+00	0.36991E+00
0.50000E+00	0.0000	
ANION # 1	0.61280E+01	0.81249E+00
0.75422E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.01E+00	4.14E+00	5.00E-01	46.3285	47.8914	5.7801	66.667
3.50E+00	4.38E+00	5.00E-01	41.7576	52.2770	5.9654	67.907
3.00E+00	4.63E+00	5.00E-01	36.9026	56.9469	6.1504	69.085
2.50E+00	4.89E+00	5.00E-01	31.6885	61.9738	6.3377	70.217
2.00E+00	5.16E+00	5.00E-01	26.1066	67.3668	6.5266	71.3
1.50E+00	5.44E+00	5.00E-01	20.1507	73.1324	6.7169	72.334
1.00E+00	5.74E+00	5.00E-01	13.8164	79.2755	6.9082	73.316
5.00E-01	6.04E+00	5.00E-01	7.1001	85.7999	7.1001	74.248

Fixed mMgCl2 = 1.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

THE NUMBER OF ITERATIONS IS 15

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 2.5000
3 1.0000

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
20 1.5899
53 1.3018
CATION # TOTAL
3 1.0000

IONIC STRENGTH = 10.2181

IONIC STRENGTH = 9.7471

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23502E+01	0.94007E+00
0.25000E+01	0.0000	
CATION # 2	0.19414E+01	0.45711E+00
0.42471E+01	0.0010	
CATION # 3	0.74768E+00	0.74768E+00
0.10000E+01	0.0000	
ANION # 1	0.10319E+02	0.11797E+01
0.87471E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33502E+01	0.99226E+00
0.33764E+01	-0.0003	
CATION # 2	0.17256E+01	0.44917E+00
0.38417E+01	0.0007	
CATION # 3	0.99249E+00	0.99249E+00
0.10000E+01	0.0000	
ANION # 1	0.11610E+02	0.12595E+01
0.92181E+01	-0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 2.0000
3 1.0000

IONIC STRENGTH = 9.4961

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18241E+01	0.91203E+00
0.20000E+01	0.0000	
CATION # 2	0.20748E+01	0.46146E+00
0.44961E+01	0.0006	
CATION # 3	0.63925E+00	0.63925E+00
0.10000E+01	0.0000	
ANION # 1	0.96558E+01	0.11365E+01
0.84961E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.29081E+01	0.96937E+00
0.30000E+01	0.0000	
CATION # 2	0.18155E+01	0.45264E+00
0.40109E+01	0.0008	
CATION # 3	0.87764E+00	0.87764E+00
0.10000E+01	0.0000	
ANION # 1	0.11035E+02	0.12246E+01
0.90109E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 1.5000
3 1.0000

IONIC STRENGTH = 9.2576

THE NUMBER OF ITERATIONS IS 16

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.	EQUATION	LOG K
CATION # 1	0.13279E+01	0.88525E+00	53	1.3018
0.15000E+01	0.0000			
CATION # 2	0.22158E+01	0.46573E+00		
0.47576E+01	0.0006			
CATION # 3	0.54852E+00	0.54852E+00		
0.10000E+01	0.0000			
ANION # 1	0.90414E+01	0.10949E+01	1	0.5000
0.82576E+01	0.0000		3	1.0000

IONIC STRENGTH = 8.8166

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
3.38E+00	3.84E+00	1.00E+00	41.0849	46.7468	12.1683	65.741
3.00E+00	4.01E+00	1.00E+00	37.4490	50.0680	12.4830	66.748
2.50E+00	4.25E+00	1.00E+00	32.2701	54.8218	12.9081	68.05
2.00E+00	4.50E+00	1.00E+00	26.6805	59.9792	13.3403	69.306
1.50E+00	4.76E+00	1.00E+00	20.6680	65.5534	13.7787	70.515
5.00E-01	5.32E+00	1.00E+00	7.3350	77.9949	14.6701	72.782

Fixed mMgCl2 = 1.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K	EQUATION	LOG K
20	1.5899	53	1.3018
53	1.3018		
CATION #	TOTAL	CATION #	TOTAL
3	1.5000	1	2.5000
		3	1.5000

IONIC STRENGTH = 10.8090

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.	MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.27395E+01	0.98051E+00	CATION # 1	0.24044E+01	0.96178E+00
0.27939E+01	-0.0004		0.25000E+01	0.0000	
CATION # 2	0.14110E+01	0.40142E+00	CATION # 2	0.14697E+01	0.40377E+00
0.35151E+01	0.0009		0.36399E+01	0.0009	
CATION # 3	0.14872E+01	0.99147E+00	CATION # 3	0.13433E+01	0.89551E+00
0.15000E+01	0.0000		0.15000E+01	0.0000	
ANION # 1	0.14198E+02	0.15252E+01	ANION # 1	0.13631E+02	0.14914E+01
0.93090E+01	-0.0004		0.91399E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 2.0000
 3 1.5000

IONIC STRENGTH = 10.3628

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18619E+01	0.93097E+00
0.20000E+01	0.0000	
CATION # 2	0.15746E+01	0.40764E+00
0.38628E+01	0.0009	
CATION # 3	0.11330E+01	0.75536E+00
0.15000E+01	0.0000	
ANION # 1	0.12723E+02	0.14355E+01
0.88628E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 1.5000
 3 1.5000

IONIC STRENGTH = 10.0992

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13522E+01	0.90149E+00
0.15000E+01	0.0000	
CATION # 2	0.16862E+01	0.41135E+00
0.40992E+01	0.0007	
CATION # 3	0.95938E+00	0.63959E+00
0.15000E+01	0.0000	
ANION # 1	0.11881E+02	0.13816E+01
0.85992E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 1.0000
 3 1.5000

IONIC STRENGTH = 9.8488

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.87334E+00	0.87334E+00
0.10000E+01	0.0000	
CATION # 2	0.18045E+01	0.41495E+00
0.43488E+01	0.0009	
CATION # 3	0.81548E+00	0.54365E+00
0.15000E+01	0.0000	
ANION # 1	0.11102E+02	0.13297E+01
0.83488E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 0.5000
 3 1.5000

IONIC STRENGTH = 9.6114

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42326E+00	0.84652E+00
0.50000E+00	0.0000	
CATION # 2	0.19297E+01	0.41846E+00
0.46114E+01	0.0005	
CATION # 3	0.69587E+00	0.46391E+00
0.15000E+01	0.0000	
ANION # 1	0.10382E+02	0.12799E+01
0.81114E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.79E+00	3.52E+00	1.50E+00	35.7779	45.0134	19.2086	64.551
2.50E+00	3.64E+00	1.50E+00	32.7229	47.6433	19.6338	65.412
2.00E+00	3.86E+00	1.50E+00	27.1636	52.4637	20.3727	66.842
1.50E+00	4.10E+00	1.50E+00	21.1291	57.7417	21.1291	68.229
1.00E+00	4.35E+00	1.50E+00	14.6011	63.4973	21.9016	69.571
5.00E-01	4.61E+00	1.50E+00	7.5627	69.7492	22.6881	70.863

Fixed mMgCl2 = 2.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 11.4331

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22123E+01	0.97680E+00
0.22649E+01	-.0004	
CATION # 2	0.11395E+01	0.35966E+00
0.31682E+01	0.0008	
CATION # 3	0.20354E+01	0.10177E+01
0.20000E+01	0.0000	
ANION # 1	0.17581E+02	0.18638E+01
0.94331E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	2.0000
3	2.0000

IONIC STRENGTH = 11.2729

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19182E+01	0.95909E+00
0.20000E+01	0.0000	
CATION # 2	0.11834E+01	0.36158E+00
0.32729E+01	-.0007	
CATION # 3	0.18469E+01	0.92343E+00
0.20000E+01	0.0000	
ANION # 1	0.16929E+02	0.18257E+01
0.92729E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.5000
3	2.0000

IONIC STRENGTH = 10.9810

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13901E+01	0.92671E+00
0.15000E+01	0.0000	
CATION # 2	0.12706E+01	0.36502E+00
0.34810E+01	-.0009	
CATION # 3	0.15417E+01	0.77085E+00
0.20000E+01	0.0000	
ANION # 1	0.15767E+02	0.17556E+01
0.89810E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.0000
3	2.0000

IONIC STRENGTH = 10.7030

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.89570E+00	0.89570E+00
0.10000E+01	0.0000	
CATION # 2	0.13637E+01	0.36827E+00
0.37030E+01	0.0008	
CATION # 3	0.12921E+01	0.64604E+00
0.20000E+01	0.0000	
ANION # 1	0.14691E+02	0.16880E+01
0.87030E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

IONIC STRENGTH = 10.4389

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
1	0.5000
3	2.0000

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43305E+00	0.86611E+00
0.50000E+00	0.0000	
CATION # 2	0.14628E+01	0.37137E+00
0.39389E+01	0.0008	
CATION # 3	0.10874E+01	0.54368E+00
0.20000E+01	0.0000	
ANION # 1	0.13695E+02	0.16229E+01
0.84389E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.26E+00	3.17E+00	2.00E+00	30.4705	42.6229	26.9067	63.05
2.00E+00	3.27E+00	2.00E+00	27.4993	45.0013	27.4993	63.891
1.50E+00	3.48E+00	2.00E+00	21.4869	49.8639	28.6492	65.453
1.00E+00	3.70E+00	2.00E+00	14.9187	55.2439	29.8374	66.979
5.00E-01	3.94E+00	2.00E+00	7.7653	61.1735	31.0612	68.459

Fixed mMgCl2 = 2.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 12.1021

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17605E+01	0.98156E+00
0.17936E+01	0.0005	
CATION # 2	0.90681E+00	0.32287E+00
0.28085E+01	-0.0009	
CATION # 3	0.26985E+01	0.10794E+01
0.25000E+01	0.0000	
ANION # 1	0.22093E+02	0.23009E+01
0.96021E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.5000
3	2.5000

IONIC STRENGTH = 11.9145

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14414E+01	0.96093E+00
0.15000E+01	0.0000	
CATION # 2	0.94675E+00	0.32484E+00
0.29145E+01	-0.0006	
CATION # 3	0.24070E+01	0.96280E+00
0.25000E+01	0.0000	
ANION # 1	0.21161E+02	0.22477E+01
0.94145E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.0000
3	2.5000

IONIC STRENGTH = 11.6062

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.92688E+00	0.92688E+00
0.10000E+01	0.0000	
CATION # 2	0.10188E+01	0.32799E+00
0.31062E+01	0.0007	
CATION # 3	0.19873E+01	0.79492E+00
0.25000E+01	0.0000	
ANION # 1	0.19664E+02	0.21594E+01
0.91062E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K

53 1.3018

CATION # TOTAL

1 0.5000
3 2.5000

IONIC STRENGTH = 11.3123

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44713E+00	0.89427E+00
0.50000E+00	0.0000	
CATION # 2	0.10961E+01	0.33092E+00
0.33123E+01	-0.0007	
CATION # 3	0.16477E+01	0.65906E+00
0.25000E+01	0.0000	
ANION # 1	0.18277E+02	0.20741E+01
0.88123E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.79E+00	2.81E+00	2.50E+00	25.2545	39.5446	35.2009	61.175
1.50E+00	2.91E+00	2.50E+00	21.6935	42.1506	36.1559	62.183
1.00E+00	3.11E+00	2.50E+00	15.1373	47.0195	37.8432	63.88
5.00E-01	3.31E+00	2.50E+00	7.9210	52.4737	39.6052	65.544

Fixed mMgCl2 = 3.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K

20 1.5899
53 1.3018

CATION # TOTAL

3 3.0000

IONIC STRENGTH = 12.8293

EQUATION LOG K

53 1.3018

CATION # TOTAL

1 1.0000
3 3.0000

IONIC STRENGTH = 12.5694

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.96712E+00	0.96712E+00
0.10000E+01	0.0000	
CATION # 2	0.75190E+00	0.29263E+00
0.25694E+01	0.0006	
CATION # 3	0.30482E+01	0.10161E+01
0.30000E+01	0.0000	
ANION # 1	0.26644E+02	0.27843E+01
0.95694E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K

53 1.3018

CATION # TOTAL

1 0.5000
3 3.0000

IONIC STRENGTH = 12.2435

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 16

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46567E+00	0.93134E+00
0.50000E+00	0.0000	

CATION # 2	0.81101E+00	0.29561E+00
0.27435E+01	-0.0008	
CATION # 3	0.24880E+01	0.82934E+00
0.30000E+01	0.0000	
ANION # 1	0.24703E+02	0.26724E+01
0.92435E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.38E+00	2.45E+00	3.00E+00	20.2630	35.8080	43.9290	58.862
1.00E+00	2.57E+00	3.00E+00	15.2221	39.1116	45.6663	60.28
5.00E-01	2.74E+00	3.00E+00	8.0083	43.9417	48.0500	62.111

Fixed mMgCl2 = 3.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.5000

IONIC STRENGTH = 13.6285

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10582E+01	0.10194E+01
0.10381E+01	-0.0007	
CATION # 2	0.54506E+00	0.26074E+00
0.20905E+01	0.0004	
CATION # 3	0.48141E+01	0.13754E+01
0.35000E+01	0.0000	
ANION # 1	0.36755E+02	0.36289E+01
0.10129E+02	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.7500
3	3.5000

IONIC STRENGTH = 13.4198

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	--------------------	------------

CATION # 1	0.74765E+00	0.99687E+00
0.75000E+00	0.0000	
CATION # 2	0.56988E+00	0.26264E+00
0.21698E+01	-0.0009	
CATION # 3	0.42421E+01	0.12120E+01
0.35000E+01	0.0000	
ANION # 1	0.35155E+02	0.35439E+01
0.99198E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.5000
3	3.5000

IONIC STRENGTH = 13.2423

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48880E+00	0.97759E+00
0.50000E+00	0.0000	
CATION # 2	0.59241E+00	0.26420E+00
0.22423E+01	-0.0006	
CATION # 3	0.38043E+01	0.10870E+01
0.35000E+01	0.0000	
ANION # 1	0.33818E+02	0.34712E+01
0.97423E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K	MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
53	1.3018			
CATION #	TOTAL			
1	0.2500			
3	3.5000			
IONIC STRENGTH = 13.0683				
		CATION # 1	0.23966E+00	0.95864E+00
		0.25000E+00	0.0000	
		CATION # 2	0.61591E+00	0.26568E+00
		0.23183E+01	-0.0008	
		CATION # 3	0.34149E+01	0.97568E+00
		0.35000E+01	0.0000	
		ANION # 1	0.32528E+02	0.33995E+01
		0.95683E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.04E+00	2.09E+00	3.50E+00	15.6609	31.5376	52.8015	56.061
7.50E-01	2.17E+00	3.50E+00	11.6826	33.7986	54.5188	57.193
5.00E-01	2.24E+00	3.50E+00	8.0099	35.9211	56.0691	58.176
2.50E-01	2.32E+00	3.50E+00	4.1198	38.2035	57.6768	59.158

Fixed mMgCl2 = 4.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.0000

IONIC STRENGTH = 14.5122

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.79733E+00	0.10541E+01
0.75644E+00	0.0002	
CATION # 2	0.41069E+00	0.23390E+00
0.17558E+01	-0.0008	
CATION # 3	0.66992E+01	0.16748E+01
0.40000E+01	0.0000	
ANION # 1	0.48782E+02	0.46405E+01
0.10512E+02	0.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
----------	-------

1	0.5000
3	4.0000

IONIC STRENGTH = 14.3140

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.51644E+00	0.10329E+01
0.50000E+00	0.0000	
CATION # 2	0.42755E+00	0.23569E+00
0.18140E+01	-0.0009	
CATION # 3	0.59459E+01	0.14865E+01
0.40000E+01	0.0000	
ANION # 1	0.46858E+02	0.45431E+01
0.10314E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.2500
3	4.0000

IONIC STRENGTH = 14.1239

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.25312E+00	0.10125E+01
0.25000E+00	0.0000	
CATION # 2	0.44477E+00	0.23734E+00
0.18739E+01	-0.0008	
CATION # 3	0.52966E+01	0.13242E+01
0.40000E+01	0.0000	
ANION # 1	0.45044E+02	0.44493E+01
0.10124E+02	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
7.56E-01	1.76E+00	4.00E+00	11.6157	26.9615	61.4228	52.742
5.00E-01	1.81E+00	4.00E+00	7.9189	28.7298	63.3513	53.799
2.50E-01	1.87E+00	4.00E+00	4.0824	30.5998	65.3179	54.833

Fixed mMgCl2 = 4.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	4.5000
IONIC STRENGTH = 15.4886	

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.58948E+00	0.10995E+01
0.53614E+00	0.0001	
CATION # 2	0.30363E+00	0.20905E+00
0.14524E+01	-.0006	
CATION # 3	0.97123E+01	0.21583E+01
0.45000E+01	0.0000	
ANION # 1	0.65982E+02	0.60046E+01
0.10989E+02	0.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
1	0.4000
3	4.5000
IONIC STRENGTH = 15.3766	

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43510E+00	0.10877E+01
0.40000E+00	0.0000	
CATION # 2	0.31021E+00	0.21008E+00
0.14766E+01	-.0007	
CATION # 3	0.90853E+01	0.20190E+01
0.45000E+01	0.0000	
ANION # 1	0.64583E+02	0.59378E+01
0.10877E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

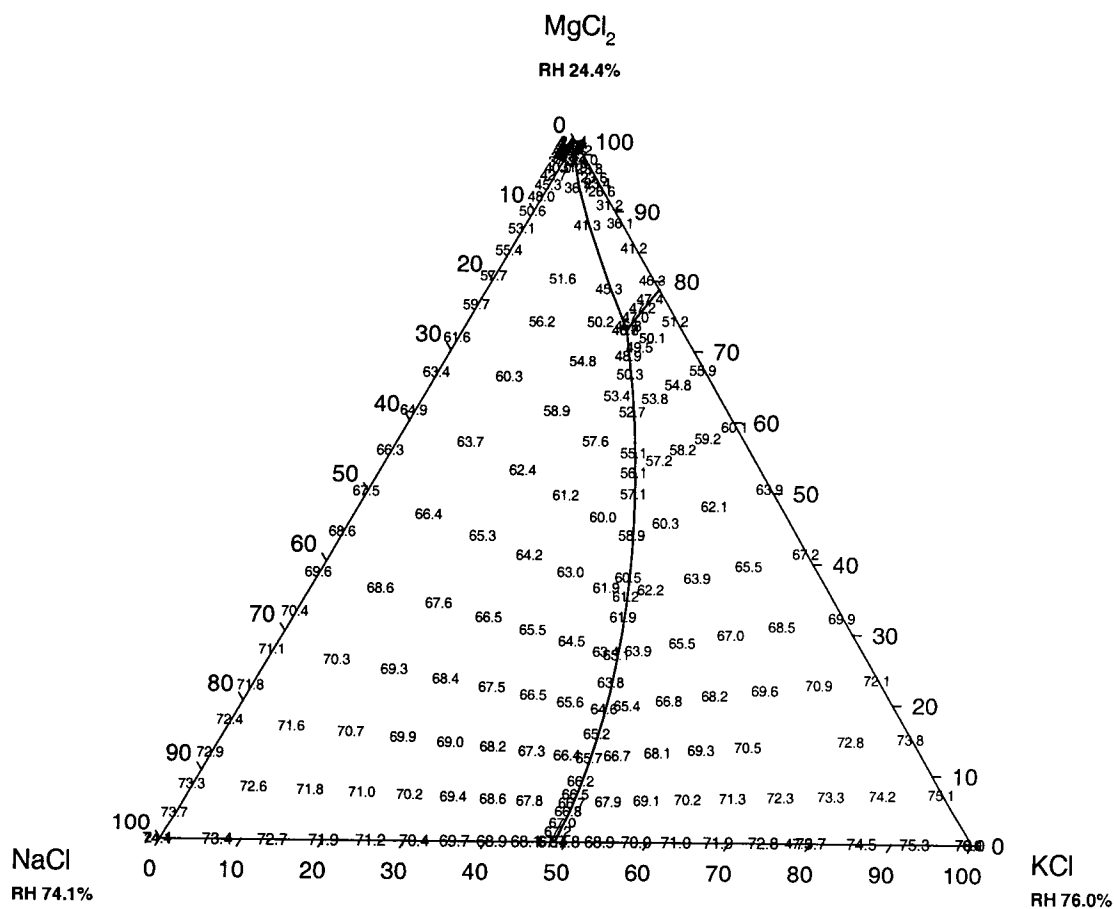
TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3
THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
1	0.2500
3	4.5000
IONIC STRENGTH = 15.2541	

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.26871E+00	0.10748E+01
0.25000E+00	0.0000	
CATION # 2	0.31766E+00	0.21119E+00
0.15041E+01	-.0007	
CATION # 3	0.84424E+01	0.18761E+01
0.45000E+01	0.0000	
ANION # 1	0.63069E+02	0.58646E+01
0.10754E+02	0.0000	

molal NaCl	molal KCl	molal MgCl ₂	XNaCl	XKCl	XMgCl ₂	RH%
5.36E-01	1.45E+00	4.50E+00	8.2629	22.3841	69.3530	48.921
4.00E-01	1.48E+00	4.50E+00	6.2729	23.1565	70.5705	49.496
2.50E-01	1.50E+00	4.50E+00	3.9974	24.0498	71.9528	50.133

The following is the plot of RH at 90 C for the NaCl-KCl-MgCl₂ system:



September 11, 2001

Fixed $m_{\text{MgCl}_2} = 0.5$ (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
halite+sylvite boundary	
20	1.5899
53	1.3018
CATION #	TOTAL
3	0.5000
IONIC STRENGTH =	9.6504

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40556E+01	0.10120E+01
0.40075E+01	0.0003	
CATION # 2	0.20889E+01	0.50422E+00
0.41429E+01	-0.0007	
CATION # 3	0.50826E+00	0.10165E+01
0.50000E+00	0.0000	
ANION # 1	0.95906E+01	0.10481E+01
0.91504E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 6

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.5000
3	0.5000
IONIC STRENGTH =	9.2292

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42072E+01	0.99479E+00
0.42292E+01	0.0004	
CATION # 2	0.17380E+01	0.49656E+00
0.35000E+01	0.0000	
CATION # 3	0.48599E+00	0.97199E+00
0.50000E+00	0.0000	
ANION # 1	0.92448E+01	0.10591E+01
0.87292E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.0000
3	0.5000
IONIC STRENGTH =	8.9112

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43291E+01	0.98139E+00
0.44112E+01	0.0004	
CATION # 2	0.14709E+01	0.49028E+00
0.30000E+01	0.0000	
CATION # 3	0.46973E+00	0.93947E+00
0.50000E+00	0.0000	
ANION # 1	0.89844E+01	0.10681E+01
0.84112E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	3.0000
3	0.5000
IONIC STRENGTH =	8.9112

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43291E+01	0.98139E+00
0.44112E+01	0.0004	
CATION # 2	0.14709E+01	0.49028E+00
0.30000E+01	0.0000	
CATION # 3	0.46973E+00	0.93947E+00
0.50000E+00	0.0000	
ANION # 1	0.89844E+01	0.10681E+01
0.84112E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

CATION # TOTAL
 2 1.5000
 3 0.5000
 IONIC STRENGTH = 8.0059

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	2.5000
3	0.5000

IONIC STRENGTH = 8.6014

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44544E+01	0.96805E+00
0.46014E+01	0.0005	
CATION # 2	0.12095E+01	0.48379E+00
0.25000E+01	0.0000	
CATION # 3	0.45440E+00	0.90879E+00
0.50000E+00	0.0000	
ANION # 1	0.87317E+01	0.10778E+01
0.81014E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	2.0000
3	0.5000

IONIC STRENGTH = 8.2997

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45828E+01	0.95481E+00
0.47997E+01	0.0007	
CATION # 2	0.95421E+00	0.47710E+00
0.20000E+01	0.0000	
CATION # 3	0.43998E+00	0.87996E+00
0.50000E+00	0.0000	
ANION # 1	0.84871E+01	0.10881E+01
0.77997E+01	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.47142E+01	0.94173E+00
0.50059E+01	0.0009	
CATION # 2	0.70542E+00	0.47028E+00
0.15000E+01	0.0000	
CATION # 3	0.42648E+00	0.85296E+00
0.50000E+00	0.0000	
ANION # 1	0.82505E+01	0.10992E+01
0.75059E+01	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	1.0000
3	0.5000

IONIC STRENGTH = 7.7198

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48484E+01	0.92885E+00
0.52198E+01	0.0009	
CATION # 2	0.46334E+00	0.46334E+00
0.10000E+01	0.0000	
CATION # 3	0.41387E+00	0.82773E+00
0.50000E+00	0.0000	
ANION # 1	0.80221E+01	0.11111E+01
0.72198E+01	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.5000
3	0.5000

IONIC STRENGTH = 7.4414

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49853E+01	0.91619E+00
0.54414E+01	0.0006	
CATION # 2	0.22816E+00	0.45633E+00
0.50000E+00	0.0000	

CATION # 3 0.40213E+00 0.80425E+00
0.50000E+00 0.0000

ANION # 1 0.78018E+01 0.11240E+01
0.69414E+01 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.01E+00	4.14E+00	5.00E-01	46.3273	47.8926	5.7801	66.667
4.23E+00	3.50E+00	5.00E-01	51.3926	42.5315	6.0759	67.766
4.41E+00	3.00E+00	5.00E-01	55.7589	37.9209	6.3202	68.608
4.41E+00	3.00E+00	5.00E-01	55.7589	37.9209	6.3202	68.608
4.60E+00	2.50E+00	5.00E-01	60.5336	32.8887	6.5777	69.436
4.80E+00	2.00E+00	5.00E-01	65.7520	27.3984	6.8496	70.248
5.01E+00	1.50E+00	5.00E-01	71.4526	21.4105	7.1368	71.042
5.22E+00	1.00E+00	5.00E-01	77.6779	14.8814	7.4407	71.817
5.44E+00	5.00E-01	5.00E-01	84.4754	7.7623	7.7623	72.57

Fixed mMgCl2 = 1.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	1.0000

IONIC STRENGTH = 10.2181

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33502E+01	0.99226E+00
0.33763E+01	0.0004	
CATION # 2	0.17256E+01	0.44917E+00
0.38418E+01	-0.0010	
CATION # 3	0.99250E+00	0.99250E+00
0.10000E+01	0.0000	
ANION # 1	0.11610E+02	0.12594E+01
0.92181E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.5000
3	1.0000

IONIC STRENGTH = 9.9825

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.34179E+01	0.98144E+00
0.34825E+01	-0.0006	
CATION # 2	0.15594E+01	0.44553E+00
0.35000E+01	0.0000	
CATION # 3	0.95982E+00	0.95982E+00
0.10000E+01	0.0000	
ANION # 1	0.11380E+02	0.12669E+01
0.89825E+01	-0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.0000
3	1.0000

IONIC STRENGTH = 9.6452

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.35196E+01	0.96554E+00
0.36452E+01	-0.0010	
CATION # 2	0.13198E+01	0.43992E+00
0.30000E+01	0.0000	
CATION # 3	0.91439E+00	0.91439E+00
0.10000E+01	0.0000	
ANION # 1	0.11051E+02	0.12783E+01
0.86452E+01	-0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

THE NUMBER OF ITERATIONS IS 9

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 1.5000
3 1.0000

IONIC STRENGTH = 8.6854

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 2.5000
3 1.0000

IONIC STRENGTH = 9.3166

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.36243E+01	0.94962E+00
0.38166E+01	-.0005	
CATION # 2	0.10850E+01	0.43402E+00
0.25000E+01	0.0000	
CATION # 3	0.87176E+00	0.87176E+00
0.10000E+01	0.0000	
ANION # 1	0.10732E+02	0.12904E+01
0.83166E+01	-.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 8

EQUATION LOG K
20 1.5899

CATION # TOTAL
2 2.0000
3 1.0000

IONIC STRENGTH = 8.9967

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.37321E+01	0.93379E+00
0.39967E+01	-.0008	
CATION # 2	0.85573E+00	0.42786E+00
0.20000E+01	0.0000	
CATION # 3	0.83191E+00	0.83191E+00
0.10000E+01	0.0000	
ANION # 1	0.10422E+02	0.13033E+01
0.79967E+01	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.38425E+01	0.91808E+00
0.41854E+01	0.0006	
CATION # 2	0.63226E+00	0.42150E+00
0.15000E+01	0.0000	
CATION # 3	0.79469E+00	0.79469E+00
0.10000E+01	0.0000	
ANION # 1	0.10122E+02	0.13171E+01
0.76854E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 1.0000
3 1.0000

IONIC STRENGTH = 8.3825

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.39555E+01	0.90256E+00
0.43825E+01	0.0004	
CATION # 2	0.41498E+00	0.41498E+00
0.10000E+01	0.0000	
CATION # 3	0.76009E+00	0.76009E+00
0.10000E+01	0.0000	
ANION # 1	0.98331E+01	0.13319E+01
0.73825E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION LOG K
20 1.5899
CATION # TOTAL
2 0.5000
3 1.0000

IONIC STRENGTH = 8.0880

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.45880E+01	0.40709E+01 0.0006	0.88729E+00

CATION # 2	0.20416E+00	0.40831E+00
0.50000E+00	0.0000	
CATION # 3	0.72795E+00	0.72795E+00
0.10000E+01	0.0000	
ANION # 1	0.95544E+01	0.13480E+01
0.70880E+01	0.0006	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
3.38E+00	3.84E+00	1.00E+00	41.0837	46.7480	12.1683	65.741
3.48E+00	3.50E+00	1.00E+00	43.6267	43.8459	12.5274	66.362
3.65E+00	3.00E+00	1.00E+00	47.6796	39.2403	13.0801	67.265
3.82E+00	2.50E+00	1.00E+00	52.1636	34.1689	13.6676	68.155
4.00E+00	2.00E+00	1.00E+00	57.1226	28.5849	14.2925	69.032
4.19E+00	1.50E+00	1.00E+00	62.6051	22.4370	14.9580	69.892
4.38E+00	1.00E+00	1.00E+00	68.6643	15.6678	15.6678	70.733
4.59E+00	5.00E-01	1.00E+00	75.3614	8.2129	16.4258	71.553

Fixed mMgCl2 = 1.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
----------	-------

halite+sylvite boundary

20	1.5899
53	1.3018

CATION #	TOTAL
----------	-------

3	1.5000
---	--------

IONIC STRENGTH = 10.8091

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27395E+01	0.98051E+00
0.27939E+01	0.0003	
CATION # 2	0.14110E+01	0.40142E+00
0.35152E+01	-0.0007	
CATION # 3	0.14872E+01	0.99148E+00
0.15000E+01	0.0000	
ANION # 1	0.14198E+02	0.15252E+01
0.93091E+01	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

2	3.0000
3	1.5000

IONIC STRENGTH = 10.4389

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.28264E+01	0.96169E+00
0.29389E+01	-0.0009	
CATION # 2	0.11895E+01	0.39651E+00
0.30000E+01	0.0000	
CATION # 3	0.13929E+01	0.92859E+00
0.15000E+01	0.0000	
ANION # 1	0.13762E+02	0.15395E+01
0.89389E+01	-0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 7

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

2	2.5000
3	1.5000

IONIC STRENGTH = 10.0889

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.29139E+01	0.94333E+00
0.30889E+01	-0.0007	
CATION # 2	0.97843E+00	0.39137E+00
0.25000E+01	0.0000	
CATION # 3	0.13077E+01	0.87182E+00
0.15000E+01	0.0000	
ANION # 1	0.13349E+02	0.15542E+01
0.85889E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 10
 EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 2.0000
 3 1.5000
 IONIC STRENGTH = 9.7480

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30043E+01	0.92497E+00
0.32480E+01	0.0006	
CATION # 2	0.77183E+00	0.38592E+00
0.20000E+01	0.0000	
CATION # 3	0.12287E+01	0.81915E+00
0.15000E+01	0.0000	
ANION # 1	0.12947E+02	0.15697E+01
0.82480E+01	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 11
 EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 1.5000
 3 1.5000
 IONIC STRENGTH = 9.4162

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.30975E+01	0.90671E+00
0.34162E+01	0.0004	
CATION # 2	0.57028E+00	0.38019E+00
0.15000E+01	0.0000	
CATION # 3	0.11557E+01	0.77046E+00
0.15000E+01	0.0000	
ANION # 1	0.12557E+02	0.15862E+01
0.79162E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 12
 EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 1.0000
 3 1.5000
 IONIC STRENGTH = 9.0935

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31932E+01	0.88862E+00
0.35935E+01	0.0008	
CATION # 2	0.37423E+00	0.37423E+00
0.10000E+01	0.0000	
CATION # 3	0.10883E+01	0.72551E+00
0.15000E+01	0.0000	
ANION # 1	0.12180E+02	0.16041E+01
0.75935E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 12
 EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.5000
 3 1.5000
 IONIC STRENGTH = 8.7798

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32914E+01	0.87078E+00
0.37798E+01	0.0008	
CATION # 2	0.18404E+00	0.36808E+00
0.50000E+00	0.0000	
CATION # 3	0.10262E+01	0.68413E+00
0.15000E+01	0.0000	
ANION # 1	0.11817E+02	0.16233E+01
0.72798E+01	0.0008	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.79E+00	3.52E+00	1.50E+00	35.7775	45.0142	19.2084	64.551
2.94E+00	3.00E+00	1.50E+00	39.5072	40.3285	20.1643	65.554
3.09E+00	2.50E+00	1.50E+00	43.5738	35.2664	21.1598	66.522
3.25E+00	2.00E+00	1.50E+00	48.1328	29.6384	22.2288	67.478
3.42E+00	1.50E+00	1.50E+00	53.2434	23.3783	23.3783	68.42
3.59E+00	1.00E+00	1.50E+00	58.9727	16.4109	24.6164	69.345
3.78E+00	5.00E-01	1.50E+00	65.3967	8.6508	25.9525	70.25

Fixed mMgCl2 = 2.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 11.4331

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22123E+01	0.97680E+00
0.22649E+01	-.0004	
CATION # 2	0.11395E+01	0.35966E+00
0.31682E+01	0.0006	
CATION # 3	0.20354E+01	0.10177E+01
0.20000E+01	0.0000	
ANION # 1	0.17581E+02	0.18638E+01
0.94331E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	3.0000
3	2.0000

IONIC STRENGTH = 11.3053

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	-----------------	------------

CATION # 1	0.22359E+01	0.96988E+00
0.23053E+01	-.0005	
CATION # 2	0.10750E+01	0.35834E+00
0.30000E+01	0.0000	
CATION # 3	0.19820E+01	0.99100E+00
0.20000E+01	0.0000	
ANION # 1	0.17396E+02	0.18695E+01
0.93053E+01	-.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.5000
3	2.0000

IONIC STRENGTH = 10.9314

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23079E+01	0.94918E+00
0.24314E+01	-.0008	
CATION # 2	0.88533E+00	0.35413E+00
0.25000E+01	0.0000	
CATION # 3	0.18315E+01	0.91574E+00
0.20000E+01	0.0000	
ANION # 1	0.16853E+02	0.18870E+01
0.89314E+01	-.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION # TOTAL
 2 2.0000
 3 2.0000

IONIC STRENGTH = 10.5668

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23830E+01	0.92836E+00
0.25668E+01	-0.0005	
CATION # 2	0.69906E+00	0.34953E+00
0.20000E+01	0.0000	
CATION # 3	0.16931E+01	0.84655E+00
0.20000E+01	0.0000	
ANION # 1	0.16322E+02	0.19053E+01
0.85668E+01	-0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	2.0000

IONIC STRENGTH = 9.8659

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.25417E+01	0.88686E+00
0.28659E+01	0.0008	
CATION # 2	0.33933E+00	0.33933E+00
0.10000E+01	0.0000	
CATION # 3	0.14505E+01	0.72525E+00
0.20000E+01	0.0000	
ANION # 1	0.15303E+02	0.19455E+01
0.78659E+01	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	2.0000

IONIC STRENGTH = 10.2116

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.24610E+01	0.90755E+00
0.27116E+01	-0.0006	
CATION # 2	0.51687E+00	0.34458E+00
0.15000E+01	0.0000	
CATION # 3	0.15663E+01	0.78317E+00
0.20000E+01	0.0000	
ANION # 1	0.15805E+02	0.19247E+01
0.82116E+01	-0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 9

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	2.0000

IONIC STRENGTH = 9.5298

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.26250E+01	0.86639E+00
0.30298E+01	0.0006	
CATION # 2	0.16691E+00	0.33383E+00
0.50000E+00	0.0000	
CATION # 3	0.13450E+01	0.67249E+00
0.20000E+01	0.0000	
ANION # 1	0.14817E+02	0.19678E+01
0.75298E+01	0.0006	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.26E+00	3.17E+00	2.00E+00	30.4705	42.6229	26.9067	63.05
2.31E+00	3.00E+00	2.00E+00	31.5565	41.0661	27.3774	63.403
2.43E+00	2.50E+00	2.00E+00	35.0781	36.0677	28.8542	64.453
2.57E+00	2.00E+00	2.00E+00	39.0875	30.4562	30.4562	65.499
2.71E+00	1.50E+00	2.00E+00	43.6538	24.1484	32.1978	66.537
2.87E+00	1.00E+00	2.00E+00	48.8570	17.0477	34.0954	67.563
3.03E+00	5.00E-01	2.00E+00	54.7904	9.0419	36.1677	68.574

Fixed mMgCl2 = 2.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 12.1021

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17605E+01	0.98156E+00
0.17936E+01	0.0004	
CATION # 2	0.90680E+00	0.32287E+00
0.28085E+01	-0.0007	
CATION # 3	0.26984E+01	0.10794E+01
0.25000E+01	0.0000	
ANION # 1	0.22093E+02	0.23009E+01
0.96021E+01	0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.5000
3	2.5000

IONIC STRENGTH = 11.8569

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17965E+01	0.96744E+00
0.18569E+01	-0.0008	
CATION # 2	0.80220E+00	0.32088E+00
0.25000E+01	0.0000	
CATION # 3	0.25449E+01	0.10180E+01
0.25000E+01	0.0000	
ANION # 1	0.21651E+02	0.23139E+01
0.93569E+01	-0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	2.0000
3	2.5000

IONIC STRENGTH = 11.4668

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18573E+01	0.94430E+00
0.19668E+01	-0.0007	
CATION # 2	0.63455E+00	0.31728E+00
0.20000E+01	0.0000	
CATION # 3	0.23141E+01	0.92563E+00
0.25000E+01	0.0000	
ANION # 1	0.20942E+02	0.23355E+01
0.89668E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 10

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	2.5000

IONIC STRENGTH = 11.0859

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19211E+01	0.92100E+00
0.20859E+01	0.0005	
CATION # 2	0.46988E+00	0.31326E+00
0.15000E+01	0.0000	
CATION # 3	0.21045E+01	0.84180E+00
0.25000E+01	0.0000	
ANION # 1	0.20246E+02	0.23580E+01
0.85859E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 11

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 1.0000

3 2.5000

IONIC STRENGTH = 10.7145

ACTIVITY ACT.COEFF.

%ERROR

MOLALITY

CATION # 1 0.19879E+01 0.89769E+00

0.22145E+01 0.0009

CATION # 2 0.30886E+00 0.30886E+00

0.10000E+01 0.0000

CATION # 3 0.19150E+01 0.76599E+00

0.25000E+01 0.0000

ANION # 1 0.19565E+02 0.23818E+01

0.82145E+01 0.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 12

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 0.5000

3 2.5000

IONIC STRENGTH = 10.3528

ACTIVITY ACT.COEFF.

%ERROR

MOLALITY

CATION # 1 0.20575E+01 0.87450E+00

0.23528E+01 0.0006

CATION # 2 0.15207E+00 0.30414E+00

0.50000E+00 0.0000

CATION # 3 0.17442E+01 0.69766E+00

0.25000E+01 0.0000

ANION # 1 0.18903E+02 0.24072E+01

0.78528E+01 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.79E+00	2.81E+00	2.50E+00	25.2545	39.5446	35.2009	61.175
1.86E+00	2.50E+00	2.50E+00	27.0808	36.4596	36.4596	61.874
1.97E+00	2.00E+00	2.50E+00	30.4138	30.9272	38.6590	63.012
2.09E+00	1.50E+00	2.50E+00	34.2743	24.6471	41.0786	64.153
2.21E+00	1.00E+00	2.50E+00	38.7523	17.4993	43.7484	65.289
2.35E+00	5.00E-01	2.50E+00	43.9546	9.3409	46.7045	66.417

Fixed mMgCl2 = 3.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 18

EQUATION LOG K

20 1.5899

53 1.3018

CATION # TOTAL

3 3.0000

IONIC STRENGTH = 12.8293

ACTIVITY ACT.COEFF.

%ERROR

MOLALITY

CATION # 1 0.13776E+01 0.99550E+00

0.13838E+01 0.0003

CATION # 2 0.70957E+00 0.29016E+00

0.24455E+01 -.0007

CATION # 3 0.35718E+01 0.11906E+01

0.30000E+01 0.0000

ANION # 1 0.28234E+02 0.28724E+01

0.98293E+01 0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 2.0000

3 3.0000

IONIC STRENGTH = 12.4592

ACTIVITY ACT.COEFF.

%ERROR

MOLALITY

CATION # 1 0.14200E+01 0.97311E+00

0.14592E+01 -.0005

CATION # 2 0.57587E+00 0.28793E+00

0.20000E+01 0.0000

CATION # 3 0.32357E+01 0.10786E+01

0.30000E+01 0.0000

ANION # 1 0.27392E+02 0.28958E+01

0.94592E+01 -.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	3.0000

IONIC STRENGTH = 12.0517

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14704E+01	0.94757E+00
0.15517E+01	-.0009	
CATION # 2	0.42748E+00	0.28498E+00
0.15000E+01	0.0000	
CATION # 3	0.28939E+01	0.96462E+00
0.30000E+01	0.0000	
ANION # 1	0.26453E+02	0.29224E+01
0.90517E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	3.0000

IONIC STRENGTH = 11.6532

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15238E+01	0.92176E+00
0.16532E+01	-.0006	
CATION # 2	0.28159E+00	0.28159E+00
0.10000E+01	0.0000	
CATION # 3	0.25874E+01	0.86246E+00
0.30000E+01	0.0000	
ANION # 1	0.25525E+02	0.29498E+01
0.86532E+01	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 14

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	3.0000

IONIC STRENGTH = 11.2639

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.15802E+01	0.89588E+00
0.17639E+01	-.0004	
CATION # 2	0.13890E+00	0.27779E+00
0.50000E+00	0.0000	
CATION # 3	0.23138E+01	0.77126E+00
0.30000E+01	0.0000	
ANION # 1	0.24614E+02	0.29785E+01
0.82639E+01	-.0004	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.38E+00	2.45E+00	3.00E+00	20.2627	35.8089	43.9284	58.862
1.46E+00	2.00E+00	3.00E+00	22.5910	30.9636	46.4454	59.95
1.55E+00	1.50E+00	3.00E+00	25.6407	24.7864	49.5728	61.185
1.65E+00	1.00E+00	3.00E+00	29.2436	17.6891	53.0673	62.43
1.76E+00	5.00E-01	3.00E+00	33.5094	9.4987	56.9920	63.678

Fixed mMgCl2 = 3.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.5000

IONIC STRENGTH = 13.6285

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10582E+01	0.10194E+01
0.10380E+01	0.0003	
CATION # 2	0.54507E+00	0.26074E+00
0.20905E+01	-0.0007	
CATION # 3	0.48141E+01	0.13754E+01
0.35000E+01	0.0000	
ANION # 1	0.36755E+02	0.36289E+01
0.10129E+02	0.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.5000
3	3.5000

IONIC STRENGTH = 13.1168

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11027E+01	0.98736E+00
0.11168E+01	-0.0009	
CATION # 2	0.38806E+00	0.25870E+00
0.15000E+01	0.0000	
CATION # 3	0.41462E+01	0.11846E+01
0.35000E+01	0.0000	
ANION # 1	0.35275E+02	0.36680E+01
0.96168E+01	-0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	3.5000

IONIC STRENGTH = 12.6917

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11434E+01	0.95948E+00
0.11917E+01	-0.0007	
CATION # 2	0.25644E+00	0.25644E+00
0.10000E+01	0.0000	
CATION # 3	0.36474E+01	0.10421E+01
0.35000E+01	0.0000	
ANION # 1	0.34018E+02	0.37009E+01
0.91917E+01	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	3.5000

IONIC STRENGTH = 12.2748

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.11870E+01	0.93119E+00
0.12748E+01	-0.0005	
CATION # 2	0.12686E+00	0.25371E+00
0.50000E+00	0.0000	
CATION # 3	0.32053E+01	0.91581E+00
0.35000E+01	0.0000	
ANION # 1	0.32767E+02	0.37342E+01
0.87748E+01	-0.0005	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.04E+00	2.09E+00	3.50E+00	15.6597	31.5381	52.8023	56.061
1.12E+00	1.50E+00	3.50E+00	18.2579	24.5226	57.2195	57.596
1.19E+00	1.00E+00	3.50E+00	20.9375	17.5694	61.4931	58.928
1.27E+00	5.00E-01	3.50E+00	24.1677	9.4790	66.3532	60.281

Fixed mMgCl2 = 4.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
----------	-------

20	1.5899
53	1.3018

CATION #	TOTAL
----------	-------

3	4.0000
---	--------

IONIC STRENGTH = 14.5122

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.79734E+00	0.10541E+01
0.75645E+00	-.0006	
CATION # 2	0.41069E+00	0.23390E+00
0.17558E+01	-.0010	
CATION # 3	0.66993E+01	0.16748E+01
0.40000E+01	0.0000	
ANION # 1	0.48782E+02	0.46405E+01
0.10512E+02	-.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

2	1.5000
3	4.0000

IONIC STRENGTH = 14.2805

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.81135E+00	0.10396E+01
0.78046E+00	-.0005	
CATION # 2	0.35034E+00	0.23356E+00
0.15000E+01	0.0000	
CATION # 3	0.62383E+01	0.15596E+01
0.40000E+01	0.0000	

ANION # 1 0.47939E+02 0.46632E+01
 0.10280E+02 -.0005

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

2	1.0000
3	4.0000

IONIC STRENGTH = 13.8319

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.84063E+00	0.10104E+01
0.83194E+00	-.0009	
CATION # 2	0.23251E+00	0.23251E+00
0.10000E+01	0.0000	
CATION # 3	0.54151E+01	0.13538E+01
0.40000E+01	0.0000	
ANION # 1	0.46270E+02	0.47061E+01
0.98319E+01	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
----------	-------

20	1.5899
----	--------

CATION #	TOTAL
----------	-------

2	0.5000
3	4.0000

IONIC STRENGTH = 13.3899

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.87249E+00	0.98043E+00
0.88990E+00	-.0007	

CATION # 2 0.11548E+00 0.23095E+00
 0.50000E+00 0.0000
 CATION # 3 0.46887E+01 0.11722E+01
 0.40000E+01 0.0000

ANION # 1 0.44580E+02 0.47477E+01
 0.93899E+01 -.0007

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
7.56E-01	1.76E+00	4.00E+00	11.6158	26.9615	61.4227	52.742
7.80E-01	1.50E+00	4.00E+00	12.4268	23.8836	63.6896	53.427
8.32E-01	1.00E+00	4.00E+00	14.2652	17.1470	68.5878	54.8
8.90E-01	5.00E-01	4.00E+00	16.5105	9.2766	74.2129	56.216

Fixed mMgCl2 = 4.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.5000

IONIC STRENGTH = 15.4886

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.58948E+00	0.10995E+01	
0.53614E+00 0.0001		
CATION # 2 0.30363E+00	0.20905E+00	
0.14524E+01 -.0006		
CATION # 3 0.97123E+01	0.21583E+01	
0.45000E+01 0.0000		
ANION # 1 0.65982E+02	0.60046E+01	
0.10989E+02 0.0001		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	4.5000

IONIC STRENGTH = 15.0661

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.60742E+00	0.10730E+01	
0.56609E+00 -.0008		
CATION # 2 0.20915E+00	0.20915E+00	
0.10000E+01 0.0000		
CATION # 3 0.84711E+01	0.18825E+01	
0.45000E+01 0.0000		
ANION # 1 0.64034E+02	0.60604E+01	
0.10566E+02 -.0008		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	4.5000

IONIC STRENGTH = 14.6036

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1 0.62921E+00	0.10424E+01	
0.60364E+00 -.0008		
CATION # 2 0.10439E+00	0.20879E+00	
0.50000E+00 0.0000		
CATION # 3 0.72553E+01	0.16123E+01	
0.45000E+01 0.0000		
ANION # 1 0.61816E+02	0.61182E+01	
0.10104E+02 -.0008		

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
5.36E-01	1.45E+00	4.50E+00	8.2629	22.3841	69.3530	48.921
5.66E-01	1.00E+00	4.50E+00	9.3320	16.4851	74.1829	50.154
6.04E-01	5.00E-01	4.50E+00	10.7723	8.9228	80.3049	51.576

Fixed mMgCl2 = 0.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	0.5000

IONIC STRENGTH = 9.6503

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40556E+01	0.10120E+01
0.40076E+01	-.0004	
CATION # 2	0.20889E+01	0.50422E+00
0.41428E+01	0.0009	
CATION # 3	0.50826E+00	0.10165E+01
0.50000E+00	0.0000	
ANION # 1	0.95905E+01	0.10481E+01
0.91503E+01	-.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	3.5000
3	0.5000

IONIC STRENGTH = 9.3817

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.34388E+01	0.98251E+00
0.35000E+01	0.0000	
CATION # 2	0.22335E+01	0.50973E+00
0.43817E+01	0.0006	
CATION # 3	0.43467E+00	0.86935E+00
0.50000E+00	0.0000	
ANION # 1	0.89697E+01	0.10099E+01
0.88817E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	3.0000
3	0.5000

IONIC STRENGTH = 9.1295

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.28641E+01	0.95469E+00
0.30000E+01	0.0000	
CATION # 2	0.23844E+01	0.51505E+00
0.46295E+01	0.0007	
CATION # 3	0.37387E+00	0.74774E+00
0.50000E+00	0.0000	
ANION # 1	0.84020E+01	0.97364E+00
0.86295E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	2.5000
3	0.5000

IONIC STRENGTH = 8.8893

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23202E+01	0.92807E+00
0.25000E+01	0.0000	
CATION # 2	0.25438E+01	0.52029E+00
0.48893E+01	0.0007	
CATION # 3	0.32266E+00	0.64531E+00
0.50000E+00	0.0000	
ANION # 1	0.78753E+01	0.93873E+00
0.83893E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018
 CATION # TOTAL
 1 2.0000
 3 0.5000

IONIC STRENGTH = 8.6609

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18052E+01	0.90261E+00
0.20000E+01	0.0000	
CATION # 2	0.27120E+01	0.52548E+00
0.51609E+01	0.0007	
CATION # 3	0.27939E+00	0.55877E+00
0.50000E+00	0.0000	
ANION # 1	0.73871E+01	0.90518E+00
0.81609E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018
 CATION # TOTAL
 1 1.5000
 3 0.5000

IONIC STRENGTH = 8.4439

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13174E+01	0.87829E+00
0.15000E+01	0.0000	
CATION # 2	0.28888E+01	0.53066E+00
0.54439E+01	0.0007	
CATION # 3	0.24272E+00	0.48544E+00
0.50000E+00	0.0000	
ANION # 1	0.69348E+01	0.87297E+00
0.79439E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018
 CATION # TOTAL
 1 1.0000
 3 0.5000

IONIC STRENGTH = 8.2378

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.85508E+00	0.85508E+00
0.10000E+01	0.0000	
CATION # 2	0.30746E+01	0.53584E+00
0.57378E+01	0.0008	
CATION # 3	0.21155E+00	0.42309E+00
0.50000E+00	0.0000	
ANION # 1	0.65159E+01	0.84208E+00
0.77378E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018
 CATION # TOTAL
 1 0.5000
 3 0.5000

IONIC STRENGTH = 8.0422

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.41646E+00	0.83293E+00
0.50000E+00	0.0000	
CATION # 2	0.32692E+01	0.54106E+00
0.60422E+01	0.0008	
CATION # 3	0.18496E+00	0.36991E+00
0.50000E+00	0.0000	
ANION # 1	0.61280E+01	0.81249E+00
0.75422E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.01E+00	4.14E+00	5.00E-01	46.3285	47.8914	5.7801	66.667
3.50E+00	4.38E+00	5.00E-01	41.7576	52.2770	5.9654	67.907
3.00E+00	4.63E+00	5.00E-01	36.9026	56.9469	6.1504	69.085
2.50E+00	4.89E+00	5.00E-01	31.6885	61.9738	6.3377	70.217
2.00E+00	5.16E+00	5.00E-01	26.1066	67.3668	6.5266	71.3
1.50E+00	5.44E+00	5.00E-01	20.1507	73.1324	6.7169	72.334
1.00E+00	5.74E+00	5.00E-01	13.8164	79.2755	6.9082	73.316
5.00E-01	6.04E+00	5.00E-01	7.1001	85.7999	7.1001	74.248

Fixed mMgCl2 = 1.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

THE NUMBER OF ITERATIONS IS 15

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 2.5000
3 1.0000

THE NUMBER OF ITERATIONS IS 15

IONIC STRENGTH = 9.7471

EQUATION LOG K
20 1.5899
53 1.3018
CATION # TOTAL
3 1.0000

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.23502E+01 0.94007E+00
0.25000E+01 0.0000
CATION # 2 0.19414E+01 0.45711E+00
0.42471E+01 0.0010
CATION # 3 0.74768E+00 0.74768E+00
0.10000E+01 0.0000
ANION # 1 0.10319E+02 0.11797E+01
0.87471E+01 0.0000

IONIC STRENGTH = 10.2181

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.33502E+01 0.99226E+00
0.33764E+01 -0.0003
CATION # 2 0.17256E+01 0.44917E+00
0.38417E+01 0.0007
CATION # 3 0.99249E+00 0.99249E+00
0.10000E+01 0.0000
ANION # 1 0.11610E+02 0.12595E+01
0.92181E+01 -0.0003

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 2.0000
3 1.0000

THE NUMBER OF ITERATIONS IS 15

IONIC STRENGTH = 9.4961

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 3.0000
3 1.0000

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.18241E+01 0.91203E+00
0.20000E+01 0.0000
CATION # 2 0.20748E+01 0.46146E+00
0.44961E+01 0.0006
CATION # 3 0.63925E+00 0.63925E+00
0.10000E+01 0.0000
ANION # 1 0.96558E+01 0.11365E+01
0.84961E+01 0.0000

IONIC STRENGTH = 10.0109

MOLALITY ACTIVITY %ERROR ACT.COEFF.
CATION # 1 0.29081E+01 0.96937E+00
0.30000E+01 0.0000
CATION # 2 0.18155E+01 0.45264E+00
0.40109E+01 0.0008
CATION # 3 0.87764E+00 0.87764E+00
0.10000E+01 0.0000
ANION # 1 0.11035E+02 0.12246E+01
0.90109E+01 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 1.5000
3 1.0000

IONIC STRENGTH = 9.2576

THE NUMBER OF ITERATIONS IS 16

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.	EQUATION	LOG K
CATION # 1	0.13279E+01	0.88525E+00		
0.15000E+01	0.0000		53	1.3018
CATION # 2	0.22158E+01	0.46573E+00		
0.47576E+01	0.0006		CATION #	TOTAL
CATION # 3	0.54852E+00	0.54852E+00		
0.10000E+01	0.0000		1	0.5000
ANION # 1	0.90414E+01	0.10949E+01	3	1.0000
0.82576E+01	0.0000			

IONIC STRENGTH = 8.8166

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
3.38E+00	3.84E+00	1.00E+00	41.0849	46.7468	12.1683	65.741
3.00E+00	4.01E+00	1.00E+00	37.4490	50.0680	12.4830	66.748
2.50E+00	4.25E+00	1.00E+00	32.2701	54.8218	12.9081	68.05
2.00E+00	4.50E+00	1.00E+00	26.6805	59.9792	13.3403	69.306
1.50E+00	4.76E+00	1.00E+00	20.6680	65.5534	13.7787	70.515
5.00E-01	5.32E+00	1.00E+00	7.3350	77.9949	14.6701	72.782

Fixed mMgCl2 = 1.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
1	2.5000
3	1.5000

IONIC STRENGTH = 10.6399

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.24044E+01	0.96178E+00
0.25000E+01	0.0000	
CATION # 2	0.14697E+01	0.40377E+00
0.36399E+01	0.0009	
CATION # 3	0.13433E+01	0.89551E+00
0.15000E+01	0.0000	
ANION # 1	0.13631E+02	0.14914E+01
0.91399E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.27395E+01	0.98051E+00
0.27939E+01	-0.0004	
CATION # 2	0.14110E+01	0.40142E+00
0.35151E+01	0.0009	
CATION # 3	0.14872E+01	0.99147E+00
0.15000E+01	0.0000	
ANION # 1	0.14198E+02	0.15252E+01
0.93090E+01	-0.0004	

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 14

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 2.0000
 3 1.5000

IONIC STRENGTH = 10.3628

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.18619E+01	0.93097E+00
0.20000E+01	0.0000	
CATION # 2	0.15746E+01	0.40764E+00
0.38628E+01	0.0009	
CATION # 3	0.11330E+01	0.75536E+00
0.15000E+01	0.0000	
ANION # 1	0.12723E+02	0.14355E+01
0.88628E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 1.5000
 3 1.5000

IONIC STRENGTH = 10.0992

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13522E+01	0.90149E+00
0.15000E+01	0.0000	
CATION # 2	0.16862E+01	0.41135E+00
0.40992E+01	0.0007	
CATION # 3	0.95938E+00	0.63959E+00
0.15000E+01	0.0000	
ANION # 1	0.11881E+02	0.13816E+01
0.85992E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 1.0000
 3 1.5000

IONIC STRENGTH = 9.8488

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.87334E+00	0.87334E+00
0.10000E+01	0.0000	
CATION # 2	0.18045E+01	0.41495E+00
0.43488E+01	0.0009	
CATION # 3	0.81548E+00	0.54365E+00
0.15000E+01	0.0000	
ANION # 1	0.11102E+02	0.13297E+01
0.83488E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
 53 1.3018

CATION # TOTAL
 1 0.5000
 3 1.5000

IONIC STRENGTH = 9.6114

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.42326E+00	0.84652E+00
0.50000E+00	0.0000	
CATION # 2	0.19297E+01	0.41846E+00
0.46114E+01	0.0005	
CATION # 3	0.69587E+00	0.46391E+00
0.15000E+01	0.0000	
ANION # 1	0.10382E+02	0.12799E+01
0.81114E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.79E+00	3.52E+00	1.50E+00	35.7779	45.0134	19.2086	64.551
2.50E+00	3.64E+00	1.50E+00	32.7229	47.6433	19.6338	65.412
2.00E+00	3.86E+00	1.50E+00	27.1636	52.4637	20.3727	66.842
1.50E+00	4.10E+00	1.50E+00	21.1291	57.7417	21.1291	68.229
1.00E+00	4.35E+00	1.50E+00	14.6011	63.4973	21.9016	69.571
5.00E-01	4.61E+00	1.50E+00	7.5627	69.7492	22.6881	70.863

Fixed mMgCl2 = 2.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.0000

IONIC STRENGTH = 11.4331

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22123E+01	0.97680E+00
0.22649E+01	-0.0004	
CATION # 2	0.11395E+01	0.35966E+00
0.31682E+01	0.0008	
CATION # 3	0.20354E+01	0.10177E+01
0.20000E+01	0.0000	
ANION # 1	0.17581E+02	0.18638E+01
0.94331E+01	-0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	2.0000
3	2.0000

IONIC STRENGTH = 11.2729

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19182E+01	0.95909E+00
0.20000E+01	0.0000	
CATION # 2	0.11834E+01	0.36158E+00
0.32729E+01	-0.0007	
CATION # 3	0.18469E+01	0.92343E+00
0.20000E+01	0.0000	
ANION # 1	0.16929E+02	0.18257E+01
0.92729E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 13

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.5000
3	2.0000

IONIC STRENGTH = 10.9810

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13901E+01	0.92671E+00
0.15000E+01	0.0000	
CATION # 2	0.12706E+01	0.36502E+00
0.34810E+01	-0.0009	
CATION # 3	0.15417E+01	0.77085E+00
0.20000E+01	0.0000	
ANION # 1	0.15767E+02	0.17556E+01
0.89810E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 12

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.0000
3	2.0000

IONIC STRENGTH = 10.7030

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.89570E+00	0.89570E+00
0.10000E+01	0.0000	
CATION # 2	0.13637E+01	0.36827E+00
0.37030E+01	0.0008	
CATION # 3	0.12921E+01	0.64604E+00
0.20000E+01	0.0000	
ANION # 1	0.14691E+02	0.16880E+01
0.87030E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 14

IONIC STRENGTH = 10.4389

EQUATION	LOG K
53	1.3018
CATION #	TOTAL
1	0.5000
3	2.0000

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43305E+00	0.86611E+00
0.50000E+00	0.0000	
CATION # 2	0.14628E+01	0.37137E+00
0.39389E+01	0.0008	
CATION # 3	0.10874E+01	0.54368E+00
0.20000E+01	0.0000	
ANION # 1	0.13695E+02	0.16229E+01
0.84389E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.26E+00	3.17E+00	2.00E+00	30.4705	42.6229	26.9067	63.05
2.00E+00	3.27E+00	2.00E+00	27.4993	45.0013	27.4993	63.891
1.50E+00	3.48E+00	2.00E+00	21.4869	49.8639	28.6492	65.453
1.00E+00	3.70E+00	2.00E+00	14.9187	55.2439	29.8374	66.979
5.00E-01	3.94E+00	2.00E+00	7.7653	61.1735	31.0612	68.459

Fixed mMgCl2 = 2.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	2.5000

IONIC STRENGTH = 12.1021

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.17605E+01	0.98156E+00
0.17936E+01	0.0005	
CATION # 2	0.90681E+00	0.32287E+00
0.28085E+01	-0.0009	
CATION # 3	0.26985E+01	0.10794E+01
0.25000E+01	0.0000	
ANION # 1	0.22093E+02	0.23009E+01
0.96021E+01	0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.5000
3	2.5000

IONIC STRENGTH = 11.9145

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14414E+01	0.96093E+00
0.15000E+01	0.0000	
CATION # 2	0.94675E+00	0.32484E+00
0.29145E+01	-0.0006	
CATION # 3	0.24070E+01	0.96280E+00
0.25000E+01	0.0000	
ANION # 1	0.21161E+02	0.22477E+01
0.94145E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	1.0000
3	2.5000

IONIC STRENGTH = 11.6062

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.92688E+00	0.92688E+00
0.10000E+01	0.0000	
CATION # 2	0.10188E+01	0.32799E+00
0.31062E+01	0.0007	
CATION # 3	0.19873E+01	0.79492E+00
0.25000E+01	0.0000	
ANION # 1	0.19664E+02	0.21594E+01
0.91062E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3
THE NUMBER OF ITERATIONS IS 15
EQUATION LOG K

53 1.3018
CATION # TOTAL
1 0.5000
3 2.5000
IONIC STRENGTH = 11.3123

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44713E+00	0.89427E+00
0.50000E+00	0.0000	
CATION # 2	0.10961E+01	0.33092E+00
0.33123E+01	-0.0007	
CATION # 3	0.16477E+01	0.65906E+00
0.25000E+01	0.0000	
ANION # 1	0.18277E+02	0.20741E+01
0.88123E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.79E+00	2.81E+00	2.50E+00	25.2545	39.5446	35.2009	61.175
1.50E+00	2.91E+00	2.50E+00	21.6935	42.1506	36.1559	62.183
1.00E+00	3.11E+00	2.50E+00	15.1373	47.0195	37.8432	63.88
5.00E-01	3.31E+00	2.50E+00	7.9210	52.4737	39.6052	65.544

Fixed mMgCl2 = 3.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3
THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 1.0000
3 3.0000
IONIC STRENGTH = 12.5694

EQUATION	LOG K
20	1.5899
53	1.3018
CATION #	TOTAL
3	3.0000

IONIC STRENGTH = 12.8293

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.13776E+01	0.99550E+00
0.13838E+01	-0.0005	
CATION # 2	0.70956E+00	0.29016E+00
0.24454E+01	0.0008	
CATION # 3	0.35717E+01	0.11906E+01
0.30000E+01	0.0000	
ANION # 1	0.28234E+02	0.28724E+01
0.98293E+01	-0.0005	

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.96712E+00	0.96712E+00
0.10000E+01	0.0000	
CATION # 2	0.75190E+00	0.29263E+00
0.25694E+01	0.0006	
CATION # 3	0.30482E+01	0.10161E+01
0.30000E+01	0.0000	
ANION # 1	0.26644E+02	0.27843E+01
0.95694E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 53
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
1
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3
THE NUMBER OF ITERATIONS IS 16

EQUATION LOG K
53 1.3018
CATION # TOTAL
1 0.5000
3 3.0000
IONIC STRENGTH = 12.2435

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46567E+00	0.93134E+00
0.50000E+00	0.0000	

CATION # 2	0.81101E+00	0.29561E+00
0.27435E+01	-0.0008	
CATION # 3	0.24880E+01	0.82934E+00
0.30000E+01	0.0000	
ANION # 1	0.24703E+02	0.26724E+01
0.92435E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.38E+00	2.45E+00	3.00E+00	20.2630	35.8080	43.9290	58.862
1.00E+00	2.57E+00	3.00E+00	15.2221	39.1116	45.6663	60.28
5.00E-01	2.74E+00	3.00E+00	8.0083	43.9417	48.0500	62.111

Fixed mMgCl2 = 3.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	3.5000

IONIC STRENGTH = 13.6285

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.10582E+01	0.10194E+01
0.10381E+01	-0.0007	
CATION # 2	0.54506E+00	0.26074E+00
0.20905E+01	0.0004	
CATION # 3	0.48141E+01	0.13754E+01
0.35000E+01	0.0000	
ANION # 1	0.36755E+02	0.36289E+01
0.10129E+02	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.7500
3	3.5000

IONIC STRENGTH = 13.4198

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	--------------------	------------

CATION # 1	0.74765E+00	0.99687E+00
0.75000E+00	0.0000	
CATION # 2	0.56988E+00	0.26264E+00
0.21698E+01	-0.0009	
CATION # 3	0.42421E+01	0.12120E+01
0.35000E+01	0.0000	
ANION # 1	0.35155E+02	0.35439E+01
0.99198E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 15

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.5000
3	3.5000

IONIC STRENGTH = 13.2423

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.48880E+00	0.97759E+00
0.50000E+00	0.0000	
CATION # 2	0.59241E+00	0.26420E+00
0.22423E+01	-0.0006	
CATION # 3	0.38043E+01	0.10870E+01
0.35000E+01	0.0000	
ANION # 1	0.33818E+02	0.34712E+01
0.97423E+01	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 18

EQUATION	LOG K	MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
53	1.3018			
CATION #	TOTAL			
1	0.2500			
3	3.5000			
IONIC STRENGTH = 13.0683				

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.23966E+00	0.95864E+00
0.25000E+00	0.0000	
CATION # 2	0.61591E+00	0.26568E+00
0.23183E+01	- .0008	
CATION # 3	0.34149E+01	0.97568E+00
0.35000E+01	0.0000	
ANION # 1	0.32528E+02	0.33995E+01
0.95683E+01	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
1.04E+00	2.09E+00	3.50E+00	15.6609	31.5376	52.8015	56.061
7.50E-01	2.17E+00	3.50E+00	11.6826	33.7986	54.5188	57.193
5.00E-01	2.24E+00	3.50E+00	8.0099	35.9211	56.0691	58.176
2.50E-01	2.32E+00	3.50E+00	4.1198	38.2035	57.6768	59.158

Fixed mMgCl2 = 4.0 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.0000

IONIC STRENGTH = 14.5122

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.79733E+00	0.10541E+01
0.75644E+00	0.0002	
CATION # 2	0.41069E+00	0.23390E+00
0.17558E+01	- .0008	
CATION # 3	0.66992E+01	0.16748E+01
0.40000E+01	0.0000	
ANION # 1	0.48782E+02	0.46405E+01
0.10512E+02	0.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

1

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
----------	-------

1	0.5000
3	4.0000

IONIC STRENGTH = 14.3140

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.51644E+00	0.10329E+01
0.50000E+00	0.0000	
CATION # 2	0.42755E+00	0.23569E+00
0.18140E+01	- .0009	
CATION # 3	0.59459E+01	0.14865E+01
0.40000E+01	0.0000	
ANION # 1	0.46858E+02	0.45431E+01
0.10314E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 53

1 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.2500
3	4.0000

IONIC STRENGTH = 14.1239

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.25312E+00	0.10125E+01
0.25000E+00	0.0000	
CATION # 2	0.44477E+00	0.23734E+00
0.18739E+01	- .0008	
CATION # 3	0.52966E+01	0.13242E+01
0.40000E+01	0.0000	
ANION # 1	0.45044E+02	0.44493E+01
0.10124E+02	0.0000	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
7.56E-01	1.76E+00	4.00E+00	11.6157	26.9615	61.4228	52.742
5.00E-01	1.81E+00	4.00E+00	7.9189	28.7298	63.3513	53.799
2.50E-01	1.87E+00	4.00E+00	4.0824	30.5998	65.3179	54.833

Fixed mMgCl2 = 4.5 (sylvite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899
53	1.3018

CATION #	TOTAL
3	4.5000

IONIC STRENGTH = 15.4886

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.58948E+00	0.10995E+01
0.53614E+00	0.0001	
CATION # 2	0.30363E+00	0.20905E+00
0.14524E+01	-0.0006	
CATION # 3	0.97123E+01	0.21583E+01
0.45000E+01	0.0000	
ANION # 1	0.65982E+02	0.60046E+01
0.10989E+02	0.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
5.36E-01	1.45E+00	4.50E+00	8.2629	22.3841	69.3530	48.921
4.00E-01	1.48E+00	4.50E+00	6.2729	23.1565	70.5705	49.496
2.50E-01	1.50E+00	4.50E+00	3.9974	24.0498	71.9528	50.133

Fixed mMgCl2 = 4.7612 (halite field)
 [first point: halite+sylvite+carnallite]

CATION #	TOTAL
1	0.4000
3	4.5000

IONIC STRENGTH = 15.3766

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.43510E+00	0.10877E+01
0.40000E+00	0.0000	
CATION # 2	0.31021E+00	0.21008E+00
0.14766E+01	-0.0007	
CATION # 3	0.90853E+01	0.20190E+01
0.45000E+01	0.0000	
ANION # 1	0.64583E+02	0.59378E+01
0.10877E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 53
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 1
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
53	1.3018

CATION #	TOTAL
1	0.2500
3	4.5000

IONIC STRENGTH = 15.2541

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.26871E+00	0.10748E+01
0.25000E+00	0.0000	
CATION # 2	0.31766E+00	0.21119E+00
0.15041E+01	-0.0007	
CATION # 3	0.84424E+01	0.18761E+01
0.45000E+01	0.0000	
ANION # 1	0.63069E+02	0.58646E+01
0.10754E+02	0.0000	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO SATURATED SOLID 53

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
14	4.1989
20	1.5899
53	1.3018

IONIC STRENGTH = 16.0363

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.49993E+00	0.11274E+01
0.44345E+00	0.0002	
CATION # 2	0.25750E+00	0.19668E+00
0.13093E+01	-0.0007	
CATION # 3	0.12004E+02	0.25212E+01
0.47612E+01	0.0000	
ANION # 1	0.77802E+02	0.69003E+01
0.11275E+02	0.0002	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	4.7612

IONIC STRENGTH = 15.7431

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.50980E+00	0.11094E+01
0.45953E+00	-0.0009	
CATION # 2	0.19706E+00	0.19706E+00
0.10000E+01	0.0000	
CATION # 3	0.10906E+02	0.22906E+01
0.47612E+01	0.0000	
ANION # 1	0.76295E+02	0.69474E+01
0.10982E+02	-0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.7500
3	4.7612

IONIC STRENGTH = 15.5072

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.51828E+00	0.10944E+01
0.47358E+00	-0.0007	
CATION # 2	0.14793E+00	0.19724E+00
0.75000E+00	0.0000	
CATION # 3	0.10079E+02	0.21169E+01
0.47612E+01	0.0000	
ANION # 1	0.75048E+02	0.69838E+01
0.10746E+02	-0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	4.7612

IONIC STRENGTH = 15.2722

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.52720E+00	0.10790E+01
0.48862E+00	0.0010	
CATION # 2	0.98649E-01	0.19730E+00
0.50000E+00	0.0000	
CATION # 3	0.93042E+01	0.19542E+01
0.47612E+01	0.0000	
ANION # 1	0.73776E+02	0.70189E+01
0.10511E+02	0.0010	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.2500
3	4.7612

IONIC STRENGTH = 15.0383

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.53661E+00	0.10632E+01
0.50473E+00	0.0006	
CATION # 2	0.49309E-01	0.19724E+00
0.25000E+00	0.0000	

CATION # 3 0.85796E+01 0.18020E+01
0.47612E+01 0.0000

ANION # 1 0.72483E+02 0.70528E+01
0.10277E+02 0.0006

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.43E-01	1.31E+00	4.76E+00	6.8077	20.0999	73.0924	46.748
4.60E-01	1.00E+00	4.76E+00	7.3871	16.0753	76.5376	47.579
4.74E-01	7.50E-01	4.76E+00	7.9131	12.5318	79.5551	48.27
4.89E-01	5.00E-01	4.76E+00	8.4980	8.6959	82.8061	48.979
5.05E-01	2.50E-01	4.76E+00	9.1504	4.5323	86.3173	49.704

Fixed mMgCl2 = 5.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 21

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	1.0000
3	5.0000

IONIC STRENGTH = 16.3786

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.43324E+00	0.11443E+01
0.37859E+00	0.0006	
CATION # 2	0.18607E+00	0.18607E+00
0.10000E+01	0.0000	
CATION # 3	0.13877E+02	0.27755E+01
0.50000E+01	0.0000	
ANION # 1	0.89777E+02	0.78900E+01
0.11379E+02	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

20 1.5899

CATION # TOTAL

2	0.7500
3	5.0000

IONIC STRENGTH = 16.1395

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44002E+00	0.11296E+01
0.38952E+00	0.0008	
CATION # 2	0.13988E+00	0.18651E+00
0.75000E+00	0.0000	
CATION # 3	0.12810E+02	0.25619E+01
0.50000E+01	0.0000	
ANION # 1	0.88394E+02	0.79352E+01
0.11140E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.5000
3	5.0000

IONIC STRENGTH = 15.9013

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.44719E+00	0.11144E+01
0.40127E+00	0.0006	
CATION # 2	0.93412E-01	0.18682E+00
0.50000E+00	0.0000	
CATION # 3	0.11809E+02	0.23618E+01
0.50000E+01	0.0000	
ANION # 1	0.86976E+02	0.79785E+01
0.10901E+02	0.0006	

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.2500
3	5.0000

IONIC STRENGTH = 15.6639

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45477E+00	0.10988E+01
0.41387E+00	0.0009	

CATION # 2	0.46757E-01	0.18703E+00
0.25000E+00	0.0000	
CATION # 3	0.10873E+02	0.21745E+01
0.50000E+01	0.0000	
ANION # 1	0.85526E+02	0.80202E+01
0.10664E+02	0.0009	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
0.3802	0.9616	5.0000	5.9956	15.1625	78.8418	45.271
3.90E-01	7.50E-01	5.00E+00	6.3445	12.2159	81.4396	45.842
4.01E-01	5.00E-01	5.00E+00	6.7997	8.4728	84.7275	46.534
4.14E-01	2.50E-01	5.00E+00	7.3072	4.4139	88.2789	47.246

Fixed mMgCl2 = 5.5 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	5.5000

IONIC STRENGTH = 17.2530

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31492E+00	0.11925E+01
0.26409E+00	-0.0004	
CATION # 2	0.80704E-01	0.16506E+00
0.48894E+00	-0.0010	
CATION # 3	0.19946E+02	0.36265E+01
0.55000E+01	0.0000	
ANION # 1	0.12351E+03	0.10509E+02
0.11753E+02	-0.0004	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.3500
3	5.5000

IONIC STRENGTH = 17.1180

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31744E+00	0.11844E+01
0.26803E+00	0.0006	
CATION # 2	0.57909E-01	0.16545E+00
0.35000E+00	0.0000	
CATION # 3	0.19036E+02	0.34611E+01
0.55000E+01	0.0000	
ANION # 1	0.12252E+03	0.10546E+02
0.11618E+02	0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.1500
3	5.5000

IONIC STRENGTH = 16.9240

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32124E+00	0.11724E+01
0.27400E+00	0.0007	
CATION # 2	0.24895E-01	0.16597E+00
0.15000E+00	0.0000	
CATION # 3	0.17785E+02	0.32337E+01
0.55000E+01	0.0000	
ANION # 1	0.12108E+03	0.10599E+02
0.11424E+02	0.0007	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
------------	-----------	-------------	-------	------	--------	-----

0.2641	0.4889	5.50E+00	4.2234	7.8192	87.9574	41.338
2.68E-01	0.3500	5.50E+00	4.3810	5.7208	89.8982	41.704
2.74E-01	0.1500	5.50E+00	4.6253	2.5321	92.8427	42.241

Fixed mMgCl2 = 6.0 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 23

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	6.0000

IONIC STRENGTH = 18.4258

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22283E+00	0.12614E+01
0.17665E+00	-.0001	
CATION # 2	0.36057E-01	0.14471E+00
0.24916E+00	0.0010	
CATION # 3	0.32153E+02	0.53588E+01
0.60000E+01	0.0000	
ANION # 1	0.17455E+03	0.14048E+02
0.12426E+02	-.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.1500
3	6.0000

IONIC STRENGTH = 18.3283

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22391E+00	0.12560E+01
0.17826E+00	0.0009	
CATION # 2	0.21767E-01	0.14512E+00
0.15000E+00	0.0000	
CATION # 3	0.31082E+02	0.51803E+01
0.60000E+01	0.0000	
ANION # 1	0.17371E+03	0.14090E+02
0.12328E+02	0.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.0500
3	6.0000

IONIC STRENGTH = 18.2300

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.22503E+00	0.12505E+01
0.17995E+00	0.0009	
CATION # 2	0.72755E-02	0.14551E+00
0.50000E-01	0.0000	
CATION # 3	0.30030E+02	0.50050E+01
0.60000E+01	0.0000	
ANION # 1	0.17284E+03	0.14133E+02
0.12230E+02	0.0009	

molal NaCl	molal KCl	molal MgCl ₂	XNaCl	XKCl	XMgCl ₂	RH%
1.77E-01	2.49E-01	6.00E+00	2.7491	3.8775	93.3734	36.707
1.78E-01	1.50E-01	6.00E+00	2.8169	2.3703	94.8128	36.948
1.80E-01	5.00E-02	6.00E+00	2.8885	0.8026	96.3090	37.194

Fixed mMgCl₂ = 4.6 (halite field)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	1.2500
3	4.6000

IONIC STRENGTH = 15.5575

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.55896E+00	0.11014E+01
0.50748E+00	-.0009	
CATION # 2	0.25549E+00	0.20439E+00
0.12500E+01	0.0000	
CATION # 3	0.10061E+02	0.21872E+01
0.46000E+01	0.0000	
ANION # 1	0.69586E+02	0.63506E+01
0.10957E+02	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.9000
3	4.6000

IONIC STRENGTH = 15.2294

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.57208E+00	0.10807E+01
0.52937E+00	-.0009	
CATION # 2	0.18407E+00	0.20453E+00
0.90000E+00	0.0000	
CATION # 3	0.90339E+01	0.19639E+01
0.46000E+01	0.0000	

ANION # 1 0.67990E+02 0.63964E+01
0.10629E+02 -.0009

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.7500
3	4.6000

IONIC STRENGTH = 15.0894

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.57800E+00	0.10716E+01
0.53940E+00	-.0009	
CATION # 2	0.15338E+00	0.20451E+00
0.75000E+00	0.0000	
CATION # 3	0.86209E+01	0.18741E+01
0.46000E+01	0.0000	
ANION # 1	0.67294E+02	0.64154E+01
0.10489E+02	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.6000
3	4.6000

IONIC STRENGTH = 14.9498

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.58410E+00	0.10623E+01
0.54984E+00	-.0008	

CATION # 2 0.12267E+00 0.20445E+00
 0.60000E+00 0.0000
 CATION # 3 0.82238E+01 0.17878E+01
 0.46000E+01 0.0000
 ANION # 1 0.66591E+02 0.64340E+01
 0.10350E+02 -.0008

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 2 0.6000
 3 4.6000

IONIC STRENGTH = 14.9498

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.58410E+00 -.0008	0.10623E+01
0.54984E+00		
CATION # 2	0.12267E+00 0.0000	0.20445E+00
0.60000E+00		
CATION # 3	0.82238E+01 0.0000	0.17878E+01
0.46000E+01		
ANION # 1	0.66591E+02 -.0008	0.64340E+01
0.10350E+02		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
5.07E-01	1.25E+00	4.60E+00	7.9824	19.6619	72.3557	48.495
5.29E-01	9.00E-01	4.60E+00	8.7799	14.9269	76.2932	49.456
5.39E-01	7.50E-01	4.60E+00	9.1588	12.7347	78.1064	49.877
5.50E-01	6.00E-01	4.60E+00	9.5627	10.4351	80.0022	50.305
5.50E-01	6.00E-01	4.60E+00	9.5627	10.4351	80.0022	50.305
5.64E-01	4.00E-01	4.60E+00	10.1435	7.1885	82.6679	50.884
5.80E-01	2.00E-01	4.60E+00	10.7774	3.7176	85.5050	51.472

EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.4000
 3 4.6000

IONIC STRENGTH = 14.7644

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.59253E+00 -.0008	0.10498E+01
0.56443E+00		
CATION # 2	0.81720E-01 0.0000	0.20430E+00
0.40000E+00		
CATION # 3	0.77184E+01 0.0000	0.16779E+01
0.46000E+01		
ANION # 1	0.65644E+02 -.0008	0.64582E+01
0.10164E+02		

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 17

EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.2000
 3 4.6000

IONIC STRENGTH = 14.5798

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.60129E+00 -.0008	0.10371E+01
0.57980E+00		
CATION # 2	0.40814E-01 0.0000	0.20407E+00
0.20000E+00		
CATION # 3	0.72396E+01 0.0000	0.15738E+01
0.46000E+01		
ANION # 1	0.64687E+02 -.0008	0.64818E+01
0.99798E+01		

Halite+carnallite boundary (additional points)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	4.9000

IONIC STRENGTH = 16.2023

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46116E+00	0.11351E+01
0.40627E+00	-.0005	
CATION # 2	0.20881E+00	0.19051E+00
0.10961E+01	-.0008	
CATION # 3	0.12917E+02	0.26361E+01
0.49000E+01	0.0000	
ANION # 1	0.84342E+02	0.74624E+01
0.11302E+02	-.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	5.1000

IONIC STRENGTH = 16.4969

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.40831E+00	0.11502E+01
0.35498E+00	-.0003	
CATION # 2	0.15309E+00	0.18184E+00
0.84190E+00	-.0008	
CATION # 3	0.14629E+02	0.28684E+01
0.51000E+01	0.0000	
ANION # 1	0.95260E+02	0.83584E+01
0.11397E+02	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	5.2000

IONIC STRENGTH = 16.6666

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.38336E+00	0.11594E+01
0.33066E+00	-.0003	
CATION # 2	0.13069E+00	0.17759E+00
0.73594E+00	-.0009	
CATION # 3	0.15693E+02	0.30180E+01
0.52000E+01	0.0000	
ANION # 1	0.10146E+03	0.88483E+01
0.11467E+02	-.0003	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 21

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	5.4000

IONIC STRENGTH = 17.0457

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.33664E+00	0.11806E+01
0.28514E+00	-.0001	
CATION # 2	0.94853E-01	0.16920E+00
0.56059E+00	-.0009	
CATION # 3	0.18330E+02	0.33945E+01
0.54000E+01	0.0000	
ANION # 1	0.11554E+03	0.99213E+01
0.11646E+02	-.0001	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
14	4.1989
20	1.5899

CATION # TOTAL
3 5.6000
IONIC STRENGTH = 17.4707

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.29432E+00 -0.0004	0.12052E+01
CATION # 2	0.68642E-01 -0.0009	0.16094E+00
CATION # 3	0.21793E+02 0.0000	0.38917E+01
ANION # 1	0.13215E+03 -0.0004	0.11133E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	5.8000

IONIC STRENGTH = 17.9333

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.25644E+00 -0.0007	0.12323E+01
CATION # 2	0.49680E-01 -0.0006	0.15278E+00
CATION # 3	0.26306E+02 0.0000	0.45355E+01
ANION # 1	0.15168E+03 -0.0007	0.12501E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 40

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	6.2000

IONIC STRENGTH = 18.9420

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.19324E+00 0.0000	0.12918E+01
CATION # 2	0.26303E-01 0.0009	0.13673E+00
CATION # 3	0.39701E+02 0.0000	0.64033E+01

ANION # 1 0.20128E+03 0.15796E+02
0.12742E+02 0.0000

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 40

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	6.4000

IONIC STRENGTH = 19.4764

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.16735E+00 0.0000	0.13230E+01
CATION # 2	0.19319E-01 0.0008	0.12886E+00
CATION # 3	0.49422E+02 0.0000	0.77222E+01
ANION # 1	0.23242E+03 0.0000	0.17774E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 40

EQUATION	LOG K
14	4.1989
20	1.5899

CATION #	TOTAL
3	6.6000

IONIC STRENGTH = 20.0250

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.14477E+00 0.0000	0.13544E+01
CATION # 2	0.14307E-01 0.0007	0.12112E+00
CATION # 3	0.61927E+02 0.0000	0.93829E+01
ANION # 1	0.26866E+03 0.0000	0.20012E+02

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 14
NUMBER CORRESPONDING TO SATURATED SOLID 20
NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 41

EQUATION	LOG K	MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
14	4.1989	CATION # 1	0.93440E-01	0.14462E+01
20	1.5899	0.64609E-01	0.0006	
CATION #	TOTAL	CATION # 2	0.61581E-02	0.98929E-01
3	7.2000	0.62247E-01	0.0004	
IONIC STRENGTH = 21.7269		CATION # 3	0.12521E+03	0.17390E+02
		0.72000E+01	0.0000	
		ANION # 1	0.41626E+03	0.28654E+02
		0.14527E+02	0.0006	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
4.06E-01	1.10E+00	4.90E+00	6.3456	17.1202	76.5342	45.926
3.55E-01	8.42E-01	5.10E+00	5.6374	13.3701	80.9925	44.567
3.31E-01	7.36E-01	5.20E+00	5.2765	11.7438	82.9796	43.817
2.85E-01	5.61E-01	5.40E+00	4.5654	8.9756	86.4591	42.199
2.44E-01	4.27E-01	5.60E+00	3.8946	6.8015	89.3039	40.45
2.08E-01	3.25E-01	5.80E+00	3.2857	5.1343	91.5800	38.608
1.50E-01	1.92E-01	6.20E+00	2.2866	2.9406	94.7728	34.776
1.26E-01	1.50E-01	6.40E+00	1.8946	2.2455	95.8599	32.841
1.07E-01	1.18E-01	6.60E+00	1.5662	1.7307	96.7032	30.922
6.46E-02	6.22E-02	7.20E+00	0.8818	0.8496	98.2686	25.407

Additional Halite field calculations (fixed mMgCl2 = 5.5)

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 2
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3
 THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.0500
3	5.5000

IONIC STRENGTH = 16.8271

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32321E+00	0.11662E+01
0.27714E+00	-.0009	
CATION # 2	0.83100E-02	0.16620E+00
0.50000E-01	0.0000	
CATION # 3	0.17185E+02	0.31245E+01
0.55000E+01	0.0000	
ANION # 1	0.12034E+03	0.10624E+02
0.11327E+02	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899
CATION #	TOTAL
2	0.1000
3	5.5000

IONIC STRENGTH = 16.8756

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32222E+00	0.11693E+01
0.27556E+00	-.0009	
CATION # 2	0.16609E-01	0.16609E+00
0.10000E+00	0.0000	
CATION # 3	0.17483E+02	0.31787E+01
0.55000E+01	0.0000	
ANION # 1	0.12071E+03	0.10611E+02
0.11376E+02	-.0009	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20
 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3

THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899
CATION #	TOTAL

2 0.2000
3 5.5000
IONIC STRENGTH = 16.9725

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.32027E+00	0.11754E+01
0.27248E+00	0.0008	
CATION # 2	0.33169E-01	0.16585E+00
0.20000E+00	0.0000	
CATION # 3	0.18092E+02	0.32894E+01
0.55000E+01	0.0000	
ANION # 1	0.12144E+03	0.10586E+02
0.11472E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.2500
3	5.5000

IONIC STRENGTH = 17.0210

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31932E+00	0.11784E+01
0.27097E+00	0.0008	
CATION # 2	0.41430E-01	0.16572E+00
0.25000E+00	0.0000	
CATION # 3	0.18402E+02	0.33459E+01
0.55000E+01	0.0000	
ANION # 1	0.12181E+03	0.10573E+02
0.11521E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.3000
3	5.5000

IONIC STRENGTH = 17.0695

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
----------	--------------------	------------

CATION # 1	0.31837E+00	0.11814E+01
0.26949E+00	0.0008	
CATION # 2	0.49677E-01	0.16559E+00
0.30000E+00	0.0000	
CATION # 3	0.18717E+02	0.34031E+01
0.55000E+01	0.0000	
ANION # 1	0.12217E+03	0.10559E+02
0.11569E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.4000
3	5.5000

IONIC STRENGTH = 17.1666

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31653E+00	0.11873E+01
0.26659E+00	0.0008	
CATION # 2	0.66126E-01	0.16532E+00
0.40000E+00	0.0000	
CATION # 3	0.19360E+02	0.35199E+01
0.55000E+01	0.0000	
ANION # 1	0.12288E+03	0.10533E+02
0.11667E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
NUMBER CORRESPONDING TO SATURATED SOLID 20
2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
THE NUMBER OF ITERATIONS IS 39

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.4500
3	5.5000

IONIC STRENGTH = 17.2152

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.31562E+00	0.11902E+01
0.26517E+00	0.0008	
CATION # 2	0.74328E-01	0.16517E+00
0.45000E+00	0.0000	
CATION # 3	0.19687E+02	0.35795E+01
0.55000E+01	0.0000	
ANION # 1	0.12323E+03	0.10519E+02
0.11715E+02	0.0008	

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
2.77E-01	5.00E-02	5.50E+00	4.7560	0.8581	94.3859	42.514
2.76E-01	1.00E-01	5.50E+00	4.6899	1.7020	93.6081	42.377
2.72E-01	2.00E-01	5.50E+00	4.5623	3.3487	92.0890	42.105
2.71E-01	2.50E-01	5.50E+00	4.5004	4.1522	91.3474	41.971
2.69E-01	3.00E-01	5.50E+00	4.4401	4.9428	90.6172	41.837
2.67E-01	4.00E-01	5.50E+00	4.3231	6.4866	89.1903	41.571
2.65E-01	4.50E-01	5.50E+00	4.2665	7.2403	88.4932	41.44

Additional halite field (fixed mMgCl2 = 4.5):

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.2000
3	4.5000

IONIC STRENGTH = 14.3286

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.64333E+00	0.10234E+01
0.62863E+00	-0.0006	
CATION # 2	0.41667E-01	0.20833E+00
0.20000E+00	0.0000	
CATION # 3	0.65998E+01	0.14666E+01
0.45000E+01	0.0000	
ANION # 1	0.60459E+02	0.61514E+01
0.98286E+01	-0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.4000
3	4.5000

IONIC STRENGTH = 14.5118

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.63383E+00	0.10361E+01
0.61176E+00	-0.0006	
CATION # 2	0.83462E-01	0.20865E+00
0.40000E+00	0.0000	
CATION # 3	0.70308E+01	0.15624E+01
0.45000E+01	0.0000	
ANION # 1	0.61366E+02	0.61294E+01
0.10012E+02	-0.0006	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 16

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.6000
3	4.5000

IONIC STRENGTH = 14.6957

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.62468E+00	0.10486E+01
0.59573E+00	-0.0005	
CATION # 2	0.12534E+00	0.20890E+00
0.60000E+00	0.0000	
CATION # 3	0.74859E+01	0.16635E+01
0.45000E+01	0.0000	
ANION # 1	0.62264E+02	0.61069E+01
0.10196E+02	-0.0005	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 15

EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.8000
 3 4.5000
 IONIC STRENGTH = 14.8805

MOLALITY ACTIVITY ACT.COEFF.
 %ERROR
 CATION # 1 0.61588E+00 0.10609E+01
 0.58052E+00 -.0009
 CATION # 2 0.16725E+00 0.20906E+00
 0.80000E+00 0.0000
 CATION # 3 0.79657E+01 0.17702E+01
 0.45000E+01 0.0000
 ANION # 1 0.63154E+02 0.60839E+01
 0.10381E+02 -.0009

molal NaCl	molal KCl	molal MgCl2	XNaCl	XKCl	XMgCl2	RH%
6.29E-01	2.00E-01	4.50E+00	11.7972	3.7533	84.4495	52.457
6.12E-01	4.00E-01	4.50E+00	11.0992	7.2572	81.6436	51.867
5.96E-01	6.00E-01	4.50E+00	10.4592	10.5342	79.0066	51.287
5.81E-01	8.00E-01	4.50E+00	9.8719	13.6042	76.5238	50.716

Additional halite field (fixed mMgCl2 = 5):

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.0300
 3 5.0000

IONIC STRENGTH = 15.4557

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46179E+00	0.10847E+01
0.42573E+00	0.0007	
CATION # 2	0.56132E-02	0.18711E+00
0.30000E-01	0.0000	
CATION # 3	0.10100E+02	0.20201E+01
0.50000E+01	0.0000	
ANION # 1	0.84226E+02	0.80555E+01
0.10456E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K
 20 1.5899

CATION # TOTAL
 2 0.0600
 3 5.0000

IONIC STRENGTH = 15.4841

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.46082E+00	0.10866E+01
0.42407E+00	0.0007	
CATION # 2	0.11226E-01	0.18710E+00
0.60000E-01	0.0000	
CATION # 3	0.10203E+02	0.20406E+01
0.50000E+01	0.0000	
ANION # 1	0.84404E+02	0.80507E+01
0.10484E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00
 NUMBER CORRESPONDING TO SATURATED SOLID 20
 2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY
 THE NUMBER OF ITERATIONS IS 19

EQUATION LOG K
 20 1.5899
 CATION # TOTAL
 2 0.0900
 3 5.0000

IONIC STRENGTH = 15.5124

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45984E+00	0.10886E+01
0.42242E+00	0.0007	
CATION # 2	0.16839E-01	0.18709E+00
0.90000E-01	0.0000	
CATION # 3	0.10306E+02	0.20613E+01
0.50000E+01	0.0000	
ANION # 1	0.84583E+02	0.80460E+01
0.10512E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

IONIC STRENGTH = 15.5928

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.1750
3	5.0000

IONIC STRENGTH = 15.5503

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45856E+00	0.10912E+01
0.42025E+00	0.0007	
CATION # 2	0.24321E-01	0.18708E+00
0.13000E+00	0.0000	
CATION # 3	0.10446E+02	0.20891E+01
0.50000E+01	0.0000	
ANION # 1	0.84820E+02	0.80396E+01
0.10550E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 19

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.2000
3	5.0000

IONIC STRENGTH = 15.6165

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45634E+00	0.10956E+01
0.41650E+00	0.0008	
CATION # 2	0.37411E-01	0.18705E+00
0.20000E+00	0.0000	
CATION # 3	0.10693E+02	0.21386E+01
0.50000E+01	0.0000	
ANION # 1	0.85232E+02	0.80283E+01
0.10617E+02	0.0008	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 2

NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY 3

THE NUMBER OF ITERATIONS IS 20

EQUATION	LOG K
20	1.5899

CATION #	TOTAL
2	0.4000
3	5.0000

IONIC STRENGTH = 15.8062

MOLALITY	ACTIVITY %ERROR	ACT.COEFF.
CATION # 1	0.45017E+00	0.11082E+01
0.40620E+00	0.0005	

CATION # 2 0.74768E-01 0.18692E+00
 0.40000E+00 0.0000
 CATION # 3 0.11427E+02 0.22854E+01
 0.50000E+01 0.0000
 ANION # 1 0.86400E+02 0.79954E+01
 0.10806E+02 0.0005

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

THE NUMBER OF ITERATIONS IS 21

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 1.2000
 3 5.0000

IONIC STRENGTH = 16.5704

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 0.6000
 3 5.0000

IONIC STRENGTH = 15.9965

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.42809E+00	0.11557E+01
0.37041E+00	0.0009	
CATION # 2	0.22278E+00	0.18565E+00
0.12000E+01	0.0000	
CATION # 3	0.14781E+02	0.29562E+01
0.50000E+01	0.0000	
ANION # 1	0.90856E+02	0.78525E+01
0.11570E+02	0.0009	

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.44427E+00	0.11206E+01
0.39647E+00	0.0007	
CATION # 2	0.11203E+00	0.18671E+00
0.60000E+00	0.0000	
CATION # 3	0.12201E+02	0.24402E+01
0.50000E+01	0.0000	
ANION # 1	0.87547E+02	0.79614E+01
0.10996E+02	0.0007	

SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

2 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

3 NUMBER CORRESPONDING TO CATION WITH FIXED MOLALITY

THE NUMBER OF ITERATIONS IS 20

EQUATION LOG K

20 1.5899

CATION # TOTAL

2 0.8000
 3 5.0000

IONIC STRENGTH = 16.1873

MOLALITY	ACTIVITY %ERROR	ACT. COEFF.
CATION # 1	0.43863E+00	0.11326E+01
0.38727E+00	0.0009	
CATION # 2	0.14914E+00	0.18643E+00
0.80000E+00	0.0000	
CATION # 3	0.13018E+02	0.26035E+01
0.50000E+01	0.0000	
ANION # 1	0.88673E+02	0.79263E+01
0.11187E+02	0.0009	

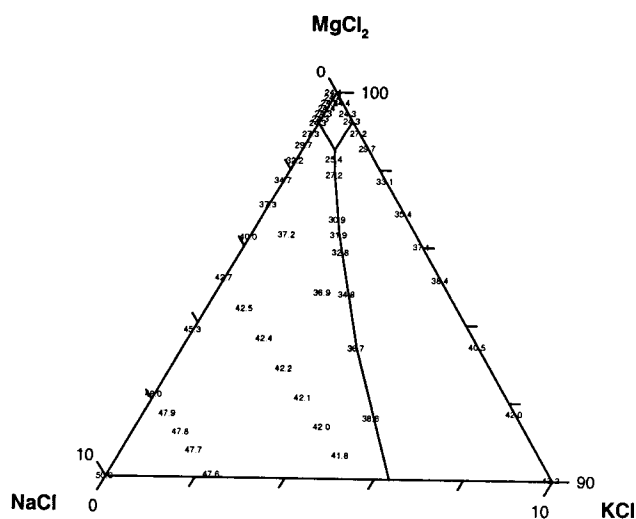
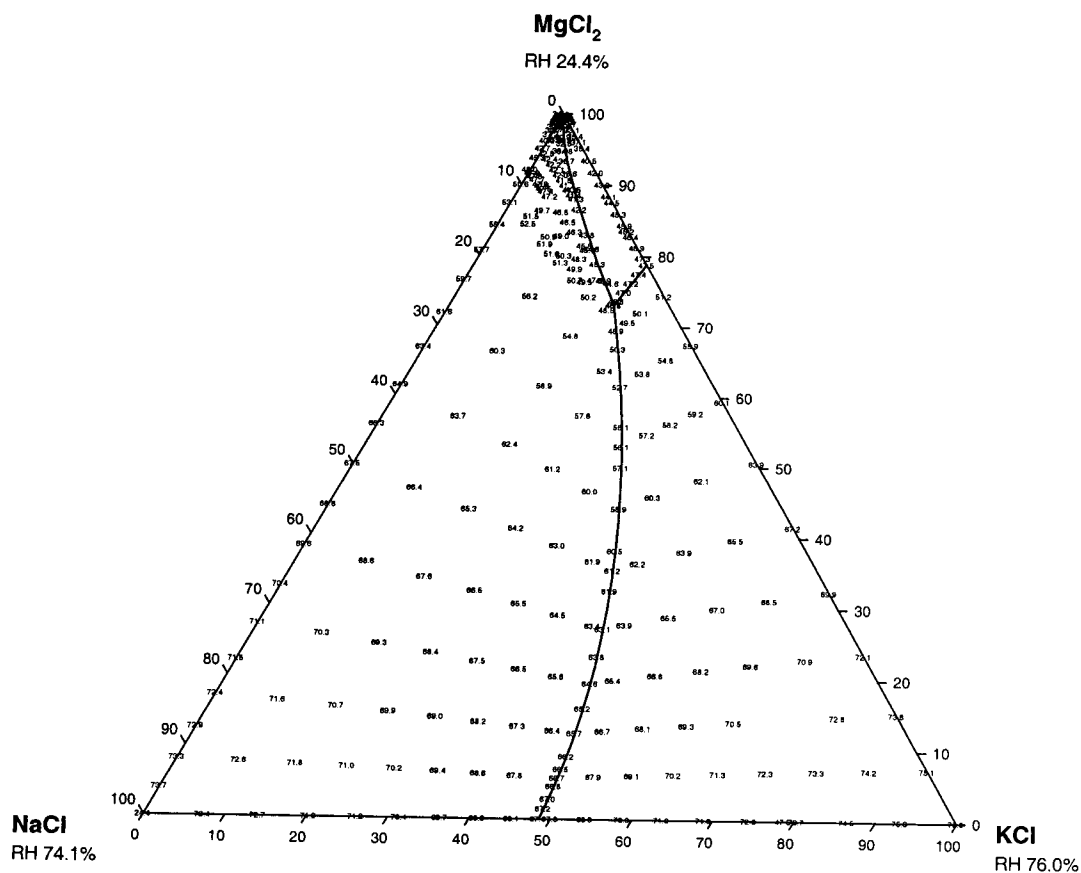
SOLUBILITY AND SPECIATION CALCULATION IN MIXED
 ELECTROLYTE SYSTEMS

TEMP(C) = 90.00 PRESS(BARS) = 1.00

NUMBER CORRESPONDING TO SATURATED SOLID 20

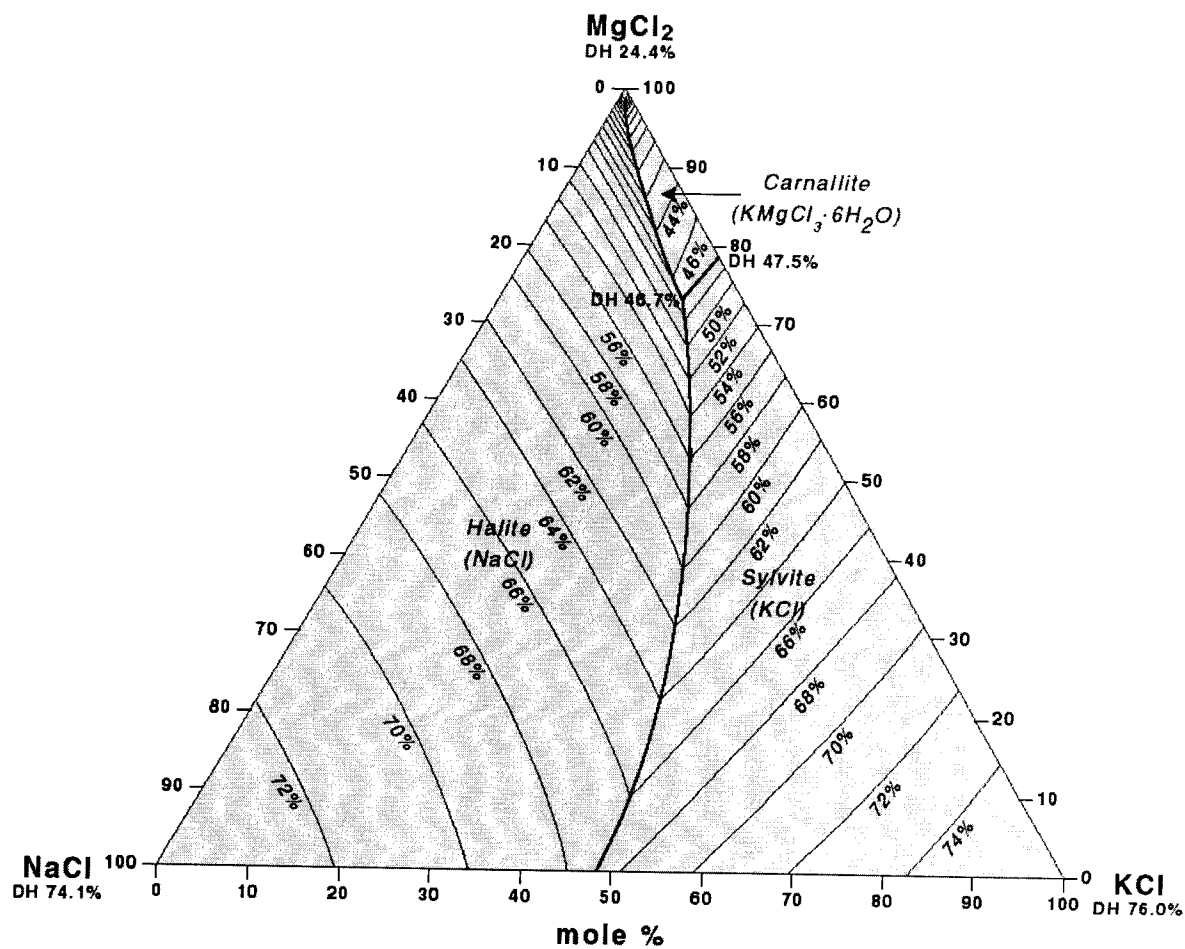
molal NaCl	molal KCl	molal MgCl ₂	XNaCl	XKCl	XMgCl ₂	RH%
4.26E-01	3.00E-02	5.00E+00	7.8034	0.5499	91.6468	47.886
4.24E-01	6.00E-02	5.00E+00	7.7328	1.0941	91.1732	47.798
4.22E-01	9.00E-02	5.00E+00	7.6631	1.6327	90.7043	47.71
4.20E-01	1.30E-01	5.00E+00	7.5717	2.3422	90.0860	47.593
4.19E-01	1.50E-01	5.00E+00	7.5266	2.6934	89.7800	47.535
4.18E-01	1.75E-01	5.00E+00	7.4708	3.1290	89.4002	47.462
4.17E-01	2.00E-01	5.00E+00	7.4157	3.5609	89.0234	47.39
4.06E-01	4.00E-01	5.00E+00	6.9960	6.8892	86.1148	46.817
3.96E-01	6.00E-01	5.00E+00	6.6117	10.0059	83.3824	46.255
3.87E-01	8.00E-01	5.00E+00	6.2591	12.9298	80.8111	45.706
3.70E-01	1.20E+00	5.00E+00	5.6375	18.2637	76.0988	44.643

The following plots the calculated relative humidity in the NaCl-KCl-MgCl₂ at 90 C:



September 13, 2001

The following is a plot of the relative humidity at 90 C for solid saturated conditions in the system NaCl-KCl-MgCl₂:



Entries into Scientific Notebook No. 185 for the period
January 1, 2001, to September 13, 2001, have been made
by

RTPabalan 9/14/01
Roberto T. Pabalan / Date

No original entry into this Scientific Notebook has been
removed.

RTPabalan 9/14/01
Roberto T. Pabalan / Date