Supporting Information

ASPEN Plus® Input Files for MEA and Ionic Liquid Processes

MEA Process:

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;
;Input Summary created by Aspen Plus Rel. 21.0 at 13:04:31 Fri Aug 20, 2010
;Directory
;
;
IN-UNITS ENG TEMPERATURE=C

DEF-STREAMS CONVEN ALL

DESCRIPTION "
   H2O-MEA-H2S-CO2 PROPERTY METHOD: ELECNRTL WITH KINETIC
   CONSIDERATION TEMPERATURE: UP TO 120 C MEA CONCENTRATION UP
   TO 50WT.%
   "

DATABANKS ASPENPCD  / AQUEOUS  / SOLIDS  / PURE856

PROP-SOURCES ASPENPCD  / AQUEOUS  / SOLIDS  / PURE856

COMPONENTS
   N2 N2 /
   O2 O2 /
   CO CO /
   CO2 CO2 /
   CH4 CH4 /
   H2O H2O /
   MEA C2H7NO /
   H2S H2S /
   HCO3- HCO3- /
   MEACOO- /
   MEA+ /
   CO3-2 CO3-2 /
   HS- HS- /
   S-2 S-2 /
   H3O+ H3O+ /
   OH- OH-

HENRY-COMPS KEMEA CO2 H2S

CHEMISTRY KEMEA
   IN-UNITS SI
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   PARAM KBASIS=MOLEFRAC
   STOIC 1 MEA+ -1.0 / H2O -1.0 / MEA 1.0 / H3O+ 1.0
   STOIC 2 CO2 -1.0 / H2O -2.0 / H3O+ 1.0 / HCO3- 1.0
   STOIC 3 HCO3- -1.0 / H2O -1.0 / H3O+ 1.0 / CO3-2 1.0
   STOIC 4 MEACOO- -1.0 / H2O -1.0 / MEA 1.0 / HCO3- 1.0
   STOIC 5 H2O -2.0 / H3O+ 1.0 / OH- 1.0
   STOIC 6 H2O -1.0 / H2S -1.0 / HS- 1.0 / H3O+ 1.0
   STOIC 7 H2O -1.0 / HS- -1.0 / S-2 1.0 / H3O+ 1.0
   K-STOIC 1 A=-3.0383250 B=-7008.3570 C=0.0 D=-.00313489
   K-STOIC 2 A=231.4650 B=-12092.10 C=-36.78160 D=0.0
   K-STOIC 3 A=216.0490 B=-12431.70 C=-35.48190 D=0.0
   K-STOIC 4 A=-.521350 B=-2545.530 C=0.0 D=0.0
   K-STOIC 5 A=132.8990 B=-13445.90 C=-22.47730 D=0.0
   K-STOIC 6 A=214.5820 B=-12995.40 C=-33.54710 D=0.0
   K-STOIC 7 A=-9.7420 B=-8585.470 C=0.0 D=0.0

FLOWSHEET
   BLOCK SCRUBBER IN=FLUEGAS SCRUBH2O OUT=SCRUBGAS SCRUBLIQ
   BLOCK ABSORBER IN=SCRUBGAS XLEANOIL OUT=ABS-VENT RICHOIL
   BLOCK STRIPPER IN=STRPFEED OUT=CO2PROD H2OCOND STRPRBOT
   BLOCK LEANMIX IN=X6 XTRAH2O H2OCOND OUT=1
   BLOCK RECYSEP IN=X4 OUT=XRECYCLE XDUMP
   BLOCK RECYMIX IN=XRECYCLE LEANOIL OUT=XLEANOIL
   BLOCK PRODCOND IN=CO2PROD OUT=ZWETCO2
   BLOCK P2PEXCH IN=ZBOT ZRICH OUT=X6 X7
   BLOCK ABSPUMP IN=RICHOIL OUT=ZRICH
   BLOCK STRPPUMP IN=STRPRBOT OUT=ZBOT
   BLOCK PRODFLSH IN=ZWETCO2 OUT=XCO2PROD ZCO2COND
   BLOCK HEATER IN=X7 OUT=STRPFEED
   BLOCK COOLER IN=1 OUT=X4

PROPERTIES ELECNRTL HENRY-COMPS=KEMEA CHEMISTRY=KEMEA  &
      TRUE-COMPS=YES

; --- N2; Dippr (8/1991); Expt'l TB; Expt'l TC; Expt'l PC
; --- O2; Dippr (8/1992); Expt'l TB; Expt'l TC; Expt'l PC
; --- CO; Dippr (8/1993); Expt'l TB; Expt'l TC; Expt'l PC
; --- CH4; Dippr (8/1994); Expt'l TB; Expt'l TC; Expt'l PC

PROP-DATA DATA1
   IN-UNITS SI
   PROP-LIST MW / TB / TC / PC / OMEGA
   PVAL N2 28.020 / 77.340 / 126.20 / 3400000.0 /  &
      .03772150
   PVAL O2 32.0 / 90.190 / 154.580 / 5043000.0 / .02217980
   PVAL CO 28.010 / 81.70 / 132.920 / 3499000.0 /  &
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      .04816210
   PVAL CH4 16.0420 / 111.660 / 190.560 / 4599000.0 /  &
      .01154780

; --- N2; Dippr (8/1991); Expt'l VC;  ZC; Expt'l MUP
; --- O2; Dippr (8/1992); Expt'l VC;  ZC; Expt'l MUP
; --- CO; Dippr (8/1993); Expt'l VC;  ZC; Expt'l MUP
; --- CH4; Dippr (8/1994); Expt'l VC;  ZC; Expt'l MUP

PROP-DATA DATA2
   IN-UNITS SI
   PROP-LIST VC / ZC / VB / MUP
   PVAL N2 .089210 / .2890 / .0346720 / 0.0
   PVAL O2 .07340 / .2880 / .0280230 / 0.0
   PVAL CO .09440 / .2990 / .0354430 / 3.54560E-26
   PVAL CH4 .09860 / .2860 / .0379690 / 0.0

; --- N2; Dippr (8/1991); Expt'l DHFORM; Expt'l DGFORM
; --- O2; Dippr (8/1992); Expt'l DHFORM; Expt'l DGFORM
; --- CO; Dippr (8/1993); Expt'l DHFORM;  DGFORM
; --- CH4; Dippr (8/1994); Expt'l DHFORM;  DGFORM

PROP-DATA DATA3
   IN-UNITS SI
   PROP-LIST DHFORM / DGFORM
   PVAL N2 0.0 / 0.0
   PVAL O2 0.0 / 0.0
   PVAL CO -1.10530E+08 / -1.37150E+08
   PVAL CH4 -74520000.0 / -50490000.0

PROP-DATA DATA4
   IN-UNITS SI
   PROP-LIST VLSTD
   PVAL N2 .0891530
   PVAL O2 .0735050
   PVAL CO .0950360
   PVAL CH4 .0991850

PROP-DATA DATA16
   IN-UNITS SI
   PROP-LIST RKTZRA / DHFORM
   PVAL MEA .19852040 / -2.101930E+08
   PROP-LIST CHARGE / IONTYP / MW / DHAQFM
   PVAL MEACOO- -1.0 / 3.0 / 104.08240 / -6.8750E+08
   PVAL MEA+ 1.0 / 1.0 / 62.0880 / -3.3750E+08
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PROP-DATA CPAQ0-1
   IN-UNITS SI
   PROP-LIST CPAQ0
   PVAL MEACOO- 0.0 298.50 0.0 0.0 0.0 0.0
   PVAL MEA+ 0.0 295.120 0.0 0.0 0.0 0.0

PROP-DATA CPDIEC-1
   IN-UNITS SI
   PROP-LIST CPDIEC
   PVAL MEA 35.760 14836.0 273.150

PROP-DATA CPIG-1
   IN-UNITS SI
   PROP-LIST CPIG
   PVAL MEACOO- 20800.0 0.0 0.0 0.0 0.0 0.0 0.0 2000.0
   PVAL MEA+ 20800.0 0.0 0.0 0.0 0.0 0.0 0.0 2000.0

;PROP-DATA
; IN-UNITS  SI  TEMP=K  MOLE-HEAT-CAPACITY='J/KMOL-K'
; PROP-LIST  CPLDIP
; --- N2; Dippr (8/1991); Recommended: 63-112 K; Expt'l: 63-115 K
; PVAL N2        2.819700E+05 -1.228100E+04  2.480000E+02 -2.218200E+00  &
;               7.490200E-03    0.00  126.20
; --- O2; Dippr (8/1992); Recommended: 54-142 K; Expt'l: 54-142 K
; PVAL O2        1.754300E+05 -6.152300E+03  1.139200E+02 -9.238200E-01  &
;               2.796300E-03    0.00  154.58
; --- CO; Dippr (8/1993); Expt'l: 70-132 K; Refitted to Eqn. 100.
; PVAL CO        1.277608E+05 -1.677883E+03  1.048179E+01  0.000000E+00  &
;               0.000000E+00   70.00  132.92
; --- CH4; Dippr (8/1994); Expt'l: 91-190 K; Refitted to Eqn. 100.
; PVAL CH4       1.630513E+05 -1.956070E+03  8.772740E+00  0.000000E+00  &
;               0.000000E+00   90.00  190.56
; --- N2; Dippr (8/1991); Recommended: 50-1500 K; Expt'l: 50-1500 K
; --- O2; Dippr (8/1992); Recommended: 50-1500 K; Expt'l: 50-1500 K
; --- CO; Dippr (8/1993); Recommended: 60-1500 K; Predicted data
; --- CH4; Dippr (8/1994); Recommended: 50-1500 K; Predicted data

PROP-DATA CPIGDP-1
   IN-UNITS SI
   PROP-LIST CPIGDP
   PVAL N2 29105.0 8614.90 1701.60 103.470 909.790 0.0  &
      1500.0
   PVAL O2 29103.0 10040.0 2526.50 9356.0 1153.80 0.0  &
      1500.0
   PVAL CO 29108.0 8773.0 3085.10 8455.30 1538.20 0.0  &
      1500.0
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   PVAL CH4 33298.0 79933.0 2086.90 41602.0 991.960 0.0  &
      1500.0

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-124 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 90-90 K
; --- CO; Dippr (8/1993); Recommended: 68-132 K; Expt'l: 68-132 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-189 K

PROP-DATA DHVLDP-1
   IN-UNITS SI
   PROP-LIST DHVLDP
   PVAL N2 7490500.0 .404060 -.3170 .273430 0.0 0.0 126.20
   PVAL O2 9008000.0 .45420 -.40960 .31830 0.0 0.0 154.580
   PVAL CO 8585000.0 .49210 -.3260 .22310 0.0 0.0 132.920
   PVAL CH4 10194000.0 .260870 -.146940 .221540 0.0 0.0  &
      190.560

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-124 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 54-155 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 68-130 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-191 K

PROP-DATA DNLDIP-1
   IN-UNITS SI
   PROP-LIST DNLDIP
   PVAL N2 3.20910 .28610 126.20 .29660 0.0 0.0 126.20
   PVAL O2 3.91430 .287720 154.580 .29240 0.0 0.0 154.580
   PVAL CO 2.8970 .275320 132.920 .28130 0.0 0.0 132.920
   PVAL CH4 2.92140 .289760 190.560 .288810 0.0 0.0 190.560

; --- N2; Dippr (8/1991); Recommended: 63-124 K; Expt'l: 65-124 K
; --- O2; Dippr (8/1992); Recommended: 60-150 K; Expt'l: 60-140 K
; --- CO; Dippr (8/1993); Recommended: 68-125 K; Expt'l: 70-80 K
; --- CH4; Dippr (8/1994); Recommended: 91-180 K; Expt'l: 109-189 K

PROP-DATA KLDIP-1
   IN-UNITS SI
   PROP-LIST KLDIP
   PVAL N2 .26540 -.0016770 0.0 0.0 0.0 0.0 126.20
   PVAL O2 .27410 -.001380 0.0 0.0 0.0 0.0 154.580
   PVAL CO .28550 -.0017840 0.0 0.0 0.0 0.0 132.920
   PVAL CH4 .417680 -.00245280 .00000355880 0.0 0.0 0.0  &
      190.560

; --- N2; Dippr (8/1991); Recommended: 63-2000 K; Expt'l: 296-344 K
; --- O2; Dippr (8/1992); Recommended: 80-2000 K; Predicted data
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; --- CO; Dippr (8/1993); Recommended: 70-1500 K; Expt'l: 70-2230 K
; --- CH4; Dippr (8/1994); Recommended: 112-600 K; Expt'l: 100-1000 K

PROP-DATA KVDIP-1
   IN-UNITS SI
   PROP-LIST KVDIP
   PVAL N2 .000331430 .77220 16.3230 373.720 0.0 0.0 1500.0
   PVAL O2 .000449940 .74560 56.6990 0.0 0.0 0.0 1500.0
   PVAL CO .000598820 .68630 57.130 501.920 0.0 0.0 1500.0
   PVAL CH4 .00000839830 1.42680 -49.6540 0.0 0.0 0.0  &
      1500.0

; --- N2; Dippr (8/1991); Recommended: 63-124 K; Expt'l: 65-124 K
; --- O2; Dippr (8/1992); Recommended: 54-150 K; Expt'l: 54-152 K
; --- CO; Dippr (8/1993); Recommended: 68-131 K; Expt'l: 69-81 K
; --- CH4; Dippr (8/1994); Recommended: 91-188 K; Expt'l: 93-163 K

PROP-DATA MULDIP-1
   IN-UNITS SI
   PROP-LIST MULDIP
   PVAL N2 16.0040 -181.610 -5.15510 0.0 0.0 0.0 126.20
   PVAL O2 -4.14760 94.040 -1.2070 0.0 0.0 0.0 154.580
   PVAL CO -4.97350 97.670 -1.10880 0.0 0.0 0.0 132.920
   PVAL CH4 -6.15720 178.150 -.952390 -9.06060E-24 10.0 0.0  &
      190.560

; --- N2; Dippr (8/1991); Recommended: 63-1970 K; Expt'l: 63-76 K
; --- O2; Dippr (8/1992); Recommended: 54-1500 K; Predicted data
; --- CO; Dippr (8/1993); Recommended: 68-1250 K; Expt'l: 80-1240 K
; --- CH4; Dippr (8/1994); Recommended: 91-1000 K; Expt'l: 115-800 K

PROP-DATA MUVDIP-1
   IN-UNITS SI
   PROP-LIST MUVDIP
   PVAL N2 .000000655920 .60810 54.7140 0.0 0.0 0.0 1500.0
   PVAL O2 .0000011010 .56340 96.30 0.0 0.0 0.0 1500.0
   PVAL CO .00000111270 .53380 94.70 0.0 0.0 0.0 1500.0
   PVAL CH4 .000000525460 .590060 105.670 0.0 0.0 0.0  &
      1500.0

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-116 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 62-97 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 68-133 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-191 K

PROP-DATA PLXANT-1
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   IN-UNITS SI
   PROP-LIST PLXANT
   PVAL N2 58.2820 -1084.10 0.0 0.0 -8.31440 .0441270 1.0  &
      0.0 126.20
   PVAL O2 51.2450 -1200.20 0.0 0.0 -6.43610 .0284050 1.0  &
      0.0 154.580
   PVAL CO 45.6980 -1076.60 0.0 0.0 -4.88140 .0000756730  &
      2.0 0.0 132.920
   PVAL CH4 39.2050 -1324.40 0.0 0.0 -3.43660 .0000310190  &
      2.0 0.0 190.560
   PVAL MEA 172.780 -13492.0 0.0 0.0 -21.9140 .0000137790  &
      2.0 283.0 638.0
   PVAL H2O 72.550 -7206.70 0.0 0.0 -7.13850 .0000040460  &
      2.0 273.0 650.0
   PVAL MEACOO- -1.0E+20 0.0 0.0 0.0 0.0 0.0 0.0 0.0  &
      2000.0
   PVAL MEA+ -1.0E+20 0.0 0.0 0.0 0.0 0.0 0.0 0.0 2000.0

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 70-90 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 70-90 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 81-91 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 93-193 K

PROP-DATA SIGDIP-1
   IN-UNITS SI
   PROP-LIST SIGDIP
   PVAL N2 .029010 1.24850 0.0 0.0 0.0 0.0 126.20
   PVAL O2 .0380660 1.21360 0.0 0.0 0.0 0.0 154.580
   PVAL CO .0279590 1.1330 0.0 0.0 0.0 0.0 132.920
   PVAL CH4 .0365570 1.14660 0.0 0.0 0.0 0.0 190.560

PROP-DATA THRSWT-1
   IN-UNITS SI
   PROP-LIST THRSWT
   PVAL N2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL O2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL CO 1.0 105.0 1.0 106.0 1.0 114.0 107.0 1.0
   PVAL CH4 1.0 105.0 1.0 106.0 1.0 114.0 107.0 1.0

PROP-DATA TRNSWT-1
   IN-UNITS SI
   PROP-LIST TRNSWT
   PVAL N2 101.0 102.0 100.0 102.0 106.0
   PVAL O2 101.0 102.0 100.0 102.0 106.0
   PVAL CO 101.0 102.0 100.0 102.0 106.0
   PVAL CH4 101.0 102.0 100.0 102.0 106.0
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PROP-DATA VLBROC-1
   IN-UNITS SI
   PROP-LIST VLBROC
   PVAL H2O .04640
   PVAL CO2 .09390
   PVAL H2S .09390

; ---
; ---    ln(Hij) = aij + bij/T + cij*ln(T) + dij*T
; ---
;--- HENRY'S CONSTANT FOR METHANE OUT OF H2O FROM EXPERIMENTAL
GAS
;--- SOLUBILITY DATA IN THE RANGE 12 TO 269 DEG C.   MS 1/16/97
;--- Ref.: Morrison T.J., Billett F., J.Chem.Soc. 3819(1952).
;--- Ref.: CRAMER S.D., IND.ENG.CHEM.,PROCESS DES.DEV. 23,533(1984).
;LH--- Henry's constant for N2 in H2O from experimental gas solubility data
;LH--- the range 20 to 160 deg C.
;LH--- Henry's constant for CO in H2O from experimental gas solubility data
;LH--- the range 20 to 175 deg C.
;LH--- Henry's constant for CO2 in H2O from experimental gas solubility data
;LH--- the range 0 to 200 deg C.
;LH--- Henry's constant for O2 in H2O from experimental gas solubility data
;LH--- the range 0 to 200 deg C.
; ---- Henry's constant for N2 out of MEA set to 3000 atm/mole fraction.
; ---- Henry's constant for O2 out of MEA set to 3000 atm/mole fraction.
; ---- Henry's constant for CO out of MEA set to 3000 atm/mole fraction.
; ---- Henry's constant for CH4 out of MEA set to 1000 atm/mole fraction.

PROP-DATA HENRY-1
   IN-UNITS SI
   PROP-LIST HENRY
   BPVAL CO2 H2O 144.26410 -7566.820 -17.54630 0.0 223.150  &
      523.150 0.0
   BPVAL H2S H2O 358.1380 -13236.80 -55.05510 .0595650 273.0  &
      423.0 0.0

PROP-DATA NRTL-1
   IN-UNITS SI
   PROP-LIST NRTL
   BPVAL MEA H2O -1.0466020 -337.54560 .20 0.0 0.0 0.0 0.0  &
      1000.0
   BPVAL H2O MEA 1.4384980 99.021040 .20 0.0 0.0 0.0 0.0  &
      1000.0
   BPVAL CO2 H2O 10.0640 -3268.1350 .20 0.0 0.0 0.0 0.0  &
      1000.0
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   BPVAL H2O CO2 10.0640 -3268.1350 .20 0.0 0.0 0.0 0.0  &
      1000.0
   BPVAL MEA CO2 0.0 0.0 .20 0.0 0.0 0.0 0.0 1000.0
   BPVAL CO2 MEA 0.0 0.0 .20 0.0 0.0 0.0 0.0 1000.0
   BPVAL H2S H2O -3.6740 1155.90 .20 0.0 0.0 0.0 0.0  &
      1000.0
   BPVAL H2O H2S -3.6740 1155.90 .20 0.0 0.0 0.0 0.0  &
      1000.0
   BPVAL H2S MEA 0.0 0.0 .20 0.0 0.0 0.0 0.0 1000.0
   BPVAL MEA H2S 0.0 0.0 .20 0.0 0.0 0.0 0.0 1000.0

PROP-DATA GMELCC-1
   IN-UNITS SI
   PROP-LIST GMELCC
   PPVAL H2O ( MEA+ HCO3- ) 5.35410
   PPVAL ( MEA+ HCO3- ) H2O -4.07050
   PPVAL H2O ( MEA+ MEACOO- ) 9.88770
   PPVAL ( MEA+ MEACOO- ) H2O -4.95110
   PPVAL H2O ( MEA+ CO3-2 ) 8.0
   PPVAL ( MEA+ CO3-2 ) H2O -4.0
   PPVAL H2O ( MEA+ OH- ) 8.0
   PPVAL ( MEA+ OH- ) H2O -4.0
   PPVAL H2O ( H3O+ MEACOO- ) 8.0
   PPVAL ( H3O+ MEACOO- ) H2O -4.0
   PPVAL H2O ( H3O+ HCO3- ) 8.0
   PPVAL ( H3O+ HCO3- ) H2O -4.0
   PPVAL H2O ( H3O+ CO3-2 ) 8.0
   PPVAL ( H3O+ CO3-2 ) H2O -4.0
   PPVAL H2O ( H3O+ OH- ) 8.0
   PPVAL ( H3O+ OH- ) H2O -4.0
   PPVAL MEA ( MEA+ MEACOO- ) 15.0
   PPVAL ( MEA+ MEACOO- ) MEA -8.0
   PPVAL MEA ( MEA+ HCO3- ) 15.0
   PPVAL ( MEA+ HCO3- ) MEA -8.0
   PPVAL MEA ( MEA+ CO3-2 ) 15.0
   PPVAL ( MEA+ CO3-2 ) MEA -8.0
   PPVAL MEA ( MEA+ OH- ) 15.0
   PPVAL ( MEA+ OH- ) MEA -8.0
   PPVAL MEA ( H3O+ MEACOO- ) 15.0
   PPVAL ( H3O+ MEACOO- ) MEA -8.0
   PPVAL MEA ( H3O+ HCO3- ) 15.0
   PPVAL ( H3O+ HCO3- ) MEA -8.0
   PPVAL MEA ( H3O+ CO3-2 ) 15.0
   PPVAL ( H3O+ CO3-2 ) MEA -8.0
   PPVAL MEA ( H3O+ OH- ) 15.0
   PPVAL ( H3O+ OH- ) MEA -8.0
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PPVAL CO2 (MEA+ HCO3-) 15.0
PPVAL (MEA+ HCO3-) CO2 -8.0
PPVAL CO2 (MEA+ CO3-2) 15.0
PPVAL (MEA+ CO3-2) CO2 -8.0
PPVAL CO2 (MEA+ MEACOO-) 15.0
PPVAL (MEA+ MEACOO-) CO2 -8.0
PPVAL CO2 (H3O+ HCO3-) 15.0
PPVAL (H3O+ HCO3-) CO2 -8.0
PPVAL H2O (MEA+ HS-) 4.8492720
PPVAL (MEA+ HS-) H2O -2.7402230
PPVAL H2O (MEA+ S-2) 8.0
PPVAL (MEA+ S-2) H2O -4.0
PPVAL H2O (H3O+ HS-) 8.0
PPVAL (H3O+ HS-) H2O -4.0
PPVAL H2O (H3O+ S-2) 8.0
PPVAL (H3O+ S-2) H2O -4.0
PPVAL MEA (MEA+ HS-) 15.0
PPVAL (MEA+ HS-) MEA -8.0
PPVAL MEA (MEA+ S-2) 15.0
PPVAL (MEA+ S-2) MEA -8.0
PPVAL MEA (H3O+ HS-) 15.0
PPVAL (H3O+ HS-) MEA -8.0
PPVAL MEA (H3O+ S-2) 15.0
PPVAL (H3O+ S-2) MEA -8.0
PPVAL H2S (MEA+ HS-) 15.0
PPVAL (MEA+ HS-) H2S -8.0
PPVAL H2S (MEA+ S-2) 15.0
PPVAL (MEA+ S-2) H2S -8.0
PPVAL H2S (MEA+ OH-) 15.0
PPVAL (MEA+ OH-) H2S -8.0
PPVAL H2S (H3O+ HS-) 15.0
PPVAL (H3O+ HS-) H2S -8.0
PPVAL H2S (H3O+ S-2) 15.0
PPVAL (H3O+ S-2) H2S -8.0
PPVAL H2S (H3O+ OH-) 15.0
PPVAL (H3O+ OH-) H2S -8.0
PPVAL H2S (MEA+ MEACOO-) 15.0
PPVAL (MEA+ MEACOO-) H2S -8.0
PPVAL H2S (MEA+ HCO3-) 15.0
PPVAL (MEA+ HCO3-) H2S -8.0
PPVAL H2S (H3O+ MEACOO-) 15.0
PPVAL (H3O+ MEACOO-) H2S -8.0
PPVAL H2S (H3O+ HCO3-) 15.0
PPVAL (H3O+ HCO3-) H2S -8.0
PPVAL CO2 (MEA+ HS-) 15.0
PPVAL (MEA+ HS-) CO2 -8.0

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  PPVAL CO2 ( MEA+ S-2 ) 15.0
  PPVAL ( MEA+ S-2 ) CO2 -8.0
  PPVAL CO2 ( MEA+ OH- ) 15.0
  PPVAL ( MEA+ OH- ) CO2 -8.0
  PPVAL CO2 ( H3O+ HS- ) 15.0
  PPVAL ( H3O+ HS- ) CO2 -8.0
  PPVAL CO2 ( H3O+ S-2 ) 15.0
  PPVAL ( H3O+ S-2 ) CO2 -8.0
  PPVAL CO2 ( H3O+ OH- ) 15.0
  PPVAL ( H3O+ OH- ) CO2 -8.0
  PPVAL CO2 ( H3O+ MEACOO- ) 15.0
  PPVAL ( H3O+ MEACOO- ) CO2 -8.0
  PPVAL CO2 ( H3O+ CO3-2 ) 15.0
  PPVAL ( H3O+ CO3-2 ) CO2 -8.0

PROP-DATA GMELCD-1
  IN-UNITS SI
  PROP-LIST GMELCD
  PPVAL H2O ( MEA+ HCO3- ) 965.240
  PPVAL ( MEA+ HCO3- ) H2O -11.0670
  PPVAL H2O ( MEA+ MEACOO- ) 10.8130
  PPVAL ( MEA+ MEACOO- ) H2O 0.0
  PPVAL H2O ( MEA+ CO3-2 ) 0.0
  PPVAL ( MEA+ CO3-2 ) H2O 0.0
  PPVAL H2O ( MEA+ OH- ) 0.0
  PPVAL ( MEA+ OH- ) H2O 0.0
  PPVAL H2O ( H3O+ MEACOO- ) 0.0
  PPVAL ( H3O+ MEACOO- ) H2O 0.0
  PPVAL H2O ( H3O+ HCO3- ) 0.0
  PPVAL ( H3O+ HCO3- ) H2O 0.0
  PPVAL H2O ( H3O+ CO3-2 ) 0.0
  PPVAL ( H3O+ CO3-2 ) H2O 0.0
  PPVAL H2O ( H3O+ OH- ) 0.0
  PPVAL ( H3O+ OH- ) H2O 0.0
  PPVAL MEA ( MEA+ MEACOO- ) 0.0
  PPVAL ( MEA+ MEACOO- ) MEA 0.0
  PPVAL MEA ( MEA+ HCO3- ) 0.0
  PPVAL ( MEA+ HCO3- ) MEA 0.0
  PPVAL MEA ( MEA+ CO3-2 ) 0.0
  PPVAL ( MEA+ CO3-2 ) MEA 0.0
  PPVAL MEA ( MEA+ OH- ) 0.0
  PPVAL ( MEA+ OH- ) MEA 0.0
  PPVAL MEA ( H3O+ MEACOO- ) 0.0
  PPVAL ( H3O+ MEACOO- ) MEA 0.0
  PPVAL MEA ( H3O+ HCO3- ) 0.0
  PPVAL ( H3O+ HCO3- ) MEA 0.0
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PPVAL MEA ( H3O+ CO3-2 ) 0.0
PPVAL ( H3O+ CO3-2 ) MEA 0.0
PPVAL MEA ( H3O+ OH- ) 0.0
PPVAL ( H3O+ OH- ) MEA 0.0
PPVAL CO2 ( MEA+ HCO3- ) 0.0
PPVAL ( MEA+ HCO3- ) CO2 0.0
PPVAL CO2 ( MEA+ CO3-2 ) 0.0
PPVAL ( MEA+ CO3-2 ) CO2 0.0
PPVAL CO2 ( MEA+ MEACOO- ) 0.0
PPVAL ( MEA+ MEACOO- ) CO2 0.0
PPVAL CO2 ( H3O+ HCO3- ) 0.0
PPVAL ( H3O+ HCO3- ) CO2 0.0
PPVAL H2O ( MEA+ HS- ) 1215.540
PPVAL ( MEA+ HS- ) H2O -483.70070
PPVAL H2O ( MEA+ S-2 ) 0.0
PPVAL ( MEA+ S-2 ) H2O 0.0
PPVAL H2O ( H3O+ HS- ) 0.0
PPVAL ( H3O+ HS- ) H2O 0.0
PPVAL H2O ( H3O+ S-2 ) 0.0
PPVAL ( H3O+ S-2 ) H2O 0.0
PPVAL MEA ( MEA+ HS- ) 0.0
PPVAL ( MEA+ HS- ) MEA 0.0
PPVAL MEA ( MEA+ S-2 ) 0.0
PPVAL ( MEA+ S-2 ) MEA 0.0
PPVAL MEA ( H3O+ HS- ) 0.0
PPVAL ( H3O+ HS- ) MEA 0.0
PPVAL MEA ( H3O+ S-2 ) 0.0
PPVAL ( H3O+ S-2 ) MEA 0.0
PPVAL H2S ( MEA+ HS- ) 0.0
PPVAL ( MEA+ HS- ) H2S 0.0
PPVAL H2S ( MEA+ S-2 ) 0.0
PPVAL ( MEA+ S-2 ) H2S 0.0
PPVAL H2S ( MEA+ OH- ) 0.0
PPVAL ( MEA+ OH- ) H2S 0.0
PPVAL H2S ( H3O+ HS- ) 0.0
PPVAL ( H3O+ HS- ) H2S 0.0
PPVAL H2S ( H3O+ S-2 ) 0.0
PPVAL ( H3O+ S-2 ) H2S 0.0
PPVAL H2S ( H3O+ OH- ) 0.0
PPVAL ( H3O+ OH- ) H2S 0.0
PPVAL H2S ( MEA+ MEACOO- ) 0.0
PPVAL ( MEA+ MEACOO- ) H2S 0.0
PPVAL H2S ( MEA+ HCO3- ) 0.0
PPVAL ( MEA+ HCO3- ) H2S 0.0
PPVAL H2S ( H3O+ MEACOO- ) 0.0
PPVAL ( H3O+ MEACOO- ) H2S 0.0
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   PPVAL H2S ( H3O+ HCO3- ) 0.0
   PPVAL ( H3O+ HCO3- ) H2S 0.0
   PPVAL CO2 ( MEA+ HS- ) 0.0
   PPVAL ( MEA+ HS- ) CO2 0.0
   PPVAL CO2 ( MEA+ S-2 ) 0.0
   PPVAL ( MEA+ S-2 ) CO2 0.0
   PPVAL CO2 ( MEA+ OH- ) 0.0
   PPVAL ( MEA+ OH- ) CO2 0.0
   PPVAL CO2 ( H3O+ HS- ) 0.0
   PPVAL ( H3O+ HS- ) CO2 0.0
   PPVAL CO2 ( H3O+ S-2 ) 0.0
   PPVAL ( H3O+ S-2 ) CO2 0.0
   PPVAL CO2 ( H3O+ OH- ) 0.0
   PPVAL ( H3O+ OH- ) CO2 0.0
   PPVAL CO2 ( H3O+ MEACOO- ) 0.0
   PPVAL ( H3O+ MEACOO- ) CO2 0.0
   PPVAL CO2 ( H3O+ CO3-2 ) 0.0
   PPVAL ( H3O+ CO3-2 ) CO2 0.0

PROP-DATA GMELCE-1
   IN-UNITS SI
   PROP-LIST GMELCE
   PPVAL H2O ( MEA+ HS- ) 0.0
   PPVAL ( MEA+ HS- ) H2O 0.0
   PPVAL H2O ( MEA+ S-2 ) 0.0
   PPVAL ( MEA+ S-2 ) H2O 0.0
   PPVAL H2O ( H3O+ HS- ) 0.0
   PPVAL ( H3O+ HS- ) H2O 0.0
   PPVAL H2O ( H3O+ S-2 ) 0.0
   PPVAL ( H3O+ S-2 ) H2O 0.0
   PPVAL MEA ( MEA+ HS- ) 0.0
   PPVAL ( MEA+ HS- ) MEA 0.0
   PPVAL MEA ( MEA+ S-2 ) 0.0
   PPVAL ( MEA+ S-2 ) MEA 0.0
   PPVAL MEA ( H3O+ HS- ) 0.0
   PPVAL ( H3O+ HS- ) MEA 0.0
   PPVAL MEA ( H3O+ S-2 ) 0.0
   PPVAL ( H3O+ S-2 ) MEA 0.0
   PPVAL H2S ( MEA+ HS- ) 0.0
   PPVAL ( MEA+ HS- ) H2S 0.0
   PPVAL H2S ( MEA+ S-2 ) 0.0
   PPVAL ( MEA+ S-2 ) H2S 0.0
   PPVAL H2S ( MEA+ OH- ) 0.0
   PPVAL ( MEA+ OH- ) H2S 0.0
   PPVAL H2S ( H3O+ HS- ) 0.0
   PPVAL ( H3O+ HS- ) H2S 0.0
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   PPVAL H2S ( H3O+ S-2 ) 0.0
   PPVAL ( H3O+ S-2 ) H2S 0.0
   PPVAL H2S ( H3O+ OH- ) 0.0
   PPVAL ( H3O+ OH- ) H2S 0.0
   PPVAL H2S ( MEA+ MEACOO- ) 0.0
   PPVAL ( MEA+ MEACOO- ) H2S 0.0
   PPVAL H2S ( MEA+ HCO3- ) 0.0
   PPVAL ( MEA+ HCO3- ) H2S 0.0
   PPVAL H2S ( H3O+ MEACOO- ) 0.0
   PPVAL ( H3O+ MEACOO- ) H2S 0.0
   PPVAL H2S ( H3O+ HCO3- ) 0.0
   PPVAL ( H3O+ HCO3- ) H2S 0.0
   PPVAL CO2 ( MEA+ HS- ) 0.0
   PPVAL ( MEA+ HS- ) CO2 0.0
   PPVAL CO2 ( MEA+ S-2 ) 0.0
   PPVAL ( MEA+ S-2 ) CO2 0.0
   PPVAL CO2 ( MEA+ OH- ) 0.0
   PPVAL ( MEA+ OH- ) CO2 0.0
   PPVAL CO2 ( H3O+ HS- ) 0.0
   PPVAL ( H3O+ HS- ) CO2 0.0
   PPVAL CO2 ( H3O+ S-2 ) 0.0
   PPVAL ( H3O+ S-2 ) CO2 0.0
   PPVAL CO2 ( H3O+ OH- ) 0.0
   PPVAL ( H3O+ OH- ) CO2 0.0
   PPVAL CO2 ( H3O+ MEACOO- ) 0.0
   PPVAL ( H3O+ MEACOO- ) CO2 0.0
   PPVAL CO2 ( H3O+ CO3-2 ) 0.0
   PPVAL ( H3O+ CO3-2 ) CO2 0.0

PROP-DATA GMELCN-1
   IN-UNITS SI
   PROP-LIST GMELCN
   PPVAL H2O ( MEA+ HCO3- ) .20
   PPVAL ( MEA+ HCO3- ) H2O .20
   PPVAL H2O ( MEA+ MEACOO- ) .20
   PPVAL ( MEA+ MEACOO- ) H2O .20
   PPVAL H2O ( MEA+ CO3-2 ) .20
   PPVAL ( MEA+ CO3-2 ) H2O .20
   PPVAL H2O ( MEA+ OH- ) .20
   PPVAL ( MEA+ OH- ) H2O .20
   PPVAL H2O ( H3O+ MEACOO- ) .20
   PPVAL ( H3O+ MEACOO- ) H2O .20
   PPVAL H2O ( H3O+ HCO3- ) .20
   PPVAL ( H3O+ HCO3- ) H2O .20
   PPVAL H2O ( H3O+ CO3-2 ) .20
   PPVAL ( H3O+ CO3-2 ) H2O .20
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PPVAL H2O (H3O+ OH-) .20
PPVAL (H3O+ OH-) H2O .20
PPVAL MEA (MEA+ MEACOO-) .10
PPVAL (MEA+ MEACOO-) MEA .10
PPVAL MEA (MEA+ HCO3-) .10
PPVAL (MEA+ HCO3-) MEA .10
PPVAL MEA (MEA+ CO3-2) .10
PPVAL (MEA+ CO3-2) MEA .10
PPVAL MEA (MEA+ OH-) .10
PPVAL (MEA+ OH-) MEA .10
PPVAL MEA (H3O+ MEACOO-) .10
PPVAL (H3O+ MEACOO-) MEA .10
PPVAL MEA (H3O+ HCO3-) .10
PPVAL (H3O+ HCO3-) MEA .10
PPVAL MEA (H3O+ CO3-2) .10
PPVAL (H3O+ CO3-2) MEA .10
PPVAL MEA (H3O+ OH-) .10
PPVAL (H3O+ OH-) MEA .10
PPVAL CO2 (MEA+ HCO3-) .10
PPVAL (MEA+ HCO3-) CO2 .10
PPVAL CO2 (MEA+ CO3-2) .10
PPVAL (MEA+ CO3-2) CO2 .10
PPVAL CO2 (MEA+ MEACOO-) .10
PPVAL (MEA+ MEACOO-) CO2 .10
PPVAL CO2 (H3O+ HCO3-) .10
PPVAL (H3O+ HCO3-) CO2 .10
PPVAL H2O (MEA+ HS-) .20
PPVAL (MEA+ HS-) H2O .20
PPVAL H2O (MEA+ S-2) .20
PPVAL (MEA+ S-2) H2O .20
PPVAL H2O (H3O+ HS-) .20
PPVAL (H3O+ HS-) H2O .20
PPVAL H2O (H3O+ S-2) .20
PPVAL (H3O+ S-2) H2O .20
PPVAL MEA (MEA+ HS-) .10
PPVAL (MEA+ HS-) MEA .10
PPVAL MEA (MEA+ S-2) .10
PPVAL (MEA+ S-2) MEA .10
PPVAL MEA (H3O+ HS-) .10
PPVAL (H3O+ HS-) MEA .10
PPVAL MEA (H3O+ S-2) .10
PPVAL (H3O+ S-2) MEA .10
PPVAL H2S (MEA+ HS-) .10
PPVAL (MEA+ HS-) H2S .10
PPVAL H2S (MEA+ S-2) .10
PPVAL (MEA+ S-2) H2S .10

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   PPVAL H2S ( MEA+ OH- ) .10
   PPVAL ( MEA+ OH- ) H2S .10
   PPVAL H2S ( H3O+ HS- ) .10
   PPVAL ( H3O+ HS- ) H2S .10
   PPVAL H2S ( H3O+ S-2 ) .10
   PPVAL ( H3O+ S-2 ) H2S .10
   PPVAL H2S ( H3O+ OH- ) .10
   PPVAL ( H3O+ OH- ) H2S .10
   PPVAL H2S ( MEA+ MEACOO- ) .10
   PPVAL ( MEA+ MEACOO- ) H2S .10
   PPVAL H2S ( MEA+ HCO3- ) .10
   PPVAL ( MEA+ HCO3- ) H2S .10
   PPVAL H2S ( H3O+ MEACOO- ) .10
   PPVAL ( H3O+ MEACOO- ) H2S .10
   PPVAL H2S ( H3O+ HCO3- ) .10
   PPVAL ( H3O+ HCO3- ) H2S .10
   PPVAL CO2 ( MEA+ HS- ) .10
   PPVAL ( MEA+ HS- ) CO2 .10
   PPVAL CO2 ( MEA+ S-2 ) .10
   PPVAL ( MEA+ S-2 ) CO2 .10
   PPVAL CO2 ( MEA+ OH- ) .10
   PPVAL ( MEA+ OH- ) CO2 .10
   PPVAL CO2 ( H3O+ HS- ) .10
   PPVAL ( H3O+ HS- ) CO2 .10
   PPVAL CO2 ( H3O+ S-2 ) .10
   PPVAL ( H3O+ S-2 ) CO2 .10
   PPVAL CO2 ( H3O+ OH- ) .10
   PPVAL ( H3O+ OH- ) CO2 .10
   PPVAL CO2 ( H3O+ MEACOO- ) .10
   PPVAL ( H3O+ MEACOO- ) CO2 .10
   PPVAL CO2 ( H3O+ CO3-2 ) .10
   PPVAL ( H3O+ CO3-2 ) CO2 .10

STREAM 1
   SUBSTREAM MIXED TEMP=41.9939488 PRES=19.6959488
   MOLE-FLOW N2 0.0130291599 / CO2 0.00175991118 / H2O  &
      13739.2944 / MEA 615.15161 / HCO3- 6.42457629 /  &
      MEACOO- 365.956799 / MEA+ 387.252547 / CO3-2  &
      7.41196142 / H3O+ 1.383438E-007 / OH- 0.0472494255

STREAM ABS-VENT
   SUBSTREAM MIXED TEMP=50.2485753 PRES=14.6959488
   MOLE-FLOW N2 1903.72596 / CO2 27.8881459 / H2O  &
      243.585878 / MEA 0.105709179

STREAM CO2PROD
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   SUBSTREAM MIXED TEMP=56.2906397 PRES=20.7959488
   MOLE-FLOW N2 7.82885113 / CO2 294.638884 / H2O  &
      40.6191584 / MEA 2.882845E-007

STREAM FLUEGAS
   SUBSTREAM MIXED TEMP=142 PRES=161.655436 MASS-FLOW=69000  &
      FREE-WATER=NO NPHASE=1 PHASE=V
   MOLE-FRAC N2 0.829999997 / CO2 0.13999999948 / H2O  &
      0.03000000008

STREAM H2OCOND
   SUBSTREAM MIXED TEMP=56.2906397 PRES=6.100000039 <psig>  &
      MASS-FLOW=5958.28487
   MASS-FRAC N2 6.122864E-005 / CO2 0.00094448737 / H2O  &
      0.9962114396 / MEA 2.987903E-006 / HCO3- 0.00137604019 / &
      MEACOO- 1.962140E-006 / MEA+ 0.00140165634 / CO3-2  &
      1.764567E-007 / H3O+ 1.929620E-008 / OH- 1.763349E-009

STREAM LEANOIL
   SUBSTREAM MIXED TEMP=35 PRES=20.000000039 <psig>  &
      VOLUME-FLOW=5734.89581 FREE-WATER=NO NPHASE=1 PHASE=L
   MASS-FRAC CO2 1.173280E-007 / H2O 0.71081898063 / MEA  &
      0.10789973278 / HCO3- 0.00098930867 / MEACOO-  &
      0.10938815948 / MEA+ 0.06938678281 / CO3-2  &
      0.00150730185 / H3O+ 4.832859E-012 / OH- 2.222537E-006

STREAM RICHOIL
   SUBSTREAM MIXED TEMP=53.8004562 PRES=16.6959488
   MOLE-FLOW N2 7.84187104 / CO2 0.58560211 / H2O  &
      13632.4248 / MEA 93.3218404 / HCO3- 72.6522451 /  &
      MEACOO- 595.117788 / MEA+ 679.921506 / CO3-2  &
      6.07350519 / H3O+ 2.648785E-006 / OH- 0.00446539762

STREAM SCRUBGAS
   SUBSTREAM MIXED TEMP=46.1220775 PRES=16.6959488
   MOLE-FLOW N2 1911.5548 / CO2 322.442594 / H2O 218.479218

STREAM SCRUBH2O
   SUBSTREAM MIXED TEMP=30 PRES=4.000000039 <psig>  &
      MASS-FLOW=4000
   MASS-FRAC H2O 0.99999999438 / H3O+ 2.294251E-009 / OH-  &
      2.051257E-009

STREAM SCRUBLIQ
   SUBSTREAM MIXED TEMP=46.1220775 PRES=16.6959488
   MOLE-FLOW N2 0.0940847047 / CO2 0.00415284926 / H2O  &
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      72.6501596 / HCO3- 5.271404E-005 / CO3-2 8.477494E-011 / &
      H3O+ 5.271558E-005 / OH- 1.372328E-009

STREAM STRPFEED
   SUBSTREAM MIXED TEMP=89 PRES=10.000000039 <psig>
   MOLE-FLOW N2 7.84187104 / CO2 25.7642841 / H2O  &
      13633.7785 / MEA 145.98815 / HCO3- 74.9637039 /  &
      MEACOO- 571.295331 / MEA+ 651.077654 / CO3-2  &
      2.40582151 / H3O+ 1.057328E-005 / OH- 0.00698685163

STREAM STRPRBOT
   SUBSTREAM MIXED TEMP=116.5792 PRES=23.7959488
   MOLE-FLOW N2 1.470938E-026 / CO2 0.245254616 / H2O  &
      13321.4092 / MEA 628.094664 / HCO3- 18.4766154 /  &
      MEACOO- 359.815348 / MEA+ 380.316208 / CO3-2  &
      0.990670626 / H3O+ 5.568707E-006 / OH- 0.0429091873

STREAM X4
   SUBSTREAM MIXED TEMP=42.001 PRES=19.6959488
   MOLE-FLOW N2 0.0130199034 / CO2 0.127768966 / H2O  &
      329.481947 / MEA 0.00019657128 / HCO3- 0.13447699 /  &
      MEACOO- 9.869285E-005 / MEA+ 0.134618685 / CO3-2  &
      2.324550E-005 / H3O+ 3.892202E-006 / OH- 4.040062E-007

STREAM X6
   SUBSTREAM MIXED TEMP=42 PRES=19.6959488
   MOLE-FLOW CO2 0.00169881088 / H2O 13327.404 / MEA  &
      615.356479 / HCO3- 6.22850692 / MEACOO- 366.056678 /  &
      MEA+ 386.813063 / CO3-2 7.2410046 / H3O+  &
      1.339423E-007 / OH- 0.045868539

STREAM X7
   SUBSTREAM MIXED TEMP=75 PRES=24.6959488
   MOLE-FLOW N2 7.84187104 / CO2 3.84007118 / H2O  &
      13624.5716 / MEA 110.291278 / HCO3- 83.1135308 /  &
      MEACOO- 584.010942 / MEA+ 674.058915 / CO3-2  &
      3.46459645 / H3O+ 7.167378E-006 / OH- 0.00525643945

STREAM XCO2PROD
   SUBSTREAM MIXED TEMP=50 PRES=20.7959488
   MOLE-FLOW N2 7.82885113 / CO2 294.638859 / H2O  &
      40.6191101 / MEA 3.947547E-012 / HCO3- 2.429692E-005 /  &
      MEA+ 2.882806E-007 / CO3-2 1.502167E-011 / H3O+  &
      2.400877E-005 / OH- 1.011648E-010

STREAM XDUMP
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   SUBSTREAM MIXED TEMP=41.9939667 PRES=19.6959488
   MOLE-FLOW CO2 0.00175991684 / H2O 13739.2947 / MEA  &
      615.151581 / HCO3- 6.42454634 / MEACOO- 365.957015 /  &
      MEA+ 387.25236 / CO3-2 7.41177519 / H3O+  &
      1.383458E-007 / OH- 0.0472490607

STREAM XLEANOIL
   SUBSTREAM MIXED TEMP=35.0464605 PRES=19.6959488
   MOLE-FLOW N2 0.0130291599 / CO2 0.00093113862 / H2O  &
      13721.8459 / MEA 614.317473 / HCO3- 5.64361292 /  &
      MEACOO- 365.503496 / MEA+ 388.645875 / CO3-2  &
      8.72665282 / H3O+ 8.862644E-008 / OH- 0.0454612211

STREAM XRECYCLE
   SUBSTREAM MIXED TEMP=41.9939667 PRES=19.6959488
   MOLE-FLOW N2 0.0130291599

STREAM XTRAH2O
   SUBSTREAM MIXED TEMP=35 PRES=10.000000039 <psig>  &
      VOLUME-FLOW=24.0624999 FREE-WATER=NO NPHASE=1 PHASE=L
   MOLE-FRAC H2O 0.99999999517 / H3O+ 2.590952E-009 / OH-  &
      2.590952E-009

BLOCK LEANMIX MIXER
   PARAM NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO

BLOCK RECYMIX MIXER
   PARAM PRES=5. <psig> T-EST=42.

BLOCK RECYSEP SEP
   PARAM
   FRAC STREAM=XRECYCLE SUBSTREAM=MIXED COMPS=N2 O2 CO CO2  &
      CH4 H2O MEA H2S HCO3- MEACOO- MEA+ CO3-2 HS- S-2  &
      H3O+ OH- FRACS=1. 1. 1. 0. 1. 0. 0. 1. 0. 0. 0.  &
      0. 0. 0. 0. 0.

BLOCK PRODFLSH FLASH2
   PARAM PRES=2. <psig> DUTY=0.

BLOCK SCRUBBER FLASH2
   PARAM PRES=2. <psig> DUTY=0.

BLOCK COOLER HEATX
   PARAM T-HOT=35. U-OPTION=CONSTANT F-OPTION=CONSTANT  &
      CALC-METHOD=SHORTCUT
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   FEEDS HOT=1
   PRODUCTS HOT=X4
   HEAT-TR-COEF U=75.
   REFERENCE COLD-UTIL=WATER30

BLOCK HEATER HEATX
   PARAM T-COLD=89. PRES-COLD=20. <psig> U-OPTION=CONSTANT  &
      F-OPTION=CONSTANT CALC-METHOD=SHORTCUT
   FEEDS COLD=X7
   PRODUCTS COLD=STRPFEED
   HEAT-TR-COEF U=75.
   REFERENCE HOT-UTIL=STEAM150

BLOCK P2PEXCH HEATX
   PARAM MIN-OUT-TAPP=5. <C> U-OPTION=CONSTANT  &
      F-OPTION=CONSTANT CALC-METHOD=SHORTCUT
   FEEDS HOT=ZBOT COLD=ZRICH
   PRODUCTS HOT=X6 COLD=X7
   HEAT-TR-COEF U=75.
   FLASH-SPECS X6 NPHASE=1 PHASE=L FREE-WATER=NO
   FLASH-SPECS X7 NPHASE=1 PHASE=L FREE-WATER=NO

BLOCK PRODCOND HEATX
   PARAM T-HOT=45. U-OPTION=CONSTANT F-OPTION=CONSTANT  &
      CALC-METHOD=SHORTCUT
   FEEDS HOT=CO2PROD
   PRODUCTS HOT=ZWETCO2
   HEAT-TR-COEF U=75.
   REFERENCE COLD-UTIL=WATER30

BLOCK ABSORBER RADFRAC
   PARAM NSTAGE=25 MAXOL=100 MAXIL=19 TOLOL=1E-005
   COL-CONFIG CONDENSER=NONE REBOILER=NONE
   FEEDS SCRUBGAS 25 ON-STAGE / XLEANOIL 1 ON-STAGE
   PRODUCTS ABS-VENT 1 V / RICHOIL 25 L
   P-SPEC 1 0. <psig>
   COL-SPECS DP-COL=2.
   HEATERS 2 0.0
   REAC-STAGES 1 25 MEA-CO2
   HOLD-UP 1 25 VOL-LHLDP=100. VOL-VHLDP=1017.
   T-EST 1 50.2 / 2 66.3 / 3 73.9 / 4 75.4 / 5 74.5 /  &
      6 73. / 7 71.5 / 8 70.2 / 9 69.1 / 10 68.1 /  &
      11 67.2 / 12 66.4 / 13 65.8 / 14 65.1 / 15 64.5 / &
      16 64. / 17 63.4 / 18 62.8 / 19 62.2 / 20 61.5 /  &
      21 60.7 / 22 59.8 / 23 58.5 / 24 56.7 / 25 53.8
   L-EST 1 15480. / 2 15840. / 3 15960. / 4 15910. / 5  &
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    15820. / 6 15740. / 7 15670. / 8 15620. / 9  &
    15570. / 10 15530. / 11 15500. / 12 15470. / 13  &
    15450. / 14 15430. / 15 15410. / 16 15390. / 17  &
    15370. / 18 15350. / 19 15330. / 20 15310. / 21  &
    15280. / 22 15250. / 23 15210. / 24 15160. / 25  &
    15090.
V-EST 1 2175. / 2 2568. / 3 2976. / 4 3146. / 5  &
    3146. / 6 3090. / 7 3028. / 8 2973. / 9 2928. /  &
    10 2889. / 11 2857. / 12 2830. / 13 2806. / 14  &
    2784. / 15 2764. / 16 2746. / 17 2728. / 18  &
    2711. / 19 2694. / 20 2676. / 21 2656. / 22  &
    2633. / 23 2606. / 24 2572. / 25 2523.
X-EST 1 N2 0.00071709 / 1 CO2 3.6743E-006 / 1 H2O  &
    0.90991 / 1 MEA 0.037506 / 1 HCO3- 0.00054179 / 1  &
    MEACOO- 0.024783 / 1 MEA+ 0.02613 / 1 CO3-2  &
    0.00040123 / 1 H3O+ 1.6634E-011 / 1 OH- 2.9023E-006 /  &
    2 N2 0.00045906 / 2 CO2 5.314E-006 / 2 H2O 0.91197 / &
    2 MEA 0.031397 / 2 HCO3- 0.00088742 / 2 MEACOO-  &
    0.026779 / 2 MEA+ 0.028224 / 2 CO3-2 0.00027736 /  &
    2 H3O+ 5.1691E-011 / 2 OH- 2.3622E-006 / 3 N2  &
    0.00033711 / 3 CO2 9.3664E-006 / 3 H2O 0.91226 / 3  &
    MEA 0.024439 / 3 HCO3- 0.0013723 / 3 MEACOO-  &
    0.029752 / 3 MEA+ 0.031597 / 3 CO3-2 0.00023587 /  &
    3 H3O+ 1.0695E-010 / 3 OH- 1.6752E-006 / 4 N2  &
    0.00030045 / 4 CO2 1.4822E-005 / 4 H2O 0.91151 / 4  &
    MEA 0.019055 / 4 HCO3- 0.0018954 / 4 MEACOO-  &
    0.032314 / 4 MEA+ 0.034674 / 4 CO3-2 0.0002316 / 4  &
    H3O+ 1.5718E-010 / 4 OH- 1.2E-006 / 5 N2 0.00029752 / &
    5 CO2 1.9717E-005 / 5 H2O 0.91057 / 5 MEA 0.015609 / &
    5 HCO3- 0.0023591 / 5 MEACOO- 0.034033 / 5 MEA+  &
    0.036871 / 5 CO3-2 0.00023897 / 5 H3O+ 1.9062E-010 /  &
    5 OH- 9.2736E-007 / 6 N2 0.00030573 / 6 CO2  &
    2.3327E-005 / 6 H2O 0.90974 / 6 MEA 0.01349 / 6  &
    HCO3- 0.0027244 / 6 MEACOO- 0.035124 / 6 MEA+  &
    0.038347 / 6 CO3-2 0.00024905 / 6 H3O+ 2.0937E-010 /  &
    6 OH- 7.7148E-007 / 7 N2 0.0003169 / 7 CO2  &
    2.5863E-005 / 7 H2O 0.90906 / 7 MEA 0.012135 / 7  &
    HCO3- 0.0030019 / 7 MEACOO- 0.03584 / 7 MEA+  &
    0.03936 / 7 CO3-2 0.00025895 / 7 H3O+ 2.1902E-010 /  &
    7 OH- 6.7633E-007 / 8 N2 0.00032822 / 8 CO2  &
    2.7688E-005 / 8 H2O 0.90852 / 8 MEA 0.011213 / 8  &
    HCO3- 0.003215 / 8 MEACOO- 0.036338 / 8 MEA+  &
    0.040089 / 8 CO3-2 0.00026788 / 8 H3O+ 2.2373E-010 /  &
    8 OH- 6.135E-007 / 9 N2 0.00033888 / 9 CO2  &
    2.9066E-005 / 9 H2O 0.90808 / 9 MEA 0.010546 / 9  &
    HCO3- 0.0033839 / 9 MEACOO- 0.036705 / 9 MEA+  &
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0.040641 / 9 CO3-2 0.00027575 / 9 H3O+ 2.2591E-010 / &
9 OH- 5.6898E-007 / 10 N2 0.00034872 / 10 CO2 &
3.016E-005 / 10 H2O 0.90771 / 10 MEA 0.010036 / 10 &
HCO3- 0.0035222 / 10 MEACOO- 0.036989 / 10 MEA+ &
0.041077 / 10 CO3-2 0.00028267 / 10 H3O+ 2.2678E-010 / &
10 OH- 5.3555E-007 / 11 N2 0.00035783 / 11 CO2 &
3.1068E-005 / 11 H2O 0.9074 / 11 MEA 0.0096302 / &
11 HCO3- 0.0036392 / 11 MEACOO- 0.037217 / 11 MEA+ &
0.041434 / 11 CO3-2 0.00028882 / 11 H3O+ 2.2695E-010 / &
11 OH- 5.0923E-007 / 12 N2 0.00036634 / 12 CO2 &
3.1848E-005 / 12 H2O 0.90713 / 12 MEA 0.0092947 / &
12 HCO3- 0.003741 / 12 MEACOO- 0.037407 / 12 MEA+ &
0.041737 / 12 CO3-2 0.00029436 / 12 H3O+ 2.2672E-010 / &
12 OH- 4.877E-007 / 13 N2 0.00037438 / 13 CO2 &
3.2541E-005 / 13 H2O 0.90688 / 13 MEA 0.0090087 / &
13 HCO3- 0.0038316 / 13 MEACOO- 0.037569 / 13 MEA+ &
0.042 / 13 CO3-2 0.00029943 / 13 H3O+ 2.2627E-010 / &
13 OH- 4.6952E-007 / 14 N2 0.0003821 / 14 CO2 &
3.317E-005 / 14 H2O 0.90666 / 14 MEA 0.0087583 / &
14 HCO3- 0.0039141 / 14 MEACOO- 0.037712 / 14 MEA+ &
0.042235 / 14 CO3-2 0.00030417 / 14 H3O+ 2.2565E-010 / &
14 OH- 4.5371E-007 / 15 N2 0.00038957 / 15 CO2 &
3.3748E-005 / 15 H2O 0.90645 / 15 MEA 0.008534 / &
15 HCO3- 0.0039906 / 15 MEACOO- 0.037841 / 15 MEA+ &
0.042449 / 15 CO3-2 0.00030868 / 15 H3O+ 2.2488E-010 / &
15 OH- 4.3965E-007 / 16 N2 0.00039695 / 16 CO2 &
3.4293E-005 / 16 H2O 0.90625 / 16 MEA 0.0083283 / &
16 HCO3- 0.0040629 / 16 MEACOO- 0.03796 / 16 MEA+ &
0.042649 / 16 CO3-2 0.00031308 / 16 H3O+ 2.2396E-010 / &
16 OH- 4.2682E-007 / 17 N2 0.00040438 / 17 CO2 &
3.4813E-005 / 17 H2O 0.90606 / 17 MEA 0.0081351 / &
17 HCO3- 0.0041325 / 17 MEACOO- 0.038073 / 17 MEA+ &
0.042841 / 17 CO3-2 0.0003175 / 17 H3O+ 2.2285E-010 / &
17 OH- 4.1484E-007 / 18 N2 0.00041203 / 18 CO2 &
3.532E-005 / 18 H2O 0.90587 / 18 MEA 0.0079486 / &
18 HCO3- 0.0042011 / 18 MEACOO- 0.038183 / 18 MEA+ &
0.043029 / 18 CO3-2 0.00032206 / 18 H3O+ 2.215E-010 / &
18 OH- 4.0333E-007 / 19 N2 0.00042006 / 19 CO2 &
3.5813E-005 / 19 H2O 0.90567 / 19 MEA 0.0077639 / &
19 HCO3- 0.0042701 / 19 MEACOO- 0.038295 / 19 MEA+ &
0.043219 / 19 CO3-2 0.00032698 / 19 H3O+ 2.1978E-010 / &
19 OH- 3.9198E-007 / 20 N2 0.00042881 / 20 CO2 &
3.6303E-005 / 20 H2O 0.90546 / 20 MEA 0.0075752 / &
20 HCO3- 0.0043411 / 20 MEACOO- 0.038411 / 20 MEA+ &
0.043418 / 20 CO3-2 0.00033249 / 20 H3O+ 2.1754E-010 / &
20 OH- 3.8042E-007 / 21 N2 0.0004387 / 21 CO2 &

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    3.6797E-005 / 21 H2O 0.90522 / 21 MEA 0.0073753 /  &
    21 HCO3- 0.0044164 / 21 MEACOO- 0.038539 / 21 MEA+  &
    0.043634 / 21 CO3-2 0.000339 / 21 H3O+ 2.145E-010 /  &
    21 OH- 3.6822E-007 / 22 N2 0.00045048 / 22 CO2  &
    3.73E-005 / 22 H2O 0.90494 / 22 MEA 0.0071545 / 22  &
    HCO3- 0.0044988 / 22 MEACOO- 0.038687 / 22 MEA+  &
    0.04388 / 22 CO3-2 0.00034718 / 22 H3O+ 2.1021E-010 /  &
    22 OH- 3.5478E-007 / 23 N2 0.00046548 / 23 CO2  &
    3.7816E-005 / 23 H2O 0.9046 / 23 MEA 0.006899 / 23  &
    HCO3- 0.0045917 / 23 MEACOO- 0.038867 / 23 MEA+  &
    0.044176 / 23 CO3-2 0.00035822 / 23 H3O+ 2.038E-010 /  &
    23 OH- 3.3927E-007 / 24 N2 0.00048637 / 24 CO2  &
    3.8336E-005 / 24 H2O 0.90415 / 24 MEA 0.0065877 /  &
    24 HCO3- 0.0046984 / 24 MEACOO- 0.039106 / 24 MEA+  &
    0.044554 / 24 CO3-2 0.00037462 / 24 H3O+ 1.9356E-010 / &
    24 OH- 3.2038E-007 / 25 N2 0.00051974 / 25 CO2  &
    3.8813E-005 / 25 H2O 0.90353 / 25 MEA 0.0061852 /  &
    25 HCO3- 0.0048153 / 25 MEACOO- 0.039443 / 25 MEA+  &
    0.045064 / 25 CO3-2 0.00040254 / 25 H3O+ 1.7556E-010 / &
    25 OH- 2.9596E-007
Y-EST 1 N2 0.87515 / 1 CO2 0.01282 / 1 H2O 0.11198 /  &
    1 MEA 4.8595E-005 / 2 N2 0.74553 / 2 CO2 0.018025 /  &
    2 H2O 0.23632 / 2 MEA 0.00012437 / 3 N2 0.64208 /  &
    3 CO2 0.030512 / 3 H2O 0.32725 / 3 MEA 0.00015855 /  &
    4 N2 0.60674 / 4 CO2 0.047202 / 4 H2O 0.34592 /  &
    4 MEA 0.00013592 / 5 N2 0.6067 / 5 CO2 0.062342 /  &
    5 H2O 0.33085 / 5 MEA 0.00010538 / 6 N2 0.61764 /  &
    6 CO2 0.073732 / 6 H2O 0.30855 / 6 MEA 8.2823E-005 / &
    7 N2 0.6303 / 7 CO2 0.081885 / 7 H2O 0.28775 / 7  &
    MEA 6.7644E-005 / 8 N2 0.64194 / 8 CO2 0.087822 /  &
    8 H2O 0.27018 / 8 MEA 5.7253E-005 / 9 N2 0.65203 /  &
    9 CO2 0.092313 / 9 H2O 0.25561 / 9 MEA 4.984E-005 /  &
    10 N2 0.66068 / 10 CO2 0.09585 / 10 H2O 0.24342 /  &
    10 MEA 4.4314E-005 / 11 N2 0.66816 / 11 CO2  &
    0.098739 / 11 H2O 0.23306 / 11 MEA 4.0026E-005 /  &
    12 N2 0.67472 / 12 CO2 0.10117 / 12 H2O 0.22407 /  &
    12 MEA 3.6582E-005 / 13 N2 0.68057 / 13 CO2  &
    0.10328 / 13 H2O 0.21612 / 13 MEA 3.3728E-005 / 14  &
    N2 0.68588 / 14 CO2 0.10515 / 14 H2O 0.20893 / 14  &
    MEA 3.1297E-005 / 15 N2 0.69081 / 15 CO2 0.10685 /  &
    15 H2O 0.20231 / 15 MEA 2.9171E-005 / 16 N2  &
    0.69546 / 16 CO2 0.10843 / 16 H2O 0.19608 / 16  &
    MEA 2.7267E-005 / 17 N2 0.69996 / 17 CO2 0.10993 /  &
    17 H2O 0.19008 / 17 MEA 2.5517E-005 / 18 N2  &
    0.70443 / 18 CO2 0.11139 / 18 H2O 0.18416 / 18  &
    MEA 2.3865E-005 / 19 N2 0.70901 / 19 CO2 0.11285 /  &
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      19 H2O 0.17812 / 19 MEA 2.2257E-005 / 20 N2  &
      0.71387 / 20 CO2 0.11436 / 20 H2O 0.17176 / 20  &
      MEA 2.0642E-005 / 21 N2 0.71922 / 21 CO2 0.11597 /  &
      21 H2O 0.16479 / 21 MEA 1.8961E-005 / 22 N2  &
      0.72543 / 22 CO2 0.11778 / 22 H2O 0.15677 / 22  &
      MEA 1.7139E-005 / 23 N2 0.73305 / 23 CO2 0.11991 /  &
      23 H2O 0.14702 / 23 MEA 1.5078E-005 / 24 N2  &
      0.74307 / 24 CO2 0.12259 / 24 H2O 0.13434 / 24  &
      MEA 1.264E-005 / 25 N2 0.75743 / 25 CO2 0.12622 /  &
      25 H2O 0.11635 / 25 MEA 9.6235E-006
   PACK-SIZE 1 1 4 RASCHIG VENDOR=RASCHIG PACK-MAT=METAL  &
      PACK-SIZE="25-MM" SPAREA=67.056810 VOIDFR=.920 HETP=3.0  &
      CS-APP=1.0 P-UPDATE=NO

BLOCK STRIPPER RADFRAC
   PARAM NSTAGE=11 TOLOL=1E-005
   COL-CONFIG CONDENSER=PARTIAL-V-L
   RATESEP-ENAB CALC-MODE=EQUILIBRIUM
   FEEDS STRPFEED 2 ON-STAGE
   PRODUCTS CO2PROD 1 V / STRPRBOT 11 L / H2OCOND 1 L
   P-SPEC 1 6.1 <psig>
   COL-SPECS DP-COL=3. MOLE-RDV=0.35 MOLE-D=899. MOLE-L1=276.58
   REAC-STAGES 1 11 MEA-CO2
   HOLD-UP 1 11 VOL-LHLDP=113. VOL-VHLDP=1017.
   T-EST 1 56.3 / 2 102.2 / 3 107.5 / 4 109.9 / 5  &
      111.2 / 6 112.2 / 7 113. / 8 113.8 / 9 114.5 /  &
      10 115.3 / 11 116.6
   L-EST 1 276.6 / 2 15790. / 3 16050. / 4 16200. / 5  &
      16290. / 6 16360. / 7 16430. / 8 16490. / 9  &
      16550. / 10 16640. / 11 14710.
   V-EST 1 343.1 / 2 949.8 / 3 1337. / 4 1553. / 5  &
      1665. / 6 1735. / 7 1788. / 8 1834. / 9 1878. /  &
      10 1925. / 11 1981.
   X-EST 1 N2 3.9467E-005 / 1 CO2 0.00038761 / 1 H2O  &
      0.99876 / 1 MEA 8.8347E-007 / 1 HCO3- 0.00040731 /  &
      1 MEACOO- 3.4049E-007 / 1 MEA+ 0.00040774 / 1 CO3-2  &
      5.3108E-008 / 1 H3O+ 1.8321E-008 / 1 OH- 1.8726E-009 / &
      2 N2 3.7429E-006 / 2 CO2 0.00018077 / 2 H2O 0.9083 / &
      2 MEA 0.011437 / 2 HCO3- 0.0047402 / 2 MEACOO-  &
      0.035133 / 2 MEA+ 0.040097 / 2 CO3-2 0.00011138 /  &
      2 H3O+ 1.0278E-009 / 2 OH- 5.7263E-007 / 3 N2  &
      1.9797E-008 / 3 CO2 0.00011343 / 3 H2O 0.91095 / 3  &
      MEA 0.015687 / 3 HCO3- 0.0035574 / 3 MEACOO-  &
      0.032921 / 3 MEA+ 0.036672 / 3 CO3-2 9.6759E-005 /  &
      3 H3O+ 8.8434E-010 / 3 OH- 8.4751E-007 / 4 N2  &
      9.3039E-011 / 4 CO2 8.0685E-005 / 4 H2O 0.91235 /  &
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    4 MEA 0.018953 / 4 HCO3- 0.0029409 / 4 MEACOO-  &
    0.031233 / 4 MEA+ 0.034356 / 4 CO3-2 9.0211E-005 /  &
    4 H3O+ 7.7148E-010 / 4 OH- 1.0832E-006 / 5 N2  &
    4.1973E-013 / 5 CO2 6.3805E-005 / 5 H2O 0.91319 /  &
    5 MEA 0.021377 / 5 HCO3- 0.0025885 / 5 MEACOO-  &
    0.029965 / 5 MEA+ 0.032727 / 5 CO3-2 8.6143E-005 /  &
    5 H3O+ 6.9951E-010 / 5 OH- 1.2726E-006 / 6 N2  &
    1.8636E-015 / 6 CO2 5.3321E-005 / 6 H2O 0.9138 / 6  &
    MEA 0.023345 / 6 HCO3- 0.0023496 / 6 MEACOO-  &
    0.028925 / 6 MEA+ 0.031442 / 6 CO3-2 8.303E-005 /  &
    6 H3O+ 6.4852E-010 / 6 OH- 1.436E-006 / 7 N2  &
    8.2258E-018 / 7 CO2 4.5592E-005 / 7 H2O 0.91431 /  &
    7 MEA 0.025138 / 7 HCO3- 0.0021604 / 7 MEACOO-  &
    0.027972 / 7 MEA+ 0.030294 / 7 CO3-2 8.0302E-005 /  &
    7 H3O+ 6.0675E-010 / 7 OH- 1.5927E-006 / 8 N2  &
    3.6289E-020 / 8 CO2 3.8961E-005 / 8 H2O 0.91479 /  &
    8 MEA 0.026981 / 8 HCO3- 0.001988 / 8 MEACOO-  &
    0.02699 / 8 MEA+ 0.029135 / 8 CO3-2 7.7648E-005 /  &
    8 H3O+ 5.6693E-010 / 8 OH- 1.7624E-006 / 9 N2  &
    1.6077E-022 / 9 CO2 3.2428E-005 / 9 H2O 0.9153 / 9  &
    MEA 0.02915 / 9 HCO3- 0.0018075 / 9 MEACOO-  &
    0.025839 / 9 MEA+ 0.027798 / 9 CO3-2 7.4775E-005 /  &
    9 H3O+ 5.2266E-010 / 9 OH- 1.9741E-006 / 10 N2  &
    7.2396E-025 / 10 CO2 2.5048E-005 / 10 H2O 0.91588 /  &
    10 MEA 0.032213 / 10 HCO3- 0.0015865 / 10 MEACOO-  &
    0.024245 / 10 MEA+ 0.025977 / 10 CO3-2 7.1153E-005 /  &
    10 H3O+ 4.6438E-010 / 10 OH- 2.2955E-006 / 11 CO2  &
    1.6673E-005 / 11 H2O 0.90564 / 11 MEA 0.0427 / 11  &
    HCO3- 0.0012561 / 11 MEACOO- 0.024462 / 11 MEA+  &
    0.025855 / 11 CO3-2 6.735E-005 / 11 H3O+ 3.7858E-010 / &
    11 OH- 2.9171E-006
Y-EST 1 N2 0.022819 / 1 CO2 0.85879 / 1 H2O 0.11839 /  &
    1 MEA 8.4027E-010 / 2 N2 0.0082678 / 2 CO2 0.31072 / &
    2 H2O 0.68075 / 2 MEA 0.00026113 / 3 N2  &
    4.4209E-005 / 3 CO2 0.19059 / 3 H2O 0.80891 / 3  &
    MEA 0.00045753 / 4 N2 2.046E-007 / 4 CO2 0.13486 /  &
    4 H2O 0.86453 / 4 MEA 0.00060751 / 5 N2  &
    9.0539E-010 / 5 CO2 0.10621 / 5 H2O 0.89307 / 5  &
    MEA 0.0007183 / 6 N2 3.942E-012 / 6 CO2 0.088356 /  &
    6 H2O 0.91084 / 6 MEA 0.00080813 / 7 N2  &
    1.7058E-014 / 7 CO2 0.075214 / 7 H2O 0.9239 / 7  &
    MEA 0.00088971 / 8 N2 7.3686E-017 / 8 CO2 0.064076 /  &
    8 H2O 0.93495 / 8 MEA 0.00097292 / 9 N2  &
    3.1867E-019 / 9 CO2 0.053344 / 9 H2O 0.94559 / 9  &
    MEA 0.0010692 / 10 N2 1.3906E-021 / 10 CO2 0.041524 / &
    10 H2O 0.95727 / 10 MEA 0.0012016 / 11 CO2 0.02619 / &
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      11 H2O 0.97209 / 11 MEA 0.0017196
   UTILITIES COND-UTIL=WATER30 REB-UTIL=STEAM150

BLOCK ABSPUMP PUMP
   PARAM PRES=20. <psig>

BLOCK STRPPUMP PUMP
   PARAM PRES=20. <psig>

UTILITY STEAM150 GENERAL
   COST PRICE=0.01
   PARAM UTILITY-TYPE=STEAM PRES=150. <psig> PRES-OUT=150. <psig>  &
      VFRAC=1. VFR-OUT=0. CALOPT=FLASH

UTILITY WATER30 GENERAL
   COST PRICE=0.01
   PARAM UTILITY-TYPE=WATER TIN=30. TOUT=40. VFRAC=0.  &
      VFR-OUT=0. CALOPT=FLASH

DESIGN-SPEC CO2SPEC
   DEFINE COOMOL MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEACOO-
   DEFINE HCO3MO MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=HCO3-
   DEFINE CO3MOL MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=CO3-2
   DEFINE CO2MOL MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=CO2
   DEFINE MEAMOL MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEA
   DEFINE MEANEG MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEACOO-
   DEFINE MEAPOS MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEA+
F     co2lbs = 44.0098*(CO2MOL+CO3MOL+COOMOL+HCO3MO)
F     mealbs = 61.084*(MEAMOL+MEANEG+MEAPOS)
F     co2mea = co2lbs/mealbs
   SPEC "CO2MEA" TO "0.20"
   TOL-SPEC "0.0002"
   VARY BLOCK-VAR BLOCK=STRIPPER VARIABLE=MOLE-D  &
      SENTENCE=COL-SPECS
   LIMITS "250" "2000" STEP-SIZE=0.01 MAX-STEP-SIZ=0.05

DESIGN-SPEC MEAPCT
   DEFINE FMEA MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEA
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   DEFINE FMEACO MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEACOO-
   DEFINE FMEAP MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=MEA+
   DEFINE FH2O MOLE-FLOW STREAM=1 SUBSTREAM=MIXED  &
      COMPONENT=H2O
F     pctmea = 100*61.084*(FMEA + FMEACO + FMEAP)/
F    1        (61.084*(fmea + fmeaco + fmeap) + 18.01*fh2o)
   SPEC "PCTMEA" TO "25.25"
   TOL-SPEC "0.005"
   VARY BLOCK-VAR BLOCK=STRIPPER VARIABLE=MOLE-RDV  &
      SENTENCE=COL-SPECS
   LIMITS "0.20" "0.99"

EO-CONV-OPTI

CONV-OPTIONS
   PARAM CHECKSEQ=NO

STREAM-REPOR MOLEFLOW

PROPERTY-REP NOPARAM-PLUS

REACTIONS MEA-ACID REAC-DIST
   IN-UNITS SI MOLE-ENTHALP='cal/mol' VFLOW-RPM='cuft/hr/rpm'  &
      F-FACTOR='(lb-cuft)**.5/hr'
   DESCRIPTION "LIQUID PHASE REACTION"
   REAC-DATA 1 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 2 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 3 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 4 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 5 KINETIC PHASE=L CBASIS=MOLAR
   REAC-DATA 6 KINETIC PHASE=L CBASIS=MOLAR
   REAC-DATA 7 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 8 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   K-STOIC 1 A=-3.0383250 B=-7008.3570 C=0.0 D=-.00313489
   K-STOIC 2 A=132.8990 B=-13445.90 C=-22.47730 D=0.0
   K-STOIC 3 A=216.0490 B=-12431.70 C=-35.48190 D=0.0
   K-STOIC 4 A=-.521350 B=-2545.530 C=0.0 D=0.0
   K-STOIC 7 A=214.5820 B=-12995.40 C=-33.54710 D=0.0
   K-STOIC 8 A=-9.7420 B=-8585.470 C=0.0 D=0.0
   RATE-CON 5 PRE-EXP=4.31520E+13 ACT-ENERGY=13249.0
   RATE-CON 6 PRE-EXP=3.74860E+14 ACT-ENERGY=25271.560
   STOIC 1 MEA+ -1.0 / H2O -1.0 / MEA 1.0 / H3O+ 1.0
   STOIC 2 H2O -2.0 / H3O+ 1.0 / OH- 1.0
   STOIC 3 HCO3- -1.0 / H2O -1.0 / H3O+ 1.0 / CO3-2 1.0
```

```
   STOIC 4 MEACOO- -1.0 / H2O -1.0 / MEA 1.0 / HCO3- 1.0
   STOIC 5 CO2 -1.0 / OH- -1.0 / HCO3- 1.0
   STOIC 6 HCO3- -1.0 / CO2 1.0 / OH- 1.0
   STOIC 7 H2O -1.0 / H2S -1.0 / HS- 1.0 / H3O+ 1.0
   STOIC 8 H2O -1.0 / HS- -1.0 / S-2 1.0 / H3O+ 1.0
   POWLAW-EXP 5 CO2 1.0 / OH- 1.0
   POWLAW-EXP 6 HCO3- 1.0

REACTIONS MEA-CO2 REAC-DIST
   IN-UNITS SI MOLE-ENTHALP='cal/mol' VFLOW-RPM='cuft/hr/rpm'  &
      F-FACTOR='(lb-cuft)**.5/hr'
   DESCRIPTION "LIQUID PHASE REACTION"
   REAC-DATA 1 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 2 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 3 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 4 EQUIL PHASE=L KBASIS=MOLE-GAMMA
   REAC-DATA 5 KINETIC PHASE=L CBASIS=MOLAR
   REAC-DATA 6 KINETIC PHASE=L CBASIS=MOLAR
   K-STOIC 1 A=-3.0383250 B=-7008.3570 C=0.0 D=-.00313489
   K-STOIC 2 A=132.8990 B=-13445.90 C=-22.47730 D=0.0
   K-STOIC 3 A=216.0490 B=-12431.70 C=-35.48190 D=0.0
   K-STOIC 4 A=-.521350 B=-2545.530 C=0.0 D=0.0
   RATE-CON 5 PRE-EXP=4.31520E+13 ACT-ENERGY=13249.0
   RATE-CON 6 PRE-EXP=3.74860E+14 ACT-ENERGY=25271.560
   STOIC 1 MEA+ -1.0 / H2O -1.0 / MEA 1.0 / H3O+ 1.0
   STOIC 2 H2O -2.0 / H3O+ 1.0 / OH- 1.0
   STOIC 3 HCO3- -1.0 / H2O -1.0 / H3O+ 1.0 / CO3-2 1.0
   STOIC 4 MEACOO- -1.0 / H2O -1.0 / MEA 1.0 / HCO3- 1.0
   STOIC 5 CO2 -1.0 / OH- -1.0 / HCO3- 1.0
   STOIC 6 HCO3- -1.0 / CO2 1.0 / OH- 1.0
   POWLAW-EXP 5 CO2 1.0 / OH- 1.0
   POWLAW-EXP 6 HCO3- 1.0
;
;
;
;
;
```

IL Process:

```
;
;Input Summary created by Aspen Plus Rel. 21.0 at 13:03:59 Fri Aug 20, 2010
;Directory
;



IN-UNITS ENG TEMPERATURE=C

DEF-STREAMS CONVEN ALL

SIM-OPTIONS TLOWER=-50.0 TUPPER=250.0 MW-CALC=NO

DATABANKS PURE93  / ASPENPCD

PROP-SOURCES PURE93  / ASPENPCD

COMPONENTS
   N2 /
   O2 /
   CO /
   CO2 /
   CH4 /
   H2O H2O /
   BMIMAC /
   BMIMCO2 /
   BMIM2CO2 /
   BMIM3CO2

; --- SPECIFY HENRY'S COMPONENTS

HENRY-COMPS HENLIST N2 O2 CO CO2 CH4

FLOWSHEET
   BLOCK ABSORBER IN=LEANOIL ZZFLUE1 OUT=ABSVENT RICHOIL
   BLOCK FLASH1 IN=HOTOIL1 OUT=F1VAP F1LIQ
   BLOCK HEAT1 IN=ZRICH OUT=HOTOIL1
   BLOCK FLASH2 IN=HOTOIL2 OUT=F2VAP F2LIQ
   BLOCK CHILLER IN=ZZCOOL OUT=COLDOIL
   BLOCK REMOVE IN=COLDOIL OUT=CO2BMIM DUMPIL
   BLOCK OILMIX IN=NEWIL CO2BMIM OUT=LEANOIL
   BLOCK SUMCO2 IN=F1VAP F2VAP OUT=XITCO2
   BLOCK DUPL2 IN=F2LIQ OUT=ZF2LDUP ZZF2LIN ZF2LIQ
   BLOCK DUPRICH IN=RICHOIL OUT=ZRICH ZRICHDUP ZZRICHIN
   BLOCK HOTSIDE IN=ZF2LDUP OUT=ZHOTOUT ZDUTY
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   BLOCK COLDSIDE IN=ZRICHDUP ZDUTY OUT=ZCOLDOUT
   BLOCK FLUEDUP IN=FLUEGAS OUT=ZZFLUE1 ZZCOMPIN
   BLOCK FLUECOMP IN=ZZCOMPIN OUT=ZZCOMOUT
   BLOCK P2PEX IN=ZZF2LIN ZZRICHIN OUT=ZZHOT1 ZZCOLD1
   BLOCK COOLER IN=ZZF2LIQ OUT=ZZCOOL
   BLOCK HOTSIDE1 IN=ZZF2LIQ1 OUT=ZZF2LIQ
   BLOCK RECYPUMP IN=ZF2LIQ OUT=ZZF2LIQ1
   BLOCK HEAT2 IN=F1LIQ OUT=HOTOIL2

PROPERTIES NRTL-VLE HENRY-COMPS=HENLIST
   PROPERTIES PR-BM

MP-ROUTE PHILMXA PHILMX 3 PHILMX30
   MODEL GMRENON

; --- USE PENG-ROBINSON REDLICH-KWONG INSTEAD OF ORIGINAL
REDLICH-KWONG
; --- USE DIPPR METHOD FOR ENTHALPY CALCULATIONS
; --- COMPUTE MIXTURE LIQUID DENSITIES FROM MOLE FRACTION
AVERAGE OF PURE
; --- COMPONENT LIQUID MOLAR VOLUMES
; --- SET HEAT OF MIXING TO ZERO

PROP-REPLACE NRTL-VLE NRTL-RK
   PROP PHILMX PHILMXA
   PROP HLMX HLMX82
   PROP VLMX VLMX26
   PROP MUVMX MUVMX07
   PROP MULMX MULMX01
   PROP KVMX KVMX06
   PROP DLMX DLMX05
   PROP DL DL03
   PROP DV DV01
   PROP MUL MUL01
   PROP MUV MUV07
   PROP KV KV06
   PROP DHLMX DHLMX82
   PROP DHL DHL09
   MODEL ESPR
   MODEL ESPR0

; --- N2; Dippr (8/1991); Expt'l TB; Expt'l TC; Expt'l PC
; --- O2; Dippr (8/1992); Expt'l TB; Expt'l TC; Expt'l PC
; --- CO; Dippr (8/1993); Expt'l TB; Expt'l TC; Expt'l PC
; --- CO2; Dippr (8/1994); Expt'l TC; Expt'l PC
; --- Normal sublimation point (at 101325 Pa) is 194.67 K.
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; --- CH4; Dippr (8/1994); Expt'l TB; Expt'l TC; Expt'l PC
; --- H2O; Dippr (8/1996); Expt'l TB; Expt'l TC; Expt'l PC
; --- TB, TC, PC, OMEGA for BMIMAC set to defaults for solids.
; --- TB, TC, PC, OMEGA for BMIMCO2 set to defaults for solids.
; --- TB, TC, PC, OMEGA for BMIM2CO2 set to defaults for solids.
; --- TB, TC, PC, OMEGA for BMIM3CO2 set to defaults for solids.

PROP-DATA DATA1
   IN-UNITS SI
   PROP-LIST MW / TB / TC / PC / OMEGA
   PVAL N2 28.020 / 77.340 / 126.20 / 3400000.0 /  &
      .03772150
   PVAL O2 32.0 / 90.190 / 154.580 / 5043000.0 / .02217980
   PVAL CO 28.010 / 81.70 / 132.920 / 3499000.0 /  &
      .04816210
   PVAL CO2 44.010 / 185.610 / 304.210 / 7383000.0 /  &
      .2236210
   PVAL CH4 16.0420 / 111.660 / 190.560 / 4599000.0 /  &
      .01154780
   PVAL H2O 18.0160 / 373.150 / 647.10 / 22064000.0 /  &
      .3448610
   PVAL BMIMAC 198.2640 / 1273.150 / 1673.150 / 1013250.0 /  &
      -.50
   PVAL BMIMCO2 242.2740 / 1273.150 / 1673.150 / 1013250.0 /  &
      -.50
   PVAL BMIM2CO2 440.5380 / 1273.150 / 1673.150 / 1013250.0 / &
      -.50
   PVAL BMIM3CO2 638.8020 / 1273.150 / 1673.150 / 1013250.0 / &
      -.50

; --- N2; Dippr (8/1991); Expt'l VC;  ZC; Expt'l MUP
; --- O2; Dippr (8/1992); Expt'l VC;  ZC; Expt'l MUP
; --- CO; Dippr (8/1993); Expt'l VC;  ZC; Expt'l MUP
; --- CO2; Dippr (8/1994); Expt'l VC;  ZC; Expt'l MUP
; --- CH4; Dippr (8/1994); Expt'l VC;  ZC; Expt'l MUP
; --- H2O; Dippr (8/1996); Expt'l VC;  ZC; Expt'l MUP
; --- VC for BMIMAC based on density; ZC set to 0.20.
; --- VC for BMIMCO2 based on density; ZC set to 0.20.
; --- VC for BMIM2CO2 based on density; ZC set to 0.20.
; --- VC for BMIM3CO2 based on density; ZC set to 0.20.

PROP-DATA DATA2
   IN-UNITS SI
   PROP-LIST VC / ZC / VB / MUP / TREFHL
   PVAL N2 .089210 / .2890 / .0346720 / 0.0 / 77.340
   PVAL O2 .07340 / .2880 / .0280230 / 0.0 / 90.190
```

```
   PVAL CO .09440 / .2990 / .0354430 / 3.54560E-26 / 81.70
   PVAL CO2 .0940 / .2740 / .0946970 / 0.0 / 185.610
   PVAL CH4 .09860 / .2860 / .0379690 / 0.0 / 111.660
   PVAL H2O .0559470 / .2290 / .0188310 / 5.84930E-25 /  &
      298.150
   PVAL BMIMAC .187930 / .20 / .187930 / 0.0 / 298.150
   PVAL BMIMCO2 .229640 / .20 / .229640 / 0.0 / 298.150
   PVAL BMIM2CO2 .417570 / .20 / .417570 / 0.0 / 298.150
   PVAL BMIM3CO2 .60550 / .20 / .60550 / 0.0 / 298.150

; --- N2; Dippr (8/1991); Expt'l DHFORM; Expt'l DGFORM
; --- O2; Dippr (8/1992); Expt'l DHFORM; Expt'l DGFORM
; --- CO; Dippr (8/1993); Expt'l DHFORM;  DGFORM
; --- CO2; Dippr (8/1994); Expt'l DHFORM;  DGFORM
; --- CH4; Dippr (8/1994); Expt'l DHFORM;  DGFORM
; --- H2O; Dippr (8/1996); Expt'l DHFORM;  DGFORM
; --- DHFORM, DGFORM for BMIMAC set to ZERO.
; --- DHFORM, DGFORM for BMIMCO2 set to ZERO.
; --- DHFORM, DGFORM for BMIM2CO2 set to ZERO.
; --- DHFORM, DGFORM for BMIM3CO2 set to ZERO.

PROP-DATA DATA3
   IN-UNITS SI
   PROP-LIST DHFORM / DGFORM
   PVAL N2 0.0 / 0.0
   PVAL O2 0.0 / 0.0
   PVAL CO -1.10530E+08 / -1.37150E+08
   PVAL CO2 -3.93510E+08 / -3.94370E+08
   PVAL CH4 -74520000.0 / -50490000.0
   PVAL H2O -2.418140E+08 / -2.28590E+08
   PVAL BMIMAC -2.0E+08 / 0.0
   PVAL BMIMCO2 -5.41380E+08 / 0.0
   PVAL BMIM2CO2 -7.41380E+08 / 0.0
   PVAL BMIM3CO2 -9.41380E+08 / 0.0

PROP-DATA DATA4
   IN-UNITS SI
   PROP-LIST VLSTD
   PVAL N2 .0891530
   PVAL O2 .0735050
   PVAL CO .0950360
   PVAL CO2 .0539060
   PVAL CH4 .0991850
   PVAL H2O .0180520
   PVAL BMIMAC .187930
   PVAL BMIMCO2 .229640
```

```
   PVAL BMIM2CO2 .417570
   PVAL BMIM3CO2 .60550

; --- N2; Dippr (8/1991); Recommended: 50-1500 K; Expt'l: 50-1500 K
; --- O2; Dippr (8/1992); Recommended: 50-1500 K; Expt'l: 50-1500 K
; --- CO; Dippr (8/1993); Recommended: 60-1500 K; Predicted data
; --- CO2; Dippr (8/1994); Recommended: 50-5000 K; Expt'l: 195-1100 K
; --- CH4; Dippr (8/1994); Recommended: 50-1500 K; Predicted data
; --- H2O; Dippr (8/1996); Recommended: 100-2273 K; Expt'l: 100-2273 K
; --- Ideal gas ht capacity for BMIMAC set to 0.1 cal/gm-K.
; --- Ideal gas ht capacity for BMIMCO2 set to 0.1 cal/gm-K.
; --- Ideal gas ht capacity for BMIM2CO2 set to 0.1 cal/gm-K.
; --- Ideal gas ht capacity for BMIM3CO2 set to 0.1 cal/gm-K.

PROP-DATA CPIGDP-1
   IN-UNITS SI
   PROP-LIST CPIGDP
   PVAL N2 29105.0 8614.90 1701.60 103.470 909.790 0.0  &
      1500.0
   PVAL O2 29103.0 10040.0 2526.50 9356.0 1153.80 0.0  &
      1500.0
   PVAL CO 29108.0 8773.0 3085.10 8455.30 1538.20 0.0  &
      1500.0
   PVAL CO2 29370.0 34540.0 1428.0 26400.0 588.0 0.0 1500.0
   PVAL CH4 33298.0 79933.0 2086.90 41602.0 991.960 0.0  &
      1500.0
   PVAL H2O 33363.0 26790.0 2610.50 8896.0 1169.0 0.0  &
      1500.0
   PVAL BMIMAC 83009.170 0.0 1000.0 0.0 1000.0 0.0 1500.0
   PVAL BMIMCO2 101435.30 0.0 1000.0 0.0 1000.0 0.0 1500.0
   PVAL BMIM2CO2 184444.40 0.0 1000.0 0.0 1000.0 0.0 1500.0
   PVAL BMIM3CO2 267453.60 0.0 1000.0 0.0 1000.0 0.0 1500.0

; --- N2; Dippr (8/1991); Recommended: 63-112 K; Expt'l: 63-115 K
; --- O2; Dippr (8/1992); Recommended: 54-142 K; Expt'l: 54-142 K
; --- CO; Dippr (8/1993); Expt'l: 70-132 K; Refitted to Eqn. 100.
; --- CO2; Dippr (8/1994); Recommended: 220-290 K; Expt'l: 223-281 K
; --- CH4; Dippr (8/1994); Expt'l: 91-190 K; Refitted to Eqn. 100.
; --- H2O; Dippr (8/1996); Recommended: 273-533 K; Expt'l: 273-533 K
; --- Heat capacity for BMIMAC set the same as that of [BMIM][BF4] on a
; --- mass basis.
; --- Heat capacity for BMIMCO2 set the same as that of [BMIM][BF4] on a
; --- mass basis.
; --- Heat capacity for BMIM2CO2 provided by user.
; --- Heat capacity for BMIM3CO2 provided by user.
```

```
PROP-DATA CPLDIP-1
   IN-UNITS SI
   PROP-LIST CPLDIP
   PVAL N2 281970.0 -12281.0 248.0 -2.21820 .00749020 0.0  &
      126.20
   PVAL O2 175430.0 -6152.30 113.920 -.923820 .00279630 0.0  &
      154.580
   PVAL CO 127760.80 -1677.8830 10.481790 0.0 0.0 70.0  &
      132.920
   PVAL CO2 -8304300.0 104370.0 -433.330 .600520 0.0 0.0  &
      304.210
   PVAL CH4 163051.30 -1956.070 8.772740 0.0 0.0 90.0  &
      190.560
   PVAL H2O 276370.0 -2090.10 8.1250 -.0141160 .00000937010  &
      0.0 647.10
   PVAL BMIMAC 3515.1060 1092.4010 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIMCO2 4295.3780 1334.8880 0.0 0.0 0.0 0.0  &
      1673.150
   PVAL BMIM2CO2 7810.4850 2427.2890 0.0 0.0 0.0 0.0  &
      1673.150
   PVAL BMIM3CO2 11325.590 3519.690 0.0 0.0 0.0 0.0  &
      1673.150

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-124 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 90-90 K
; --- CO; Dippr (8/1993); Recommended: 68-132 K; Expt'l: 68-132 K
; --- CO2; Dippr (8/1994); Recommended: 217-304 K; Expt'l: 217-304 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-189 K
; --- H2O; Dippr (8/1996); Recommended: 273-647 K; Expt'l: 273-646 K
; --- Heat of vaporiz'n for BMIMAC set to 500 cal/gm.
; --- Heat of vaporiz'n for BMIMCO2 set to 500 cal/gm.
; --- Heat of vaporiz'n for BMIM2CO2 set to 500 cal/gm.
; --- Heat of vaporiz'n for BMIM3CO2 set to 500 cal/gm.

PROP-DATA DHVLDP-1
   IN-UNITS SI
   PROP-LIST DHVLDP
   PVAL N2 7490500.0 .404060 -.3170 .273430 0.0 0.0 126.20
   PVAL O2 9008000.0 .45420 -.40960 .31830 0.0 0.0 154.580
   PVAL CO 8585000.0 .49210 -.3260 .22310 0.0 0.0 132.920
   PVAL CO2 21730000.0 .3820 -.43390 .422130 0.0 0.0  &
      304.210
   PVAL CH4 10194000.0 .260870 -.146940 .221540 0.0 0.0  &
      190.560
   PVAL H2O 52053000.0 .31990 -.2120 .257950 0.0 0.0 647.10
   PVAL BMIMAC 415045900.0 0.0 0.0 0.0 0.0 0.0 1673.150
```

```
   PVAL BMIMCO2 507176400.0 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM2CO2 922222200.0 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM3CO2 1.3372680E+09 0.0 0.0 0.0 0.0 0.0 1673.150

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-124 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 54-155 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 68-130 K
; --- CO2; Dippr (8/1994); Recommended: 217-304 K; Expt'l: 217-303 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-191 K
; --- H2O; Dippr (8/1996); Expt'l: 273-647 K; Refitted to Eqn. 105
; --- Density for BMIMAC set to 1.055 gm/cc [Mark Shiflett].
; --- Density for BMIMCO2 set to 1.055 gm/c.
; --- Density for BMIM2CO2 provided by user.
; --- Density for BMIM3CO2 provided by user.

PROP-DATA DNLDIP-1
   IN-UNITS SI
   PROP-LIST DNLDIP
   PVAL N2 3.20910 .28610 126.20 .29660 0.0 0.0 126.20
   PVAL O2 3.91430 .287720 154.580 .29240 0.0 0.0 154.580
   PVAL CO 2.8970 .275320 132.920 .28130 0.0 0.0 132.920
   PVAL CO2 2.7680 .262120 304.210 .29080 0.0 0.0 304.210
   PVAL CH4 2.92140 .289760 190.560 .288810 0.0 0.0 190.560
   PVAL H2O .0049125480 .0088013340 647.10 .045847350 0.0  &
      0.0 647.10
   PVAL BMIMAC 5.3211880 1.0 1673.150 1.0 0.0 0.0 1673.150
   PVAL BMIMCO2 4.3545740 1.0 1673.150 1.0 0.0 0.0 1673.150
   PVAL BMIM2CO2 2.3947990 1.0 1673.150 1.0 0.0 0.0  &
      1673.150
   PVAL BMIM3CO2 1.6515290 1.0 1673.150 1.0 0.0 0.0  &
      1673.150

; --- N2; Dippr (8/1991); Recommended: 63-124 K; Expt'l: 65-124 K
; --- O2; Dippr (8/1992); Recommended: 60-150 K; Expt'l: 60-140 K
; --- CO; Dippr (8/1993); Recommended: 68-125 K; Expt'l: 70-80 K
; --- CO2; Dippr (8/1994); Recommended: 217-300 K; Expt'l: 218-304 K
; --- CH4; Dippr (8/1994); Recommended: 91-180 K; Expt'l: 109-189 K
; --- H2O; Dippr (8/1996); Recommended: 273-633 K; Expt'l: 273-633 K
; --- Liq'd thermal condt'y for BMIMAC set to 0.1 Btu/hr-ft-deg F.
; --- Liq'd thermal condt'y for BMIMCO2 set to 0.1 Btu/hr-ft-deg F.
; --- Liq'd thermal condt'y for BMIM2CO2 set to 0.1 Btu/hr-ft-deg F.
; --- Liq'd thermal condt'y for BMIM3CO2 set to 0.1 Btu/hr-ft-deg F.

PROP-DATA KLDIP-1
   IN-UNITS SI
   PROP-LIST KLDIP
```

```
   PVAL N2 .26540 -.0016770 0.0 0.0 0.0 0.0 126.20
   PVAL O2 .27410 -.001380 0.0 0.0 0.0 0.0 154.580
   PVAL CO .28550 -.0017840 0.0 0.0 0.0 0.0 132.920
   PVAL CO2 .44060 -.00121750 0.0 0.0 0.0 0.0 304.210
   PVAL CH4 .417680 -.00245280 .00000355880 0.0 0.0 0.0  &
      190.560
   PVAL H2O -.4320 .00572550 -.0000080780 1.8610E-09 0.0 0.0  &
      647.10
   PVAL BMIMAC .17307350 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIMCO2 .17307350 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM2CO2 .17307350 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM3CO2 .17307350 0.0 0.0 0.0 0.0 0.0 1673.150

; --- N2; Dippr (8/1991); Recommended: 63-2000 K; Expt'l: 296-344 K
; --- O2; Dippr (8/1992); Recommended: 80-2000 K; Predicted data
; --- CO; Dippr (8/1993); Recommended: 70-1500 K; Expt'l: 70-2230 K
; --- CO2; Dippr (8/1994); Recommended: 195-1500 K; Expt'l: 180-1500 K
; --- CH4; Dippr (8/1994); Recommended: 112-600 K; Expt'l: 100-1000 K
; --- H2O; Dippr (8/1996); Recommended: 273-1073 K; Expt'l: 273-1073 K
; --- Vapor thermal cond'ty  for BMIMAC set to 0.01 Btu/hr-ft-deg F.
; --- Vapor thermal cond'ty  for BMIMCO2 set to 0.01 Btu/hr-ft-deg F.
; --- Vapor thermal cond'ty  for BMIM2CO2 set to 0.01 Btu/hr-ft-deg F.
; --- Vapor thermal cond'ty  for BMIM3CO2 set to 0.01 Btu/hr-ft-deg F.

PROP-DATA KVDIP-1
   IN-UNITS SI
   PROP-LIST KVDIP
   PVAL N2 .000331430 .77220 16.3230 373.720 0.0 0.0 1500.0
   PVAL O2 .000449940 .74560 56.6990 0.0 0.0 0.0 1500.0
   PVAL CO .000598820 .68630 57.130 501.920 0.0 0.0 1500.0
   PVAL CO2 3.690 -.38380 964.0 1860000.0 0.0 0.0 1500.0
   PVAL CH4 .00000839830 1.42680 -49.6540 0.0 0.0 0.0  &
      1500.0
   PVAL H2O .00000620410 1.39730 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIMAC .017307350 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIMCO2 .017307350 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIM2CO2 .017307350 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIM3CO2 .017307350 0.0 0.0 0.0 0.0 0.0 1500.0

; --- N2; Dippr (8/1991); Recommended: 63-124 K; Expt'l: 65-124 K
; --- O2; Dippr (8/1992); Recommended: 54-150 K; Expt'l: 54-152 K
; --- CO; Dippr (8/1993); Recommended: 68-131 K; Expt'l: 69-81 K
; --- CO2; Dippr (8/1994); Recommended: 217-303 K; Expt'l: 219-303 K
; --- CH4; Dippr (8/1994); Recommended: 91-188 K; Expt'l: 93-163 K
; --- H2O; Dippr (8/1996); Recommended: 273-646 K; Expt'l: 273-646 K
; --- Liq'd viscosity for BMIMAC set to 0.82 cp.
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; --- Liq'd viscosity for BMIMCO2 set to 0.82 cp.
; --- Liq'd viscosity for BMIM2CO2 set to 0.82 cp.
; --- Liq'd viscosity for BMIM3CO2 set to 0.82 cp.

PROP-DATA MULDIP-1
   IN-UNITS SI
   PROP-LIST MULDIP
   PVAL N2 16.0040 -181.610 -5.15510 0.0 0.0 0.0 126.20
   PVAL O2 -4.14760 94.040 -1.2070 0.0 0.0 0.0 154.580
   PVAL CO -4.97350 97.670 -1.10880 0.0 0.0 0.0 132.920
   PVAL CO2 18.7750 -402.920 -4.68540 -6.91710E-26 10.0 0.0  &
      304.210
   PVAL CH4 -6.15720 178.150 -.952390 -9.06060E-24 10.0 0.0  &
      190.560
   PVAL H2O -52.8430 3703.60 5.8660 -5.8790E-29 10.0 0.0  &
      647.10
   PVAL BMIMAC -7.1077550 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIMCO2 -7.1077550 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM2CO2 -7.1077550 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM3CO2 -7.1077550 0.0 0.0 0.0 0.0 0.0 1673.150

; --- N2; Dippr (8/1991); Recommended: 63-1970 K; Expt'l: 63-76 K
; --- O2; Dippr (8/1992); Recommended: 54-1500 K; Predicted data
; --- CO; Dippr (8/1993); Recommended: 68-1250 K; Expt'l: 80-1240 K
; --- CO2; Dippr (8/1994); Recommended: 195-1500 K; Expt'l: 200-1500 K
; --- CH4; Dippr (8/1994); Recommended: 91-1000 K; Expt'l: 115-800 K
; --- H2O; Dippr (8/1996); Recommended: 273-1073 K; Expt'l: 273-1073 K
; --- Vapor viscosity for BMIMAC set to 0.01 cp.
; --- Vapor viscosity for BMIMCO2 set to 0.01 cp.
; --- Vapor viscosity for BMIM2CO2 set to 0.01 cp.
; --- Vapor viscosity for BMIM3CO2 set to 0.01 cp.

PROP-DATA MUVDIP-1
   IN-UNITS SI
   PROP-LIST MUVDIP
   PVAL N2 .000000655920 .60810 54.7140 0.0 0.0 0.0 1500.0
   PVAL O2 .0000011010 .56340 96.30 0.0 0.0 0.0 1500.0
   PVAL CO .00000111270 .53380 94.70 0.0 0.0 0.0 1500.0
   PVAL CO2 .0000021480 .460 290.0 0.0 0.0 0.0 1500.0
   PVAL CH4 .000000525460 .590060 105.670 0.0 0.0 0.0  &
      1500.0
   PVAL H2O 1.70960E-08 1.11460 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIMAC .000010 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIMCO2 .000010 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIM2CO2 .000010 0.0 0.0 0.0 0.0 0.0 1500.0
   PVAL BMIM3CO2 .000010 0.0 0.0 0.0 0.0 0.0 1500.0
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; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 63-116 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 62-97 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 68-133 K
; --- CO2; Dippr (8/1994); Recommended: 217-304 K; Expt'l: 217-304 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 91-191 K
; --- H2O; Dippr (8/1996); Recommended: 273-647 K; Expt'l: 273-647 K
; --- Vapor pressure for BMIMAC set to be consistent with TB & TC/PC.
; --- Vapor pressure for BMIMCO2 set to be consistent with TB & TC/PC.
; --- Vapor pressure for BMIM2CO2 set to be consistent with TB & TC/PC.
; --- Vapor pressure for BMIM3CO2 set to be consistent with TB & TC/PC.

PROP-DATA PLXANT-1
   IN-UNITS SI
   PROP-LIST PLXANT
   PVAL N2 58.2820 -1084.10 0.0 0.0 -8.31440 .0441270 1.0  &
      0.0 126.20
   PVAL O2 51.2450 -1200.20 0.0 0.0 -6.43610 .0284050 1.0  &
      0.0 154.580
   PVAL CO 45.6980 -1076.60 0.0 0.0 -4.88140 .0000756730  &
      2.0 0.0 132.920
   PVAL CO2 140.540 -4735.0 0.0 0.0 -21.2680 .0409090 1.0  &
      0.0 304.210
   PVAL CH4 39.2050 -1324.40 0.0 0.0 -3.43660 .0000310190  &
      2.0 0.0 190.560
   PVAL H2O 73.6490 -7258.20 0.0 0.0 -7.30370 .00000416530  &
      2.0 0.0 647.10
   PVAL BMIMAC 21.157470 -12262.30 0.0 0.0 0.0 0.0 0.0 0.0  &
      1673.150
   PVAL BMIMCO2 21.157470 -12262.30 0.0 0.0 0.0 0.0 0.0  &
      0.0 1673.150
   PVAL BMIM2CO2 21.157470 -12262.30 0.0 0.0 0.0 0.0 0.0  &
      0.0 1673.150
   PVAL BMIM3CO2 21.157470 -12262.30 0.0 0.0 0.0 0.0 0.0  &
      0.0 1673.150

; --- N2; Dippr (8/1991); Recommended: 63-126 K; Expt'l: 70-90 K
; --- O2; Dippr (8/1992); Recommended: 54-155 K; Expt'l: 70-90 K
; --- CO; Dippr (8/1993); Recommended: 68-133 K; Expt'l: 81-91 K
; --- CO2; Dippr (8/1994); Recommended: 217-304 K; Expt'l: 221-303 K
; --- CH4; Dippr (8/1994); Recommended: 91-191 K; Expt'l: 93-193 K
; --- H2O; Dippr (8/1996); Recommended: 273-647 K; Expt'l: 273-646 K
; --- Surface tension for BMIMAC set to 20 dyne/cm.
; --- Surface tension for BMIMCO2 set to 20 dyne/cm.
; --- Surface tension for BMIM2CO2 set to 20 dyne/cm.
; --- Surface tension for BMIM3CO2 set to 20 dyne/cm.
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PROP-DATA SIGDIP-1
   IN-UNITS SI
   PROP-LIST SIGDIP
   PVAL N2 .029010 1.24850 0.0 0.0 0.0 0.0 126.20
   PVAL O2 .0380660 1.21360 0.0 0.0 0.0 0.0 154.580
   PVAL CO .0279590 1.1330 0.0 0.0 0.0 0.0 132.920
   PVAL CO2 .080710 1.26620 0.0 0.0 0.0 0.0 304.210
   PVAL CH4 .0365570 1.14660 0.0 0.0 0.0 0.0 190.560
   PVAL H2O .185480 2.7170 -3.5540 2.0470 0.0 0.0 647.10
   PVAL BMIMAC .020 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIMCO2 .020 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM2CO2 .020 0.0 0.0 0.0 0.0 0.0 1673.150
   PVAL BMIM3CO2 .020 0.0 0.0 0.0 0.0 0.0 1673.150

PROP-DATA THRSWT-1
   IN-UNITS SI
   PROP-LIST THRSWT
   PVAL N2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL O2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL CO 1.0 105.0 1.0 106.0 1.0 114.0 107.0 1.0
   PVAL CO2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL CH4 1.0 105.0 1.0 106.0 1.0 114.0 107.0 1.0
   PVAL H2O 1.0 116.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL BMIMAC 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL BMIMCO2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL BMIM2CO2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0
   PVAL BMIM3CO2 1.0 105.0 1.0 106.0 1.0 100.0 107.0 1.0

PROP-DATA TRNSWT-1
   IN-UNITS SI
   PROP-LIST TRNSWT
   PVAL N2 101.0 102.0 100.0 102.0 106.0
   PVAL O2 101.0 102.0 100.0 102.0 106.0
   PVAL CO 101.0 102.0 100.0 102.0 106.0
   PVAL CO2 101.0 102.0 100.0 102.0 106.0
   PVAL CH4 101.0 102.0 100.0 102.0 106.0
   PVAL H2O 101.0 102.0 100.0 102.0 106.0
   PVAL BMIMAC 101.0 102.0 100.0 102.0 106.0
   PVAL BMIMCO2 101.0 102.0 100.0 102.0 106.0
   PVAL BMIM2CO2 101.0 102.0 100.0 102.0 106.0
   PVAL BMIM3CO2 101.0 102.0 100.0 102.0 106.0

;--- HENRY'S CONSTANT FOR METHANE OUT OF H2O FROM EXPERIMENTAL
GAS
;--- SOLUBILITY DATA IN THE RANGE 12 TO 269 DEG C.   MS 1/16/97
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;--- Ref.: Morrison T.J., Billett F., J.Chem.Soc. 3819(1952).
;--- Ref.: CRAMER S.D., IND.ENG.CHEM.,PROCESS DES.DEV. 23,533(1984).
;LH--- Henry's constant for N2 in H2O from experimental gas solubility data
;LH--- the range 20 to 160 deg C.
;LH--- Henry's constant for CO in H2O from experimental gas solubility data
;LH--- the range 20 to 175 deg C.
;LH--- Henry's constant for CO2 in H2O from experimental gas solubility data
;LH--- the range 0 to 200 deg C.
;LH--- Henry's constant for O2 in H2O from experimental gas solubility data
;LH--- the range 0 to 200 deg C.
; --- All Henry's constants for gases out of BMIMAC from solubility data for
; --- gases out of [BMIM][BF4] obtained from NIST Web Database.
; ---
; ---
; ---

PROP-DATA HENRY-1
   IN-UNITS SI
   PROP-LIST HENRY
   BPVAL CH4 H2O 494.89180 -17809.190 -76.38120 .074427220  &
      285.050 542.350 0.0
   BPVAL N2 H2O 138.16710 -6035.380 -16.68220 0.0 223.150  &
      523.150 0.0
   BPVAL CO H2O 170.12710 -7516.620 -21.48440 0.0 223.150  &
      523.150 0.0
   BPVAL CO2 H2O 144.26410 -7566.820 -17.54630 0.0 223.150  &
      523.150 0.0
   BPVAL O2 H2O 138.28410 -6304.70 -16.66650 0.0 223.150  &
      523.150 0.0
   BPVAL N2 BMIMAC 22.715950 -1116.670 0.0 0.0 283.20  &
      343.140 0.0
   BPVAL O2 BMIMAC 19.932020 -313.76180 0.0 0.0 283.150  &
      343.30 0.0
   BPVAL CO BMIMAC 19.142510 -51.808730 0.0 0.0 283.180  &
      343.040 0.0
   BPVAL CO2 BMIMAC 20.01442546 -1198.1 0.0 0.0 273.10  &
      363.16 0.0
   BPVAL CH4 BMIMAC -24.867710 5953.0060 0.0 .077847240  &
      283.050 343.090 0.0
   BPVAL N2 BMIMCO2 22.715950 -1116.670 0.0 0.0 283.20  &
      343.140 0.0
   BPVAL O2 BMIMCO2 19.932020 -313.76180 0.0 0.0 283.150  &
      343.30 0.0
   BPVAL CO BMIMCO2 19.142510 -51.808730 0.0 0.0 283.180  &
      343.040 0.0
   BPVAL CO2 BMIMCO2 20.01442546 -1198.1 0.0 0.0 273.10  &
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      363.16 0.0
   BPVAL CH4 BMIMCO2 -24.867710 5953.0060 0.0 .077847240  &
      283.050 343.090 0.0
   BPVAL N2 BMIM2CO2 22.715950 -1116.670 0.0 0.0 283.20  &
      343.140 0.0
   BPVAL O2 BMIM2CO2 19.932020 -313.76180 0.0 0.0 283.150  &
      343.30 0.0
   BPVAL CO BMIM2CO2 19.142510 -51.808730 0.0 0.0 283.180  &
      343.040 0.0
   BPVAL CO2 BMIM2CO2 20.01442546 -1198.1 0.0 0.0 273.10  &
      363.16 0.0
   BPVAL CH4 BMIM2CO2 -24.867710 5953.0060 0.0 .077847240  &
      283.050 343.090 0.0
   BPVAL N2 BMIM3CO2 22.715950 -1116.670 0.0 0.0 283.20  &
      343.140 0.0
   BPVAL O2 BMIM3CO2 19.932020 -313.76180 0.0 0.0 283.150  &
      343.30 0.0
   BPVAL CO BMIM3CO2 19.142510 -51.808730 0.0 0.0 283.180  &
      343.040 0.0
   BPVAL CO2 BMIM3CO2 20.01442546 -1198.1 0.0 0.0 273.10  &
      363.16 0.0
   BPVAL CH4 BMIM3CO2 -24.867710 5953.0060 0.0 .077847240  &
      283.050 343.090 0.0

PROP-DATA NRTL-1
   IN-UNITS SI
   PROP-LIST NRTL
   BPVAL BMIMAC H2O 0.0 -151.76030 .30 0.0 0.0 0.0 293.150  &
      393.150
   BPVAL H2O BMIMAC 0.0 -151.76030 .30 0.0 0.0 0.0 293.150  &
      393.150
   BPVAL BMIMCO2 H2O 0.0 -151.76030 .30 0.0 0.0 0.0 293.150  &
      393.150
   BPVAL H2O BMIMCO2 0.0 -151.76030 .30 0.0 0.0 0.0 293.150  &
      393.150
   BPVAL BMIM2CO2 H2O 0.0 -151.76030 .30 0.0 0.0 0.0  &
      293.150 393.150
   BPVAL H2O BMIM2CO2 0.0 -151.76030 .30 0.0 0.0 0.0  &
      293.150 393.150
   BPVAL BMIM3CO2 H2O 0.0 -151.76030 .30 0.0 0.0 0.0  &
      293.150 393.150
   BPVAL H2O BMIM3CO2 0.0 -151.76030 .30 0.0 0.0 0.0  &
      293.150 393.150

; --- NRTL param's for BMIMAC + H2O from infinite dilution activity coeff. o
; --- H2O out of BMIMAC at 363.65 K.  Infinite dilution activity coeff. of
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; --- BMIMAC out of H2O was assumed to be the same.
; --- Ref: Jork, C. et al, J. Chem. Thermodyn., 37, 537-558, 2005.

PROP-DATA PRKBV-1
   IN-UNITS SI
   PROP-LIST PRKBV
   BPVAL BMIMAC H2O 0.0 0.0 0.0 0.0 1000.000
   BPVAL H2O BMIMAC 0.0 0.0 0.0 0.0 1000.000
   BPVAL BMIMCO2 H2O 0.0 0.0 0.0 0.0 1000.000
   BPVAL H2O BMIMCO2 0.0 0.0 0.0 0.0 1000.000
   BPVAL BMIM2CO2 H2O 0.0 0.0 0.0 0.0 1000.000
   BPVAL H2O BMIM2CO2 0.0 0.0 0.0 0.0 1000.000
   BPVAL BMIM3CO2 H2O 0.0 0.0 0.0 0.0 1000.000
   BPVAL H2O BMIM3CO2 0.0 0.0 0.0 0.0 1000.000

STREAM FLUEGAS
   SUBSTREAM MIXED TEMP=50. PRES=100. <psig> MOLE-FLOW=2234.1
   MOLE-FRAC N2 0.85567 / CO2 0.14433

STREAM LEANOIL
   SUBSTREAM MIXED TEMP=0. PRES=100. <psig> MOLE-FLOW=3000.
   MOLE-FRAC BMIMAC 0.95 / BMIM3CO2 0.05

STREAM NEWIL
   SUBSTREAM MIXED TEMP=0. PRES=100. <psig> MOLE-FLOW=2713.1
   MOLE-FRAC BMIMAC 1.

DEF-STREAMS HEAT ZDUTY

BLOCK OILMIX MIXER
   PARAM PRES=100. <psig> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO

BLOCK SUMCO2 MIXER
   PARAM PRES=15. <psi> NPHASE=1 PHASE=V
   BLOCK-OPTION FREE-WATER=NO

BLOCK REMOVE SEP
   FRAC STREAM=CO2BMIM SUBSTREAM=MIXED COMPS=N2 O2 CO CO2  &
      CH4 H2O BMIMAC BMIMCO2 BMIM2CO2 BMIM3CO2 FRACS=1. 1.  &
      1. 1. 1. 1. 0. 1. 1. 1.

BLOCK CHILLER HEATER
   PARAM TEMP=0. PRES=0. <psi> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO
   UTILITY UTILITY-ID=BRINE5
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BLOCK COLDSIDE HEATER
   PARAM PRES=100. <psi> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO

BLOCK HEAT1 HEATER
   PARAM TEMP=71.76 PRES=50. <psig> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO
   UTILITY UTILITY-ID=STM125

BLOCK HOTSIDE HEATER
   PARAM TEMP=100. PRES=100. <psi> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO

BLOCK HOTSIDE1 HEATER
   PARAM TEMP=81.76 PRES=0. <psi> NPHASE=1 PHASE=L
   BLOCK-OPTION FREE-WATER=NO

BLOCK COOLER HEATX
   PARAM T-HOT=45. PRES-HOT=0. <psi> U-OPTION=CONSTANT  &
      F-OPTION=CONSTANT CALC-METHOD=SHORTCUT
   FEEDS HOT=ZZF2LIQ
   PRODUCTS HOT=ZZCOOL
   HEAT-TR-COEF U=75.
   REFERENCE COLD-UTIL=RIVER30

BLOCK HEAT2 HEATX
   PARAM T-COLD=135. U-OPTION=CONSTANT F-OPTION=CONSTANT  &
      CALC-METHOD=SHORTCUT
   FEEDS COLD=F1LIQ
   PRODUCTS COLD=HOTOIL2
   HEAT-TR-COEF U=75.
   REFERENCE HOT-UTIL=STEAM125

BLOCK P2PEX HEATX
   PARAM MIN-OUT-TAPP=10. <C> U-OPTION=CONSTANT  &
      F-OPTION=CONSTANT CALC-METHOD=SHORTCUT
   FEEDS HOT=ZZF2LIN COLD=ZZRICHIN
   PRODUCTS HOT=ZZHOT1 COLD=ZZCOLD1
   HEAT-TR-COEF U=75.

BLOCK ABSORBER RADFRAC
   PARAM NSTAGE=20 ABSORBER=YES MAXOL=150 MAXIL=15
   COL-CONFIG CONDENSER=NONE REBOILER=NONE
   RATESEP-ENAB CALC-MODE=EQUILIBRIUM
   FEEDS LEANOIL 1 ON-STAGE / ZZFLUE1 20 ON-STAGE
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PRODUCTS ABSVENT 1 V / RICHOIL 20 L
P-SPEC 1 75. <psig>
COL-SPECS
REAC-STAGES 1 20 R-1
T-EST 1 2.6 / 2 8.1 / 3 14.4 / 4 18.1 / 5 19.6 /  &
   6 20.1 / 7 20.3 / 8 20.4 / 9 20.5 / 10 22.6
L-EST 1 1571. / 2 1472. / 3 1363. / 4 1309. / 5  &
   1291. / 6 1285. / 7 1283. / 8 1283. / 9 1283. /  &
   10 1286.
V-EST 1 1935. / 2 1970. / 3 2046. / 4 2145. / 5  &
   2207. / 6 2233. / 7 2242. / 8 2245. / 9 2246. /  &
   10 2245.
X-EST 1 N2 0.0044994 / 1 CO2 0.00127 / 1 BMIMAC  &
   0.80265 / 1 BMIMCO2 0.030044 / 1 BMIM2CO2 0.043852 /  &
   1 BMIM3CO2 0.11768 / 2 N2 0.0041099 / 2 CO2  &
   0.0023036 / 2 BMIMAC 0.73772 / 2 BMIMCO2 0.041347 /  &
   2 BMIM2CO2 0.063532 / 2 BMIM3CO2 0.15099 / 3 N2  &
   0.0036217 / 3 CO2 0.0048332 / 3 BMIMAC 0.64448 / 3  &
   BMIMCO2 0.061168 / 3 BMIM2CO2 0.095559 / 3 BMIM3CO2  &
   0.19034 / 4 N2 0.0032851 / 4 CO2 0.0076577 / 4  &
   BMIMAC 0.58242 / 4 BMIMCO2 0.077531 / 4 BMIM2CO2  &
   0.11932 / 4 BMIM3CO2 0.20978 / 5 N2 0.0031295 / 5  &
   CO2 0.0092569 / 5 BMIMAC 0.55643 / 5 BMIMCO2  &
   0.085333 / 5 BMIM2CO2 0.12982 / 5 BMIM3CO2 0.21603 /  &
   6 N2 0.003072 / 6 CO2 0.0098898 / 6 BMIMAC 0.54735 / &
   6 BMIMCO2 0.088208 / 6 BMIM2CO2 0.13356 / 6  &
   BMIM3CO2 0.21792 / 7 N2 0.0030526 / 7 CO2 0.010108 /  &
   7 BMIMAC 0.54436 / 7 BMIMCO2 0.089171 / 7 BMIM2CO2  &
   0.1348 / 7 BMIM3CO2 0.21851 / 8 N2 0.0030459 / 8  &
   CO2 0.010177 / 8 BMIMAC 0.54345 / 8 BMIMCO2  &
   0.089446 / 8 BMIM2CO2 0.13519 / 8 BMIM3CO2 0.21869 /  &
   9 N2 0.0030379 / 9 CO2 0.010178 / 9 BMIMAC 0.5439 /  &
   9 BMIMCO2 0.089028 / 9 BMIM2CO2 0.1352 / 9 BMIM3CO2  &
   0.21866 / 10 N2 0.0029613 / 10 CO2 0.0098903 / 10  &
   BMIMAC 0.55373 / 10 BMIMCO2 0.082546 / 10 BMIM2CO2  &
   0.13362 / 10 BMIM3CO2 0.21726
Y-EST 1 N2 0.98578 / 1 CO2 0.014217 / 1 BMIMAC  &
   1.2192E-016 / 1 BMIMCO2 4.6152E-018 / 1 BMIM2CO2  &
   7.0874E-018 / 1 BMIM3CO2 2.0013E-017 / 2 N2 0.97196 /  &
   2 CO2 0.028043 / 2 BMIMAC 2.6165E-016 / 2 BMIMCO2  &
   1.4827E-017 / 2 BMIM2CO2 2.3947E-017 / 2 BMIM3CO2  &
   5.9826E-017 / 3 N2 0.93535 / 3 CO2 0.064654 / 3  &
   BMIMAC 5.9581E-016 / 3 BMIMCO2 5.7164E-017 / 3  &
   BMIM2CO2 9.3767E-017 / 3 BMIM3CO2 1.9612E-016 / 4 N2  &
   0.89188 / 4 CO2 0.10812 / 4 BMIMAC 9.3846E-016 / 4  &
   BMIMCO2 1.2627E-016 / 4 BMIM2CO2 2.0392E-016 / 4  &
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      BMIM3CO2 3.7625E-016 / 5 N2 0.86647 / 5 CO2 0.13353 / &
      5 BMIMAC 1.1207E-015 / 5 BMIMCO2 1.737E-016 / 5  &
      BMIM2CO2 2.7723E-016 / 5 BMIM3CO2 4.8404E-016 / 6 N2  &
      0.85629 / 6 CO2 0.14371 / 6 BMIMAC 1.1909E-015 / 6  &
      BMIMCO2 1.9397E-016 / 6 BMIM2CO2 3.081E-016 / 6  &
      BMIM3CO2 5.2743E-016 / 7 N2 0.85277 / 7 CO2 0.14723 / &
      7 BMIMAC 1.2151E-015 / 7 BMIMCO2 2.0116E-016 / 7  &
      BMIM2CO2 3.19E-016 / 7 BMIM3CO2 5.4252E-016 / 8 N2  &
      0.85161 / 8 CO2 0.14839 / 8 BMIMAC 1.2251E-015 / 8  &
      BMIMCO2 2.0379E-016 / 8 BMIM2CO2 3.231E-016 / 8  &
      BMIM3CO2 5.4834E-016 / 9 N2 0.85126 / 9 CO2 0.14874 / &
      9 BMIMAC 1.2564E-015 / 9 BMIMCO2 2.0784E-016 / 9  &
      BMIM2CO2 3.3108E-016 / 9 BMIM3CO2 5.6174E-016 / 10  &
      N2 0.85147 / 10 CO2 0.14853 / 10 BMIMAC 1.6989E-015 / &
      10 BMIMCO2 2.5595E-016 / 10 BMIM2CO2 4.3445E-016 /  &
      10 BMIM3CO2 7.4081E-016
   PACK-SIZE 1 1 20 PALL VENDOR=NORTON PACK-MAT=METAL  &
      PACK-SIZE="1-IN" PACK-FAC=56.00067 SPAREA=62.48476  &
      VOIDFR=0.94 STICH1=5.E-002 STICH2=1. STICH3=3. HETP=4.  &
      CS-APP=0.8 P-UPDATE=NO

BLOCK FLASH1 RCSTR
   PARAM VOL=100. PRES=40. <psig> DUTY=0. NPHASE=2
   PRODUCTS F1VAP V / F1LIQ L
   BLOCK-OPTION FREE-WATER=NO
   REACTIONS RXN-IDS=R-2

BLOCK FLASH2 RCSTR
   PARAM VOL=100. PRES=15.7 <psi> DUTY=0. NPHASE=2 TOL=1E-005
   PRODUCTS F2VAP V / F2LIQ L
   BLOCK-OPTION FREE-WATER=NO
   REACTIONS RXN-IDS=R-2

BLOCK RECYPUMP PUMP
   PARAM PRES=75. <psig> EFF=1. DEFF=1.

BLOCK FLUECOMP COMPR
   PARAM TYPE=ISENTROPIC PRES=75. <psig> SEFF=1.

BLOCK DUPL2 DUPL

BLOCK DUPRICH DUPL

BLOCK FLUEDUP DUPL

UTILITY BRINE5 GENERAL
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```
   COST PRICE=0.01
   PARAM UTILITY-TYPE=REFRIGERATIO COOLING-VALU=9.05 <Pcu/lb>  &
      TIN=-5. TOUT=5. CALOPT=DUTY

UTILITY RIVER30 GENERAL
   COST ENERGY-PRICE=0.001
   PARAM UTILITY-TYPE=WATER PRES=50. <psig> PRES-OUT=50. <psig>  &
      TIN=30. TOUT=40. CALOPT=FLASH

UTILITY STEAM125 GENERAL
   COST PRICE=0.01
   PARAM UTILITY-TYPE=STEAM PRES=125. <psig> PRES-OUT=125. <psig>  &
      VFRAC=1. VFR-OUT=0. CALOPT=FLASH

UTILITY STM125 GENERAL
   COST PRICE=0.001
   PARAM UTILITY-TYPE=STEAM COOLING-VALU=483. <Pcu/lb> TIN=177.  &
      TOUT=177. CALOPT=DUTY

DESIGN-SPEC BMIMFLO
   DEFINE BCO2A MOLE-FLOW STREAM=CO2BMIM SUBSTREAM=MIXED  &
      COMPONENT=BMIMCO2
   DEFINE BCO2B MOLE-FLOW STREAM=CO2BMIM SUBSTREAM=MIXED  &
      COMPONENT=BMIM2CO2
   DEFINE BCO2C MOLE-FLOW STREAM=CO2BMIM SUBSTREAM=MIXED  &
      COMPONENT=BMIM3CO2
   DEFINE BMIMAC MOLE-FLOW STREAM=NEWIL SUBSTREAM=MIXED  &
      COMPONENT=BMIMAC
   SPEC "BMIMAC + BCO2A + 2.*BCO2B + 3*BCO2C" TO "1875"
   TOL-SPEC "1"
   VARY MOLE-FLOW STREAM=NEWIL SUBSTREAM=MIXED
COMPONENT=BMIMAC
   LIMITS "1000" "4000"

DESIGN-SPEC MAXDUTY
   DEFINE THOT BLOCK-VAR BLOCK=HOTSIDE VARIABLE=TEMP  &
      SENTENCE=PARAM
   DEFINE TCOLD STREAM-VAR STREAM=ZCOLDOUT SUBSTREAM=MIXED
&
      VARIABLE=TEMP
   SPEC "THOT-TCOLD" TO "0"
   TOL-SPEC "0.1"
   VARY BLOCK-VAR BLOCK=HOTSIDE VARIABLE=TEMP
SENTENCE=PARAM
   LIMITS "40" "120" STEP-SIZE=0.1
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```
DESIGN-SPEC OILTEMP
   DEFINE TSTRIP BLOCK-VAR BLOCK=FLASH2 VARIABLE=TCALC  &
      SENTENCE=PARAM
   SPEC "TSTRIP" TO "125"
   TOL-SPEC "0.05"
   VARY BLOCK-VAR BLOCK=HEAT2 VARIABLE=T-COLD
SENTENCE=PARAM
   LIMITS "65" "145" MAX-STEP-SIZ=0.2

EO-CONV-OPTI

CONV-OPTIONS
   PARAM CHECKSEQ=NO

STREAM-REPOR MOLEFLOW

REACTIONS R-1 REAC-DIST
   REAC-DATA 1 KBASIS=MOLEFRAC
   REAC-DATA 2 KBASIS=MOLEFRAC
   REAC-DATA 3 KBASIS=MOLEFRAC
   K-STOIC 1 A=-6.5655 B=2743.9
   K-STOIC 2 A=7.6412 B=-1942.5
   K-STOIC 3 A=-0.7193 B=531.27
   STOIC 1 CO2 -1. / BMIMAC -1. / BMIMCO2 1.
   STOIC 2 BMIMCO2 -1. / BMIMAC -1. / BMIM2CO2 1.
   STOIC 3 BMIM2CO2 -1. / BMIMAC -1. / BMIM3CO2 1.

REACTIONS R-2 POWERLAW
   REAC-DATA 1 EQUIL KBASIS=MOLEFRAC
   REAC-DATA 2 EQUIL KBASIS=MOLEFRAC
   REAC-DATA 3 EQUIL KBASIS=MOLEFRAC
   K-STOIC 1 A=-6.5655 B=2743.9
   K-STOIC 2 A=7.6412 B=-1942.5
   K-STOIC 3 A=-0.7193 B=531.27
   STOIC 1 MIXED CO2 -1. / BMIMAC -1. / BMIMCO2 1.
   STOIC 2 MIXED BMIMCO2 -1. / BMIMAC -1. / BMIM2CO2 1.
   STOIC 3 MIXED BMIM2CO2 -1. / BMIMAC -1. / BMIM3CO2 1.
;
;
;
;
;
```