

LACSD1::MONROE

JOB 528

ARC696

Owner UIC: [MONROE]
Account: 355

Priority: 100
Submit queue: LALP01_ANSI
Submitted: 18-MAY-1992 16:13
Printer queue: LPS20\$LALP01
Printer node: LALP01
Started: 18-MAY-1992 16:12

Digital Equipment Corporation
VAX/VMS Version V5.4-1

PrintServer 20

DO A 017242
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ASPEN PLUS IS A TRADEMARK OF
ASPEN TECHNOLOGY, INC.
251 VASSAR STREET
CAMBRIDGE, MASSACHUSETTS 02139
617/497-9010

VERSION: DEC-VAX
RELEASE: 8.5-2
INSTALLATION: DOW-VAX

HOTLINE:
U.S.A. 617/497-9010
EUROPE (32) 2/732-6300

MAY 18, 1992
MONDAY
4:09:37 P.M.

ASPEN PLUS VER: DEC-VAX REL: 8.5-2 INST: DOW-VAX 5/18/92 PAGE 1
ETHANOLAMINES ARC INTERPRETATION
RUN CONTROL SECTION

RUN CONTROL INFORMATION

THIS VERSION OF ASPEN PLUS LICENSED TO THE DOW CHEMICAL COMPANY
TYPE OF RUN: NEW

INPUT FILE NAME: DISK\$PE2:[MONROE.PRLAD.REACTIVE]ARC696.INP;4

OUTPUT PROBLEM DATA FILE NAME: ARC696 VERSION NO. 1
LOCATED IN: DISK\$PE2:[MONROE.PRLAD.REACTIVE]

PDF SIZE USED FOR INPUT TRANSLATION:
NUMBER OF FILE RECORDS (PSIZE) = 99999
NUMBER OF IN-CORE RECORDS = 600
PSIZE NEEDED FOR SIMULATION = 2000

CALLING PROGRAM NAME: GENERAL
LOCATED IN: ASP\$ROOT:[ASPDOW]

SIMULATION REQUESTED FOR ENTIRE FLOWSHEET

DESCRIPTION

CALCULATIONS OF VLE, HEAT CAPACITY, AND DENSITIES TO IMPROVE
ACCURACY FOR ARC INTERPRETATION STUDIES. ETHANOLAMINES T-271
BOTTOMS SAMPLE ARC RCL: 92-0696

BLOCK STATUS

*
* ALL UNIT OPERATION BLOCKS WERE COMPLETED NORMALLY
*
* ALL CONVERGENCE BLOCKS WERE COMPLETED NORMALLY
*

ASPEN PLUS VER: DEC-VAX REL: 8.5-2 INST: DOW-VAX 5/18/92 PAGE 2
ETHANOLAMINES ARC INTERPRETATION
INPUT SECTION

INPUT FILE(S)

>>ORIGINAL RUN MAY 18, 1992
4:08:37 P.M. MONDAY
INPUT FILE: DISK\$PE2:[MONROE.PRLAD.REACTIVE]ARC696.INP;4
OUTPUT PDF: ARC696 VERSION: 1
LOCATED IN: DISK\$PE2:[MONROE.PRLAD.REACTIVE]

1 ;
2 TITLE 'ETHANOLAMINES ARC INTERPRETATION'
3 ;
4 ;
5 ;
6 DESCRIPTION "Calculations of VLE, heat capacity, and densities to
7 improve accuracy for ARC interpretation studies.
8 Ethanolamines T-271 bottoms sample
9 ARC RCL: 92-0696"
10 ;
11 ;
12 ;
13 IN-UNITS MET TEMPERATURE-C PRESSURE-PSI MASS-GM
14 OUT-UNITS MET TEMPERATURE-C PRESSURE-PSI MASS-GM VOLUME-FLOW-'L/HR'
15 ;
16 RUN-CONTROL MAX-TIME=1000
17 ;
18 ; SPECIFY THE PHYSICAL PROPERTY DATABANK
19 ;
20 DATABANKS DOW
21 ;
22 ; SPECIFY WHAT PROPERTIES YOU WANT ON PRINTOUT
23 ;
24 PROP-SET SET1 VMX UNITS-"L/HR" PHASE-T
25 PROP-SET SET2 RHOVM UNITS-"GM/CC" PHASE-L
26 PROP-SET SET3 CPMX UNITS-"CAL/GM-K" PHASE-T
27 ;
28 ; SPECIFY THE COMPONENTS
29 ;
30 COMPONENTS N2 NITROGEN / CO2 CO2 / WATER WATER /
31 MEA MONOETHANOLAMINE / DEA DIETHANOLAMINE /
32 TEA TRIETHANOLAMINE / TEAGE 'TRIETHANOLAMINE GLYCOL ETHER'
33 ;
34 ;
35 ; SPECIFY THE PHYSICAL PROPERTIES METHOD
36 ; IDEAL VAPOR LIQUID EQUILIBRIUM
37 ;
38 PROPERTIES SYSOP0A HENRY-COMPS-LIST1
39 ;
40 HENRY-COMPS LIST1 N2 CO2
41 ;
42 ;
43 ; SPECIFY COMPONENT DIPOLE MOMENT, SO ASPEN CAN PREDICT
44 ; VAPOR VISCOSITY FOR MIXTURE.
45 ;
46 PROP-DATA
47 IN-UNITS MET
48 PROP-LIST MUP

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INPUT FILE(S) (CONTINUED)

```

155 SPEC VOL TO 10.0
156 TOL-SPEC .05
157 VARY STREAM-VAR STREAM-CO2C VARIABLE-MASS-FLOW
158 ; VARY BLOCK-VAR BLOCK-C VARIABLE-PRES
159 LIMITS .001 1.0
160
161 DESIGN-SPEC D
162 DEFINE VOL STREAM-PROP STREAM-RESULT4 PROPERTY-SET1
163 SPEC VOL TO 10.0
164 TOL-SPEC .05
165 VARY STREAM-VAR STREAM-STEAMD VARIABLE-MASS-FLOW
166 ; VARY BLOCK-VAR BLOCK-D VARIABLE-PRES
167 LIMITS .001 3.0
168
169 DESIGN-SPEC E
170 DEFINE VOL STREAM-PROP STREAM-RESULTS5 PROPERTY-SET1
171 SPEC VOL TO 10.0
172 TOL-SPEC .05
173 VARY STREAM-VAR STREAM-STEAME VARIABLE-MASS-FLOW
174 ; VARY BLOCK-VAR BLOCK-E VARIABLE-PRES
175 LIMITS .001 3.0
176
177 DESIGN-SPEC F
178 DEFINE VOL STREAM-PROP STREAM-RESULT6 PROPERTY-SET1
179 SPEC VOL TO 10.0
180 TOL-SPEC .05
181 VARY STREAM-VAR STREAM-STEAMF VARIABLE-MASS-FLOW
182 ; VARY BLOCK-VAR BLOCK-F VARIABLE-PRES
183 LIMITS .001 3.0
184
185 DESIGN-SPEC END
186 DEFINE VOL STREAM-PROP STREAM-FINAL PROPERTY-SET1
187 SPEC VOL TO 10.0
188 TOL-SPEC .05
189 VARY BLOCK-VAR BLOCK-END VARIABLE-PRES
190 LIMITS 25 300
191
192 REPORT INPUT
193 PROPERTY-REPORT NOCOMP8
194 STREAM-REPORT MASSFRAC MASSFLOW MOLEFRAC MOLEFLOW NOZEROFLOW &
195 PROPERTIES-SET1 SET2 SET3 &
196 INCL-STREAMS-COMP1 RESULT1 RESULT2 RESULT3 RESULT4 &
197 RESULT5 RESULT6 FINAL PADGAS CO2B &
198 CO2C STEAMD STEAME STEAMF
  
```

SIMULATION STARTED MODULE USED: GENERAL CREATION: 5/ 8/92 16:03:08
 LOCATED IN: ASP\$ROOT:[ASPDOW]
 SIMULATION COMPLETED FOR ENTIRE FLOWSHEET

FLOWSHEET CONNECTIVITY BY STREAMS

STREAM	SOURCE	DEST	STREAM	SOURCE	DEST
PADGAS	----	PAD	COMP1	----	PAD
CO2B	----	B	CO2C	----	C
STEAMD	----	D	STEAME	----	E
STEAMF	----	F	RESULT1	PAD	B
RESULT2	B	C	RESULT3	C	D
RESULT4	D	E	RESULT5	E	F
RESULT6	F	END	FINAL	END	----

FLOWSHEET CONNECTIVITY BY BLOCKS

BLOCK	INLETS	OUTLETS
PAD	COMP1 PADGAS	RESULT1
B	RESULT1 CO2B	RESULT2
C	RESULT2 CO2C	RESULT3
D	RESULT3 STEAMD	RESULT4
E	RESULT4 STEAME	RESULT5
F	RESULT5 STEAMF	RESULT6
END	RESULT6	FINAL

CONVERGENCE STATUS SUMMARY

DESIGN-SPEC SUMMARY

DESIGN SPEC	ERROR	TOLERANCE	ERR/TOL	VARIABLE	STAT	CONV BLOCK
A	0.36038E-10	0.50000E-01	0.72077E-09	0.52387E-02	#	\$OLVER01
B	-0.17616E-02	0.50000E-01	-0.35232E-01	0.78069E-02	#	\$OLVER02
C	0.56217E-02	0.50000E-01	0.11243	0.34586E-01	#	\$OLVER03
D	0.39606E-01	0.50000E-01	0.79212	0.31321	#	\$OLVER04
E	-0.23660E-01	0.50000E-01	-0.47320	0.36743	#	\$OLVER05
F	-0.11671E-01	0.50000E-01	-0.23342	0.42138	#	\$OLVER06
END	-0.31390E-01	0.50000E-01	-0.62780	78.204	#	\$OLVER07

= CONVERGED
 * = NOT CONVERGED
 LB = AT LOWER BOUNDS
 UB = AT UPPER BOUNDS

DESIGN-SPEC: A

SAMPLED VARIABLES:
 VOL : PROPERTY STRMPROP SET1 IN STREAM RESULT1

SPECIFICATION:
 MAKE VOL APPROACH 10.0000
 WITHIN 0.050000

DESIGN-SPEC: END (CONTINUED)

MANIPULATED VARIABLES:

VARY : SENTENCE-PARAM VARIABLE-PRES IN UOS BLOCK END
LOWER LIMIT = 25.0000 PSI
UPPER LIMIT = 300.000 PSI
FINAL VALUE = 78.2045 PSI

CONVERGENCE BLOCK: \$SOLVER01

SPECS: A
MAXIT= 30 STEP-SIZE= 100.00 % OF RANGE
MAX-STEP= 100. % OF RANGE
XTOL= 1.000000E-08

THE NEW ALGORITHM WAS USED WITH BRACKETING-NO .
METHOD: SECANT STATUS: CONVERGED
TOTAL NUMBER OF ITERATIONS: 3

*** FINAL VALUES ***

VARIABLE	VALUE	PREV VALUE	ERR/TOL
TOTAL MASSFL KG/HR	0.5238743D-02	0.5238743D-02	0.7207657D-09

*** ITERATION HISTORY ***

DESIGN-SPEC ID: A

ITERATION	VARIABLE	ERROR	ERR/TOL
1	0.5275E-07 LB	0.7095E-01	1.419
2	0.5364E-07 LB	0.1495	2.990
3	0.5195E-07 LB	0.3604E-10	0.7208E-09

CONVERGENCE BLOCK: \$SOLVER02

SPECS: B
MAXIT= 30 STEP-SIZE= 100.00 % OF RANGE
MAX-STEP= 100. % OF RANGE
XTOL= 1.000000E-08

THE NEW ALGORITHM WAS USED WITH BRACKETING-NO .
METHOD: SECANT STATUS: CONVERGED
TOTAL NUMBER OF ITERATIONS: 3

*** FINAL VALUES ***

VARIABLE	VALUE	PREV VALUE	ERR/TOL
TOTAL MASSFL KG/HR	0.7806871D-02	0.7806871D-02	-.3523179D-01

*** ITERATION HISTORY ***

CONVERGENCE BLOCK: \$SOLVER02 (CONTINUED)

DESIGN-SPEC ID: B

ITERATION	VARIABLE	ERROR	ERR/TOL
1	0.3358E-07 LB	-0.5859	-11.72
2	0.9663E-07 LB	1.768	35.35
3	0.4927E-07 LB	-0.1762E-02	-0.3523E-01

CONVERGENCE BLOCK: \$SOLVER03

SPECS: C
MAXIT= 30 STEP-SIZE= 100.00 % OF RANGE
MAX-STEP= 100. % OF RANGE
XTOL= 1.000000E-08

THE NEW ALGORITHM WAS USED WITH BRACKETING-NO .
METHOD: SECANT STATUS: CONVERGED
TOTAL NUMBER OF ITERATIONS: 3

*** FINAL VALUES ***

VARIABLE	VALUE	PREV VALUE	ERR/TOL
TOTAL MASSFL KG/HR	0.3458567D-01	0.3458567D-01	0.1124331D+00

*** ITERATION HISTORY ***

DESIGN-SPEC ID: C

ITERATION	VARIABLE	ERROR	ERR/TOL
1	0.3358E-07 LB	-2.091	-41.82
2	0.9663E-07 LB	-1.377	-27.55
3	0.2183E-06 LB	0.5622E-02	0.1124

CONVERGENCE BLOCK: \$SOLVER04

SPECS: D
MAXIT= 30 STEP-SIZE= 100.00 % OF RANGE
MAX-STEP= 100. % OF RANGE
XTOL= 1.000000E-08

THE NEW ALGORITHM WAS USED WITH BRACKETING-NO .
METHOD: SECANT STATUS: CONVERGED
TOTAL NUMBER OF ITERATIONS: 4

*** FINAL VALUES ***

VARIABLE	VALUE	PREV VALUE	ERR/TOL
TOTAL MASSFL KG/HR	0.3132062D+00	0.3132062D+00	0.7921215D+00

*** ITERATION HISTORY ***

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COMPUTATIONAL SEQUENCE

SEQUENCE USED WAS:

SOLVER01 PAD SOLVER01<--- SOLVER02 B SOLVER02<--- SOLVER03 C
SOLVER03<--- SOLVER04 D SOLVER04<--- SOLVER05 E SOLVER05<--- SOLVER06 F
SOLVER06<--- SOLVER07 END SOLVER07<---

OVERALL FLOWSHEET BALANCE

*** MASS AND ENERGY BALANCE ***			
	IN	OUT	RELATIVE DIFF.
CONVENTIONAL COMPONENTS (KMOL/HR)			
N2	0.187008E-03	0.187008E-03	0.000000E+00
CO2	0.963252E-03	0.963252E-03	0.000000E+00
WATER	0.611769E-01	0.611769E-01	0.000000E+00
MEA	0.000000E+00	0.000000E+00	0.000000E+00
DEA	0.000000E+00	0.000000E+00	0.000000E+00
TEA	0.341846E-01	0.341846E-01	0.000000E+00
TEAGE	0.465734E-02	0.465734E-02	0.000000E+00
TOTAL BALANCE			
MOLE (KMOL/HR)	0.101169	0.101169	0.000000E+00
MASS (KG/HR)	7.14975	7.14975	0.000000E+00
ENTHALPY (CAL/SEC)	-2684.46	-2710.34	0.954794E-02

BLOCK: B MODEL: HEATER

INLET STREAMS: RESULT1 CO2B
OUTLET STREAM: RESULT2
PROPERTY OPTION SET: SYSOP0A IDEAL LIQUID / IDEAL GAS
HENRY-COMPS ID: LIST1

*** MASS AND ENERGY BALANCE ***			
	IN	OUT	RELATIVE DIFF.
TOTAL BALANCE			
MOLE (KMOL/HR)	0.392119E-01	0.392119E-01	0.000000E+00
MASS (KG/HR)	6.01315	6.01315	0.184633E-16
ENTHALPY (CAL/SEC)	-1526.78	-1307.50	-0.143620

*** INPUT DATA ***

TWO PHASE TP FLASH

SPECIFIED TEMPERATURE C 246.230

SPECIFIED PRESSURE PSI 61.0000

MAXIMUM NO. ITERATIONS 30

CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***

OUTLET TEMPERATURE C 246.23

OUTLET PRESSURE PSI 61.000

HEAT DUTY CAL/SEC 219.28

VAPOR FRACTION 0.93393E-02

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	R(I)
N2	0.47692E-02	0.19355E-04	0.50860	26278.
CO2	0.45239E-02	0.89575E-04	0.47489	5301.6
WATER	0.14156E-03	0.13187E-03	0.11694E-02	8.8682
TEA	0.87179	0.87988	0.14335E-01	0.16292E-01
TEAGE	0.11877	0.11988	0.99988E-03	0.83404E-02

BLOCK: C MODEL: HEATER

INLET STREAMS: RESULT2 CO2C
OUTLET STREAM: RESULT3
PROPERTY OPTION SET: SYSOP0A IDEAL LIQUID / IDEAL GAS
HENRY-COMPS ID: LIST1

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ETHANOLAMINES ARC INTERPRETATION
U-O-S BLOCK SECTION

BLOCK: E MODEL: HEATER (CONTINUED)

*** RESULTS ***
OUTLET TEMPERATURE C 350.51
OUTLET PRESSURE PSI 1406.5
HEAT DUTY CAL/SEC 121.25
VAPOR FRACTION 0.72743E-01

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.24043E-02	0.29591E-04	0.32675E-01	1104.2
CO2	0.12384E-01	0.25943E-03	0.16694	643.50
WATER	0.48582	0.46175	0.79274	1.7168
TEA	0.43951	0.47344	0.70227E-02	0.14834E-01
TEAGE	0.59879E-01	0.64528E-01	0.62152E-03	0.96319E-02

BLOCK: END MODEL: HEATER

INLET STREAM: RESULT6
OUTLET STREAM: FINAL
PROPERTY OPTION SET: SYSOP0A IDEAL LIQUID / IDEAL GAS
HENRY-COMPS ID: LIST1

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
TOTAL BALANCE
MOLE (KMOL/HR) 0.101169 0.101169 0.000000E+00
MASS (KG/HR) 7.14975 7.14975 0.000000E+00
ENTHALPY (CAL/SEC) -2092.73 -2710.34 0.227873

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 25.0000
SPECIFIED PRESSURE PSI 78.2045
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

ASPEN PLUS VER: DEC-VAX REL: 8.5-2 INST: DOW-VAX 5/18/92 PAGE 18
ETHANOLAMINES ARC INTERPRETATION
U-O-S BLOCK SECTION

BLOCK: END MODEL: HEATER (CONTINUED)

*** RESULTS ***
OUTLET TEMPERATURE C 25.000
OUTLET PRESSURE PSI 78.204
HEAT DUTY CAL/SEC -617.61
VAPOR FRACTION 0.88455E-02

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.18485E-02	0.12956E-04	0.20752	16018.
CO2	0.95212E-02	0.25658E-02	0.78889	307.47
WATER	0.60470	0.61006	0.35834E-02	0.58738E-02
TEA	0.33790	0.34091	0.36965E-09	0.10843E-08
TEAGE	0.46035E-01	0.46446E-01	0.18203E-11	0.39192E-10

BLOCK: F MODEL: HEATER

INLET STREAMS: RESULT5 STEAMF
OUTLET STREAM: RESULT6
PROPERTY OPTION SET: SYSOP0A IDEAL LIQUID / IDEAL GAS
HENRY-COMPS ID: LIST1

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
TOTAL BALANCE
MOLE (KMOL/HR) 0.101169 0.101169 0.000000E+00
MASS (KG/HR) 7.14975 7.14975 0.000000E+00
ENTHALPY (CAL/SEC) -2250.03 -2092.73 -0.699114E-01

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 380.080
SPECIFIED PRESSURE PSI 2,429.10
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

COMP1 RESULT1 RESULT2 RESULT3 RESULT4

STREAM ID	COMP1	RESULT1	RESULT2	RESULT3	RESULT4
FROM :	----	PAD	B	C	D
TO :	PAD	B	C	D	E
SUBSTREAM: MIXED					
PHASE:	LIQUID	MIXED	MIXED	MIXED	MIXED
COMPONENTS: KMOL/HR					
N2	0.0	1.8701-04	1.8701-04	1.8701-04	1.8701-04
CO2	0.0	0.0	1.7739-04	1.7739-04	1.7739-04
WATER	5.5508-06	5.5508-06	5.5508-06	5.5508-06	5.5508-06
TEA	3.4185-02	3.4185-02	3.4185-02	3.4185-02	3.4185-02
TEAGE	4.6573-03	4.6573-03	4.6573-03	4.6573-03	4.6573-03
COMPONENTS: MOLE FRAC					
N2	0.0	4.7908-03	4.7692-03	4.6755-03	3.2589-03
CO2	0.0	0.0	4.5239-03	2.4083-02	1.6786-02
WATER	1.4289-04	1.4220-04	1.4156-04	1.3878-04	0.3030
TEA	0.8799	0.8757	0.8717	0.8546	0.5957
TEAGE	0.1198	0.1193	0.1187	0.1164	8.1162-02
COMPONENTS: KG/HR					
N2	0.0	5.2387-03	5.2387-03	5.2387-03	5.2387-03
CO2	0.0	0.0	7.8069-03	4.2393-02	4.2393-02
WATER	1.0000-04	1.0000-04	1.0000-04	1.0000-04	0.3133
TEA	5.1000	5.1000	5.1000	5.1000	5.1000
TEAGE	0.9000	0.9000	0.9000	0.9000	0.9000
COMPONENTS: MASS FRAC					
N2	0.0	8.7235-04	8.7121-04	8.6623-04	8.2358-04
CO2	0.0	0.0	1.2983-03	7.0097-03	6.6645-03
WATER	1.6666-05	1.6652-05	1.6630-05	1.6535-05	4.9255-02
TEA	0.8499	0.8492	0.8481	0.8432	0.8017
TEAGE	0.1500	0.1498	0.1496	0.1488	0.1414
TOTAL FLOW: <i>SAMPLE</i>					
KMOL/HR	3.8847-02	3.9034-02	3.9212-02	3.9998-02	5.7383-02
KG/HR	6.0001	6.0053	6.0131	6.0477	6.3609
L/HR	5.4372	10.0000	9.9982	10.0056	10.0396
STATE VARIABLES:					
TEMP C	25.0000	25.0000	246.2300	279.4800	300.5900
PRES PSI	14.7000	14.7000	61.0000	213.3000	578.8000
VFRAC	0.0	4.7792-03	9.3593-03	2.0705-02	8.0707-02
LFRAC	1.0000	0.9952	0.9906	0.9712	0.9472
SFRAC	0.0	0.0	0.0	0.0	0.0
ENTHALPY:					
CAL/MOL	-1.4106+05	-1.4038+05	-1.2004+05	-1.1599+05	-9.7700+04
CAL/GM	-913.2706	-912.4741	-782.7864	-767.1289	-881.3704
CAL/SEC	-1522.1431	-1522.1434	-1307.5024	-1288.7193	-1557.3173
ENTROPY:					
CAL/MOL-K	-433.8920	-431.8134	-381.9649	-368.0685	-259.6695
CAL/GM-K	-2.8092	-2.8067	-2.4908	-2.4342	-2.3425
DENSITY:					
MOL/CC	7.1447-03	3.9034-03	3.9219-03	3.9975-03	5.7157-03
GM/CC	1.1035	0.6005	0.6014	0.6044	0.6335
AVG MW	154.4527	153.8469	153.3500	151.2017	110.8498

MIXED SUBSTREAM PROPERTIES:

COMP1 RESULT1 RESULT2 RESULT3 RESULT4 (CONTINUED)

STREAM ID	COMP1	RESULT1	RESULT2	RESULT3	RESULT4
*** ALL PHASES ***					
VMX L/HR	5.4372	10.0000	9.9982	10.0056	10.0396
CPMX CAL/GM-K	0.5036	0.5034	0.6835	0.7085	0.7873
*** LIQUID PHASE ***					
RHOMX GM/CC	1.1035	1.1035	0.9617	0.9356	0.9276

CO2 TO MATCH PRESSURES .00457 to .025 mola
H2O TO MATCH PRESSURES 1.06 ap.

$$\Phi = 1 + \frac{M_b C_b}{M_s} = 1.62 \quad 1.62 \quad 1.46 \quad 1.44 \quad 1.40$$

$$M_b = 15.599$$

$$C_b = 0.12$$

$$M_s = 6.009$$

WATER MODEL:

$$\Delta T_{ARC} \text{ } ^\circ\text{C} \quad 300.59 \quad 350.51 \quad 380.08$$

$$\Delta T_{ARC} \text{ } ^\circ\text{C} \quad 21.1 \quad 49.9 \quad 29.57$$

$$H_2O \text{ mola } 1.174 \quad .0204 \quad .0234$$

$$\text{mols } H_2O = .0008 \quad .0004 \quad .0009$$

$$\Delta T_{ARC}$$

$$\text{Total} = \frac{.0612}{.0388} = 1.6 \text{ mols } H_2O \text{ mola } H_2O$$

CO2C STEAMD STEAME STEAMF

STREAM ID	CO2C	STEAMD	STEAME	STEAMF
FROM :	----	----	----	----
TO :	C	D	E	F
SUBSTREAM: MIXED				
PHASE:	VAPOR	LIQUID	LIQUID	LIQUID
COMPONENTS: KMOL/HR				
CO2	7.8586-04	0.0	0.0	0.0
WATER	0.0	1.7386-02	2.0396-02	2.3390-02
COMPONENTS: MOLE FRAC				
CO2	1.0000	0.0	0.0	0.0
WATER	0.0	1.0000	1.0000	1.0000
COMPONENTS: KG/HR				
CO2	3.4586-02	0.0	0.0	0.0
WATER	0.0	0.3132	0.3674	0.4213
COMPONENTS: MASS FRAC				
CO2	1.0000	0.0	0.0	0.0
WATER	0.0	1.0000	1.0000	1.0000
TOTAL FLOW:				
KMOL/HR	7.8586-04	1.7386-02	2.0396-02	2.3390-02
KG/HR	3.4586-02	0.3132	0.3674	0.4213
L/HR	19.2208	0.3287	0.3857	0.4423
STATE VARIABLES:				
TEMP C	25.0000	100.0000	100.0000	100.0000
PRES PSI	14.7000	14.7000	14.7000	14.7000
VFRAC	1.0000	0.0	0.0	0.0
LFRAC	0.0	1.0000	1.0000	1.0000
SFRAC	0.0	0.0	0.0	0.0
ENTHALPY:				
CAL/MOL	-9.4054+04	-6.6923+04	-6.6923+04	-6.6923+04
CAL/GM	-2137.1149	-3714.7757	-3714.7757	-3714.7757
CAL/SEC	-20.5315	-323.1919	-379.1494	-434.8109
ENTROPY:				
CAL/MOL-K	0.6943	-34.8674	-34.8674	-34.8674
CAL/GM-K	1.5777-02	-1.9354	-1.9354	-1.9354
DENSITY:				
MOL/CC	4.0886-05	5.2879-02	5.2879-02	5.2879-02
GM/CC	1.7994-03	0.9526	0.9526	0.9526
AVG MW	44.0098	18.0152	18.0152	18.0152
MIXED SUBSTREAM PROPERTIES:				
*** ALL PHASES ***				
VMX L/HR	19.2208	0.3287	0.3857	0.4423
CPMX CAL/GM-K	0.2007	1.1700	1.1700	1.1700
*** LIQUID PHASE ***				
RHOX GM/CC	MISSING	0.9526	0.9526	0.9526

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