CHAPTER V

RESULTS AND DISCUSSION

5.1 The Soave-Redlich-Kwong Equation of State

Generally, the SRK equation of state is good for estimating the K values of paraffin in the normal region . The normal region is defined as the area 1 in Figure 5.1. The SRK equation of state gives an average percentage deviation of 5.30 against the experimental data (7).

5.2 The Heavy-Pseudocomponent

The critical behavior of carbon dioxide and paraffin system is shown in Figure 5.2. It shows that the curve of the critical loci of the binary carbon dioxide-paraffin of butane and heavier paraffins are similar. Therefore, any paraffin which is lighter than butane should not be included in the heavy-pseudocomponent.

5.3 Validity of Using Pseudocomponents

The pseudocomponents model is applied in order to scale down the calculation task, both in memory spaces and CPU time of computers. The validity of using pseudocomponents in the model was tested by calculating K values by using the SRK equation of state. The K values were calculated for both cases : with individual components and with a pseudocomponent. Experimental data are from references (42). The results are presented in Table 5.1-5.18.

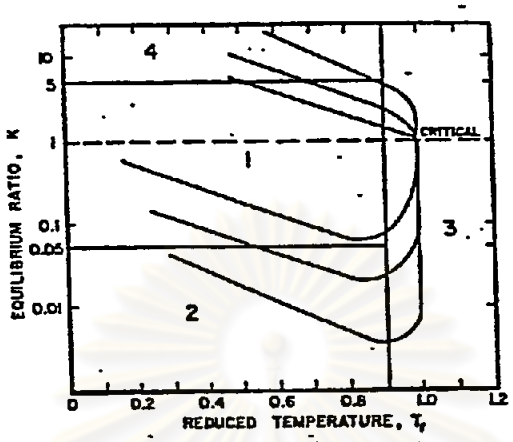

FIGURE 5.1 DEFINITION OF AREAS FOR ERROR ANALYSIS (7)

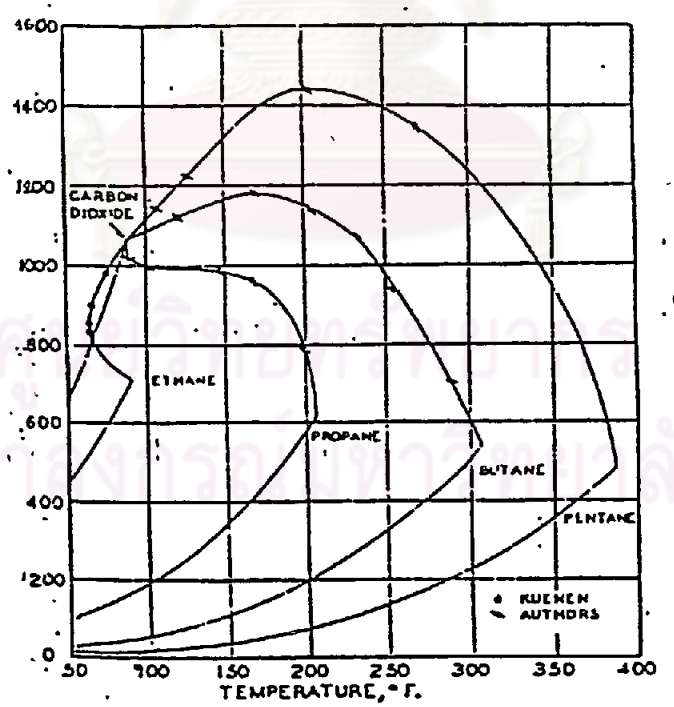

FIGURE 5.2 CRITICAL LOCI OF CARBON DIOXIDE-PARAFFIN SYSTEMS (27)

The average absolute deviation (26) is defined as

$$\%AAD = \frac{\sum_{i=1}^{N} |d_i|}{N} \times 100$$

where d_i are error

N is the number of data points.

a) Using Heavy-Pseudocomponent (C_{M+})

For M = 6, (pseudocomponent includes i-C_4 and all components heavier than i-C_4)

the range of %AAD is 0.7 to 4.7

(see Table 5.1-5.6)

For M = 8, (pseudocomponent includes i-C_5 and all components heavier than i-C_5)

the range of %AAD is 1.2 to 11.5

(see Table 5.7-5.12)

b) Using Light-Pseudocomponent (C_{M-})

(pseudocomponent includes C_1, C_2 and C_3)

the range of %AAD is 0.5 to 8.0

It may be concluded that the heavy-pseudocomponent that includes i-butane and all paraffin heavier than i-butane is the best heavy-pseudocomponent.

5.4 Study of Predicting the Compositions of Pseudocomponents

In the proposed general model, two pseudocomponents are provided, namely, the light pseudocomponent and the heavy pseudocomponent. The problem of flash calculation is that the liquid and vapor phase compositions are not known initially. Only the feed compositions is known. Consequently, the vapor and the liquid properties of the pseudocomponents cannot be evaluated.

However, to perform the flash calculation, the properties of pseudocomponents must be estimated.

A study was done to find a method for estimating the initial values of the vapor and liquid compoositions of the components comprising the pseudocomponents. For natural gas under normal practical conditions, y_i 's are assumed to be slightly different from z_i 's, so that when normalized, one obtains initial approximations for the light pseudocomponent as follows

$$y_{i,ps} = z_i / \sum_{i=1}^{M-1} z_i \qquad (5.1)$$

For the liquid phase composition, applying Equation (4.3), one has

$$x_{i,ps} = (z_i/K_i) / \sum_{i=1}^{M-1} (z_i/K_i) \qquad (5.2)$$

when the ideal solution behavior is applied in order to estimate the K values, Equation (5.3) becomes

$$x_{i,ps} = (Pz_i/P_i) / \sum_{i=1}^{M-1} (Pz_i/P_i) \qquad (5.3)$$

where P is the vapor pressure of component i

Similarly, for the heavy pseudomponent, one has

$$y_{i,ps} = z_i / \sum_{i=M}^{N} z_i \qquad (5.4)$$

and

$$x_{i,ps} = (Pz_i/P_i) / \sum_{i=M}^{N} (Pz_i/P_i) \qquad (5.5)$$

A study based on the experimental values in Reference (42) showed that Equation (5.1) to (5.2) gave rather good approximations, according to Table 5.19-5.24, and Figure 5.3-5.6. For the ideal case, it did not good prediction of the initial liquid phase composition. It is thus proposed that the initial estimation of the liquid phase composition be set by

$$x_i = 1.0/N$$

where N is the total number of components.

5.5 Comparison between the Ordinary Vapor-Liquid Equilibrium Calculation Model and the Proposed General Model with Pseudocomponents

In the ordinary model (Figure 4.3), the number of equations to be solved simultaneously equal to the number of components in natural gas. The more the components are in natural gas, the more the equations must be solved. For the proposed model (Figure 4.4), the components which are similar in physical properties are grouped into one pseudocomponent. The critical properties of the pseudocomponent are calculated by Kay's rule. Thus the number of equations to be solved in this model are less than that of the ordinary model. The calculation of the liquid phase composition (x_1 and the vapor phase composition (y_1) by flash calculations at low and moderate pressure systems were done using both models. The results are presented in Table 5.28-5.55.

Comparison of the results produced by the ordinary model and the proposed model are summarized as follows :

	The Ordinary Model		The Proposed Model	
CPU time(SU)	1.25		0.85	
Memory Spaces(K)	32		36	
	L-phase	V-phase	L-phase	V-phase
%AAD(Comparison with the experimental data)	1.1-3.1	0.0-0.2	0.6-3.1	0.0-0.1
%AAD(Comparison with the ordinary model)	-	-	1.4-2.5	0.0-0.04

It can be concluded that the proposed yields results faster than the ordinary model. The computing time saving is on the average about 32%. But the proposed model requires more spaces to store the initial property values. Compared with the experimental data, the proposed model gives better results than those of the ordinary model. This may be because of propable damping of the fluctuation in property values of the individual components forming the pseudocomponen. Because of good estimation for predicting properties in vapor phase of the SRK equation of state, the percentage average deviation of the results in vapor phase is less than in liquid phase.

It may be concluded that the proposed general model with pseudocomponents is successful in saving computing time by as much as 32%.

TABLE 5.1 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6) AT T = 41.0 °F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 41.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE °R

FEED RATE = 1.317070 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	3.088	0.395300	4.4920450	548.00	1070.00	0.22500
2	N2	0.015	0.828000	55.1999900	227.20	492.00	0.04000
3	C1	83.564	85.016220	9.9165650	343.30	673.10	0.01400
4	C2	5.574	7.720530	1.3835060	549.77	708.30	0.09900
5	C3	3.238	3.369210	0.4085820	665.95	617.40	0.15200
6	IC4	1.904	1.225400	0.1541760	734.65	529.10	0.18500
7	NC4	0.630	0.910200	0.0944170	765.31	550.70	0.20100
8	IC5	0.678	0.279800	0.0283820	829.80	483.00	0.22200
9	NC5	0.855	0.139200	0.0202860	845.60	489.50	0.25400
10	C6	13.402	0.097600	0.0063310	914.20	439.70	0.30100
11	C7	11.893	0.012990	0.0010910	972.31	396.90	0.35000
12	C8	10.774	0.004340	0.0004020	1024.31	362.10	0.40200
13	C9	4.454	0.001120	0.0002510	1073.00	345.00	0.44600
14	C10	0.869	0.000080	0.0000920	1114.70	306.00	0.48900
15	C11	0.062	0.000000	0.0000000	1153.70	292.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.09817 B1 = 0.02982
J = -0.05745 RR = -0.00293
Z = 0.93092

IPH = 0
A = 1.06592 B1 = 0.09002
J = 0.96779 RR = 0.09596
Z = 0.11023

COMPONENT	X	Y	K(EXP)	K(CAL)	K(MODEL)	TOLERANCE
CO2	0.038800	0.395300	4.4920450	3.4344990	3.4696860	0.0351863
N2	0.015000	0.828000	55.1999900	28.3269900	29.0891700	0.7621765
C1	83.564000	85.016220	9.9165650	7.9602200	8.1041060	0.1390367
C2	5.574000	7.720530	1.3835060	1.2781400	1.2890370	0.0108976
C3	3.238000	3.369210	0.4085820	0.3330530	0.3401210	0.0062680
C4+	7.904000	1.225400	0.3066278	0.1316900	0.0071788	-0.1245112

AAD = 4.6362230

TABLE 5.2 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6)

AT T = 30.0 °F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 30.000 °F P = 300.00 PSIA R = 10.730 -PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 0.503350 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	0.065	0.250400	3.8523080	548.00	1073.00	0.22500
2	N2	0.019	0.840000	44.6315700	227.20	492.00	-0.04000
3	C1	9.522	84.699430	8.8876580	343.30	673.10	0.01400
4	C2	3.764	7.922510	2.1028110	549.77	708.30	0.09900
5	C3	9.770	3.713010	0.3802220	665.95	617.40	0.15200
6	IC4	10.308	1.187900	0.1151390	734.65	529.10	0.18500
7	NC4	11.833	0.813400	0.0691030	765.31	550.70	0.20100
8	IC5	12.244	0.310400	0.0253250	829.80	483.00	0.22200
9	NC5	7.713	0.133500	0.0172940	845.60	489.50	0.25400
10	C6	14.212	0.085100	0.0059880	914.20	439.70	0.30100
11	C7	9.321	0.020650	0.0022140	972.31	395.90	0.35000
12	C8	7.332	0.004650	0.0006340	1024.31	362.10	0.40200
13	C9	2.898	0.000060	0.0000000	1073.00	345.00	0.44600
14	C10	0.848	0.000100	0.0000000	1114.70	306.00	0.48900
15	C11	0.149	0.000010	0.0000000	1153.70	232.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.10483 B1 = 0.03058
B = 0.07332 RR = 0.00321
Z = 0.92444

IPH = 0
A = 1.01681 B1 = 0.08720
Q = 0.92201 RR = 0.08866
Z = 0.10720

COMPONENT	X	Y	K(EXP)	K(CAL)	%(MODEL)	TOLERANCE
CO2	0.065000	0.250400	3.8523080	3.1330300	3.1702870	0.0322571
N2	0.019000	0.849000	44.6315700	27.6572500	20.4361700	0.7785154
C1	9.522000	84.699430	8.8876580	7.5251300	7.6611310	0.1360016
C2	3.764000	7.922510	2.1028110	1.1419690	1.1516180	0.0096493
C3	9.770000	3.713010	0.3802220	0.2902300	0.2915384	0.0012584
C4+	10.307390	1.187900	0.2357000	0.1096800	0.0087765	-0.1009035
					%AAD =	4.5333860

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THE AMOUNT OF COMPONENT,N = 16

T = 30.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 0.790030 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	0.C56	0.177200	3.1642850	548.00	1073.00	0.22500
2	N2	0.C29	0.937020	32.3110300	227.20	492.00	0.04000
3	C1	10.818	84.920380	7.8432230	343.30	673.10	0.01400
4	C2	7.039	7.785640	1.1052010	549.77	708.30	0.09900
5	C3	10.875	3.664360	0.3367250	665.55	617.40	0.15200
6	IC4	9.692	1.150220	0.1185790	734.65	529.10	0.18500
7	NC4	11.420	0.803010	0.0076950	765.31	550.70	0.20100
8	IC5	10.886	0.303610	0.0027870	829.80	493.00	0.22200
9	NC5	7.205	0.127000	0.0176120	845.60	489.50	-0.25400
10	C6	13.468	0.091790	0.0068100	914.20	439.70	0.30100
11	C7	8.920	0.027400	0.0030690	972.31	396.90	0.35000
12	C8	6.328	0.003610	0.0008850	1024.31	362.10	0.40200
13	C9	2.411	0.000640	0.0002640	1073.00	345.00	0.44600
14	C10	0.727	0.000110	0.0000000,	1114.70	306.00	0.48900
15	C11	0.127	0.001010	0.0000000	1153.70	-232.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	253.00	0.53900

IPH = 1
A = 0.10425 B1 = 0.03052
Q = 0.07200 RR = 0.00318
Z = 0.92502

IPH = 0
A = 0.93221 B1 = 0.08344
Q = 0.84181 RR = 0.07778
Z = 0.10375

COMPONENT	X	Y	K(EXP)	K(CAL)	K(MODEL)	TOLERANCE
CO2	0.056000	0.177200	3.1642850	3.1124650	3.1446050	0.0321360
N2	0.029000	0.937020	32.3110300	26.9741900	27.7234800	0.7492820
C1	10.817990	84.920080	7.8432230	7.4175750	7.5505770	0.1329975
C2	7.039000	7.785640	1.1052010	1.1247550	1.1441510	0.0093913
C3	10.875000	3.664360	0.3367250	0.2893200	0.2904493	0.0011293
C4+	9.692000	1.150220	0.1827307	0.1032700	0.0931656	-0.1001044
					%AAD =	4.4332500

TABLE 5.3 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6) AT T = 30.0°F P = 300.0 PSIA

TABLE 5.4 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6) AT T = -8.0°F P = 1115.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -8.000 °F   P = 1115.00 PSIA   R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.630890 MOLE/HR   V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	0.589	7.097400	1.2049900	548.00	1073.00	0.22500
2	N2	0.472	4.210720	8.9210190	227.20	492.00	0.04000
3	C1	37.190	91.002390	2.4210660	343.30	673.10	0.01400
4	C2	4.604	3.046180	0.6548110	549.77	708.30	0.09900
5	C3	3.491	0.582920	0.1652300	665.95	617.40	0.15200
6	IC4	2.137	0.135280	0.0626500	734.65	529.10	0.18500
7	NC4	2.995	0.128320	0.0423870	765.31	550.70	0.20100
8	IC5	3.240	0.059490	0.0181670	829.80	483.00	0.22200
9	NC5	2.597	0.036710	0.0139860	845.60	489.50	0.25400
10	C6	7.432	0.048440	0.0064500	914.20	439.70	0.30100
11	C7	9.005	0.025980	0.0026220	972.31	376.70	0.35000
12	C8	10.591	0.008570	0.0008010	1024.31	362.10	0.40200
13	C9	7.952	0.003420	0.0004300	1073.00	345.00	0.44600
14	C10	4.317	0.000910	0.0002100	1114.70	306.00	0.48900
15	C11	1.696	0.000180	0.0001100	1153.70	282.00	0.50100
15	C12	0.894	0.000040	0.0000400	1187.70	263.00	0.53900

IPH = 1
A = 0.43511   B1 = 0.11903
Q = 0.30191   RR = 0.05179
Z = 0.66228

IPH = 0
A = 4.12757   B1 = 0.33923
Q = 3.67326   RR = 1.40019
Z = 0.40801

COMPONENT	X	Y	K(EXP)	K(CAL)	K(MODEL)	TOLERANCE
CO2	0.589000	7.097400	1.2049900	1.0457090	1.0500500	0.0043411
N2	0.472000	4.210720	8.9210190	6.7024490	6.8722060	0.1697569
C1	37.190000	91.002390	2.4210660	2.1752090	2.2064050	0.0311956
C2	4.604000	3.046180	0.6548110	0.4810800	0.4827545	0.0016745
C3	3.491000	0.582920	0.1652300	0.1710500	0.1708968	-0.0001532
C4+	2.137000	0.135280	0.1478521	0.8664000	0.0006044	-0.8657956

%AAD = 1.0399340

TABLE 5.5 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD - AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6) AT T = -10.0°F P = 800.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -10.000 °F P = 800.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.543590 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	0.143	0.373660	0.2613000	543.00	1073.00	0.22500
2	N2	0.006	0.205190	34.1983300	227.20	492.00	0.04000
3	C1	31.340	97.267850	3.0990310	343.30	673.10	0.01400
4	C2	2.363	2.092600	0.8841960	549.77	703.30	0.09700
5	C3	0.169	0.028010	0.1655930	665.95	617.40	0.15200
6	IC4	0.056	0.005200	0.0923040	734.65	529.10	0.18500
7	NC4	0.177	0.005300	0.0384300	765.31	550.70	0.20100
8	IC5	0.605	0.006700	0.0110600	829.80	493.00	0.22200
9	NC5	0.498	0.003900	0.0078180	845.60	489.50	0.25400
10	C6	1.702	0.003910	0.0022930	914.20	439.70	0.30100
11	C7	3.929	0.003010	0.0007640	972.31	396.90	0.35000
12	C8	5.857	0.001580	0.0002700	1024.21	362.10	0.40200
13	C9	14.467	0.000850	0.0000600	1073.00	345.00	0.44600
14	C10	25.830	0.000650	0.0000230	1114.70	306.00	0.48900
15	C11	10.695	0.000110	0.0000100	1153.70	282.00	0.50100
16	C12	1.902	0.000010	0.0000050	1187.70	263.00	0.53900

IPH = 1
A = 0.26355 BL = 0.07949
B = 0.17775 RR = 0.02095
Z = 0.81319

IPH = 0
A = 6.34436 BL = 0.36397
B = 5.34791 RR = 2.30917
Z = 0.41194

COMPONENT	X	Y	K(EXP)	K(CAL)	K(MODEL)	TOLERANCE
CO2	0.143000	0.373660	0.2613000	1.1140600	1.1188860	0.0048265
N2	0.006000	0.205190	34.1983300	10.7217500	10.9396700	0.2179203
C1	31.337990	97.267850	3.0990310	2.8262500	2.8593040	0.0330544
C2	2.363000	2.092600	0.8841960	0.4339200	0.4355869	0.0016669
C3	0.169000	0.028010	0.1655930	0.1156600	0.1157812	0.0001213
C4+	0.050000	0.005200	0.1535367	0.0468500	0.0000077	-0.0468423

%AAD = 1.1019119

TABLE 5.6 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=6) AT T = 15.0°F P = 850.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 15.000 °F P = 850.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.357700 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K	TC (R)	PC (PSIA)	W
1	CO2	0.000	0.000000	0.0000000	548.00	1073.00	0.22500
2	N2	0.103	0.944000	9.1650470	227.20	492.00	0.04000
3	C1	27.411	86.800350	3.1633360	343.30	673.10	0.01400
4	C2	15.266	8.197730	0.5364300	549.77	708.30	0.09900
5	C3	13.796	2.557410	0.1851800	665.95	617.40	0.15200
6	IC4	8.911	0.657100	0.0736640	734.65	529.10	0.18500
7	NC4	7.995	0.505800	0.0632530	765.31	550.70	0.20100
8	IC5	7.738	0.186900	0.0241300	829.80	483.00	0.22200
9	NC5	4.285	0.078700	0.0183480	845.60	489.50	0.25400
10	C6	6.677	0.056720	0.0084850	914.20	439.70	0.30100
11	C7	3.533	0.012330	0.0034900	972.31	396.90	0.35000
12	C8	1.737	0.002620	0.0015080	1424.31	362.10	0.40200
13	C9	0.441	0.000280	0.0006350	1073.00	345.00	0.44600
14	C10	0.094	0.000030	0.0003190	1114.70	306.00	0.48900
15	C11	0.012	0.000000	0.0000000	1153.70	282.00	0.50100
16	C12	0.001	0.000000	0.0000000	1187.70	263.00	0.52900

IPH = 1
A = 0.30079 B1 = 0.08688
Q = 0.20635 RR = 0.02613
Z = 0.77792

IPH = 0
A = 1.53505 B1 = 0.17928
Q = 1.32362 RR = 0.27521
Z = 0.24129

COMPONENT	X	Y	K(EXP)	K(CAL)	K(MODEL)	TOLERANCE
CO2	0.000000	0.000000	0.0000000	1.2423250	1.2463130	0.0039825
N2	0.103000	0.944000	9.1650470	7.8123300	7.9326440	0.1203146
C1	27.410990	86.800350	3.1633360	2.6232790	2.6460390	0.0227594
C2	15.265990	8.197730	0.5364300	0.5430300	0.5490063	0.0059763
C3	13.795990	2.557410	0.1851800	0.1781400	0.1773841	-0.0007559
C4+	8.911000	0.657100	0.1811313	0.0811700	0.0152438	-0.0659212

%AAD = 0.7516479

TABLE 5.7 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=8) AT T = 41.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT, N = 16

T = 41.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.319570 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.088	0.395300	4.4920450	548.00	1073.00	0.22500
2	N2	0.015	0.828000	55.1999900	227.20	492.00	0.04000
3	C1	3.564	85.016220	9.9165650	343.30	673.10	0.01400
4	C2	5.574	7.720530	1.3835060	549.77	708.30	0.09900
5	C3	8.238	3.369210	0.4085820	665.95	617.40	0.15200
6	IC4	7.904	1.225400	0.1548760	734.65	529.10	0.18500
7	NC4	9.630	0.910200	0.0944170	765.31	550.70	0.20100
8	IC5	9.678	0.279800	0.0288820	829.80	483.00	0.22200
9	NC5	6.855	0.139200	0.0202860	845.60	489.50	0.25400
10	C6	15.402	0.097600	0.0063310	914.20	439.70	0.30100
11	C7	11.893	0.012990	0.0010910	972.31	396.90	0.35000
12	C8	10.774	0.004340	0.0004020	1024.31	362.10	0.40200
13	C9	4.454	0.001120	0.0002510	1073.00	345.00	0.44600
14	C10	0.869	0.000080	0.0000920	1114.70	306.00	0.48900
15	C11	0.062	0.000000	0.0000000	1153.70	282.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.09823 BI = 0.02983
Q = 0.06751 RR = 0.00293
Z = 0.93086

IPH = 0
A = 1.09831 BI = 0.09178
Q = 0.09810 RR = 0.10080
Z = 0.11209

COMPONENT	-X-	-Y	K(EXP)	K(SRK)	K(MODEL)	-TOLERANCE
CO2	0.088000	0.395300	4.4920450	3.4344990	3.4618270	0.0273275
N2	0.015000	0.828000	55.1999900	28.3269900	-28.8787900	0.5518036
C1	3.564000	85.016220	9.9165650	7.9650200	9.0678470	0.1028271
C2	5.574000	7.720530	1.3835060	1.2781400	1.2865630	0.0084238
C3	8.238000	3.369210	0.4085820	0.3333530	0.3398067	0.0059537
IC4	7.904000	1.225400	0.1548760	0.1316900	0.1321259	0.0004358
NC4	9.630000	0.910200	0.0944170	0.0890900	0.0891824	0.0000924
C5+	9.678000	0.279800	0.0573350	-0.0672998	0.0031035	-0.0641963
					ΣAAD =	1.6818976

TABLE 5.8 COMPARISON OF EQUILIBRIYM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=8) AT T = 30.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 30.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 0.790030 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.056	0.177200	3.1642850	548.00	1073.00	0.22500
2	N2	0.029	0.937020	32.3110300	227.20	492.00	0.04000
3	C1	10.818	84.920830	7.8432230	343.30	673.10	0.01400
4	C2	7.039	7.785640	1.1052010	549.77	708.30	0.09900
5	C3	10.675	3.664960	0.3367250	665.95	617.40	0.15200
6	IC4	9.692	1.150220	0.1185790	734.65	529.10	0.18500
7	NC4	11.420	0.803010	0.0076950	765.31	550.70	0.20100
8	IC5	10.886	0.303,10	0.0273670	820.80	483.00	0.22200
9	NC5	7.205	0.127000	0.0176120	845.60	489.50	0.25400
10	C6	13.468	0.091790	0.0068100	914.20	439.70	0.30100
11	C7	8.920	0.027400	0.0030690	972.31	396.90	0.35000
12	C8	6.328	0.008610	0.0013850	1024.31	362.10	0.40200
13	C9	2.411	0.000640	0.0002640	1073.00	345.00	0.44600
14	C10	0.727	0.000110	0.0000000	1114.70	305.00	0.48700
15	C11	0.127	0.000010	0.0000000	1153.70	292.00	0.51000
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.10432 B1 = 0.03053
B = 0.07286 RR = 0.00319
Z = 0.92495

IPH = 0
A = 0.95846 B1 = 0.08497
B = 0.86627 RR = 0.08144
Z = 0.10537

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.056000	0.177200	3.1642850	3.1124650	3.1382930	0.0258300
N2	0.029000	0.937020	32.3110300	26.5741900	27.6320100	0.5578156
C1	10.817990	84.920830	7.8432230	7.4175790	7.5187150	0.1011362
C2	7.039000	7.785640	1.1052010	1.1347590	1.1422580	0.0074987
C3	10.675000	3.664160	0.3367250	0.2893200	0.2902702	0.0009502
IC4	9.692000	1.150220	0.1185790	0.1093700	0.1095417	0.0002717
NC4	11.420000	0.803010	0.0076950	0.0732500	0.0732526	0.0000026
C5+	10.385990	0.303,10	0.0292070	0.0304000	0.0033489	-0.0495911
					%AAD =	1.5694200

TABLE 5.9 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=8) AT T = 30.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 30.000 ° F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 3.533330 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.065	0.250430	3.8523080	548.00	1073.00	0.22500
2	N2	0.019	0.848000	44.6315700	227.20	492.00	0.04000
3	C1	9.522	84.699430	8.8876580	343.30	673.10	0.01400
4	C2	3.764	7.922510	2.1023110	549.77	708.30	0.09900
5	C3	9.770	3.711010	0.3802220	665.95	617.40	0.15200
6	IC4	10.208	1.187900	0.1151390	734.65	529.10	0.18500
7	NC4	11.833	0.818400	0.0691030	765.31	550.70	0.20100
8	IC5	12.244	0.310400	0.0253290	829.80	483.00	0.22200
9	NC5	7.713	0.133500	0.0172940	845.60	489.50	0.25400
10	C6	14.212	0.035180	0.0059380	914.20	439.70	0.30100
11	C7	9.321	0.020550	0.0022140	972.31	376.90	0.35000
12	C8	7.332	0.004650	0.0006340	1024.31	362.10	0.40200
13	C9	2.898	0.000860	0.0000300	1073.00	345.00	0.44600
14	C10	0.848	0.000100	0.0000000	1114.70	306.00	0.48900
15	C11	0.149	0.000010	0.0000000	1153.70	282.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.10490 B1 = 0.03059
Q = 0.07338 RR = 0.00321
Z = 0.92437

IPH = 0
A = 1.04589 B1 = 0.08882
Q = 0.94919 RR = 0.09290
Z = 0.10892

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.065000	0.250430	3.8523080	3.1380000	3.1634650	0.0254354
N2	0.019000	0.848000	44.6315700	21.6572500	23.2234500	0.5711915
C1	9.522100	84.699430	8.8876580	7.6251300	7.6269440	0.1018143
C2	3.764000	7.922510	2.1028110	1.1419650	1.1495340	0.0075645
C3	9.770000	3.711010	0.3802220	0.2902600	0.2913132	0.0010332
IC4	10.207890	1.187900	0.1151390	0.1100050	0.1103250	0.0003250
NC4	11.833000	0.818400	0.0691031	0.0732800	0.0733259	0.0000458
C5+	12.244000	0.310400	0.0014590	0.0532000	0.0032767	-0.0499522

%AAD = 1.5320120

TABLE 5.10 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDIANRY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY PSEUDOCOMPONENT (M=8) AT T = -10.0 °F P = 800.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -10.000 °F P = 800.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE °R

FEED RATE = 2.543590 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.143	0.373660	0.2613000	548.00	1073.00	0.22500
2	N2	0.006	0.205190	34.1983300	227.20	492.00	0.04000
3	C1	31.340	97.267850	3.0990310	343.30	673.10	0.01400
4	C2	2.363	2.092600	0.8841960	549.77	708.30	0.09900
5	C3	0.169	0.028010	0.1655930	665.95	617.40	0.15200
6	IC4	0.056	0.005200	0.0928040	734.65	529.10	0.18500
7	NC4	0.177	0.006800	0.0384300	765.31	550.70	0.20100
8	IC5	0.605	0.006700	0.0110600	829.80	483.00	0.22200
9	NC5	0.498	0.003900	0.0078180	845.60	489.50	0.25400
10	C6	1.702	0.003910	0.0022930	914.20	439.70	0.30100
11	C7	3.929	0.003010	0.0007640	972.31	396.90	0.35000
12	C8	5.857	0.001580	0.0002700	1024.31	362.10	0.40200
13	C9	14.467	0.000050	0.0000600	1073.00	345.00	0.44600
14	C10	25.830	0.000650	0.0000230	1114.70	306.00	0.48900
15	C11	10.695	0.000110	0.0000100	1153.70	282.00	0.50100
16	C12	1.902	0.000010	0.0000050	1187.70	263.00	0.53900

IPH = L
A = 0.25356 B1 = 0.07949
J = 0.12775 RR = 0.02095
Z = 0.81318

IPH = 0
A = 6.37330 B1 = 0.36497
J = 5.87512 RR = 2.32606
Z = 0.41296

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.143000	0.373660	0.2613000	1.1140600	1.1187120	0.0046520
N2	0.006000	0.205190	34.1983300	10.7217500	10.9306900	0.2089434
C1	31.339990	97.267850	3.0990310	2.8262500	2.8579260	0.0316763
C2	2.360000	2.092600	0.8841960	0.4339200	0.4355212	0.0016012
C3	0.169000	0.028010	0.1655930	0.1156600	0.1157777	0.0001177
IC4	0.056000	0.005200	0.0928040	0.0468500	0.0469138	0.0000638
NC4	0.177000	0.006800	0.0384300	0.0306800	0.0306328	-0.0000472
C5+	0.605000	0.006700	0.0223030	0.0240500	0.0000095	-0.0240405

%AAD = 0.4786583

TABLE 5.11 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=8) AT T = 15.0°F P = 850.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 15.000 °F P = 850.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.357700 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.000	0.000000	0.0000000	548.00	1073.00	0.22500
2	N2	0.103	0.944000	9.1650470	227.20	492.00	0.04000
3	C1	27.411	86.800350	3.1633360	343.30	673.10	0.01400
4	C2	15.266	8.197730	0.5364300	549.77	708.30	0.09900
5	C3	13.796	2.557410	0.1851800	665.95	617.40	0.15200
6	IC4	3.911	0.657100	0.0736640	734.65	529.10	0.18500
7	NC4	9.995	0.505800	0.0505530	765.31	550.70	0.20100
8	IC5	7.738	0.186900	0.0241300	829.80	493.00	0.22200
9	NC5	4.285	0.078700	0.0183480	845.60	489.50	0.25400
10	C6	6.677	0.056720	0.0084850	914.20	439.70	0.30100
11	C7	3.533	0.012330	0.0034900	972.31	396.90	0.35000
12	C8	1.737	0.002620	0.0015080	1024.31	352.10	0.40200
13	C9	0.441	0.000280	0.0006350	1073.00	345.00	0.44600
14	C10	0.094	0.000030	0.0003190	1114.70	306.00	0.48900
15	C11	0.012	0.000000	0.0000000	1153.70	282.00	0.50100
16	C12	0.001	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.30091 B1 = 0.08690
Q = 0.20645 RR = 0.02615
Z = 0.77779

IPH = 0
A = 1.55570 B1 = 0.18108
Q = 1.34183 RR = 0.28171
Z = 0.24333

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.000000	0.000000	0.0000000	1.2423290	1.2449930	0.0026636
N2	0.103000	0.944000	9.1650470	7.8123300	7.8883350	0.0760050
C1	27.410990	86.800350	3.1633360	2.6232790	2.6376110	0.0143319
C2	15.265990	8.197730	0.5364300	0.5480300	0.5486849	0.0006549
C3	13.795990	2.557410	0.1851800	0.1781400	0.1780028	-0.0001372
I-C4	3.911000	0.657100	0.0736640	0.0611700	0.0610733	-0.0000967
NC4	9.995000	0.505800	0.0505530	0.0576200	0.0574678	-0.0001522
C5+	7.738000	0.186900	0.0569150	0.0548800	0.0059580	-0.0489220
					%AAD =	0.2196110

TABLE 5.12 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR HEAVY-PSEUDOCOMPONENT (M=8) AT T = -8.0°F P = 1115.0 PSIA

THE AMOUNT OF COMPONENT, N = 16

T = -8.000 °F P = 1115.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638890 MOLE/HR V/F = 0.500000

LD	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.589	7.097400	1.2049900	548.00	1073.00	0.22500
2	N2	0.472	4.210720	8.9210190	227.20	492.00	0.04000
3	C1	37.190	91.002390	2.4210660	343.30	673.10	0.01400
4	C2	4.604	3.046880	0.6548110	549.77	708.30	0.09900
5	C3	3.491	0.582920	0.1652300	665.95	617.40	0.15200
6	IC4	2.137	0.135280	0.0626500	734.65	529.10	0.18500
7	NC4	2.995	0.128320	0.0423870	765.31	550.70	0.20100
8	IC5	3.240	0.059490	0.0181670	829.80	483.00	0.22200
9	NC5	2.597	0.036710	0.0139860	845.60	489.50	0.25400
10	C6	7.432	0.048440	0.0064500	914.20	439.70	0.30100
11	C7	9.805	0.025980	0.0026220	972.31	396.90	0.35000
12	C8	10.591	0.008570	0.0008010	1024.31	362.10	0.40200
13	C9	7.952	0.003420	0.0004300	1073.00	345.00	0.44600
14	C10	4.317	0.000910	0.0002100	1114.70	306.00	0.48900
15	C11	1.696	0.000180	0.0001100	1153.70	282.00	0.50100
16	C12	0.894	0.000040	0.0000400	1187.70	263.00	0.53900

IPH = 1
A = 0.43526 B1 = 0.11906
Q = 0.30203 RR = 0.05187
Z = 0.65210

IPH = 0
A = 4.24025 B1 = -0.34505
Q = 3.77615 RR = 1.46308
Z = 0.41406

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.589000	7.097400	1.2049900	1.0457050	1.0494320	0.0037231
N2	0.472000	4.210720	8.9210190	5.7024490	6.8360180	-0.1335688
C1	37.190000	91.002390	2.4210660	2.1752090	2.1997140	0.0245047
C2	4.604000	3.046880	0.6548110	0.4810800	0.4824766	0.0013966
C3	3.491000	0.582920	0.1652300	0.1710500	0.1709797	-0.0000703
IC4	2.137000	0.135280	0.0626500	0.0864000	0.0866004	-0.0797996
NC4	2.995000	0.128320	0.0423870	0.0607500	0.0605356	-0.0002144
C5+	3.240000	0.059490	0.0428160	0.0067198	0.0005744	-0.0661454

SAAD = -11.5140700

TABLE 5.13 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = 41.0 °F P = 300.0 PSIA

T = 41.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.319670 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (Z)	Y (Y)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.088	0.395300	4.4920450	548.00	1073.00	0.22500
2	N2	0.015	0.828000	55.1999900	227.20	492.00	0.04000
3	C1	3.564	85.016220	9.5165650	343.30	673.10	0.01400
4	C2	5.574	7.720530	1.3853060	549.77	708.30	0.09900
5	C3	3.238	3.367210	0.4085820	665.95	617.40	0.15200
6	IC4	7.904	1.225400	0.1549760	734.65	529.10	0.18500
7	NC4	9.630	0.910200	0.0944170	765.31	550.70	0.20100
8	IC5	9.678	0.279800	0.0289820	829.80	483.00	0.22200
9	NC5	6.855	0.139200	0.0202860	845.60	489.50	0.25400
10	C6	15.402	0.097600	0.0063310	914.20	439.70	0.30100
11	C7	11.893	0.012990	0.0010910	972.31	396.90	0.35000
12	C8	10.774	0.004340	0.0004020	1024.31	362.10	0.40200
13	C9	4.454	0.001120	0.0002510	1073.00	345.00	0.44600
14	C10	0.869	0.000080	0.0000920	1114.70	306.00	0.48900
15	C11	0.062	0.000000	0.0000000	1153.70	282.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.08640 BI = 0.02819
J = 0.05741 RR = 0.00244
Z = 0.94187

IPH = 0
A = 1.34231 BI = 0.11571
J = 1.71321 RR = 0.21317
Z = 0.13340

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.000330	0.003953	4.4920450	3.4344590	3.5646090	0.2301893
N2	0.000150	0.008280	55.1999000	28.3269300	35.7977200	7.4707230
C1+	0.223760	0.961059	11.7086500	7.9650200	0.0282332	-7.9417860
IC4	0.079040	0.012254	0.1549760	0.1316500	0.0306944	-0.1009956
NC4	0.096300	0.009102	0.0944170	0.0390900	0.0214066	-0.0676034
IC5	0.096780	0.002790	0.0289820	0.0317400	0.0058075	-0.0279325
NC5	0.068550	0.001392	0.0202860	0.0242000	0.0014357	-0.0227143
C6	0.154020	0.000976	0.0063310	0.0067600	0.0003891	-0.0063709
C7	0.118930	0.000130	0.0010910	0.0014900	0.0001042	-0.0017958
C8	0.107740	0.000043	0.0004020	0.0005100	0.0000290	-0.0004820
C9	0.044540	0.000011	0.0002510	0.0001900	0.0001264	-0.0000196
C10	0.008690	0.000001	0.0000920	0.0000400	0.0000345	-0.0000055
					%AAD =	1.8992770

TABLE 5.14 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = 30.0 °F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 30.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE R

FEED RATE = 3.503350 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	h
1	CO2	0.065	0.250400	3.8523080	548.00	1073.00	0.22500
2	N2	0.019	0.848000	44.6315700	227.20	492.00	0.04000
3	C1	9.522	84.699430	8.8876580	343.20	673.10	0.01400
4	C2	3.764	7.922510	2.1028110	549.17	708.30	0.09900
5	C3	9.770	3.710010	0.3802220	665.95	617.40	0.15200
6	IC4	10.308	1.187900	0.1151350	734.65	529.10	0.18500
7	NC4	11.833	0.818400	0.0691020	765.31	550.70	0.20100
8	IC5	12.244	0.310400	0.0253290	829.80	483.00	0.22200
9	NC5	7.713	0.133500	0.0172940	845.60	489.50	0.25400
10	C6	14.212	0.085180	0.0059880	914.20	439.70	0.30100
11	C7	9.321	0.020650	0.0022140	972.31	396.30	0.35000
12	C8	7.332	0.004650	0.0006340	1024.31	362.10	0.40200
13	C9	2.898	0.000860	0.0000000	1073.00	345.00	0.44600
14	C10	0.848	0.000100	0.0000000	1114.70	306.00	0.48900
15	C11	0.149	0.000010	0.0000000	1153.70	282.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.07990 B1 = 0.02754
Q = 0.05160 RR = 0.00220
Z = 0.94807

IPH = 0
A = 2.21589 B1 = 0.11409
Q = 2.08879 RR = 0.25281
Z = 0.12784

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.000650	0.002504	3.8523080	2.1380300	3.7700510	0.6320219
N2	0.000190	0.008480	44.6315700	27.6572500	53.5111500	25.8538500
C1+	0.451970	0.983462	11.5549300	7.5251300	0.0002042	-7.5249250
IC5	0.122440	0.003104	0.0253290	0.0269300	0.0002934	-0.0266866
NC5	0.077130	0.001335	0.0172940	0.0191300	0.0000672	-0.0190128
C6	0.142120	0.000852	0.0059880	0.0052200	0.0000193	-0.0051007
C7	0.093210	0.000206	0.0022140	0.0013800	0.0015532	0.0001732
C8	0.073320	0.000047	0.0006340	0.0003630	0.0003998	0.0000499
C9	0.028930	0.000009	0.0000000	0.0000900	0.0000934	0.0000084
C10	0.008480	0.000001	0.0000000	0.0000200	0.0000289	0.0000089
					%AAD =	0.5104037

TABLE 5.15 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = 30.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 30.000 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE R

FEED RATE = 0.790030 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.056	0.177200	3.1642850	548.00	1073.00	0.22500
2	N2	0.029	0.937020	32.31103CC	227.20	492.00	0.04000
3	C1	10.818	84.920880	7.8432220	343.30	673.10	0.01400
4	C2	7.039	7.785640	1.1052010	549.77	708.30	0.09900
5	C3	10.875	3.664860	0.3367250	665.95	617.40	0.15200
6	IC4	9.692	1.150220	0.1185790	734.65	529.10	0.18500
7	NC4	11.420	0.808010	0.0076950	765.31	550.70	0.20100
8	IC5	10.886	0.303610	0.0270670	829.80	483.00	0.22200
9	NC5	7.205	0.127000	0.0176120	845.60	489.50	0.25400
10	C6	13.468	0.091790	0.0063100	914.20	439.70	0.30100
11	C7	9.920	0.027400	0.0030690	972.31	396.90	0.35000
12	C8	6.328	0.005610	0.0003850	1024.31	362.10	0.40200
13	C9	2.411	0.000640	0.0002640	1073.00	345.00	0.44600
14	C10	0.727	0.000110	0.0000300	1114.70	306.00	0.48900
15	C11	0.127	0.000010	0.0000000	1153.70	282.00	0.50100
16	C12	0.000	0.000000	0.0000000	1187.70	263.00	0.53900

IPH = 1
A = 0.07986 B1 = 0.02754
Q = 0.05156 RR = 0.00220
Z = 0.94812

IPH = 0
A = 1.93333 B1 = 0.10790
Q = 1.81379 RR = 0.20860
Z = 0.12222

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.000560	0.001772	3.1642850	3.1124690	3.6426140	0.5301447
N2	0.000290	0.009370	32.31103CC	26.974 1900	49.184210C	22.2100200
C1+	0.498440	0.983296	9.4114220	7.417579C	0.0015606	-7.4160180
IC5	0.108860	0.003036	0.0278670	0.0265300	0.0002723	-0.026o777
NC5	0.072050	0.001270	0.0176120	0.019_100	0.0000624	-0.0190476
C6	0.134680	0.000918	0.0063100	0.0051300	0.0000175	-0.0051125
C7	0.099200	0.000274	0.0030690	0.0031 900	0.0014556	0.0000756
C8	0.063280	0.000056	0.0003850	0.0003500	0.0003709	0.0000209
C9	0.024110	0.000006	0.0002640	0.0002300	0.0000914	0.0000614
C10	0.007270	0.000001	0.0000000	0.0000200	0.0000261	0.0000061
					ΣAAC =	0.5094187

TABLE 5.16 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = -10.0°F P = 800.0 PSIA

T = -10.000 ° F P = 800.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.543590 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.143	0.373660	0.2613000	548.00	1073.00	-0.22500
2	N2	0.006	0.205190	34.1983300	227.20	492.00	0.04000
3	C1	31.340	97.267850	3.0990310	343.30	673.10	0.01400
4	C2	2.363	2.092600	0.8841960	549.77	709.80	0.09900
5	C3	0.169	0.024010	0.1655930	665.95	617.40	0.15200
6	IC4	0.050	0.005200	0.0920040	734.65	529.10	0.18500
7	NC4	0.177	0.006800	0.0384300	765.31	550.70	0.20100
8	IC5	0.605	0.006700	0.0110600	829.80	483.00	0.22200
9	NC5	0.498	0.003900	0.0078180	845.60	489.50	0.25400
10	C6	1.702	0.003910	0.0022930	914.20	439.70	0.30100
11	C7	3.929	0.003010	0.0007640	972.31	396.90	0.35000
12	C8	5.857	0.001580	0.0002700	1024.31	362.10	0.40200
13	C9	14.467	0.000950	0.0000600	1073.00	345.00	0.44600
14	C10	25.830	0.000650	0.0000230	1114.70	306.00	0.48900
15	C11	10.695	0.000110	0.0000100	1153.70	282.00	0.50100
16	C12	1.902	0.000010	0.0000050	1187.70	263.00	0.53900

IPH = 1
A = 0.25503 B1 = 0.07862
Q = 0.17023 RR = 0.02005
Z = 0.32278

IPH = 0
A = 4.42351 B1 = 0.30475
Q = 4.02588 RR = 1.34807
Z = 0.35505

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.001430	0.003737	0.2613000	1.1140600	1.0910190	-0.0230417
N2	0.000060	0.002052	34.1983300	10.7217500	10.1652300	-0.5565138
C1+	0.998720	0.994210	0.9956100	0.9956100	0.9956100	0.0000000

SAAD = 0.7110918E

TABLE 5.17 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDIANRY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = 15.0°F P = 850.0 PSIA

THE AMOUNT OF COMPONENT ,N = 16

T = 15.000 °F P = 850.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.357700 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.000	0.000000	0.0000000	548.00	1073.00	0.22500
2	N2	0.103	0.944000	9.1650470	227.20	492.00	0.04000
3	C1	27.411	86.000350	0.1633360	343.30	673.10	0.01400
4	C2	15.266	8.197730	0.5369300	549.77	708.30	0.09900
5	C3	13.796	2.557410	0.1851800	665.95	617.40	0.15200
6	IC4	3.911	0.657100	0.0736640	734.65	529.10	0.18500
7	NC4	9.995	0.505800	0.0505530	765.31	550.70	0.20100
8	IC5	7.738	0.186900	0.0241300	829.80	483.00	0.22200
9	NC5	4.285	0.078700	0.0183480	845.60	489.50	0.25400
10	C6	6.677	0.056720	0.0084850	914.20	439.70	0.30100
11	C7	3.533	0.012030	0.0034900	972.31	396.90	0.35000
12	C8	1.737	0.002620	0.0015080	1024.31	362.10	0.40200
13	C9	0.441	0.000280	0.0006350	1073.00	345.00	0.44600
14	C10	0.094	0.000030	0.0003190	1114.70	306.00	0.48900
15	C11	0.012	0.000000	0.0000000	1153.70	282.00	0.50100
16	C12	0.001	0.000000	0.0000000	1187.70	263.00	0.52900

IPH = 1
A = 0.25914 B1 = 0.08196
Q = 0.17046 RR = 0.02124
Z = 0.82456

IPH = 0
A = 2.32002 B1 = 0.21171
Q = 2.06349 RR = 0.49117
Z = 0.26269

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.000000	0.000000	0.0000000	1.2423250	1.2739090	0.0365801
N2	0.001030	0.009440	9.1650470	7.8123300	10.7536100	2.9412830
C1+	0.564730	0.975555	3.3949450	2.6232790	0.2475736	-2.3757050
IC4	0.039110	0.006571	0.0736640	0.0311700	0.0149423	-0.0662277
NC4	0.099950	0.005058	0.0505530	0.0576200	0.0106674	-0.0469526
IC5	0.077380	0.001860	0.0241300	0.0257900	0.0031919	-0.0225981
NC5	0.042850	0.000787	0.0183480	0.0191700	0.0027793	-0.0103907
C6	0.066770	0.000567	0.0084850	0.0065500	0.0002332	-0.0063168
C7	0.035330	0.000123	0.0034900	0.0022300	0.0000722	-0.0021778
C8	0.017370	0.000026	0.0015080	0.0007400	0.0000223	-0.0007177
C9	0.004410	0.000003	0.0006350	0.0002500	0.0001333	-0.0001117
C10	0.000940	0.000000	0.0003190	0.0001300	0.0000450	-0.0000350
					SAAD =	1.3627320

TABLE 5.18 COMPARISON OF EQUILIBRIUM K VALUES FROM THE ORDINARY METHOD AND THE PROPOSED GENERAL MODEL FOR LIGHT-PSEUDOCOMPONENT (C_{1+}) AT T = -8.0°F P = 1115.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -8.000 °F P = 1115.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.688890 MOLE/HR V/F = 0.500000

ID	COMPONENT	X (%)	Y (%)	K (EXP)	TC (R)	PC (PSIA)	W
1	CO2	0.589	7.097400	1.2049CC	548.CO	1073.00	0.22500
2	N2	0.472	4.210720	8.9210190	227.20	492.00	0.04000
3	C1	37.190	91.002390	2.4210660	343.30	673.10	0.01400
4	C2	4.604	3.046880	0.6543110	549.77	708.30	0.09900
5	C3	3.491	0.582920	0.1652300	665.95	617.40	0.15200
6	IC4	2.137	0.133280	0.0626500	734.65	529.10	0.18500
7	NC4	2.995	0.128320	0.0423870	765.21	550.70	0.20100
8	IC5	3.240	0.059490	0.0181670	829.80	483.00	0.22200
9	NC5	2.597	0.036710	0.0139960	845.60	489.50	0.25400
10	C6	7.432	0.048440	0.0064500	914.20	439.70	0.30100
11	C7	9.805	0.025930	0.0026220	972.31	396.90	0.35000
12	C8	10.591	0.009570	0.0001010	1024.31	362.10	0.40200
13	C9	7.952	0.003420	0.0004300	1078.00	345.00	0.44600
14	C10	4.317	0.000910	0.0002100	1114.70	306.00	0.48900
15	C11	1.696	0.000180	0.0001100	1153.70	282.00	0.50100
16	C12	0.894	0.000040	0.0000400	1187.70	263.00	0.53900

IPH = 1
A = 0.41413 BI = 0.11685
J = 0.28363 RR = 0.04839
Z = 0.69087

IPH = 0
A = 5.20922 BI = 0.38360
J = 4.67848 RR = 1.99824
Z = 0.45098

COMPONENT	X	Y	K(EXP)	K(SRK)	K(MODEL)	TOLERANCE
CO2	0.005890	0.070974	1.2049CC	1.0457390	1.0367400	-0.0089693
N2	0.004720	0.042107	8.9210190	6.7021490	7.2626000	0.5601511
C1	0.452850	0.946322	2.4211060	2.1752090	0.9450583	-1.2301510
IC4	0.021370	0.001358	0.0626500	0.8664000	0.0140438	-0.8515512
NC4	0.029950	0.001283	0.0423870	0.0307500	0.0138155	-0.0499245
IC5	0.032400	0.000595	0.0181670	0.0305400	0.0035639	-0.0269761
NC5	0.025970	0.000367	0.0139860	0.0224000	0.0008228	-0.0213772
C6	0.074320	0.000484	0.0064500	0.0085400	0.0002010	-0.0082590
C7	0.098050	0.000260	0.0026220	0.0032500	0.0001007	-0.0031851
C8	0.105910	0.000096	0.0009010	0.0012100	0.0000357	-0.0011743
C9	0.079520	0.000034	0.0004300	0.0004400	0.0000135	-0.0001265
C10	0.043170	0.000007	0.0002100	0.0001700	0.0001211	-0.0000489

%AAD = 8.0236250

TABLE 5.19 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR HEAVY-PSEUDOCOMPONENT AT T = -8.0°F P = 1115.0 PSIA

T = -8.0°F P = 1115.0 psia

mole/hr L = 0.00039

V = 2.6385

F = L + V = 2.63889

Component	x_i	y_i	z_i	K_i	$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\Sigma(z_i/K_i)}$
CO_2	0.589	0.70974	0.70973	0.0					
N_2	0.472	4.21072	4.21017	0.0					
C_1	37.190	91.00240	90.99455	2.421066					
C_2	4.604	3.04688	3.04710	0.654811					
C_3	3.491	0.58292	0.58334	0.165230					
i-C_4	2.137	0.13528	0.13558	0.062650	0.040	0.302	0.298	2.16409	0.052
n-C_4	2.995	0.12832	0.12874	0.042387	0.056	0.287	0.283	3.03725	0.072
i-C_5	3.240	0.05949	0.05995	0.018167	0.060	0.133	0.132	3.29994	0.079
n-C_5	2.597	0.03671	0.03708	0.013986	0.048	0.082	0.082	2.65122	0.063
C_6	7.432	0.04844	0.04952	0.00645	0.138	0.108	0.109	7.67752	0.183
C_7	9.805	0.02598	0.02741	0.002622	0.182	0.058	0.060	10.45385	0.249
C_8	10.591	0.00857	0.01012	0.000801	0.197	0.019	0.022	12.63421	0.301
C_9	7.592	0.00342	0.00458	0.0					
C_{10}	4.317	0.00091	0.00154	0.0					
C_{11}	1.696	0.00018	0.00043	0.0					
C_{12}	0.894	0.00004	0.00017	0.0					
	= 53.656	= 0.44734	=0.45512					=41.91808	

TABLE 5.20 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE EATIMATION VALUES

FOR HEAVY-PSEUDOCOMPONENT AT T = 15.0°F P = 700.0 PSIA

T = 15 °F P = 700.0 psia

mole/hr L = 0.03313

V = 1.3193

F = L + V = 1.35243

Component	x_i	y_i	z_i	K_i	$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\sum(z_i/K_i)}$
CO_2	0.0	0.0	0.0	0.0					
N_2	0.078	1.01011	0.98729	0.0					
C_1	22.741	86.63524	85.07018	3.806192					
C_2	14.343	8.29232	8.44052	0.577630					
C_3	13.859	2.55278	2.82973	0.184028					
i-C_4	9.618	0.67387	0.89296	0.069999	0.196	0.446	0.334	12.75675	0.129
n-C_4	11.001	0.52806	0.78460	0.047956	0.225	0.350	0.294	16.36083	0.166
i-C_5	8.795	0.17622	0.38734	0.020017	0.180	0.117	0.145	19.35055	0.196
n-C_5	5.131	0.06521	0.18930	0.012696	0.105	0.043	0.071	14.91021	0.151
C_6	7.830	0.05462	0.24508	0.00696	0.160	0.036	0.092	35.16717	0.356
C_7	3.903	0.00939	0.10477	0.0		0.006	0.039		
C_8	2.001	0.00193	0.05090	0.0		0.001	0.019		
C_9	0.552	0.00021	0.01373	0.0		0.0001	0.005		
C_{10}	0.123	0.00002	0.00303	0.0					
C_{11}	0.022	0.00000	0.00055	0.0					
C_{12}	0.001	0.00000	0.00003	0.0					
	= 48.977	= 1.50953	= 2.67229					=98.54551	

TABLE 5.21 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR HEAVY-PSEUDOCOMPONENT AT T = 15.0°F P = 200.0.0 PSIA

Component	x_i	y_i	z_i	K_i
CO_2	0.0	0.0	0.0	0.0
N_2	0.019	0.93738	0.93205	0.0
C_1	7.577	85.76607	85.31217	11.311396
C_2	6.028	8.39818	8.38443	1.392303
C_3	8.828	2.83914	2.87391	0.321401
i-C_4	7.698	0.82823	0.86811	0.107526
n-C_4	10.202	0.67287	0.72819	0.065914
i-C_5	11.323	0.30302	0.36700	0.026744
n-C_5	8.028	0.11094	0.15691	0.013811
C_6	18.647	0.11518	0.22277	0.006173
C_7	12.284	0.02390	0.09508	0.0
C_8	6.917	0.00459	0.04472	0.0
C_9	2.018	0.00045	0.01216	0.0
C_{10}	0.382	0.00003	0.00225	0.0
C_{11}	0.042	0.00000	0.00025	0.0
C_{12}	0.006	0.00000	0.00004	0.0
	= 77.547	= 2.05921	= 2.49748	

T = 15.0°F P = 200.0 psia

mole/hr L = 0.00770

V = 1.3193

F = L + V = 1.32700

$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\Sigma(z_i/K_i)}$
0.099	0.402	0.348	8.07349	0.100
0.132	0.327	0.292	11.04758	0.138
0.146	0.147	0.147	13.7227	0.171
0.104	0.054	0.063	11.36123	0.141
0.240	0.056	0.089	36.08078	0.449
	0.012	0.038		
	0.002	0.018		
	0.0002	0.005		
			= 80.2928	

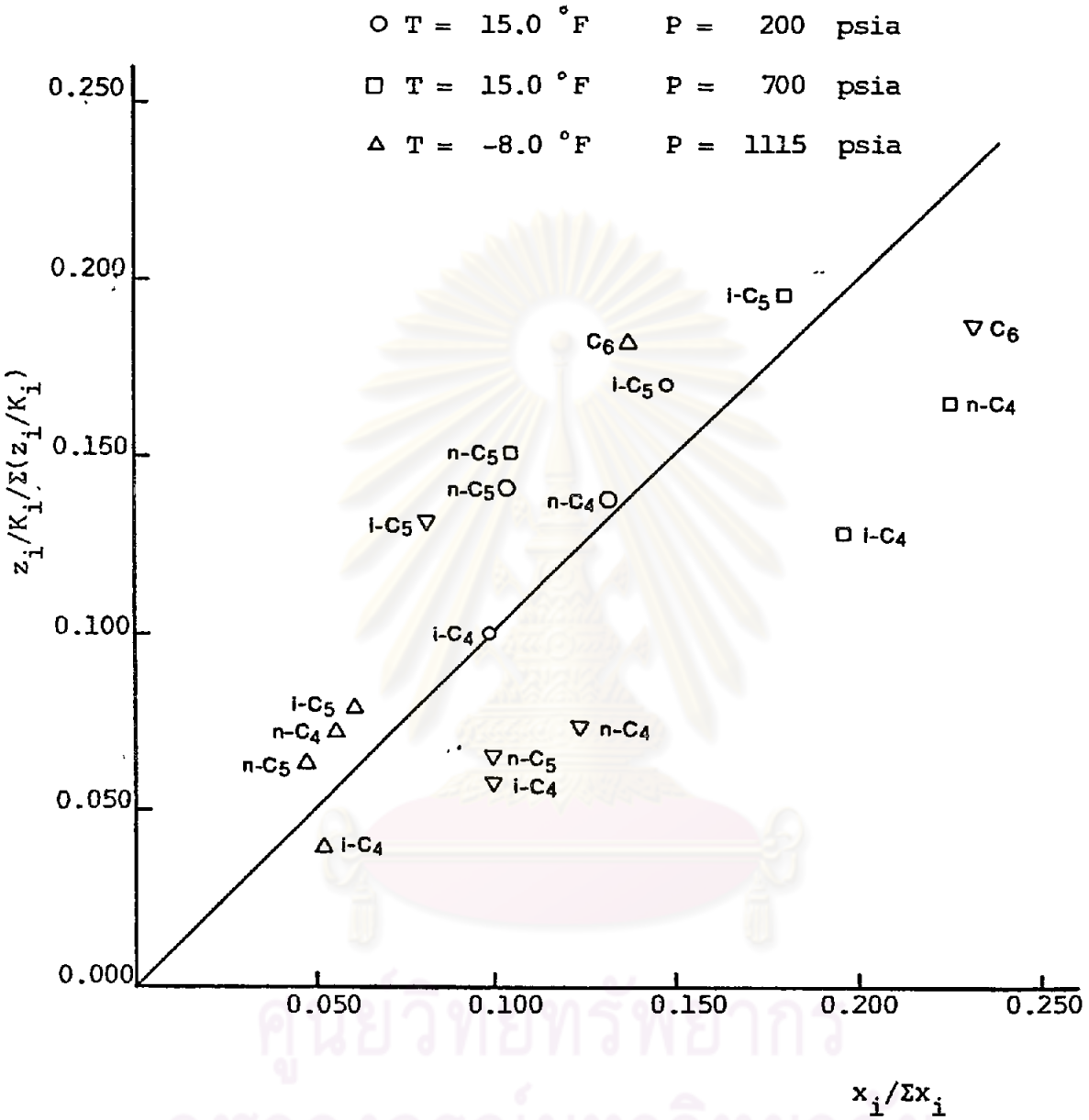

FIGURE 5.3 THE COMPARISON OF EXPERIMENTAL VALUES (ABCISSA) AND ESTIMATED VALUES (ORDINATE) IN THE LIQUID PHASE OF HEAVY-PSEUDOCOMPONENTS

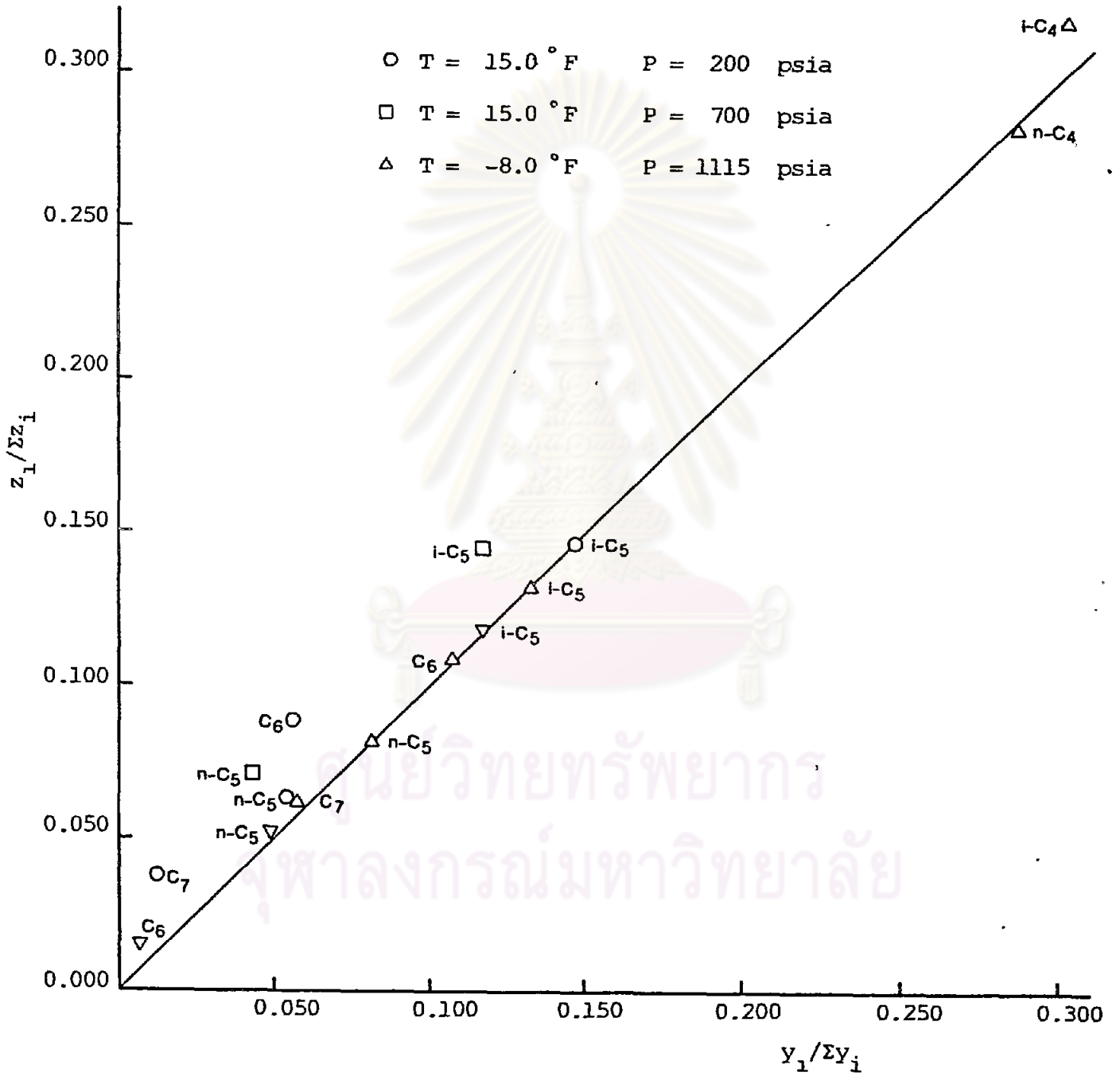

FIGURE 5.4 THE COMPARISON OF EXPERIMENTAL VALUES (ABCISSA) AND ESTIMATED VALUES (ORDINATE) IN THE VAPOR PHASE OF HEAVY-PSEUDOCOMPONENTS

TABLE 5.22 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR LIGHT-PSEUDOCOMPONENT AT T = 15.0°F P = 200.0 PSIA

Component	x_i	y_i	z_i	K_i	$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\sum_{i=1}^{n}(z_i/K_i)}$
CO_2	0.0	0.0	0.0	0.0	-	-	-	-	-
N_2	0.019	0.93738	0.93205	0.0	-	-	-	-	-
C_1	7.577	85.76607	85.31217	11.311396	0.338	0.884	0.883	7.54214	0.335
C_2	6.028	8.39818	8.38443	1.392303	0.269	0.086	0.087	6.02198	0.268
C_3	8.828	2.83914	2.87391	0.321401	0.394	0.029	0.030	8.94182	0.397
	22.433	97.0039	96.05705					22.50594	
$i\text{-}C_4$	7.698	0.82823	0.86811	0.107526					
$n\text{-}C_4$	10.202	0.67287	0.72819	0.065914					
$i\text{-}C_5$	11.323	0.30302	0.36700	0.026744					
$n\text{-}C_5$	8.028	0.11094	0.15691	0.013811					
C_6	18.647	0.11518	0.22277	0.006173					
C_7	12.284	0.02390	0.09508	0.0					
C_8	6.917	0.00459	0.04472	0.0					
C_9	2.018	0.00045	0.01216	0.0					
C_{10}	0.382	0.00003	0.00225	0.0					
C_{11}	0.042	0.00000	0.00025	0.0					
C_{12}	0.006	0.00000	0.00004	0.0					

T = 15 °F P = 200 psia

mole/hr L = 0.0077

V = 1.3193

F = L + V = 1.3270

TABLE 5.23 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR LIGHT-PSEUDOCOMPONENT AT T = 15.0°F P = 700.0 PSIA

Component	x_i	y_i	z_i	K_i	$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\sum_{i=1}^{N}(z_i/K_i)}$
CO_2	0.0	0.0	0.0	0.0	-	-	-	-	-
N_2	0.078	1.01011	0.98729	0.0	-	-	-	-	-
C_1	22.741	86.63524	85.07018	3.806192	0.446	0.889	0.883	22.30547	0.429
C_2	14.343	8.29232	8.44052	0.577630	0.282	0.085	0.088	14.61233	0.279
C_3	13.859	2.55278	2.82973	0.184028	0.272	0.026	0.029	15.37663	0.294
	50.943	97.48034	96.34043					52.33943	
$i\text{-}C_4$	9.618	0.67387	0.89296	0.069999					
$n\text{-}C_4$	11.001	0.52806	0.78460	0.047956					
$i\text{-}C_5$	8.795	0.17622	0.38734	0.020017					
$n\text{-}C_5$	5.131	0.06521	0.18930	0.012696					
C_6	7.830	0.05462	0.024508	0.006969					
C_7	3.903	0.00939	0.10477	0.0					
C_8	2.001	0.00193	0.05090	0.0					
C_9	0.552	0.00021	0.01373	0.0					
C_{10}	0.123	0.00002	0.00303	0.0					
C_{11}	0.022	0.00000	0.00055	0.0					
C_{12}	0.001	0.00000	0.00003	0.0					

T = 15.0 °F P = 700.0 psia

mole/hr L = 0.03313

V = 1.3193

F = L + V = 1.35243

TABLE 5.24 COMPARISON OF THE INITIAL PHASE COMPOSITION VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR LIGHT-PSEUDOCOMPONENT AT T = -8.0°F P = 1115.0 PSIA

Component	x_i	y_i	z_i	K_i	$x_i/\Sigma x_i$	$y_i/\Sigma y_i$	$z_i/\Sigma z_i$	z_i/K_i	$\frac{z_i/K_i}{\sum_{i=1}^{n}(z_i/K_i)}$
CO_2	0.589	0.70974	0.70973	0.0	-	-	-	-	-
N_2	0.472	4.21072	4.21017	0.0	-	-	-	-	-
C_1	37.190	91.00240	90.99455	2.421066	0.821	0.962	0.962	39.58450	0.821
C_2	4.604	3.04688	3.04710	0.654811	0.102	0.032	0.032	4.6534	0.102
C_3	3.491	0.58292	0.58334	0.165230	0.077	0.006	0.006	3.53047	0.077
	45.285	94.6322	94.62499					45.76837	
$i\text{-}C_4$	2.137	0.13528	0.13558	0.062650					
$n\text{-}C_4$	2.995	0.12832	0.12874	0.042387					
$i\text{-}C_5$	3.240	0.05949	0.05995	0.018167					
$n\text{-}C_5$	2.597	0.03671	0.03708	0.013986					
C_6	7.432	0.04844	0.04952	0.00645					
C_7	9.805	0.02598	0.02741	0.002622					
C_8	10.591	0.00857	0.01012	0.000801					
C_9	7.952	0.00342	0.00458	0.0					
C_{10}	4.317	0.00091	0.00154	0.0					
C_{11}	1.696	0.00018	0.00043	0.0					
C_{12}	0.894	0.00004	0.00017	0.0					

T = -8.0 °F P = 1115.0 psia

mole/hr L = 0.00039

V = 2.6385

F = L + V = 2.63889

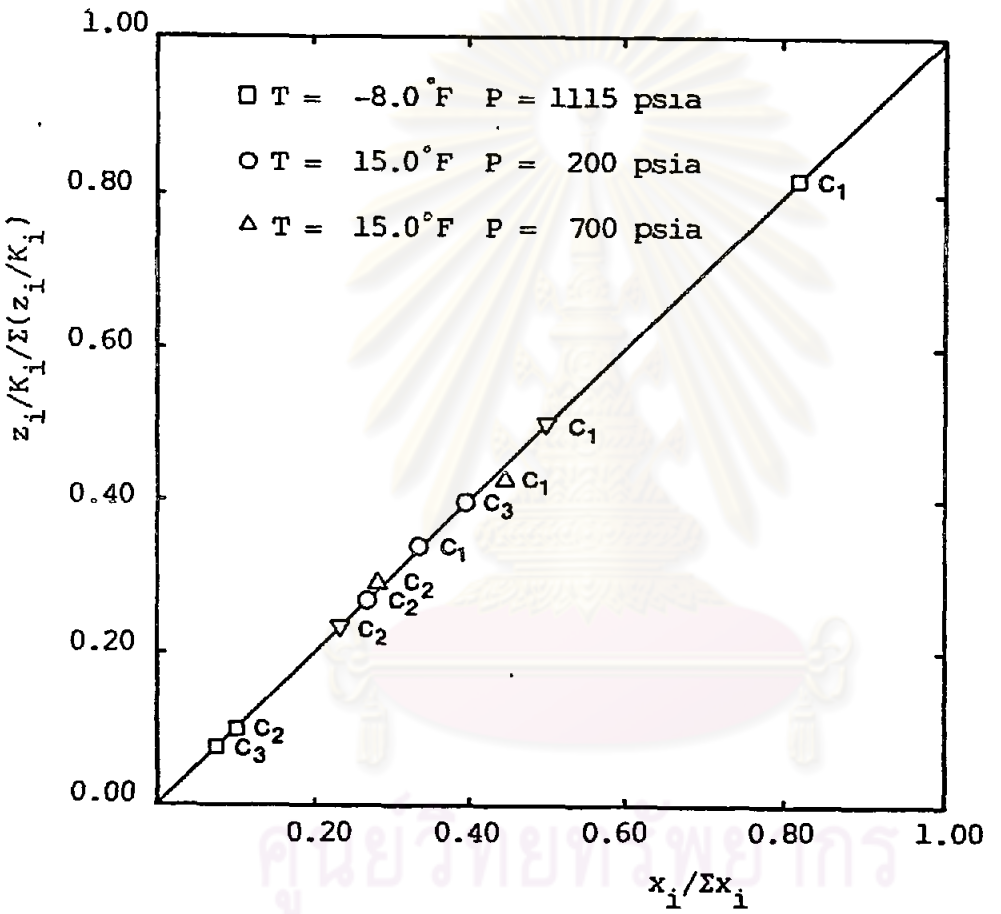

FIGURE 5.5 THE COMPARISON OF EXPERIMENTAL VALUES (ABCISSA) AND ESTIMATED VALUES (ORDIANTE) IN THE LIQUID PHASE OF LIGHT-PSEUDOCOMPONENTS

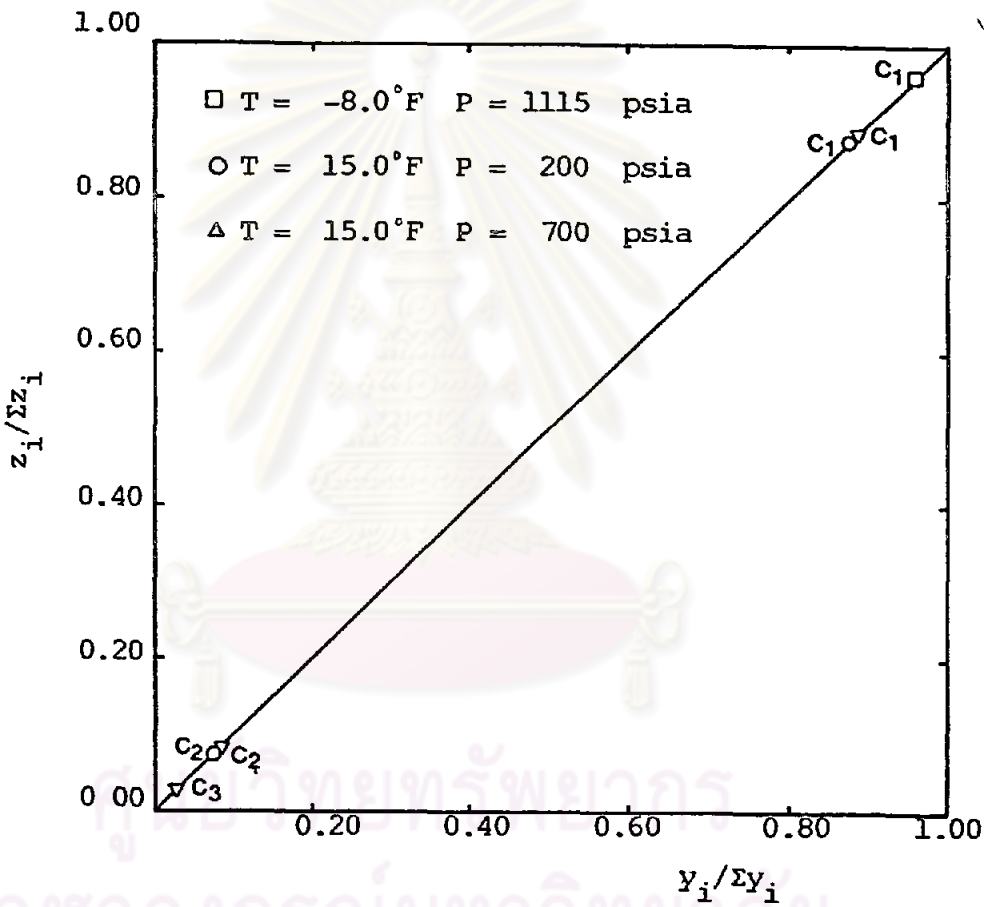

FIGURE 5.6 THE COMPARISON OF EXPERIMANTAL VALUES (ABCISSA) AND ESTIMATED VALUES (ORDINATE) IN THE VAPOR PHASE OF LIGHT-PSEUDOCOMPONENTS

TABLE 5.25 COMPARISON OF THE INITIAL PHASE VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR IDEAL CASE

AT T = 15.0°F P = 200.0 PSIA

Component	x_i	$Y_i = z_i$	P_i(atm)	$K_i = P_i/P$	$x_i' = Y_i/K_i$	$x_i/\Sigma x_i$	$x_i'/\Sigma x_i'$
CO_2	0.0	0.0	26.53257	1.9495	0.0		
N_2	0.019	0.93205	-	-	-		
C_1	7.577	85.31217	506.4543	39.212	2.2926		
C_2	6.028	8.38443	18.54087	1.3623	6.1546		
C_3	8.828	2.87391	3.47006	0.255	11.2718		
$i\text{-}C_4$	7.698	0.86811	1.09927	0.0808	10.748	0.099	0.007
$n\text{-}C_4$	10.202	0.72819	2.51477	0.185	3.941	0.132	0.002
$i\text{-}C_5$	11.323	0.36700	0.22640	0.0166	22.062	0.146	0.014
$n\text{-}C_5$	8.028	0.15691	0.15279	0.0123	13.977	0.104	0.009
C_6	18.647	0.22277	0.03494	0.0026	86.774	0.240	0.054
C_7	12.284	0.09508	0.00808	5.94×10^{-6}	160.153	0.163	0.099
C_8	6.917	0.04472	0.00191	1.41×10^{-4}	317.661		
C_9	2.018	0.01246	0.00042	3.14×10^{-5}	396.216		
C_{10}	0.382	0.00225	0.00009	7.20×10^{-6}	312.474		
C_{11}	0.042	0.00025	0.00002	1.62×10^{-6}	154.659		
C_{12}	0.006	0.00004	0.00000	0.0	0.0		
	75.547				1614.765		

T = 15.0 °F P = 200.0 psia

= 13.61 atm

TABLE 5.26 COMPARISON OF THE INITIAL PHASE VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR IDEAL CASE

AT T = 15.0 °F P = 700.0 PSIA

Component	x_i	$y_i = z_i$	P_i (atm)	$K_i=P_i/P$	$x_i'=y_i/K_i$	$x_i/\Sigma x_i$	$x_i'/\Sigma x_i'$
CO_2	0.000	0.000	26.53257	0.55717	0.000		
N_2	0.078	0.98729	-	-	-		
C_1	22.741	85.07018	506.4543	10.6353	7.999		
C_2	14.343	8.44052	18.54087	0.38935	21.678		
C_3	13.859	2.82973	3.47006	0.07287	38.832		
$i\text{-}C_4$	9.618	0.89296	1.09927	0.02308	38.690	0.196	0.007
$n\text{-}C_4$	11.001	0.78460	2.51477	0.05281	14.857	0.225	0.0012
$i\text{-}C_5$	8.795	0.38734	0.22640	0.00475	81.545	0.180	3.86×10^{-6}
$n\text{-}C_5$	5.131	0.18930	0.15279	0.00321	58.972	0.005	0.004
C_6	7.830	0.24508	0.03494	0.00073	335.726	0.160	0.027
C_7	3.903	0.10477	0.00808	0.000017	6162.941	0.08	0.501
C_8	2.001	0.05090	0.00191	0.00004	1272.500	0.041	0.103
C_9	0.552	0.01373	0.00042	0.000009	1525.560	0.011	1.11×10^{-6}
C_{10}	0.123	0.00303	0.00009	0.000002	1441.860	0.002	
C_{11}	0.022	0.00055	0.00002	0.000000	1375.000		
C_{12}	0.001	0.00003	0.00000	0.000000	0.000		

$T = 15.0\ ^\circ F \quad P = 700.0$ psia

$= 47.62$ atm

TABLE 5.27 COMPARISON OF THE INITIAL PHASE VALUES OF THE EXPERIMENT AND THE ESTIMATION VALUES FOR IDEAL CASE

AT T = -8.0 °F P = 1115.0 PSIA

Component	x_i	$y_i = z_i$	P_i(atm)	$K_i = P_i/P$	$x_i' = y_i/K_i$	$x_i/\Sigma x_i$	$x_i'/\Sigma x_i'$
CO_2	0.589	4.21072	18.12699	0.239	17.618		
N_2	0.472	0.70973	-	-	-		
C_1	37.190	90.99455	301.6218	3.976	22.886		
C_2	4.604	3.04710	13.15507	0.173	17.613		
C_3	3.491	0.58334	2.22451	0.029	20.115		
i-C_4	2.137	0.13558	0.65482	0.0086	15.765	0.04	9.96×10^{-4}
n-C_4	2.995	0.12874	1.78649	0.0236	5.455	0.056	3.44×10^{-4}
i-C_5	3.240	0.05995	0.12042	0.0016	59.95	0.060	3.79×10^{-3}
n-C_5	2.597	0.03708	0.07786	0.001	37.08	0.048	2.34×10^{-3}
C_6	7.432	0.04952	0.1581	2.08×10^{-4}	238.077	0.138	0.015
C_7	9.805	0.02741	0.00323	4.26×10^{-5}	643.427	0.183	0.041
C_8	10.591	0.1012	0.00067	8.83×10^{-6}	1146.093	0.197	0.072
C_9	7.952	0.00458	0.00013	1.71×10^{-6}	2672.112	0.148	0.169
C_{10}	4.317	0.00154	0.000026	3.43×10^{-7}	4489.79	0.08	0.284
C_{11}	1.696	0.00043	0.000005	6.59×10^{-8}	6525.04	0.03	0.412
C_{12}	0.894	0.00017	0.00000	0.000	0.0		
	53.656				15832.789		

T = -8.0 °F P = 1115.0 psia

= 75.85 atm

THE AMOUNT OF COMPONENT,N = 16

T = -10.00 °F P = 500.00 PSIA R = 10 730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638330 MOLE/HR V/F = 0 500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005544
2	N2	0.062500	0.002730
3	C1	0.062500	0.966292
4	C2	0.062500	0.022314
5	C3	0.062500	0.002002
6	IC4	0.062500	0.000317
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000138
9	NC5	0.062500	0.000101
10	C6	0.062500	0.000083
11	C7	0.062500	0.000079
12	C8	0.062500	0.000048
13	C9	0.062500	0.000034
14	C10	0.062500	0.000019
15	C11	0.062500	0.000005
16	C12	0 062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.999755800
V = 2.638345000 MOLE/HR
L = 0.000484467 MOLE/HR

NO. OF ITERATION = 3

TABLE 5.28 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = -10.0°F P = 500.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00228	0.00554	0 00419	0.005544	1.46123	0 00191	-0.000000
2	N2	0.00007	0.00273	0-00019	0.002730	16.07114	0 00012	0.000000
3	C1	0-21054	0.96639	0-27078	0.966448	3.94478	0 06024	0.000061
4	C2	0.03044	0.02231	0.04809	0.022309	0.51266	0 01765	-0.000005
5	C3	0.01310	0.00200	0 01873	0.001999	0.11795	0 00563	-0.000002
6	IC4	0.00612	0.00032	0 00827	0.000315	0.04207	0.00215	-0.000001
7	NC4	0 00797	0.00029	0.01193	0.000291	0.02694	0 00398	-0.000002
9	IC5	0.01355	0.00014	0.01575	0.000134	0.00942	0.00220	-0.000002
9	NC5	0.01318	0.00010	0-01687	0.000097	0.00635	0-00369	-0.000002
10	C6	0-04268	0.00008	0-05149	0.000072	0.00155	0 00881	-0.000006
11	C7	0.09785	0.00007	0-14098	0.000048	0.00038	0 04313	-0-000019
12	C8	0-17314	0.00003	0 15900	0.000012	0.00009	-0.01414	-0.000014
13	C9	0.20957	0.00001	0.14164	0.000003	0.00002	-0 06793	-0.000005
14	C10	0.12938	0.00003	0-08348	0.000000	0.00000	-0 04590	-0-000026
15	C11	0-03810	0.00000	0-02275	0.000000	0.00000	0-01535	-0.000000
16	C12	0.01032	0.00000	0.00583	0.000000	0.00000	-0 00449	0.000000
			SUM =	1 00000	1.000001	%AAD =	1 85838	0.000004

TABLE 5.29 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 0.0°F P = 500.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 °F P = 500 00 PSIA R = 10 730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638710 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005940
2	N2	0.062500	0.002810
3	C1	0.062500	0.966192
4	C2	0.062500	0.021852
5	C3	0.062500	0.002042
6	IC4	0.062500	0.000303
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000136
9	NC5	0.062500	0.000097
10	C6	0.062500	0.000108
11	C7	0.062500	0.000113
12	C8	0.062500	0.000060
13	C9	0.062500	0.000029
14	C10	0.062500	0.000018
15	C11	0.062500	0.000005
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.999755800
V = 2.633269000 MOLE/HR
L = 0.0004405 98 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00321	0.00594	0.00418	0.005940	1.59715	0.00097	0.000000
2	N2	0.00013	0.00281	0.00020	0.002810	16.14519	0.00007	0.000000
3	C1	0.19913	0.96625	0.26293	0.966347	4.13322	0.06380	0.000094
4	C2	0.03118	0.02185	0.04292	0.021848	0.57249	0.01174	-0.000004
5	C3	0.01306	0.00204	0.01667	0.002039	0.13751	0.00361	-0.000002
6	IC4	0.00630	0.00030	0.00674	0.000302	0.05040	0.00044	-0.000001
7	NC4	0.00980	0.00029	0.01000	0.000292	0.03279	0.00020	-0.000001
8	IC5	0.01213	0.00014	0.01273	0.000133	0.01177	0.00060	-0.000002
9	NC5	0.01204	0.00010	0.01312	0.000094	0.00807	0.00108	-0.000002
10	C6	0.03781	0.00011	0.05304	0.000097	0.00205	0.01523	-0.000008
11	C7	0.08907	0.00011	0.16517	0.000077	0.00052	0.07610	-0.000029
12	C8	0.16319	0.00005	0.18167	0.000020	0.00013	0.01848	-0.000026
13	C9	0.20815	0.00001	0.11964	0.000003	0.00003	-0.08851	-0.000010
14	C10	0.14774	0.00001	0.07936	0.000001	0.00001	-0.06838	-0.000005
15	C11	0.05335	0.00000	0.02387	0.000000	0.00000	0.02948	-0.000001
16	C12	0.02003	0.00000	0.00776	0.000000	0.00000	-0.01227	-0.000000
			SUM =	1.00000	1.000001	%AAD =	2.44332	0.001165

THE AMOUNT OF COMPONENT,N = 16

T = 50.00 °F P = 500.00 PSIA R = 10 730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.320530 MOLE/HR V/F = 0 500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.002595
2	N2	0.062500	0.008323
3	C1	0.062500	0.851252
4	C2	0.062500	0.076620
5	C3	0.062500	0.003315
6	IC4	0.062500	0.012398
7	NC4	0.062500	0.008630
8	IC5	0.062500	0.003476
9	NC5	0.062500	0.001519
10	C6	0.062500	0.001224
11	C7	0.062500	0.000387
12	C8	0.062500	0.000137
13	C9	0.062500	0.000034
14	C10	0.062500	0.000011
15	C11	0.062500	0.000001
16	C12	0.062500	0.000000
	SUM =	1.000000	0.969920

V/F = 0.778699607
V = 1.318741000 MOLE/HR
L = 0.001788139 MOLE/HR

NO. OF ITERATION = 3

table 5.30 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 50.0 °F, P = 500.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00103	0.00260	0.00115	0.002677	2.31748	0.00012	0.000081
2	N2	0.00039	0.00833	0.00054	0.008591	15.79344	0.00015	0.000261
3	C1	0.14339	0.85191	0.17623	0.878570	4.95675	0.03284	0.026658
4	C2	0.07636	0.07662	0.08424	0.078989	0.93225	0.00788	0.002369
5	C3	0.10988	0.00331	0.01225	0.003406	0.27646	-0.09763	0.000098
6	IC4	0.10324	0.01231	0.10823	0.012657	0.11628	0.00499	0.000344
7	NC4	0.11279	0.00853	0.10697	0.008769	0.08151	-0.00582	0.000236
8	IC5	0.10690	0.00338	0.10281	0.003454	0.03341	-0.00409	0.000074
9	NC5	0.06257	0.00146	0.05985	0.001490	0.02475	-0.00272	0.000028
10	C6	0.11327	0.00112	0.13943	0.001081	0.00771	0.02616	-0.000038
11	C7	0.07512	0.00003	0.10685	0.000259	0.00241	0.03173	0.000228
12	C8	0.05875	0.00008	0.06958	0.000050	0.00072	0.01083	-0.000032
13	C9	0.02627	0.00001	0.02287	0.000005	0.00022	-0.00340	-0.000004
14	C10	0.00901	0.00000	0.00817	0.000001	0.00007	-0.00084	-0.000002
15	C11	0.00103	0.00000	0.00082	0.000000	0.00003	-0.00021	-0.000000
16	C12	0.00000	0.00000	0.00000	0.000000	0.00001	0.00000	0.000000
			SUM =	1.00000	1.000000	%AAD =	1.43374	0.190338

THE AMOUNT OF COMPONENT,N = 16

T = 47.00 °F P = 815.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE °R

FEED RATE = 2.638670 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006617
2	N2	0.062500	0.029980
3	C1	0.062500	0.923041
4	C2	0.062500	0.030932
5	C3	0.062500	0.005329
6	IC4	0.062500	0.001090
7	NC4	0.062500	0.001041
8	IC5	0.062500	0.000499
9	NC5	0.062500	0.000368
10	C6	0.062500	0.000423
11	C7	0.062500	0.000315
12	C8	0.062500	0.000198
13	C9	0.062500	0.000098
14	C10	0.062500	0.000045
15	C11	0.062500	0.000017
16	C12	0.062500	0.000007
	SUM =	1.000000	0.999999

V/F = 0.999623200
V = 2.637651000 MOLE/HR
L = 0.001018524 MOLE/HR

NO. OF ITERATION = 3

TABLE 5.31 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 47.0°F P = 815.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00405	0.00662	0.00398	0.006618	1.66486	0.00007	0.000001
2	N2	0.00253	0.02998	0.00271	0.029991	10.96481	-0.00018	0.000008
3	C1	0.21503	0.92309	0.26213	0.923290	3.48636	-0.04710	0.000204
4	C2	0.04723	0.03093	0.04362	0.030927	0.70183	0.00361	-0.000004
5	C3	0.02556	0.00533	0.02353	0.005322	0.22385	0.00203	-0.000006
6	IC4	0.01191	0.00109	0.01063	0.001087	0.10122	0.00128	-0.000003
7	NC4	0.01752	0.00104	0.01441	0.001036	0.07112	0.00311	-0.000004
8	IC5	0.01744	0.00050	0.01551	0.000493	0.03148	0.00193	-0.000005
9	NC5	0.01503	0.00037	0.01532	0.000362	0.02339	0.00029	-0.000005
10	C6	0.04752	0.00042	0.05049	0.000404	0.00792	0.00297	-0.000016
11	C7	0.08236	0.00031	0.10140	0.000277	0.00270	0.01904	-0.000033
12	C8	0.12308	0.00019	0.15632	0.000139	0.00088	0.03324	-0.000051
13	C9	0.13932	0.00009	0.14598	0.000043	0.00029	0.00666	-0.000046
14	C10	0.11951	0.00004	0.09513	0.000009	0.00010	0.02438	-0.000028
15	C11	0.07485	0.00001	0.04021	0.000002	0.00004	0.03464	-0.000010
16	C12	0.05706	0.00000	0.01864	0.000000	0.00002	0.03842	-0.000003
			SUM =	1.00000	1.000000	%AAD =	1.36850	0.002561

TABLE 5.32 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATIONMODEL AT T = -8.0 °F P = 250.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 °F P = 250.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.639800 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.004000
2	N2	0.062500	0.035993
3	C1	0.062500	0.894976
4	C2	0.062500	0.044821
5	C3	0.062500	0.014038
6	IC4	0.062500	0.001311
7	NC4	0.062500	0.002835
8	IC5	0.062500	0.000622
9	NC5	0.062500	0.000632
10	C6	0.062500	0.000294
11	C7	0.062500	0.000264
12	C8	0.062500	0.000144
13	C9	0.062500	0.000045
14	C10	0.062500	0.000018
15	C11	0.062500	0.000006
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.799107600
V = 2.637214000 MOLE/HR
L = 0.002585411 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00175	0.00400	0.00145	0.004002	2.65062	-0.00030	0.000001
2	N2	0.00110	0.03601	0.00100	0.036026	34.63550	-0.00010	0.000015
3	C1	0.11403	0.89536	0.11202	0.895705	7.67670	-0.00201	0.000345
4	C2	0.06160	0.04481	0.05057	0.044816	0.85083	-0.01103	0.000003
5	C3	0.00821	0.01400	0.07730	0.013979	0.17361	0.06909	-0.000025
6	IC4	0.02246	0.00130	0.02189	0.001292	0.05664	-0.00057	-0.000009
7	NC4	0.07207	0.00280	0.07561	0.002767	0.03514	0.00354	-0.000034
8	IC5	0.04464	0.00060	0.04938	0.000576	0.01121	0.00474	-0.000024
9	NC5	0.06466	0.00060	0.07365	0.000564	0.00735	0.00899	-0.000037
10	C6	0.09214	0.00025	0.11381	0.000189	0.00159	0.02167	-0.000061
11	C7	0.15476	0.00019	0.20462	0.000074	0.00035	0.04986	-0.000114
12	C8	0.16507	0.00006	0.14317	0.000010	0.00007	-0.02190	-0.000052
13	C9	0.07507	0.00001	0.04816	0.000001	0.00001	-0.02691	-0.000008
14	C10	0.03299	0.00000	0.01887	0.000000	0.00000	-0.01412	-0.000001
15	C11	0.01160	0.00000	0.00634	0.000000	0.00000	-0.00526	-0.000000
16	C12	0.00393	0.00000	0.00215	0.000000	0.00000	-0.00178	0.000000
			SUM =	1.00000	1.000000	%AAD =	1.51173	0.004559

TABLE 5.33 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = -8.0°F P = 1115.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 °F P = 1115.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638890 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.007097
2	N2	0.062500	0.042107
3	C1	0.062500	0.909945
4	C2	0.062500	0.030471
5	C3	0.062500	0.005833
6	IC4	0.062500	0.001356
7	NC4	0.062500	0.001287
8	IC5	0.062500	0.000599
9	NC5	0.062500	0.000371
10	C6	0.062500	0.000495
11	C7	0.062500	0.000274
12	C8	0.062500	0.000101
13	C9	0.062500	0.000046
14	C10	0.062500	0.000015
15	C11	0.062500	0.000004
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000004

V/F = 0.999432500
V = 2.637163000 MOLE/HR
L = 0.001727104 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00589	0.00710	0.00722	0.007097	0.96081	0.00133	-0.000000
2	N2	0.00472	0.04211	0.00601	0.042128	6.85053	0.00129	0.000021
3	C1	0.37190	0.91002	0.41306	0.910229	2.15366	0.04116	0.000206
4	C2	0.04604	0.03047	0.06890	0.030448	0.43188	0.02286	-0.000020
5	C3	0.03491	0.00583	0.04043	0.005813	0.14053	0.00552	-0.000016
6	IC4	0.02137	0.00135	0.01994	0.001345	0.06594	-0.00143	-0.000008
7	NC4	0.02995	0.00128	0.02727	0.001272	0.04561	-0.00268	-0.000011
8	IC5	0.03240	0.00059	0.02698	0.000584	0.02116	-0.00542	-0.000011
9	NC5	0.02597	0.00037	0.02282	0.000358	0.01532	-0.00315	-0.000009
10	C6	0.07432	0.00048	0.08227	0.000448	0.00532	0.00795	-0.000037
11	C7	0.09805	0.00026	0.11038	0.000210	0.00186	0.01233	-0.000050
12	C8	0.10591	0.00006	0.08338	0.000053	0.00062	-0.02253	-0.000006
13	C9	0.07952	0.00003	0.05801	0.000012	0.00020	-0.02151	-0.000022
14	C10	0.04317	0.00001	0.02352	0.000002	0.00007	-0.01965	-0.000007
15	C11	0.01696	0.00000	0.00697	0.000000	0.00004	-0.00999	-0.000002
16	C12	0.00894	0.00000	0.00286	0.000000	0.00001	-0.00608	-0.000000
			SUM =	1.00000	1.000000	%AAD =	1.15552	0.002657

THE AMOUNT OF COMPONENT,N = 16

T = -10.00 °F P = 800.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.543530 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.003736
2	N2	0.062500	0.002052
3	C1	0.062500	0.972654
4	C2	0.062500	0.020926
5	C3	0.062500	0.000280
6	IC4	0.062500	0.000052
7	NC4	0.062500	0.000068
8	IC5	0.062500	0.000067
9	NC5	0.062500	0.000039
10	C6	0.062500	0.000040
11	C7	0.062500	0.000031
12	C8	0.062500	0.000018
13	C9	0.062500	0.000014
14	C10	0.062500	0.000015
15	C11	0.062500	0.000005
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.999992100
V = 2.543536000 MOLE/HR
L = 0.000053406 MOLE/HR

NO. OF ITERATION = 5

TABLE 5.34 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 10.0°F P = 800.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00143	0.00374	0.00167	0.003737	1.17160	0.00024	-0.000000
2	N2	0.00006	0.00205	0.00003	0.002052	12.78584	0.00002	-0.000000
3	C1	0.31340	0.97268	0.16267	0.972667	3.12449	-0.15073	-0.000011
4	C2	0.02363	0.02093	0.02420	0.020926	0.45188	0.00057	0.000000
5	C3	0.00169	0.00028	0.00124	0.000280	0.11813	-0.00045	0.000000
6	IC4	0.00056	0.00005	0.00056	0.000052	0.04819	0.00000	-0.000000
7	NC4	0.00177	0.00007	0.00116	0.000068	0.03078	-0.00061	0.000000
8	IC5	0.00605	0.00007	0.00283	0.000067	0.01241	-0.00322	0.000000
9	NC5	0.00498	0.00004	0.00244	0.000039	0.00838	-0.00254	0.000000
10	C6	0.01702	0.00004	0.00870	0.000040	0.00238	-0.00832	0.000000
11	C7	0.03929	0.00003	0.02390	0.000031	0.00068	-0.01539	0.000001
12	C8	0.05857	0.00002	0.04912	0.000017	0.00018	-0.00945	0.000001
13	C9	0.14467	0.00001	0.12762	0.000012	0.00005	-0.01705	0.000003
14	C10	0.25830	0.00001	0.36529	0.000010	0.00001	0.10699	0.000004
15	C11	0.10695	0.00000	0.18574	0.000002	0.00001	0.07879	0.000001
16	C12	0.01902	0.00000	0.04277	0.000000	0.00000	0.02375	0.000000
			SUM =	1.00000	1.000000	%AAD =	2.61326	0.000148

TABLE 5.35 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 8.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 8.00 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.153030 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010069
2	N2	0.062500	0.004437
3	C1	0.062500	0.951393
4	C2	0.062500	0.031772
5	C3	0.062500	0.001574
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000018
9	NC5	0.062500	0.000017
10	C6	0.062500	0.000053
11	C7	0.062500	0.000056
12	C8	0.062500	0.000034
13	C9	0.062500	0.000013
14	C10	0.062500	0.000027
15	C11	0.062500	0.000006
16	C12	0.062500	0.000000
	SUM =	1.000000	1.000000

V/F = 0.999877900
V = 1.152992030 MOLE/HR
L = 0.000058174 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00262	0.01007	0.00513	0.010069	2.55399	0.00251	0.000000
2	N2	0.00007	0.00444	0.00022	0.004438	26.08089	0.00015	0.000000
3	C1	0.07704	0.95193	0.18779	0.951963	6.59248	0.11075	0.000040
4	C2	0.03243	0.03177	0.04734	0.031771	0.87280	0.01491	-0.000001
5	C3	0.01646	0.00157	0.01026	0.001573	0.19946	-0.00620	-0.000000
6	IC4	0.00008	0.00002	0.00028	0.000015	0.06951	0.00020	-0.000000
7	NC4	0.00021	0.00001	0.00040	0.000014	0.04521	0.00019	-0.000000
8	IC5	0.00130	0.00002	0.00154	0.000018	0.01536	0.00024	-0.000000
9	NC5	0.00173	0.00002	0.00210	0.000017	0.01054	0.00037	-0.000000
10	C6	0.02294	0.00005	0.02617	0.000051	0.00253	0.00323	-0.000002
11	C7	0.06476	0.00005	0.09964	0.000047	0.00061	0.03488	-0.000007
12	C8	0.09969	0.00003	0.16972	0.000018	0.00014	0.07003	-0.000012
13	C9	0.11754	0.00001	0.10686	0.000003	0.00003	-0.01068	-0.000005
14	C10	0.42584	0.00001	0.27146	0.000002	0.00001	-0.15438	-0.000009
15	C11	0.12610	0.00000	0.06580	0.000000	0.00000	0.06030	0.000000
16	C12	0.01119	0.00000	0.00530	0.000000	0.00000	-0.00589	0.000000
			SUM =	1.00000	1.000002	%AAD =	2.96814	0.000484

TABLE 5.36 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 8.0°F P = 700.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 8.00 °F P = 700.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.453830 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010155
2	N2	0.062500	0.004651
3	C1	0.062500	0.951288
4	C2	0.062500	0.031921
5	C3	0.062500	0.001755
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000013
9	NC5	0.062500	0.000015
10	C6	0.062500	0.000048
11	C7	0.062500	0.000051
12	C8	0.062500	0.000031
13	C9	0.062500	0.000013
14	C10	0.062500	0.000024
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.999877900
V = 2.453800000 MOLE/HR
L = 0.000030109 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00285	0.01016	0.00947	0.010155	1.31993	0.00662	-0.000000
2	N2	0.00009	0.00465	0.00055	0.004652	10.42605	0.00046	0.000000
3	C1	0.25105	0.95131	0.38169	0.951346	3.06853	0.13064	0.000036
4	C2	0.02279	0.03192	0.07540	0.031917	0.52112	0.05261	-0.000005
5	C3	0.00885	0.00176	0.01493	0.001754	0.14461	0.00608	-0.000001
6	IC4	0.00005	0.00001	0.00031	0.000015	0.05851	0.00026	-0.000000
7	NC4	0.00015	0.00001	0.00043	0.000014	0.03987	0.00028	-0.000000
8	IC5	0.00092	0.00001	0.00100	0.000013	0.01580	0.00008	-0.000000
9	NC5	0.00128	0.00001	0.00162	0.000015	0.01131	0.00034	-0.000000
10	C6	0.01516	0.00005	0.01713	0.000046	0.00330	0.00197	-0.000001
11	C7	0.04357	0.00005	0.05806	0.000046	0.00097	0.01449	-0.000004
12	C8	0.06792	0.00003	0.09724	0.000021	0.00027	0.02932	-0.000008
13	C9	0.10162	0.00001	0.08130	0.000005	0.00008	-0.02032	-0.000005
14	C10	0.36321	0.00001	0.20955	0.000004	0.00002	-0.15366	-0.000009
15	C11	0.09597	0.00000	0.04242	0.000000	0.00001	-0.05355	-0.000001
16	C12	0.02452	0.00000	0.00889	0.000000	0.00000	-0.01563	-0.000000
			SUM =	1.00000	1.000001	%AAD =	3.03951	0.000445

TABLE 5.37 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE ORDINARY VLE CALCULATION MODEL AT T = 0.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.250860 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006002
2	N2	0.062500	0.003101
3	C1	0.062500	0.964610
4	C2	0.062500	0.022708
5	C3	0.062500	0.002301
6	IC4	0.062500	0.000330
7	NC4	0.062500	0.000311
8	IC5	0.062500	0.000151
9	NC5	0.062500	0.000111
10	C6	0.062500	0.000123
11	C7	0.062500	0.000112
12	C8	0.062500	0.000075
13	C9	0.062500	0.000040
14	C10	0.062500	0.000019
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.999755800
V = 2.250412000 MOLE/HR
L = 0.000447273 MOLE/HR

NO. OF ITERATION = 3

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00172	0.00600	0.00270	0.006003	2.43330	0.00098	0.000000
2	N2	0.00006	0.00310	0.00012	0.003102	28.44411	0.00006	0.000000
3	C1	0.12591	0.96467	0.15784	0.964792	6.68532	0.03193	0.000120
4	C2	0.01849	0.02271	0.03065	0.022707	0.81029	0.01216	-0.000002
5	C3	0.00894	0.00230	0.01429	0.002299	0.17595	0.00535	-0.000002
6	IC4	0.00425	0.00033	0.00602	0.000329	0.05983	0.00177	-0.000001
7	NC4	0.00706	0.00031	0.00891	0.000309	0.03790	0.00185	-0.000001
8	IC5	0.01056	0.00015	0.01285	0.000148	0.01259	0.00229	-0.000002
9	NC5	0.01112	0.00011	0.01397	0.000108	0.00843	0.00285	-0.000002
10	C6	0.04042	0.00012	0.06171	0.000109	0.00194	0.02129	-0.000011
11	C7	0.09897	0.00010	0.17672	0.000072	0.00045	0.07775	-0.000032
12	C8	0.18355	0.00006	0.23975	0.000021	0.00010	0.05620	-0.000040
13	C9	0.24508	0.00002	0.16423	0.000003	0.00002	-0.08085	-0.000018
14	C10	0.17514	0.00001	0.08440	0.000000	0.00000	-0.09074	-0.000006
15	C11	0.05016	0.00000	0.01959	0.000000	0.00000	-0.03057	-0.000001
16	C12	0.01859	0.00000	0.00625	0.000000	0.00000	-0.01233	-0.000000
			SUM =	1.00000	1.000000	%AAD =	2.68101	0.001507

THE AMOUNT OF COMPONENT,N = 16

T = -10.00 °F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638830 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005544
2	N2	0.062500	0.002730
3	C1	0.062500	0.966292
4	C2	0.062500	0.022314
5	C3	0.062500	0.002002
6	IC4	0.062500	0.000317
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000138
9	NC5	0.062500	0.000101
10	C6	0.062500	0.000093
11	C7	0.062500	0.000079
12	C8	0.062500	0.000048
13	C9	0.062500	0.000034
14	C10	0.062500	0.000019
15	C11	0.062500	0.000005
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.998513200
V = 2.634835000 MOLE/HR
L = 0.003994942 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.38 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED MODEL AT T = - 10.0°F P = 500.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00228	0.00554	0.00331	0.005541	1.51901	0.00137	0.000002
2	N2	0.00007	0.00273	0.00013	0.002731	10.55620	0.00008	0.000004
3	C1	0.21054	0.96639	0.20444	0.966471	4.28653	0.01314	0.000081
4	C2	0.03044	0.02231	0.03812	0.022263	0.52955	0.01164	-0.000029
5	C3	0.01310	0.00200	0.01493	0.001977	0.11976	0.00344	-0.000020
6	IC4	0.00612	0.00032	0.00590	0.000316	0.04849	0.00040	-0.000000
7	NC4	0.00797	0.00029	0.00847	0.000293	0.03132	0.00138	-0.000000
8	IC5	0.01355	0.00014	0.01080	0.000136	0.01143	-0.00163	0.000000
9	NC5	0.01318	0.00010	0.01155	0.000099	0.00777	-0.00043	0.000000
10	C6	0.04268	0.00008	0.03573	0.000079	0.00200	-0.00324	0.000000
11	C7	0.09785	0.00007	0.11308	0.000064	0.00051	0.02698	-0.000003
12	C8	0.17314	0.00003	0.17495	0.000024	0.00012	0.01979	-0.000002
13	C9	0.20957	0.00001	0.20102	0.000007	0.00003	0.01234	-0.000001
14	C10	0.12938	0.00003	0.12131	0.000001	0.00001	0.01557	-0.000025
15	C11	0.03810	0.00000	0.03669	0.000000	0.00000	0.00240	-0.000000
16	C12	0.01032	0.00000	0.00951	0.000000	0.00000	0.00018	0.000000
			SUM =	1.00000	1.000002	%AAD =	0.72633	0.006819

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 ° F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638710 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005940
2	N2	0.062500	0.002810
3	C1	0.062500	0.966192
4	C2	0.062500	0.021852
5	C3	0.062500	0.002042
6	IC4	0.062500	0.000303
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000136
9	NC5	0.062500	0.000097
10	C6	0.062500	0.000108
11	C7	0.062500	0.000113
12	C8	0.062500	0.000060
13	C9	0.062500	0.000029
14	C10	0.062500	0.000018
15	C11	0.062500	0.000005
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.998506300
V = 2.634722000 MOLE/HR
L = 0.003987312 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.39 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 0.0 °F P = 500.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	EPSX	ERRY
1	CO2	0.00321	0.00594	0.00339	0.005937	1.65729	0.00038	0.000003
2	N2	0.00013	0.00281	0.00014	0.002811	19.42580	0.00002	0.000004
3	C1	0.19913	0.96625	0.20489	0.966358	4.46485	0.01752	0.001060
4	C2	0.03118	0.02185	0.03493	0.021808	0.59027	0.00580	-0.000022
5	C3	0.01306	0.00204	0.01372	0.002021	0.13948	0.00145	-0.000019
6	IC4	0.00630	0.00030	0.00505	0.000303	0.05674	-0.00096	-0.000000
7	NC4	0.00980	0.00029	0.00745	0.000293	0.03719	-0.00193	-0.000000
8	IC5	0.01213	0.00014	0.00922	0.000135	0.01383	-0.00238	-0.000000
9	NC5	0.01204	0.00010	0.00948	0.000096	0.00955	-0.00201	-0.000000
10	C6	0.03781	0.00011	0.03850	0.000103	0.00253	0.00296	-0.000002
11	C7	0.08907	0.00011	0.13373	0.000095	0.00067	0.05234	-0.000010
12	C8	0.16315	0.00005	0.19380	0.000035	0.00017	0.04174	-0.000012
13	C9	0.20815	0.00001	0.16724	0.000008	0.00004	-0.03131	-0.000006
14	C10	0.14774	0.00001	0.12614	0.000001	0.00001	-0.01436	-0.000005
15	C11	0.05335	0.00000	0.03924	0.000000	0.00000	-0.01186	-0.000001
16	C12	0.02003	0.00000	0.01297	0.000000	0.00000	-0.00632	-0.000000
			SUM =	1.00000	1.000002	AAD =	1.20837	0.007143

TABLE 5.40 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 50.0 °F P = 500.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 50.00 ° F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.320530 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.002595
2	N2	0.062500	0.008323
3	C1	0.062500	0.851252
4	C2	0.062500	0.076620
5	C3	0.062500	0.003315
6	IC4	0.062500	0.012398
7	NC4	0.062500	0.008630
8	IC5	0.062500	0.003476
9	NC5	0.062500	0.001519
10	C6	0.062500	0.001224
11	C7	0.062500	0.000387
12	C8	0.062500	0.000137
13	C9	0.062500	0.000034
14	C10	0.062500	0.000011
15	C11	0.062500	0.000001
16	C12	0.062500	0.000000
	SUM =	1.000000	0.963920

V/F = 0.973352700
V = 1.285310000 MOLE/HR
L = 0.035219100 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00103	0.00260	0.00125	0.002667	2.28365	0.00012	0.000039
2	N2	0.00039	0.00833	0.00062	0.008642	14.99790	0.00018	0.000205
3	C1	0.14339	0.85191	0.15602	0.830545	4.81664	0.03715	0.017702
4	C2	0.07636	0.07662	0.08945	0.077423	0.92806	0.00603	-0.000158
5	C3	0.10988	0.00331	0.01207	0.003141	0.27959	-0.09876	-0.000206
6	IC4	0.10324	0.01231	0.10160	0.012477	0.13168	-0.00967	0.000007
7	NC4	0.11279	0.00853	0.10023	0.008660	0.09264	-0.02047	0.000013
8	IC5	0.10690	0.00338	0.09354	0.003442	0.03946	-0.02075	0.000019
9	NC5	0.06257	0.00146	0.05452	0.001492	0.02934	-0.01235	0.000011
10	C6	0.11327	0.00112	0.12694	0.001130	0.00954	0.00365	-0.000004
11	C7	0.07512	0.00003	0.10353	0.000302	0.00312	0.02025	0.000264
12	C8	0.05875	0.00008	0.07793	0.000071	0.00098	0.01305	-0.000012
13	C9	0.02627	0.00001	0.02961	0.000009	0.00031	0.00100	-0.000001
14	C10	0.00901	0.00000	0.01146	0.000001	0.00010	0.00155	-0.000001
15	C11	0.00103	0.00000	0.00113	0.000000	0.00004	0.00006	-0.000000
16	C12	0.00000	0.00000	0.00000	0.000000	0.00001	0.00000	0.000000
			SUM =	1.00000	1.000000	%AAD =	1.93154	0.116573

THE AMOUNT OF COMPONENT,N = 16

T = 47.00 ° F P = 815.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.633670 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006617
2	N2	0.062500	0.029980
3	C1	0.062500	0.923041
4	C2	0.062500	0.030932
5	C3	0.062500	0.005329
6	IC4	0.062500	0.001090
7	NC4	0.062500	0.001041
8	IC5	0.062500	0.000499
9	NC5	0.062500	0.000368
10	C6	0.062500	0.000423
11	C7	0.062500	0.000315
12	C8	0.062500	0.000198
13	C9	0.062500	0.000098
14	C10	0.062500	0.000045
15	C11	0.062500	0.000017
16	C12	0.062500	0.000007
	SUM =	1.000000	0.999999

V/F = 0.794394600
V = 2.623856000 MOLE/HR
L = 0.014813420 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.41 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 47.0 °F P = 815.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00405	0.00662	0.00362	0.006608	1.69211	-0.00013	0.000015
2	N2	0.00253	0.02998	0.00235	0.030024	11.81847	0.00002	0.000153
3	C1	0.21503	0.92309	0.23417	0.923417	3.65476	0.03856	0.003728
4	C2	0.04723	0.03093	0.03957	0.030751	0.71995	-0.00436	-0.000066
5	C3	0.02556	0.00533	0.02116	0.005211	0.22825	-0.00265	-0.000093
6	IC4	0.01191	0.00109	0.00853	0.001085	0.11789	-0.00267	-0.000005
7	NC4	0.01752	0.00104	0.01141	0.001036	0.08414	-0.00517	-0.000009
8	IC5	0.01744	0.00050	0.01177	0.000496	0.03903	-0.00469	-0.000009
9	NC5	0.01503	0.00037	0.01151	0.000365	0.02940	-0.00257	-0.000001
10	C6	0.04752	0.00042	0.03654	0.000416	0.01056	-0.00795	-0.000002
11	C7	0.08236	0.00031	0.07362	0.000304	0.00383	-0.00264	-0.000004
12	C8	0.12308	0.00019	0.12556	0.000181	0.00133	0.01333	-0.000009
13	C9	0.13932	0.00009	0.15370	0.000077	0.00046	0.02719	-0.000011
14	C10	0.11951	0.00004	0.14430	0.000026	0.00017	0.03632	-0.000011
15	C11	0.07485	0.00001	0.09174	0.000007	0.00003	0.02904	-0.000004
16	C12	0.05706	0.00000	0.04421	0.000001	0.00003	-0.00910	-0.000002
			SUM =	1.00000	1.000004	%AAD =	1.04356	0.025677

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 ° F. P = 250.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.639800 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.004000
2	N2	0.062500	0.035993
3	C1	0.062500	0.894976
4	C2	0.062500	0.044821
5	C3	0.062500	0.014038
6	IC4	0.062500	0.001311
7	NC4	0.062500	0.002835
8	IC5	0.062500	0.000622
9	NC5	0.062500	0.000632
10	C6	0.062500	0.000294
11	C7	0.062500	0.000264
12	C8	0.062500	0.000144
13	C9	0.062500	0.000045
14	C10	0.062500	0.000018
15	C11	0.062500	0.000006
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.993023200
V = 2.621380000 MOLE/HR
L = 0.018410630 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.42 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = -8.0°F P = 250.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00175	0.00400	0.00220	0.004000	2.46668	-0.00012	0.000016
2	N2	0.00110	0.03601	0.00188	0.036085	26.02831	0.00029	0.000226
3	C1	0.11403	0.89536	0.18672	0.896543	6.52544	0.02394	0.004931
4	C2	0.06160	0.04481	0.07451	0.044561	0.80840	-0.00625	-0.000066
5	C3	0.00821	0.01400	0.10653	0.013527	0.17257	0.07050	-0.000421
6	IC4	0.02246	0.00130	0.02563	0.001272	0.06748	-0.00353	-0.000023
7	NC4	0.07207	0.00280	0.08581	0.002709	0.04291	-0.00866	-0.000060
8	IC5	0.04464	0.00060	0.05136	0.000549	0.01453	-0.00669	-0.000049
9	NC5	0.06466	0.00060	0.07368	0.000528	0.00974	-0.01022	-0.000070
10	C6	0.09214	0.00025	0.09572	0.000161	0.00229	-0.02142	-0.000083
11	C7	0.15476	0.00019	0.14774	0.000058	0.00054	-0.04560	-0.000120
12	C8	0.16507	0.00006	0.09720	0.000008	0.00012	-0.09325	-0.000054
13	C9	0.07507	0.00001	0.03230	0.000001	0.00003	-0.05121	-0.000003
14	C10	0.03295	0.00000	0.01263	0.000000	0.00001	-0.02366	-0.000001
15	C11	0.01160	0.00000	0.00424	0.000000	0.00000	-0.00846	-0.000000
16	C12	0.00393	0.00000	0.00144	0.000000	0.00000	-0.00287	0.000000
			SUM =	1.00000	1.000003	AAD =	2.35406	0.039576

TABLE 5.43 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = -8.0 °F P = 1115.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 °F P = 1115.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638390 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.007097
2	N2	0.062500	0.042107
3	C1	0.062500	0.909945
4	C2	0.062500	0.030471
5	C3	0.062500	0.005833
6	IC4	0.062500	0.001356
7	NC4	0.062500	0.001287
8	IC5	0.062500	0.000599
9	NC5	0.062500	0.000371
10	C6	0.062500	0.000495
11	C7	0.062500	0.000274
12	C8	0.062500	0.000101
13	C9	0.062500	0.000046
14	C10	0.062500	0.000015
15	C11	0.062500	0.000004
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000004

V/F = 0.709463500
V = 2.611078000 MOLE/HR
L = 0.027812000 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00589	0.00710	0.00859	0.007062	0.89118	0.00206	-0.000009
2	N2	0.00472	0.04211	0.01081	0.042299	4.43717	0.00485	0.000346
3	C1	0.37190	0.91002	0.59682	0.910691	1.73038	0.15631	0.000984
4	C2	0.04604	0.03047	0.07881	0.029944	0.43066	0.02371	-0.000416
5	C3	0.03491	0.00583	0.02983	0.005500	0.15653	0.00035	-0.000305
6	IC4	0.02137	0.00135	0.01257	0.001350	0.12177	-0.01025	0.000002
7	NC4	0.02995	0.00128	0.01673	0.001281	0.08653	-0.01509	0.000003
8	IC5	0.03240	0.00059	0.01407	0.000595	0.04803	-0.01995	0.000003
9	NC5	0.02597	0.00037	0.01168	0.000368	0.03576	-0.01564	0.000002
10	C6	0.07432	0.00048	0.02626	0.000490	0.01531	-0.04223	0.000007
11	C7	0.09805	0.00026	0.04573	0.000268	0.00665	-0.05756	0.000009
12	C8	0.10591	0.00006	0.03962	0.000097	0.00276	-0.07085	0.000033
13	C9	0.07952	0.00003	0.04232	0.000041	0.00110	-0.04206	0.000007
14	C10	0.04317	0.00001	0.02733	0.000012	0.00051	-0.01894	0.000003
15	C11	0.01696	0.00000	0.01117	0.000003	0.00031	-0.00708	0.000001
16	C12	0.00894	0.00000	0.00713	0.000001	0.00015	-0.00263	0.000001
			SUM =	1.00000	1.000002	%AAD =	3.05958	0.032132

TABLE 5.44 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 0.0 °F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 ° F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.250830 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006002
2	N2	0.062500	0.003101
3	C1	0.062500	0.964610
4	C2	0.062500	0.022708
5	C3	0.062500	0.002301
6	IC4	0.062500	0.000330
7	NC4	0.062500	0.000311
8	IC5	0.062500	0.000151
9	NC5	0.062500	0.000111
10	C6	0.062500	0.000123
11	C7	0.062500	0.000112
12	C8	0.062500	0.000075
13	C9	0.062500	0.000040
14	C10	0.062500	0.000019
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.998543700
V = 2.247532000 MOLE/HR
L = 0.003327370 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00172	0.00600	0.00197	0.006001	2.53359	0.00065	0.000005
2	N2	0.00006	0.00310	0.00008	0.003102	32.63286	0.00004	0.000004
3	C1	0.12591	0.96467	0.11054	0.964791	7.25635	0.00719	0.001151
4	C2	0.01849	0.02271	0.02244	0.022678	0.84015	0.00853	-0.000007
5	C3	0.00894	0.00230	0.01056	0.002284	0.17978	0.00378	-0.000015
6	IC4	0.00425	0.00033	0.00429	0.000329	0.06390	0.00091	-0.000000
7	NC4	0.00706	0.00031	0.00625	0.000309	0.04117	0.00046	-0.000000
8	IC5	0.01056	0.00015	0.00890	0.000149	0.01395	0.00015	-0.000001
9	NC5	0.01112	0.00011	0.00951	0.000109	0.00948	0.00042	-0.000001
10	C6	0.04042	0.00012	0.04310	0.000117	0.00225	0.01148	-0.000003
11	C7	0.09897	0.00010	0.14106	0.000091	0.00054	0.07089	-0.000014
12	C8	0.18355	0.00006	0.25673	0.000037	0.00012	0.12559	-0.000024
13	C9	0.24508	0.00002	0.22122	0.000007	0.00003	0.02139	-0.000015
14	C10	0.17514	0.00001	0.12437	0.000001	0.00001	-0.02539	-0.000005
15	C11	0.05016	0.00000	0.02943	0.000000	0.00000	-0.01472	-0.000001
16	C12	0.01859	0.00000	0.00943	0.000000	0.00000	-0.00717	-0.000000
			SUM =	1.00000	1.000004	%AAD =	1.86663	0.007783

TABLE 5.45 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 8.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 8.00 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.153030 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010069
2	N2	0.062500	0.004437
3	C1	0.062500	0.951893
4	C2	0.062500	0.031772
5	C3	0.062500	0.001574
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000018
9	NC5	0.062500	0.000017
10	C6	0.062500	0.000053
11	C7	0.062500	0.000056
12	C8	0.062500	0.000034
13	C9	0.062500	0.000013
14	C10	0.062500	0.000027
15	C11	0.062500	0.000006
16	C12	0.062500	0.000000
	SUM =	1.000000	1.000000

V/F = 0.999877900
V = 1.152317000 MOLE/HR
L = 0.000232677 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00262	0.01007	0.00534	0.010069	2.54509	0.00134	0.000000
2	N2	0.00007	0.00444	0.00023	0.004438	25.83601	0.00010	0.000000
3	C1	0.07704	0.95193	0.19602	0.951963	6.55877	0.06811	0.000064
4	C2	0.03243	0.03177	0.04925	0.031771	0.87122	0.00404	-0.000000
5	C3	0.01646	0.00157	0.01069	0.001573	0.19938	-0.00857	-0.000000
6	IC4	0.00008	0.00002	0.00027	0.000015	0.07435	0.00012	-0.000000
7	NC4	0.00021	0.00001	0.00039	0.000014	0.04851	0.00008	-0.000000
8	IC5	0.00130	0.00002	0.00146	0.000018	0.01682	-0.00022	-0.000000
9	NC5	0.00173	0.00002	0.00199	0.000017	0.01158	-0.00026	-0.000000
10	C6	0.02294	0.00005	0.02426	0.000051	0.00285	-0.00497	-0.000001
11	C7	0.06476	0.00005	0.06517	0.000048	0.00070	-0.00314	-0.000006
12	C8	0.09969	0.00003	0.10059	0.000019	0.00016	0.01922	-0.000011
13	C9	0.11754	0.00001	0.10633	0.000003	0.00004	-0.03993	-0.000005
14	C10	0.42584	0.00001	0.27807	0.000002	0.00001	-0.21994	-0.000009
15	C11	0.12610	0.00000	0.06797	0.000000	0.00000	-0.07577	0.000000
16	C12	0.01119	0.00000	0.00559	0.000000	0.00000	-0.00712	0.000000
			SUM =	1.00000	1.000001	%AAD =	2.92394	0.000009

THE AMOUNT OF COMPONENT,A = 16

T = 8.00 °F P = 700.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.453030 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010155
2	N2	0.062500	0.004651
3	C1	0.062500	0.951288
4	C2	0.062500	0.031921
5	C3	0.062500	0.001755
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000013
9	NC5	0.062500	0.000015
10	C6	0.062500	0.000048
11	C7	0.062500	0.000051
12	C8	0.062500	0.000031
13	C9	0.062500	0.000013
14	C10	0.062500	0.000024
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.193877900
V = 2.453342000 MOLE/HR
L = 0.000337872 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.46 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE EXPERIMENTAL DATA AND THE PROPOSED GENERAL MODEL AT T = 8.0°F P = 700.0 PSIA

ID	COMPONENT	X(EXP)	Y(EXP)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00265	0.01016	0.01027	0.010155	1.28749	0.00503	-0.000005
2	N2	0.00009	0.00465	0.00064	0.004651	9.54257	0.00040	0.000000
3	C1	0.25105	0.95131	0.42403	0.951340	2.92411	0.07430	0.000055
4	C2	0.02279	0.03192	0.08073	0.031917	0.51531	0.03915	-0.000004
5	C3	0.00885	0.00176	0.01572	0.001754	0.14545	0.00321	-0.000001
6	IC4	0.00005	0.00001	0.00028	0.000015	0.06959	0.00017	-0.000000
7	NC4	0.00015	0.00001	0.00039	0.000014	0.04701	0.00015	-0.000000
8	IC5	0.00092	0.00001	0.00086	0.000013	0.01963	-0.00026	-0.000000
9	NC5	0.00128	0.00001	0.00137	0.000015	0.01397	-0.00022	-0.000000
10	C6	0.01516	0.00005	0.01403	0.000046	0.00429	-0.00436	-0.000001
11	C7	0.04357	0.00005	0.04622	0.000047	0.00132	-0.00811	-0.000003
12	C8	0.06792	0.00003	0.07867	0.000023	0.00039	-0.00757	-0.000005
13	C9	0.10162	0.00001	0.07220	0.000006	0.00011	-0.04623	-0.000004
14	C10	0.36321	0.00001	0.20250	0.000005	0.00004	-0.20785	-0.000008
15	C11	0.09597	0.00000	0.04275	0.000000	0.00002	-0.06317	-0.000001
16	C12	0.02452	0.00000	0.00924	0.000000	0.00000	-0.01743	-0.000000
			SUM =	1.00000	1.000001	AAC =	2.98500	0.000509

THE AMOUNT OF COMPONENT,N = 16

T = -10.00 ° F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.639830 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005544
2	N2	0.062500	0.002730
3	C1	0.062500	0.966292
4	C2	0.062500	0.022314
5	C3	0.062500	0.002002
6	IC4	0.062500	0.000317
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000138
9	NC5	0.062500	0.000101
10	C6	0.062500	0.000083
11	C7	0.062500	0.000079
12	C8	0.062500	0.000048
13	C9	0.062500	0.000034
14	C10	0.062500	0.000019
15	C11	0.062500	0.000005
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.999513200
V = 2.639815000 MOLE/HR
L = 0.000394942 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.47 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = -10.0°F P = 500.0 PSIA

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00419	0.00554	0.00331	0.005541	1.51901	-0.00054	0.000002
2	N2	0.00019	0.00273	0.00013	0.002731	18.55620	-0.00004	0.000004
3	C1	0.27078	0.96645	0.20444	0.966471	4.23653	-0.04510	0.000943
4	C2	0.04809	0.02231	0.03812	0.022263	0.52955	-0.00601	-0.000024
5	C3	0.01873	0.00200	0.01493	0.001979	0.11976	-0.00219	-0.000018
6	IC4	0.00827	0.00031	0.00593	0.000316	0.04848	-0.00175	0.000001
7	NC4	0.01195	0.00029	0.00847	0.000293	0.03132	-0.00260	0.000002
8	IC5	0.01575	0.00001	0.01080	0.000136	0.01143	-0.00383	0.000123
9	NC5	0.01687	0.00010	0.01156	0.000099	0.00777	-0.00412	0.000002
10	C6	0.05149	0.00007	0.02573	0.000079	0.00200	-0.01205	0.000007
11	C7	0.14098	0.00005	0.11303	0.000064	0.00051	-0.01615	0.000016
12	C8	0.15900	0.00001	0.17495	0.000024	0.00012	0.03413	0.000012
13	C9	0.14164	0.00000	0.20102	0.000007	0.00003	0.08027	0.000004
14	C10	0.08348	0.00000	0.13131	0.000001	0.00001	0.06147	0.000001
15	C11	0.02275	0.00000	0.03669	0.000000	0.00000	0.01775	0.000000
16	C12	0.00583	0.00000	0.00951	0.000000	0.00000	0.00467	0.000000
			SUM =	1.00000	1.000002	AAD =	1.82915	0.007739

TABLE 5.48 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = 0.0°F P = 500.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 °F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638710 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.005940
2	N2	0.062500	0.002810
3	C1	0.062500	0.966192
4	C2	0.062500	0.021852
5	C3	0.062500	0.002042
6	IC4	0.062500	0.000303
7	NC4	0.062500	0.000294
8	IC5	0.062500	0.000136
9	NC5	0.062500	0.000097
10	C6	0.062500	0.000108
11	C7	0.062500	0.000113
12	C8	0.062500	0.000060
13	C9	0.062500	0.000029
14	C10	0.062500	0.000018
15	C11	0.062500	0.000005
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.999506300
V = 2.634722000 MOLE/HR
L = 0.003987312 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00418	0.00594	0.003337	0.005937	1.65729	-0.00059	0.000003
2	N2	0.00020	0.00281	0.000014	0.002811	18.42580	-0.00005	0.000004
3	C1	0.26293	0.96635	0.202489	0.966358	4.46485	-0.04628	0.000966
4	C2	0.04292	0.02185	0.034931	0.021808	0.59027	-0.00534	-0.000018
5	C3	0.01667	0.00204	0.013728	0.002021	0.13948	-0.00216	-0.000016
6	IC4	0.00674	0.00030	0.005053	0.000303	0.03674	-0.00140	0.000001
7	NC4	0.01000	0.00029	0.007457	0.000293	0.03719	-0.00213	0.000001
8	IC5	0.01273	0.00013	0.009227	0.000135	0.01383	-0.00238	0.000001
9	NC5	0.01312	0.00009	0.009480	0.000096	0.00955	-0.00309	0.000002
10	C6	0.05304	0.00010	0.038560	0.000103	0.00253	-0.01227	0.000006
11	C7	0.16517	0.00008	0.133730	0.000095	0.00067	-0.02376	0.000013
12	C8	0.18167	0.00002	0.193800	0.000035	0.00017	0.02336	0.000015
13	C9	0.11964	0.00000	0.167240	0.000009	0.00004	0.05720	0.000005
14	C10	0.07936	0.00000	0.126140	0.000001	0.00001	0.05402	0.000000
15	C11	0.02387	0.00000	0.029240	0.000000	0.00000	0.01762	0.000000
16	C12	0.00776	0.00000	0.012970	0.000000	0.00000	0.00595	0.000000
			SUM =	1.000000	1.000002	ZAAD =	1.61634	0.006604

TABLE 5.49 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = 50.0°F P = 500.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 50.00 °F P = 500.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE °R

FEED RATE = 1.000000 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.002595
2	N2	0.062500	0.003323
3	C1	0.062500	0.831252
4	C2	0.062500	0.076620
5	C3	0.062500	0.003315
6	IC4	0.062500	0.012398
7	NC4	0.062500	0.008630
8	IC5	0.062500	0.003476
9	NC5	0.062500	0.001519
10	C6	0.062500	0.001224
11	C7	0.062500	0.000387
12	C8	0.062500	0.000137
13	C9	0.062500	0.000034
14	C10	0.062500	0.000011
15	C11	0.062500	0.000001
16	C12	0.062500	0.000000
	SUM =	1.000000	0.969920

V/F = 0.977332700
V = 1.285310000 MOLE/HR
L = 0.033210110 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00115	0.00263	0.000125	0.002667	2.28365	0.000000	-0.000043
2	N2	0.00054	0.00859	0.000062	0.008642	14.99790	0.000003	-0.000056
3	C1	0.17623	0.87857	0.019602	0.883545	4.81664	0.000431	-0.000956
4	C2	0.00842	0.07899	0.008945	0.077423	0.92806	0.001397	-0.002527
5	C3	0.01225	0.00034	0.012007	0.003141	0.27895	-0.000113	0.002761
6	IC4	0.01823	0.01256	0.010160	0.012477	0.13168	-0.001466	-0.000335
7	NC4	0.00697	0.00877	0.010023	0.003660	0.09264	-0.001465	-0.000217
8	IC5	0.00281	0.00345	0.009354	0.003442	0.03946	-0.001666	-0.000055
9	NC5	0.00585	0.00149	0.005452	0.001492	0.02934	-0.000063	-0.000017
10	C6	0.00943	0.00108	0.012654	0.001130	0.00954	-0.002251	0.000035
11	C7	0.00685	0.00003	0.010353	0.000302	0.00312	-0.001148	0.000272
12	C8	0.00698	0.00005	0.007793	0.000071	0.00958	0.000482	0.000020
13	C9	0.00287	0.00001	0.002561	0.000009	0.00331	0.000440	-0.000004
14	C10	0.00817	0.00000	0.011460	0.000001	0.00010	0.000239	0.000000
15	C11	0.00082	0.00000	0.001113	0.000000	0.00004	0.000027	0.000000
16	C12	0.00000	0.00000	0.000000	0.000000	0.00001	0.000000	0.000000
			SUM =	1.000000	1.000000	AAD =	1.000579	0.005610

THE AMOUNT OF COMPONENT,N = 16

T = 47.00 ° F P = 815.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.638670 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006617
2	N2	0.062500	0.029980
3	C1	0.062500	0.923041
4	C2	0.062500	0.030932
5	C3	0.062500	0.005329
6	IC4	0.062500	0.001090
7	NC4	0.062500	0.001041
8	IC5	0.062500	0.000499
9	NC5	0.062500	0.000368
10	C6	0.062500	0.000423
11	C7	0.062500	0.000315
12	C8	0.062500	0.000198
13	C9	0.062500	0.000098
14	C10	0.062500	0.000045
15	C11	0.062500	0.000017
16	C12	0.062500	0.000007
	SUM =	1.000000	0.999399

V/F = 0.9943946C0
V = 2.623356000 MOLE/HR
L = 0.0140134 20 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.50 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = 47.0°F P = 815.0 PSIA

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00398	0.00662	C.00362	C.006608	1.69211	-0.00006	0.000014
2	N2	0.00271	0.02999	0.00235	C.030024	11.81847	-0.00016	0.000144
3	C1	0.26213	0.92329	C.23417	C.923417	3.65476	-0.00854	C.003525
4	C2	0.04362	0.03093	C.03953	C.030751	0.71995	-0.00075	-0.000082
5	C3	0.02353	0.00532	C.02116	C.005211	0.22825	-0.00062	-0.000092
6	IC4	0.01063	0.00109	C.00853	C.001085	0.11789	-0.00139	0.000003
7	NC4	0.01441	0.00104	C.01141	C.001036	0.08414	-0.00206	0.000003
8	IC5	0.01551	0.00049	C.01177	C.000496	0.03903	-C.00276	C.000004
9	NC5	0.01532	0.00036	0.01151	C.000365	0.02940	-0.00286	C.000004
10	C6	0.05045	0.00040	C.03654	0.000416	0.01056	-0.01072	C.000014
11	C7	0.10140	0.00028	C.07362	C.000304	0.00383	-C.02169	C.000029
12	C8	0.15632	0.00014	C.12593	0.000181	0.00133	-0.01991	0.000042
13	C9	0.14598	0.00004	C.15376	C.000077	0.00046	0.02053	C.000024
14	C10	0.09513	0.00001	C.14436	C.000026	0.00017	0.06120	C.000017
15	C11	0.04021	0.00000	C.07746	0.000007	0.00009	0.04368	0.000005
16	C12	0.01864	0.00000	C.04421	C.000001	0.00003	0.02924	C.000001
			SUM =	1.00000	1.000004	AAD =	1.41477	0.024363

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 ° F P = 250.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.639800 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.004000
2	N2	0.062500	0.035993
3	C1	0.062500	0.894976
4	C2	0.062500	0.044821
5	C3	0.062500	0.014038
6	IC4	0.062500	0.001311
7	NC4	0.062500	0.002835
8	IC5	0.062500	0.000622
9	NC5	0.062500	0.000632
10	C6	0.062500	0.000294
11	C7	0.062500	0.000264
12	C8	0.062500	0.000144
13	C9	0.062500	0.000045
14	C10	0.062500	0.000018
15	C11	0.062500	0.000006
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000000

V/F = 0.993028200
V = 2.621389000 MOLE/HR
L = 0.018410630 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.51 COMPARISON OF THE LIQUID PHASE AND AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = -8.0°F P = 250.0 PSIA

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00145	0.00400	0.00220	0.004000	2.46668	0.00018	0.000015
2	N2	0.00100	0.03603	0.00188	0.036085	26.02831	0.00039	0.000210
3	C1	0.11202	0.89570	0.18672	0.896543	6.52544	0.02595	0.004586
4	C2	0.05057	0.04482	0.07491	0.044561	0.80840	0.00478	-0.000069
5	C3	0.07730	0.01398	0.10653	0.013527	0.17257	0.00141	-0.000396
6	IC4	0.02189	0.00129	0.02563	0.001272	0.06748	-0.00276	-0.000014
7	NC4	0.07561	0.00277	0.08581	0.002709	0.04291	-0.01220	-0.000046
8	IC5	0.04938	0.00058	0.05136	0.000549	0.01453	-0.01143	-0.000034
9	NC5	0.07365	0.00056	0.07361	0.000528	0.00974	-0.01921	-0.000034
10	C6	0.11381	0.00019	0.09572	0.000161	0.00229	-0.04309	-0.000027
11	C7	0.20462	0.00007	0.14774	0.000053	0.00054	-0.09546	-0.000015
12	C8	0.14317	0.00001	0.09720	0.000008	0.00012	-0.07135	-0.000001
13	C9	0.04816	0.00000	0.03230	0.000001	0.00003	-0.02430	0.000001
14	C10	0.01887	0.00000	0.01263	0.000000	0.00001	-0.00954	0.000000
15	C11	0.00634	0.00000	0.00424	0.000000	0.00000	-0.00320	0.000000
16	C12	0.00215	0.00000	0.00144	0.000000	0.00000	-0.00109	0.000000
			SUM =	1.00000	1.000003	AAD =	2.04076	0.033992

THE AMOUNT OF COMPONENT,N = 16

T = -8.00 ° F P = 1115.00 PSIA R = 10.720 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.630810 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.007097
2	N2	0.062500	0.042107
3	C1	0.062500	0.909945
4	C2	0.062500	0.030471
5	C3	0.062500	0.005833
6	IC4	0.062500	0.001356
7	NC4	0.062500	0.001287
8	IC5	0.062500	0.000599
9	NC5	0.062500	0.000371
10	C6	0.062500	0.000495
11	C7	0.062500	0.000274
12	C8	0.062500	0.000101
13	C9	0.062500	0.000046
14	C10	0.062500	0.000015
15	C11	0.062500	0.000004
16	C12	0.062500	0.000002
	SUM =	1.000000	1.000004

V/F = 0.9394607500
V = 2.611078000 MOLE/HR
L = 0.027812000 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.52 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = -8.0°F P = 1115.0 PSIA

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00722	0.00710	0.00899	0.007062	0.89113	0.00073	-0.000069
2	N2	0.00601	0.04213	0.01081	0.042299	4.43717	0.00356	0.000326
3	C1	0.41306	0.91023	0.59682	0.910691	1.73038	0.11515	0.003779
4	C2	0.06890	0.03045	0.07881	0.029944	0.43086	0.00085	-0.000395
5	C3	0.04043	0.00581	0.03983	0.005500	0.15658	-0.00517	-0.000293
6	IC4	0.01994	0.00135	0.01257	0.001350	0.12177	-0.00882	0.000010
7	NC4	0.02727	0.00127	0.01679	0.001231	0.09653	-0.01241	0.000014
8	IC5	0.02698	0.00058	0.01407	0.000596	0.04803	-0.01453	0.000014
9	NC5	0.02282	0.00036	0.01168	0.000368	0.03576	-0.01249	0.000012
10	C6	0.08227	0.00045	0.03623	0.000490	0.01531	-0.05018	0.000043
11	C7	0.11038	0.00021	0.04573	0.000268	0.00665	-0.06989	0.000059
12	C8	0.08338	0.00005	0.03962	0.000097	0.00276	-0.04832	0.000044
13	C9	0.05801	0.00001	0.04232	0.000041	0.00110	-0.02055	0.000027
14	C10	0.02352	0.00000	0.02738	0.000012	0.00051	-0.00071	0.000010
15	C11	0.00697	0.00000	0.01117	0.000003	0.00031	0.00291	0.000003
16	C12	0.00286	0.00000	0.00713	0.000001	0.00015	0.00345	0.000001
			SUM =	1.00000	1.000002	%AAD =	2.21075	0.031502

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TABLE 5.53 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = 0.0°F P = 300.0 PSIA

THE AMOUNT OF COMPONENT,N = 16

T = 0.00 °F P = 300.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.250860 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.006002
2	N2	0.062500	0.003101
3	C1	0.062500	0.764610
4	C2	0.062500	0.022708
5	C3	0.062500	0.002301
6	IC4	0.062500	0.000330
7	NC4	0.062500	0.000311
8	IC5	0.062500	0.000151
9	NC5	0.062500	0.000111
10	C6	0.062500	0.000123
11	C7	0.062500	0.000112
12	C8	0.062500	0.000075
13	C9	0.062500	0.000040
14	C10	0.062500	0.000019
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.998543700
V = 2.247532000 MOLE/HR
L = 0.003327370 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00270	0.00600	0.00197	0.006001	2.50359	-0.00033	0.000004
2	N2	0.00012	0.00310	0.00008	0.003102	32.63265	-0.00002	0.000003
3	C1	0.15784	0.96479	0.11054	0.964791	7.25635	-0.02474	0.001030
4	C2	0.03065	0.02271	0.02244	0.022678	0.04015	-0.00363	-0.000005
5	C3	0.01429	0.00230	0.01056	0.002284	0.17978	-0.00157	-0.000013
6	IC4	0.00602	0.00033	0.00429	0.000329	0.06390	-0.00086	0.000001
7	NC4	0.00891	0.00031	0.00625	0.000309	0.04117	-0.00139	0.000001
8	IC5	0.01285	0.00015	0.00890	0.000149	0.01395	-0.00214	0.000002
9	NC5	0.01397	0.00011	0.00959	0.000109	0.00948	-0.00243	0.000001
10	C6	0.06171	0.00011	0.04310	0.000117	0.00225	-0.00981	0.000003
11	C7	0.17672	0.00007	0.14106	0.000091	0.00054	-0.00686	0.000019
12	C8	0.23975	0.00002	0.25673	0.000037	0.00012	0.05939	0.000014
13	C9	0.16423	0.00000	0.22122	0.000007	0.00003	0.10215	0.000004
14	C10	0.08440	0.00000	0.12437	0.000001	0.00001	0.06535	0.000001
15	C11	0.01959	0.00000	0.02543	0.000000	0.00000	0.01595	0.000000
16	C12	0.00625	0.00000	0.00943	0.000000	0.00000	0.00516	0.000000
			SUM =	1.00000	1.000004	%AAD =	1.94905	0.006926

THE AMOUNT OF COMPONENT,N = 16

T = 8.00 °F P = 300.00 PSIA R = 10.720 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 1.153030 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010069
2	N2	0.062500	0.004437
3	C1	0.062500	0.951893
4	C2	0.062500	0.031772
5	C3	0.062500	0.001574
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000018
9	NC5	0.062500	0.000017
10	C6	0.062500	0.000053
11	C7	0.062500	0.000056
12	C8	0.062500	0.000034
13	C9	0.062500	0.000013
14	C10	0.062500	0.000027
15	C11	0.062500	0.000006
16	C12	0.062500	0.000000
	SUM =	1.000000	1.000000

V/F = 0.999377900
V = 1.152817030 MOLE/HR
L = 0.000232697 MOLE/HR

NO. OF ITERATION = 2

TABLE 5.54 COMPARISON OF THE LIQUID AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT T = 8.0°F P = 300.0 PSIA

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00513	0.01007	0.00634	0.010069	2.54509	-0.00117	0.000001
2	N2	0.00022	0.00444	0.00023	0.004438	25.83601	-0.00005	0.000000
3	C1	0.18779	0.95197	0.19602	0.951963	6.55877	-0.04264	0.000024
4	C2	0.04734	0.03177	0.04925	0.031771	0.87122	-0.01087	0.000001
5	C3	0.01026	0.00157	0.01063	0.001573	0.19938	-0.00237	0.000000
6	IC4	0.00028	0.00001	0.00027	0.000015	0.07435	-0.00008	0.000000
7	NC4	0.00040	0.00001	0.00039	0.000014	0.04051	-0.00011	0.000000
9	IC5	0.00154	0.00002	0.00146	0.000018	0.01682	-0.00046	0.000000
9	NC5	0.00210	0.00002	0.00199	0.000017	0.01158	-0.00063	0.000000
10	C6	0.02617	0.00005	0.02426	0.000051	0.00285	-0.00120	0.000000
11	C7	0.09964	0.00005	0.09170	0.000048	0.00070	-0.03174	0.000001
12	C8	0.16972	0.00002	0.16051	0.000019	0.00016	-0.05081	0.000001
13	C9	0.10686	0.00000	0.10033	0.000003	0.00004	-0.02815	0.000000
14	C10	0.27146	0.00000	0.21807	0.000002	0.00001	-0.06556	-0.000000
15	C11	0.06580	0.00000	0.06797	0.000000	0.00000	-0.01947	0.000000
16	C12	0.00530	0.00000	0.00550	0.000000	0.00000	-0.00123	0.000000
			SUM =	1.00000	1.000001	%AAD =	1.62211	0.000176

TABLE 5.55 COMPARISON OF THE LIQUID PHASE AND THE VAPOR PHASE COMPOSITIONS FROM THE ORDINARY VLE CALCULATION MODEL AND THE PROPOSED GENERAL MODEL AT $T = 8.0^{\circ}F$ $P = 700.0$ PSIA

THE AMOUNT OF COMPONENT = 16

T = 8.00 °F P = 700.00 PSIA R = 10.730 PSIA-CUBIC FT/LB-MOLE°R

FEED RATE = 2.453880 MOLE/HR V/F = 0.500000

INITIAL VALUE OF LIQUID AND VAPOR PHASE COMPOSITION

ID	COMPONENT	X	Y
1	CO2	0.062500	0.010155
2	N2	0.062500	0.004651
3	C1	0.062500	0.951288
4	C2	0.062500	0.031921
5	C3	0.062500	0.001755
6	IC4	0.062500	0.000015
7	NC4	0.062500	0.000014
8	IC5	0.062500	0.000013
9	NC5	0.062500	0.000015
10	C6	0.062500	0.000048
11	C7	0.062500	0.000051
12	C8	0.062500	0.000031
13	C9	0.062500	0.000013
14	C10	0.062500	0.000024
15	C11	0.062500	0.000004
16	C12	0.062500	0.000001
	SUM =	1.000000	0.999999

V/F = 0.338779C3
V = 2.453812030 MOLE/HR
L = 0.000067872 MOLE/HR

NO. OF ITERATION = 2

ID	COMPONENT	X(ORDINARY)	Y(ORDINARY)	X(MODEL)	Y(MODEL)	K(MODEL)	ERRX	ERRY
1	CO2	0.00947	0.01015	0.01027	0.010155	1.28949	-0.00159	0.000000
2	N2	0.00055	0.00465	0.00064	0.004651	9.54257	-0.00006	0.000000
3	C1	0.38169	0.95135	0.42468	0.951340	2.92411	-0.05634	0.000019
4	C2	0.07540	0.03122	0.08073	0.031917	0.51531	-0.01346	0.000000
5	C3	0.01493	0.00175	0.01572	0.001754	0.14545	-0.00287	0.000000
6	IC4	0.00031	0.00001	0.00023	0.000013	0.06959	-0.00009	-0.000000
7	NC4	0.00043	0.00001	0.00039	0.000014	0.04701	-0.00013	-0.000000
8	IC5	0.00100	0.00001	0.00085	0.000013	0.01964	-0.00034	-0.000000
9	NC5	0.00162	0.00001	0.00137	0.000015	0.01397	-0.00056	-0.000000
10	C6	0.01713	0.00005	0.01403	0.000046	0.00423	-0.00633	0.000000
11	C7	0.05806	0.00005	0.04622	0.000047	0.00132	-0.02260	0.000001
12	C8	0.09724	0.00002	0.07867	0.000023	0.00039	-0.03689	0.000002
13	C9	0.00130	0.00001	0.07220	0.000006	0.00011	-0.02591	0.000001
14	C10	0.20555	0.00000	0.20259	0.000005	0.00004	-0.05417	0.000001
15	C11	0.04242	0.00000	0.04279	0.000000	0.00002	-0.00962	0.000000
16	C12	0.00887	0.00000	0.00924	0.000000	0.00000	-0.00180	0.000000
			SUM =	1.000000	1.000001	AAD =	1.45501	0.000167