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APPENDICES

APPENDIX A

THERMODYNAMIC PROPERTIES DATA

Table A.1 Presents thermodynamic properties of pure components used for calculation in this work.

Substances / Properties	Benzene	Cyclohexane	n-Heptane
Molecular weight [a]	78.11	84.16	100.20
Boiling point (K) [a]	353.2	353.9	371.6
Critical temperature (K) [a]	562.16	553.64	540.10
Critical pressure (Pa) [a]	4898000	4075000	2735750
Acentric factor (ω) [a]	0.20929	0.20877	0.35022
Pure compound parameter (κ_1) in PRSV equation [a]	0.07019	0.07023	0.04648
Pure compound parameter (κ_2) in PRSV2 equation [b]	0.7939	0.6146	0.9331
Pure compound parameter (κ_3) in PRSV2 equation [b]	0.5230	0.5300	0.4960

[a] Stryjek et al., 1989:323-333

[b] Stryjek et al., 1989:820-826

APPENDIX B

DENSITY REFERENCE

Table B.1 Density of nitrogen at elevated temperature and pressure (User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995).

P (bar) / T (K)	1.01325	2	5	10
	Density (g/cm^3)			
250	0.00135	0.00270	0.00676	0.01358
300	0.00112	0.00225	0.00562	0.01125
350	0.00096	0.00192	0.00481	0.00961
400	0.00084	0.00168	0.00421	0.00840
450	0.00075	0.00150	0.00374	0.00746
500	0.00067	0.00135	0.00336	0.00671
550	0.00061	0.00122	0.00306	0.00610

Table B.2 Density of nitrogen at elevated temperature and pressure in this work.

P (bar) / T (K)	1.01325	2	5	10
	Density (g/cm^3)			
308.15	0.0010927	0.0021881	0.0054730	0.0109587
313.15	0.0010752	0.0021530	0.0053851	0.0107812
323.15	0.0010417	0.0020861	0.0052175	0.0104429
333.15	0.0010103	0.0020233	0.0050600	0.0101251

Table B.3 Density of benzene at elevated temperature and pressure.

P (bar) / T (K)	1.01325[a]	2[b]	5[b]	10[b]
	Density (g/cm^3)			
300.00	-	0.87176	0.87201	0.87244
303.15	0.86830	-	-	-
313.15	0.85810	-	-	-
320.00	-	0.85022	0.85052	0.85101
333.15	0.83580	-	-	
340.00	-	0.82834	0.82868	0.82925
353.15	0.81460	-	-	-
360.00	-	-	0.80633	0.80699
373.15	0.79260	-	-	-
380.00	-	-	0.78323	0.70741
393.15	0.76850	-	-	-
400.00	-		0.7591	0.76004
413.15	0.74370	-	-	-
420.00	-	-	-	0.73469
440.00	-	-	-	0.70741

[a] Beg et al., (1993)

[b] User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995

Table B.4 Density of benzene at elevated temperature and pressure in this work.

P (bar) / T (K)	1.01325	2	5	10
	Density (g/cm^3)			
308.15	0.866484	0.869597	0.872035	0.882199
313.15	0.861377	0.864355	0.866535	0.877592
323.15	0.851014	0.853810	0.855535	0.868229
333.15	0.840451	0.843184	0.844535	0.858666

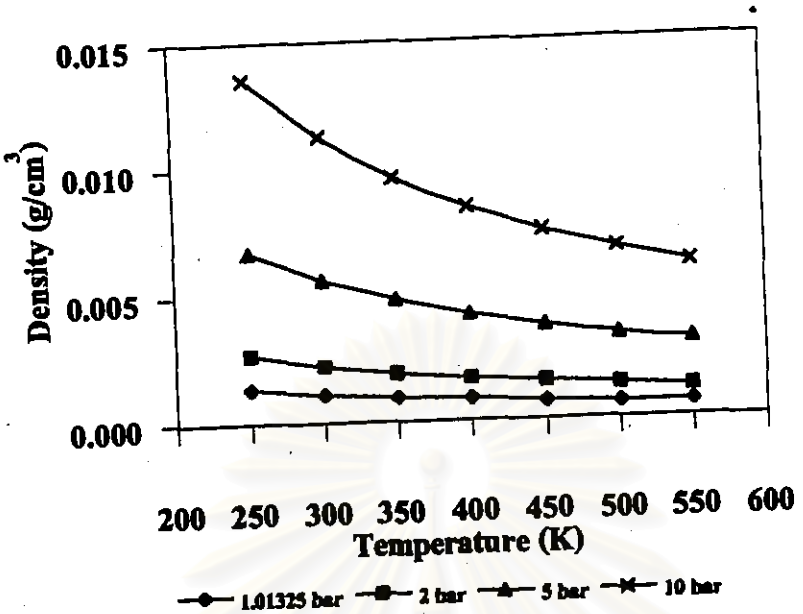

Figure B.1 Density of nitrogen at elevated temperature and pressure (User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995).

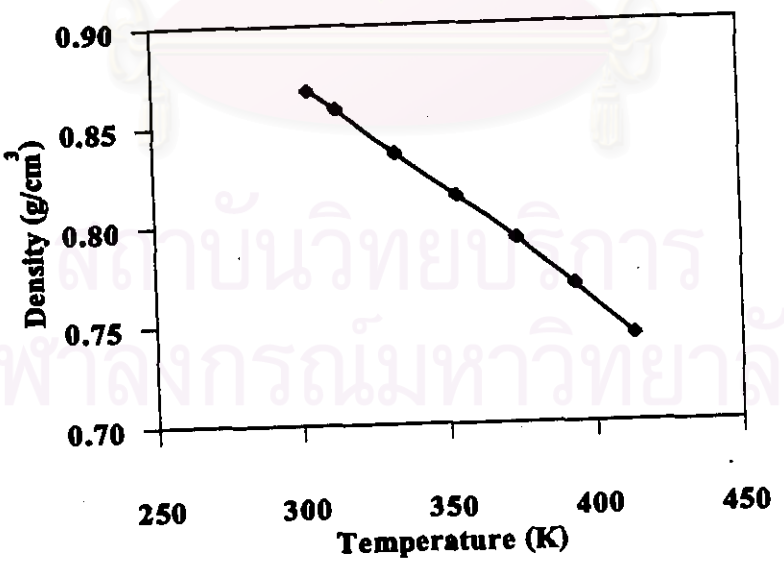

Figure B.2 Density of benzene at 1.01325 bar (Beg et al. 1993).

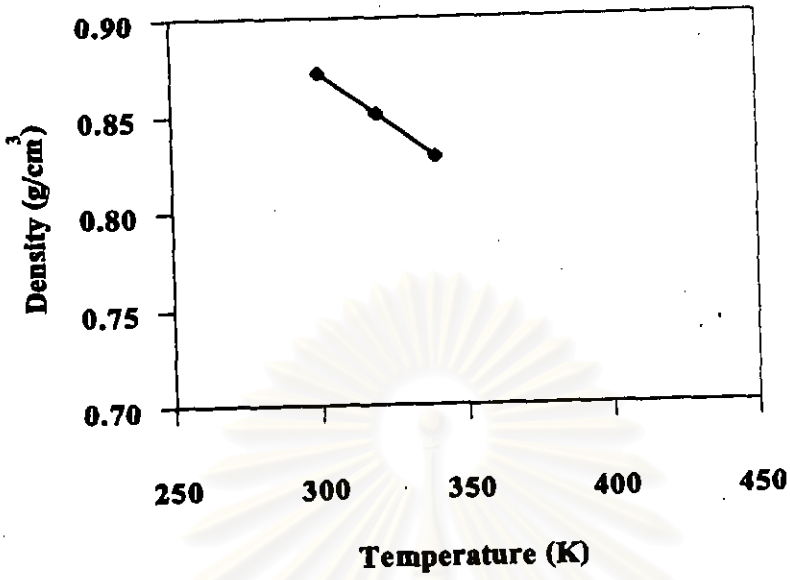

Figure B.3 Density of benzene at 2 bar (User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995).

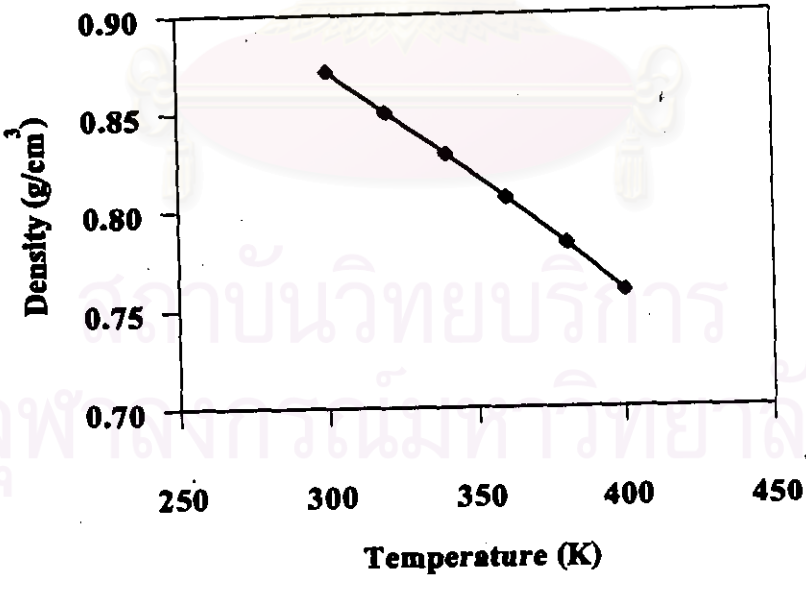

Figure B.4 Density of benzene at 5 bar (User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995).

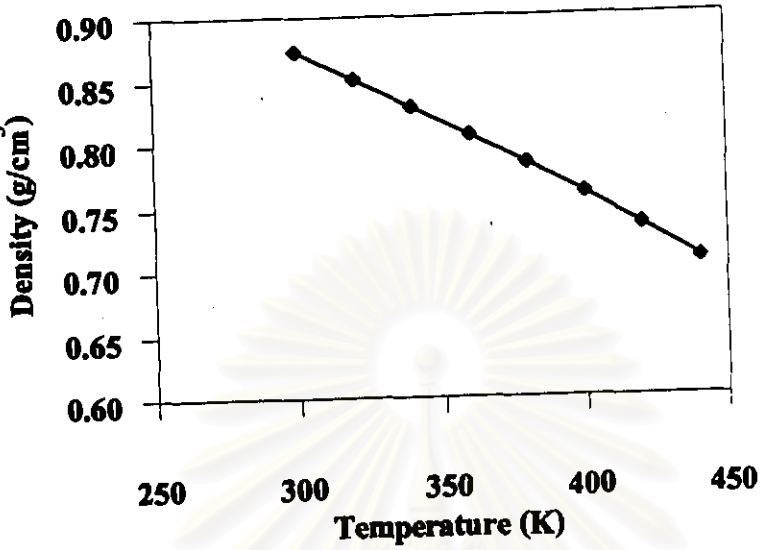

Figure B.5 Density of benzene at 10 bar (User manual of DMA 512P density measuring cell for high pressures and high temperatures, 1995).

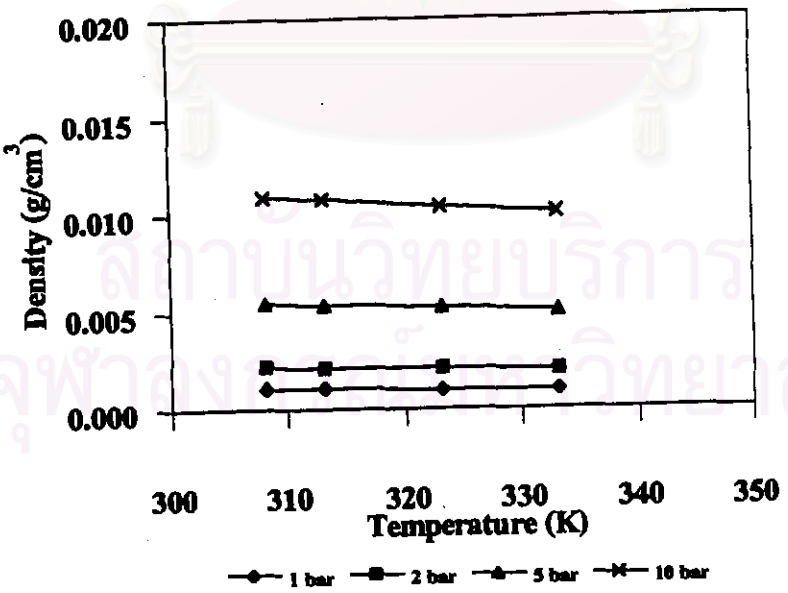

Figure B.6 Density of nitrogen at interesting temperature and pressure.

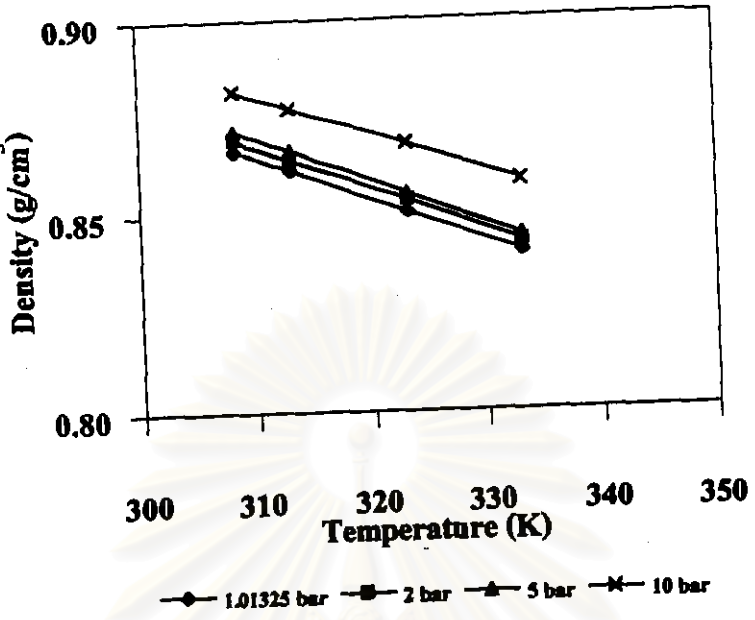

Figure B.7 Density of benzene at interesting temperature and pressure.

APPENDIX C

GAS CHROMATOGRAPH CALIBRATION

The calibration curves of benzene, cyclohexane and n-heptane are illustrated in the following figures.

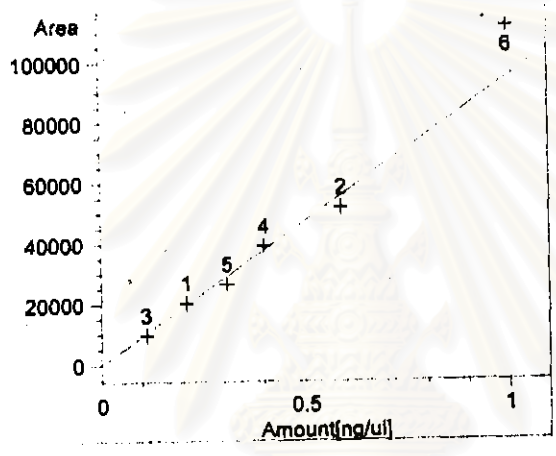

Figure C.1 Calibration curve of liquid benzene.

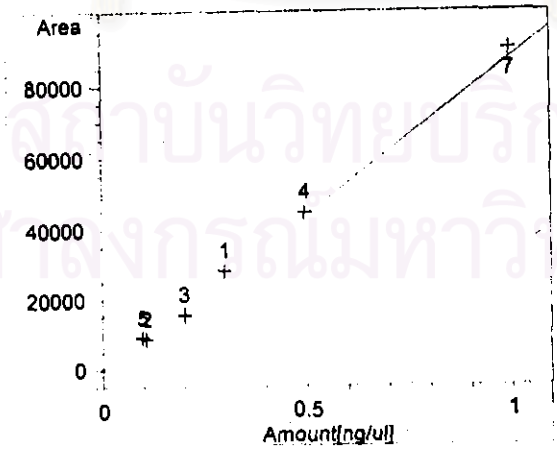

Figure C.2 Calibration curve of liquid cyclohexane.

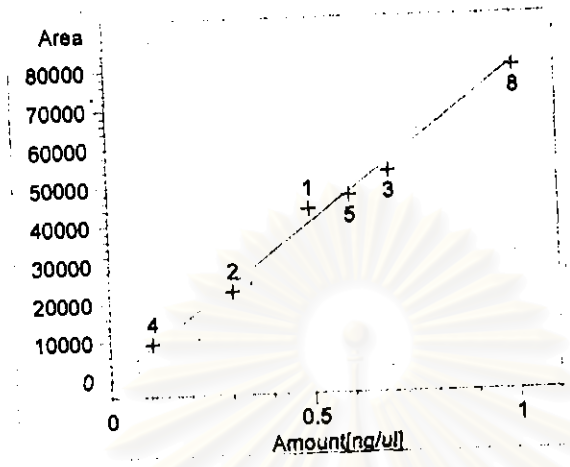

Figure C.3 Calibration curve of liquid n-heptane.

APPENDIX D

CORRELATIONS OF PARTIAL MOLAR VOLUME

D.1 Derivatives with Respect to Mole Fractions.

For a binary system, note that

$$n_1 = nx_1 = (n_1 + n_2)x_1$$

and

$$dn_1 = ndx_1 + x_1 dn_1 = \frac{ndx_1}{1 - x_1}$$

so that

$$\overline{M}_1 = \left(\frac{\partial nM}{\partial n_1}\right)_{T,P,n_2} = M + n\left(\frac{\partial M}{\partial n_1}\right)$$

$$= M + (1 - x_1)\left(\frac{\partial M}{\partial x_1}\right)_{T,P}$$

similarly,

$$\overline{M}_2 = M + x_1\left(\frac{\partial M}{\partial x_2}\right)_{T,P}$$

$$= M - x_1\left(\frac{\partial M}{\partial x_1}\right)_{T,P}$$

In the general case the partial molar property is

$$\overline{M}_i = M - \sum_{k \neq i} x_k \left(\frac{\partial M}{\partial x_k}\right)_{T,P,x_{j \neq k}}$$

The correlations for partial molar volumes were represented by the Peng-Robinson equation of state as follows:

$$Z^3 - (1 - B)Z^2 + (A - 3B^2 - 2B)Z - (AB - B^2 - B^3) = 0$$

$$A = \sum_{i=1}^{n}\sum_{j=1}^{n} x_i x_j (1 - k_{ij})\sqrt{A_i A_j}$$

$$B = \sum_{i=1}^{n} x_i B_i$$

The required derivatives are found as follows:

For binary system:

$$A = x_1^2 A_1 + (1-x_1)^2 A_2 + 2x_1(1-x_1)(1-k_{12})\sqrt{A_1 A_2}$$

$$\left(\frac{\partial A}{\partial x_1}\right) = 2x_1 A_1 - 2(1-x_1)A_2 + 2(1-2x_1)(1-k_{12})\sqrt{A_1 A_2}$$

$$B = x_1 B_1 + (1-x_1)B_2$$

$$\left(\frac{\partial B}{\partial x_1}\right) = B_1 - B_2$$

therefore,

$$\left(\frac{\partial Z}{\partial x_1}\right) = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_1}\right) + (Z^2 - (2+6B)Z - A + 2B + 3B^2)\left(\frac{\partial B}{\partial x_1}\right)\right]}{3Z^2 - 2(1-B)Z + A - 3B^2 - 2B}$$

since

$$V = \frac{ZRT}{P}$$

the derivative is

$$\left(\frac{\partial V}{\partial x_1}\right) = \frac{RT}{P}\left(\frac{\partial Z}{\partial x_1}\right)$$

and the equations for the partial molar volume are

$$\overline{V}_1 = \frac{RT}{P}\left[Z + x_2\left(\frac{\partial Z}{\partial x_1}\right)\right]$$

$$\overline{V}_2 = \frac{RT}{P}\left[Z - x_1\left(\frac{\partial Z}{\partial x_1}\right)\right]$$

For ternary system:

$$A=(1-x_2-x_3)^2A_1+x_2^2A_2+x_3^2A_3++2(1-x_2-x_3)x_2(1-k_{12})\sqrt{A_1A_2}$$
$$+2x_3(1-x_2-x_3)(1-k_{13})\sqrt{A_1A_3}+2x_2x_3)(1-k_{23})\sqrt{A_2A_3}$$
$$=x_1^2A_1+(1-x_1-x_3)^2A_2+x_3^2A_3+2x_1(1-x_1-x_3)(1-k_{12})\sqrt{A_1A_2}$$
$$+2x_1x_3)(1-k_{13})\sqrt{A_1A_3}+2x_3(1-x_1-x_3)(1-k_{23})\sqrt{A_2A_3}$$
$$=x_1^2A_1+x_2^2A_2+(1-x_1-x_2)^2A_3+2x_1x_2(1-k_{12})\sqrt{A_1A_2}$$
$$+2x_1(1-x_1-x_2)(1-k_{13})\sqrt{A_1A_3}+2x_2(1-x_1-x_2)(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_1}\right)_{x_2}=2A_1x_1-2A_3(1-x_1-x_2)+2x_2(1-k_{12})\sqrt{A_1A_2}$$
$$+2(1-x_1-x_2)(1-k_{13})\sqrt{A_1A_3}-2x_1(1-k_{13})\sqrt{A_1A_3}-2x_2(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_2}\right)_{x_1}=2A_2x_2-2A_3(1-x_1-x_2)+2x_1(1-k_{12})\sqrt{A_1A_2}$$
$$-2x_1(1-k_{13})\sqrt{A_1A_3}+2(1-x_1-x_2)(1-k_{23})\sqrt{A_2A_3}-2x_2(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_2}\right)_{x_3}=-2A_1(1-x_2-x_3)+2x_2A_2+2(1-x_2-x_3)(1-k_{12})\sqrt{A_1A_2}$$
$$-2x_2(1-k_{12})\sqrt{A_1A_2}-2x_3(1-k_{13})\sqrt{A_1A_3}+2x_3(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_3}\right)_{x_2}=-2A_1(1-x_2-x_3)+2A_3x_3-2x_2(1-k_{12})\sqrt{A_1A_2}$$
$$+2(1-x_2-x_3)(1-k_{13})\sqrt{A_1A_3}-2x_3(1-k_{13})\sqrt{A_1A_3}+2x_2(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_1}\right)_{x_3}=2A_1x_1-2A_2(1-x_1-x_3)+2(1-x_1-x_3)(1-k_{12})\sqrt{A_1A_2}$$
$$-2x_1(1-k_{12})\sqrt{A_1A_2}+2x_3(1-k_{13})\sqrt{A_1A_3}-2x_3(1-k_{23})\sqrt{A_2A_3}$$

$$\left(\frac{\partial A}{\partial x_3}\right)_{x_1}=-2A_2(1-x_1-x_3)+2A_3x_3-2x_1(1-k_{12})\sqrt{A_1A_2}$$
$$+2x_1(1-k_{13})\sqrt{A_1A_3}+2(1-x_1-x_3)(1-k_{23})\sqrt{A_2A_3}-2x_3(1-k_{23})\sqrt{A_2A_3}$$

$$B = (1-x_2-x_3)B_1 + x_2B_2 + x_3B_3$$
$$= x_1B_1 + (1-x_1-x_3)B_2 + x_3B_3$$
$$= x_1B_1 + x_2B_2 + (1-x_1-x_2)B_3$$

$$\left(\frac{\partial B}{\partial x_1}\right)_{x_2} = B_1 - B_3 \qquad \left(\frac{\partial B}{\partial x_2}\right)_{x_3} = -B_1 + B_2 \qquad \left(\frac{\partial B}{\partial x_1}\right)_{x_3} = B_1 - B_2$$

$$\left(\frac{\partial B}{\partial x_2}\right)_{x_1} = B_2 - B_3 \qquad \left(\frac{\partial B}{\partial x_3}\right)_{x_2} = -B_1 + B_3 \qquad \left(\frac{\partial B}{\partial x_3}\right)_{x_1} = -B_2 + B_3$$

therefore,

$$\left(\frac{\partial Z}{\partial x_1}\right)_{x_2} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_1}\right)_{x_2} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_1}\right)_{x_2}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

$$\left(\frac{\partial Z}{\partial x_2}\right)_{x_1} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_2}\right)_{x_1} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_2}\right)_{x_1}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

$$\left(\frac{\partial Z}{\partial x_2}\right)_{x_3} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_2}\right)_{x_3} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_2}\right)_{x_3}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

$$\left(\frac{\partial Z}{\partial x_3}\right)_{x_2} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_3}\right)_{x_2} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_3}\right)_{x_2}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

$$\left(\frac{\partial Z}{\partial x_1}\right)_{x_3} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_1}\right)_{x_3} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_1}\right)_{x_3}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

$$\left(\frac{\partial Z}{\partial x_3}\right)_{x_1} = \frac{-\left[(Z-B)\left(\frac{\partial A}{\partial x_3}\right)_{x_1} + (Z^2-(2+6B)Z-A+2B+3B^2)\left(\frac{\partial B}{\partial x_3}\right)_{x_1}\right]}{3Z^2-2(1-B)Z+A-3B^2-2B}$$

similarly, the equations of partial molar volume as follows

$$\overline{V}_1 = \frac{RT}{P}\left[Z - x_2\left(\frac{\partial Z}{\partial x_2}\right)_{x_3} - x_3\left(\frac{\partial Z}{\partial x_3}\right)_{x_2}\right]$$

$$\overline{V}_2 = \frac{RT}{P}\left[Z - x_1\left(\frac{\partial Z}{\partial x_1}\right)_{x_3} - x_3\left(\frac{\partial Z}{\partial x_3}\right)_{x_1}\right]$$

$$\overline{V}_3 = \frac{RT}{P}\left[Z - x_1\left(\frac{\partial Z}{\partial x_1}\right)_{x_1} - x_2\left(\frac{\partial Z}{\partial x_2}\right)_{x_1}\right]$$

APPENDIX E

CALCULATIONS

E.1 Determination of Two Apparatus Constants; A and B

The sample data are actual calibration tests performed on the DMA512P using nitrogen and benzene. The measured oscillation period and density value at 1.01325 bar and 308.15 K are shown in Table E.1.

Table E.1 Oscillation period and density value at 1.01325 bar and 308.15 K of standards.

Standard	Density at 1.01325 bar, 308.15 K (g/cm^3)	Period at 1.01325 bar, 308.15 K (μsec)
Nitrogen	0.0010927	3834.0303
Benzene	0.8664840	3994.7327

The constants A and B are calculated using the equation as follow:

$$A(1.01325\ \text{bar}, 308.15\ \text{K}) = \frac{\rho_1 - \rho_2}{p_1^2 - p_2^2}$$

$$= \frac{0.866484 - 0.0010927}{(3994.7327)^2 - (3834.0303)^2}$$

$$= 6.87855 \times 10^{-7}\ \ g/cm^3/\mu sec^2$$

$$B(1.01325\ \text{bar}, 308.15\ \text{K}) = \frac{p_2^2\rho_1 - p_1^2\rho_2}{p_1^2 - p_2^2}$$

$$= \frac{(3834.0303)^2 \times 0.866484 - (3994.7327)^2 \times 0.0010927}{(3994.7327)^2 - (3834.0303)^2}$$

$$= 10.11023732\ \ g/cm^3$$

E.2 Determination of Density

For example, cyclohexane whose density is to be measured is introduced into the system and the resulting period of oscillation is 3977.0543 at 1.01325 bar and 308.15 K. With the parameters A and B entered into the mPDS2000, the density of the fluid is calculated as follows and the resulting density value displayed:

Density of the fluid at 1.01325 bar and 308.15 K = $Ap^2 - B$

$= 6.87855 \times 10^{-7} \times (3977.0543)^2 - 10.11023732$

$= 0.7620\ g/cm^3$

APPENDIX F

EXPERIMENTAL AND CALCULATED DATA

F.1 Experimental Data

Table F.1.1 Period of harmonic oscillation of calibration standards at 308.15 K.

T (K)	P (bar)	Nitrogen period (μsec)	Benzene period (μsec)
308.15	1.01325	3834.019	3994.720
		3834.049	3994.783
		3834.023	3994.695
	average	3834.0303	3994.7327
	2	3834.219	3994.791
		3834.245	3994.751
		3834.229	3994.847
	average	3834.2310	3994.7983
	5	3834.662	3994.953
		3834.634	3994.987
		3834.665	3994.975
	average	3834.6537	3994.9717
	10	38345.788	3995.050
		3835.781	3995.013
		3835.765	3995.029
	average	3835.778	3994.0307

Table F.1.2 Period of harmonic oscillation of calibration standards at 313.15 K.

T (K)	P (bar)	Nitrogen period (μsec)	Benzene period (μsec)
313.15	1.01325	3836.531	3996.263
		3836.553	3996.259
		3836.557	3996.287
	average	3836.547	3996.2697
	2	3936.781	3996.407
		3936.772	3996.437
		3936.776	3996.407
	average	3936.7763	3996.417
	5	3937.382	3996.663
		3937.376	3996.620
		3837.371	3996.615
	average	3837.3763	3996.6327
	10	3838.573	3996.755
		3838.569	3996.712
		3838.545	3996.727
	average	3838.5623	3996.7313

Table F.1.3 Period of harmonic oscillation of calibration standards at 323.15 K.

T (K)	P (bar)	Nitrogen period (μsec)	Benzene period (μsec)
323.15	1.01325	3840.949	4000.050
		3840.941	4000.039
		3840.926	4000.023
	average	3840.9387	4000.0373
	2	3841.137	4000.075
		3841.141	4000.036
		3841.133	4000.033
	average	3841.137	4000.048
	5	3841.857	4000.112
		3841.834	4000.109
		3841.841	4000.121
	average	3841.844	4000.114
	10	3843.184	4000.207
		3843.186	4000.216
		3843.199	4000.193
	average	3843.1897	4000.2053

Table F.1.4 Period of harmonic oscillation of calibration standards at 333.15 K.

T (K)	P (bar)	Nitrogen period (μsec)	Benzene period (μsec)
323.15	1.01325	3845.937	4003.347
		3845.930	4003.323
		3845.934	4003.343
	average	3945.9337	4003.3377
	2	3846.107	4003.387
		3846.176	4003.407
		3846.111	4003.379
	average	3846.1313	4003.391
	5	3846.645	4003.469
		3846.657	4003.447
		3846.676	4003.455
	average	3846.6593	4003.457
	10	3847.772	4003.607
		3847.768	4003.630
		3847.795	4003.610
	average	3847.7783	4003.6157

Table F.1.5 The calibration constant A and B at various states.

T (K)	P (bar)	Parameters	
		A	B
308.15	1.01325	6.87855×10^{-7}	10.11023732
	2	6.90015×10^{-7}	10.14195360
	5	6.90361×10^{-7}	10.14599070
	10	6.98626×10^{-7}	10.26805767
313.15	1.01325	6.87648×10^{-7}	10.12048269
	2	6.89488×10^{-7}	10.14769673
	5	6.90237×10^{-7}	10.15866665
	10	6.99435×10^{-7}	10.29509358
323.15	1.01325	6.81347×10^{-7}	10.05073547
	2	6.83539×10^{-7}	10.08307331
	5	6.85106×10^{-7}	10.10679168
	10	6.96517×10^{-7}	10.27719254
333.15	1.01325	6.79430×10^{-7}	10.04858318
	2	6.81426×10^{-7}	10.07811785
	5	6.82012×10^{-7}	10.08652845
	10	6.93513×10^{-7}	10.25760845

Table F.1.6 Experimental liquid densities varies pressure of benzene (1) and cyclohexane (2) at temperature 308.15 K.

x_1	Density (g/cm^3)			
	P = 1.01325 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.76955	0.77203	0.77381	0.78276
0.2181	0.78131	0.78448	0.78630	0.79198
0.3770	0.79210	0.79494	0.79697	0.80279
0.5843	0.80895	0.81209	0.81392	0.82006
0.7851	0.82594	0.82875	0.83038	0.83609
0.9088	0.83959	0.84252	0.84434	0.85043
1.0000	0.86648	0.86960	0.87204	0.88220

Table F.1.7 Experimental liquid densities varies pressure of benzene (1) and cyclohexane (2) at temperature 313.15 K.

x_1	Density (g/cm^3)			
	P = 1.01325 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.76468	0.76687	0.76808	0.77775
0.2181	0.77785	0.78010	0.78098	0.78650
0.3770	0.78845	0.79065	0.79195	0.79783
0.5843	0.80471	0.80732	0.80873	0.81469
0.7851	0.82094	0.82354	0.82471	0.83068
0.9088	0.83492	0.83751	0.83899	0.84484
1.0000	0.86138	0.86436	0.86654	0.87759

Table F.1.8 Experimental liquid densities varies pressure of benzene (1) and cyclohexane (2) at temperature 323.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.75303	0.75593	0.75734	0.76807
0.2181	0.76569	0.76971	0.77050	0.77572
0.3770	0.77709	0.78003	0.78159	0.78710
0.5843	0.79310	0.79650	0.79809	0.80393
0.7851	0.80931	0.81232	0.81381	0.81959
0.9088	0.82336	0.82615	0.82779	0.83362
1.0000	0.85101	0.85381	0.85554	0.86823

Table F.1.9 Experimental liquid densities varies pressure of benzene (1) and cyclohexane (2) at temperature 333.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.74479	0.74738	0.74880	0.76141
0.2181	0.75545	0.75821	0.75975	0.76466
0.3770	0.76727	0.77000	0.77135	0.77697
0.5843	0.78367	0.78604	0.78767	0.79300
0.7851	0.79954	0.80245	0.80550	0.80938
0.9088	0.81399	0.81654	0.81796	0.82351
1.0000	0.84045	0.84318	0.84454	0.85867

Table F.1.10 Experimental liquid densities varies pressure of benzene (1) and n-heptane (2) at temperature 308.15 K.

x_1	Density (g/cm^3)			
	P = 1 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.67445	0.67665	0.67813	0.68588
0.2778	0.70184	0.70445	0.70715	0.71387
0.4214	0.72323	0.72510	0.72749	0.73311
0.5685	0.75179	0.75436	0.75688	0.76230
0.6876	0.77672	0.77980	0.78195	0.78756
0.8822	0.82316	0.82579	0.82735	0.83340
1.0000	0.86648	0.86960	0.87204	0.88220

Table F.1.11 Experimental liquid densities varies pressure of benzene (1) and n-heptane (2) at temperature 313.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.66862	0.67056	0.67161	0.68066
0.2778	0.69652	0.69867	0.70078	0.70717
0.4214	0.71977	0.72213	0.72368	0.72847
0.5685	0.74816	0.75049	0.75172	0.75712
0.6876	0.77409	0.77650	0.77778	0.78292
0.8822	0.81841	0.82106	0.82221	0.82792
1.0000	0.86138	0.86436	0.86654	0.87759

Table F.1.12 Experimental liquid densities varies pressure of benzene (1) and n-heptane (2) at temperature 323.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.66002	0.66232	0.66386	0.67345
0.2778	0.68663	0.68917	0.69110	0.69655
0.4214	0.70972	0.71250	0.71399	0.71891
0.5685	0.73802	0.74040	0.74208	0.74666
0.6876	0.76193	0.76476	0.76621	0.77161
0.8822	0.80649	0.80929	0.81099	0.81723
1.0000	0.85101	0.85381	0.85554	0.86823

Table F.1.13 Experimental liquid densities varies pressure of benzene (1) and n-heptane (2) at temperature 333.15 K.

x_1	Density (g/cm^3)			
	P = 1.01325 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.65369	0.65607	0.65705	0.66763
0.2778	0.67630	0.67918	0.68053	0.68555
0.4214	0.70119	0.70365	0.70517	0.70986
0.5685	0.72910	0.73136	0.73255	0.73787
0.6876	0.75262	0.75535	0.75667	0.76197
0.8822	0.79709	0.79941	0.80130	0.80672
1.0000	0.84045	0.84318	0.84454	0.85867

Table F.1.14 Experimental liquid densities varies pressure of cyclohexane (1) and n-heptane (2) at temperature 308.15 K.

x_1	Density (g/cm^3)			
	P = 1.01325 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.67445	0.67665	0.67813	0.68588
0.1839	0.68546	0.68795	0.69005	0.69829
0.3647	0.69924	0.70156	0.70344	0.71185
0.4758	0.70891	0.71098	0.71282	0.72100
0.6891	0.72945	0.73191	0.73355	0.74217
0.8221	0.74450	0.74683	0.74873	0.75741
1.0000	0.76955	0.77203	0.77381	0.78276

Table F.1.15 Experimental liquid densities varies pressure of cyclohexane (1) and n-heptane (2) at temperature 313.15 K.

x_1	Density (g/cm^3)			
	P = 1.01325 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.66862	0.67056	0.67161	0.68066
0.1839	0.68170	0.68388	0.68493	0.69383
0.3647	0.69544	0.69772	0.69888	0.70774
0.4758	0.70497	0.70725	0.70844	0.71728
0.6891	0.72547	0.72797	0.72905	0.73810
0.8221	0.74043	0.74276	0.74377	0.75320
1.0000	0.76468	0.76687	0.76808	0.77775

Table F.1.16 Experimental liquid densities varies pressure of cyclohexane (1) and n-heptane (2) at temperature 323.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.66002	0.66232	0.66386	0.67345
0.1839	0.67232	0.67473	0.67601	0.68567
0.3647	0.68584	0.68855	0.68980	0.69971
0.4758	0.69508	0.69795	0.69910	0.70920
0.6891	0.71544	0.71832	0.71956	0.73011
0.8221	0.72998	0.73286	0.73405	0.74508
1.0000	0.75303	0.75593	0.75734	0.76807

Table F.1.17 Experimental liquid densities varies pressure of cyclohexane (1) and n-heptane (2) at temperature 333.15 K.

x_1	Density (g/cm^3)			
	P = 1.03125 bar	P = 2 bar	P = 5 bar	P = 10 bar
0.0000	0.65369	0.65607	0.65705	0.66763
0.1839	0.66453	0.66689	0.66819	0.67904
0.3647	0.67745	0.68001	0.68126	0.69236
0.4758	0.68623	0.68859	0.69005	0.70118
0.6891	0.70674	0.70912	0.71051	0.72199
0.8221	0.72192	0.72415	0.72557	0.73727
1.0000	0.74479	0.74738	0.74880	0.76141

Table F.1.18 Excess molar volumes of benzene (1) and cyclohexane (2) system at 308.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.8561	0.7729	0.7794	1.2211
0.3770	1.2516	1.2231	1.2118	1.6306
0.5843	1.4738	1.4361	1.4703	1.8321
0.7851	1.8693	1.8727	1.9358	2.3598
0.9088	1.7918	1.7920	1.8420	2.2257
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.19 Excess molar volumes of benzene (1) and cyclohexane (2) system at 313.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.6668	0.6735	0.7387	1.3069
0.3770	1.0950	1.1197	1.1432	1.6578
0.5843	1.3944	1.3855	1.4434	1.9610
0.7851	1.8861	1.8937	1.9726	2.4644
0.9088	1.7673	1.7887	1.8454	2.3519
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.20 Excess molar volumes of benzene (1) and cyclohexane (2) system at 323.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.7858	0.6216	0.7137	1.4951
0.3770	1.1358	1.1192	1.1086	1.8191
0.5843	1.5238	1.4659	1.4763	2.1526
0.7851	2.0427	2.0076	2.0184	2.7115
0.9088	1.9306	1.9206	1.9190	2.6087
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.21 Excess molar volumes of benzene (1) and cyclohexane (2) system at 333.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	1.0339	1.0066	0.9846	2.0718
0.3770	1.2389	1.2279	1.2408	2.1701
0.5843	1.5201	1.5269	1.5299	2.5084
0.7851	2.0706	2.0308	1.8191	2.9414
0.9088	1.8695	1.8769	1.8823	2.7695
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.22 Excess molar volumes of benzene (1) and cyclohexane (2) system at 1.01325 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.8561	0.6668	0.7858	1.0339
0.3770	1.2516	1.0950	1.1358	1.2389
0.5843	1.4738	1.3944	1.5238	1.5201
0.7851	1.8693	1.8861	2.0427	2.0706
0.9088	1.7918	1.7673	1.9306	1.8695
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.23 Excess molar volumes of benzene(1) and cyclohexane (2) system at 2 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.7729	0.6735	0.6216	1.0066
0.3770	1.2231	1.1197	1.1192	1.2279
0.5843	1.4361	1.3855	1.4659	1.5269
0.7851	1.8727	1.8937	2.0076	2.0308
0.9088	1.7920	1.7887	1.9206	1.8769
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.24 Excess molar volumes of benzene(1) and cyclohexane (2) system at 5 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	0.7794	0.7387	0.7137	0.9846
0.3770	1.2118	1.1432	1.1086	1.2408
0.5843	1.4703	1.4434	1.4763	1.5299
0.7851	1.9358	1.9726	2.0184	1.8191
0.9088	1.8420	1.8454	1.9190	1.8823
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.25 Excess molar volumes of benzene (1) and cyclohexane (2) system at 10 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2181	1.2211	1.3069	1.4951	2.0718
0.3770	1.6306	1.6578	1.8191	2.1701
0.5843	1.8321	1.9610	2.1526	2.5084
0.7851	2.3598	2.4644	2.7115	2.9414
0.9088	2.2257	2.3519	2.6087	2.7695
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.26 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.5198	0.4651	0.3448	0.2730
0.3647	0.6643	0.6531	0.5904	0.5200
0.4758	0.6654	0.7056	0.6582	0.6518
0.6891	0.6602	0.6417	0.6427	0.6072
0.8221	0.5383	0.5484	0.5164	0.5039
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.27 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 313.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.1171	0.0739	0.0784	0.1265
0.3647	0.3246	0.2713	0.2584	0.3254
0.4758	0.3847	0.3383	0.3231	0.4008
0.6891	0.4480	0.3774	0.3877	0.4440
0.8221	0.3777	0.3446	0.3692	0.3773
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.28 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 323.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.2007	0.1931	0.2447	0.2576
0.3647	0.3621	0.3120	0.3622	0.3567
0.4758	0.4193	0.3521	0.4165	0.3961
0.6891	0.3903	0.3501	0.3882	0.3360
0.8221	0.3128	0.2907	0.3310	0.2348
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.29 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 333.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.4692	0.4771	0.4186	0.4076
0.3647	0.6810	0.6528	0.6208	0.6146
0.4758	0.7779	0.7934	0.7300	0.7531
0.6891	0.6151	0.6344	0.6065	0.6455
0.8221	0.3656	0.4153	0.3962	0.4533
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.30 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 1.01325 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.5198	0.1171	0.2007	0.4692
0.3647	0.6643	0.3246	0.3621	0.6810
0.4758	0.6654	0.3847	0.4193	0.7779
0.6891	0.6602	0.4480	0.3903	0.6151
0.8221	0.5383	0.3777	0.3128	0.3656
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.31 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 2 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.4651	0.0739	0.1931	0.4771
0.3647	0.6531	0.2713	0.3120	0.6528
0.4758	0.7056	0.3383	0.3521	0.7934
0.6891	0.6417	0.3774	0.3501	0.6344
0.8221	0.5484	0.3446	0.2907	0.4153
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.32 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 5 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.3448	0.0784	0.2447	0.4186
0.3647	0.5904	0.2584	0.3622	0.6208
0.4758	0.6582	0.3231	0.4165	0.7300
0.6891	0.6427	0.3877	0.3882	0.6065
0.8221	0.5164	0.3692	0.3310	0.3962
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.33 Excess molar volumes of cyclohexane (1) and n-heptane (2) system at 10 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.1839	0.2730	0.1265	0.2576	0.4076
0.3647	0.5200	0.3254	0.3567	0.6146
0.4758	0.6518	0.4008	0.3961	0.7531
0.6891	0.6072	0.4440	0.3360	0.6455
0.8221	0.5039	0.3773	0.2348	0.4533
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.34 Excess molar volumes of benzene(1) and n-heptane (2) system at 308.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.6873	1.6295	1.4229	1.6631
0.4214	1.7264	1.8181	1.6992	2.1421
0.5685	1.2233	1.2185	1.1140	1.5976
0.6876	1.0521	0.9931	0.9671	1.4236
0.8822	1.0235	1.0535	1.1290	1.5275
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.35 Excess molar volumes of benzene (1) and n-heptane (2) system at 313.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.6272	1.6116	1.4381	1.9731
0.4214	1.3561	1.3260	1.2874	2.0876
0.5685	0.9266	0.9277	0.9667	1.6363
0.6876	0.6523	0.6619	0.7110	1.3935
0.8822	0.9692	0.9777	1.0683	1.6263
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.36 Excess molar volumes of benzene (1) and n-heptane (2) system at 323.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.8552	1.8146	1.7383	2.5963
0.4214	1.5488	1.4810	1.4958	2.4305
0.5685	1.0653	1.0822	1.0708	2.0324
0.6876	1.0352	0.9940	1.0204	1.8330
0.8822	1.2220	1.2033	1.1988	1.8693
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.37 Excess molar volumes of benzene (1) and n-heptane (2) system at 333.15 K.

x_1	V^E(cm^3/g-mole)			
	1.01325 bar	2 bar	5 bar	10 bar
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	2.5656	2.4610	2.3922	3.5482
0.4214	1.7702	1.7656	1.6818	2.8698
0.5685	1.2282	1.2677	1.2562	2.3016
0.6876	1.1631	1.1355	1.1129	2.1329
0.8822	1.2103	1.2487	1.1690	2.1196
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.38 Excess molar volumes of benzene (1) and n-heptane (2) system at 1.01325 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.6873	1.6272	1.8552	2.5656
0.4214	1.7264	1.3561	1.5488	1.7702
0.5685	1.2233	0.9266	1.0653	1.2282
0.6876	1.0521	0.6523	1.0352	1.1631
0.8822	1.0235	0.9692	1.2220	1.2103
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.39 Excess molar volumes of benzene (1) and n-heptane (2) system at 2 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.6295	1.6116	1.8146	2.4610
0.4214	1.8181	1.3260	1.4810	1.7656
0.5685	1.2185	0.9277	1.0822	1.2677
0.6876	0.9931	0.6619	0.9940	1.1355
0.8822	1.0535	0.9777	1.2033	1.2487
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.40 Excess molar volumes of benzene (1) and n-heptane (2) system at 5 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.4229	1.4381	1.7383	2.3922
0.4214	1.6992	1.2874	1.4958	1.6818
0.5685	1.1140	0.9667	1.0708	1.2562
0.6876	0.9671	0.7110	1.0204	1.1129
0.8822	1.1290	1.0683	1.1988	1.1690
1.0000	0.0000	0.0000	0.0000	0.0000

Table F.1.41 Excess molar volumes of benzene (1) and n-heptane (2) system at 10 bar.

x_1	V^E(cm^3/g-mole)			
	308.15 K	313.15 K	323.15 K	333.15 K
0.0000	0.0000	0.0000	0.0000	0.0000
0.2778	1.6631	1.9731	2.5963	3.5482
0.4214	2.1421	2.0876	2.4305	2.8698
0.5685	1.5976	1.6363	2.0324	2.3016
0.6876	1.4236	1.3935	1.8330	2.1329
0.8822	1.5275	1.6263	1.8693	2.1196
1.0000	0.0000	0.0000	0.0000	0.0000

F.2 Calculated Data

Table F.2.1 Partial molar volumes (cm^3/g-mole) of benzene (1) and cyclohexane (2) system at 308.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	112.9837	109.3626	112.2307	109.0113	111.6544	108.7605	108.9914	107.5170
0.2181	103.6068	106.7030	102.8922	106.3543	102.4671	106.1603	101.1932	105.5493
0.3770	96.8776	107.2983	96.3939	106.9983	96.0532	106.7833	95.0846	106.1739
0.5843	90.8451	112.0650	90.4759	111.6569	90.2807	111.3942	89.5969	110.5857
0.7851	89.7065	119.6679	89.4267	119.1731	89.2800	118.8338	88.7347	117.7868
0.9088	90.6535	123.9557	90.3546	123.3616	90.1762	122.9329	89.5704	121.6541
1.0000	90.1463	123.2396	89.8229	122.5873	89.5716	122.0294	88.5400	119.9308

Table F.2.2 Partial molar volumes (cm^3/g-mole) of benzene (1) and cyclohexane (2) system at 313.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	113.8481	110.0591	113.1763	109.7448	112.7624	109.5719	109.8692	108.2096
0.2181	103.9647	107.2063	103.4535	106.9560	103.2346	106.8641	101.9856	106.2604
0.3770	97.2635	107.8329	96.8870	107.5969	96.6688	107.4561	95.6826	106.8298
0.5843	91.3159	112.6665	91.0068	112.3218	90.8607	112.1084	90.1840	111.3051
0.7851	90.2475	120.4163	89.9852	119.9534	89.8841	119.6861	89.3041	118.5848
0.9088	91.1562	124.6931	90.8888	124.1621	90.7435	123.7937	90.1541	122.5489
1.0000	90.6801	124.1025	90.3674	123.4753	90.1401	122.9639	89.0051	120.6803

Table F.2.3 Partial molar volumes (cm^3/g-mole) of benzene (1) and cyclohexane (2) system at 323.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	116.9782	111.7618	116.0614	111.3331	115.5648	111.1258	112.2555	109.5733
0.2181	106.3619	108.7007	105.4237	108.2398	105.2155	108.1567	103.9913	107.5729
0.3770	98.9297	109.2614	98.4112	108.9377	98.1415	108.7647	97.1922	108.1619
0.5843	92.5445	114.4679	92.1295	114.0073	91.9603	113.7600	91.2859	112.9426
0.7851	91.3761	122.7614	91.0643	122.2087	90.9293	121.8690	90.3584	120.7524
0.9088	92.3471	127.3301	92.0515	126.7379	91.8863	126.3158	91.2850	125.0199
1.0000	91.7851	126.5706	91.4841	125.9597	91.2991	125.5169	89.9646	122.8274

Table F.2.4 Partial molar volumes (cm^3/g-mole) of benzene (1) and cyclohexane (2) system at 333.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	118.6407	112.9983	117.8040	112.6067	117.2906	112.3932	113.3605	110.5318
0.2181	108.0806	110.0969	107.4171	109.7715	107.0251	109.5976	105.8403	109.0326
0.3770	100.2460	110.6295	99.7541	110.3198	99.5168	110.1647	98.5280	109.5307
0.5843	93.5843	115.9490	93.2914	115.6145	93.1152	115.3515	92.4911	114.5737
0.7851	92.4135	124.5506	92.1049	124.0020	91.7995	123.3744	91.4216	122.5558
0.9088	93.3687	129.2082	93.0924	128.6519	92.9480	128.2575	92.3631	126.9795
1.0000	92.9383	128.7613	92.6374	128.1509	92.4882	127.7679	90.9663	124.7250

Table F.2.5 Partial molar volumes (cm^3/g-mole) of cyclohexane (1) and n-heptane (2) system at 308.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	106.1929	148.5655	105.4506	148.0825	104.9954	147.7593	102.4596	146.0897
0.1839	106.6252	149.8193	105.8984	149.3538	105.3255	148.9558	103.0020	147.4416
0.3647	106.7058	151.1363	106.1303	150.7644	105.6989	150.4462	103.6753	149.1136
0.4758	106.8100	152.1518	106.3483	151.8456	105.9678	151.5498	104.1917	150.3513
0.6891	107.5086	154.7986	107.0570	154.4783	106.7780	154.2208	105.2376	153.0950
0.8221	108.2221	156.8620	107.8420	156.5688	107.5453	156.2778	106.1624	155.1820
1.0000	109.3626	159.9043	109.0113	159.5970	108.7605	159.3076	107.5170	158.1873

Table F.2.6 Partial molar volumes (cm^3/g-mole) of cyclohexane (1) and n-heptane (2) system at 313.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	107.4963	149.8609	106.8370	149.4273	106.5290	149.1937	103.5243	147.2101
0.1839	107.1874	150.6515	106.5498	150.2379	106.2891	150.0295	103.7542	148.3690
0.3647	107.2732	151.9711	106.7040	151.6000	106.4550	151.3897	104.3027	149.9650
0.4758	107.4096	152.9998	106.8957	152.6587	106.6633	152.4502	104.7231	151.1393
0.6891	108.1111	155.6196	107.6472	155.2904	107.4716	155.0962	105.8345	153.9025
0.8221	108.8310	157.6591	108.4466	157.3633	108.2951	157.1694	106.7716	155.9761
1.0000	110.0591	160.7283	109.7448	160.4519	109.5719	160.2202	108.2096	159.0139

Table F.2.7 Partial molar volumes (cm^3/g-mole) of cyclohexane (1) and n-heptane (2) system at 323.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	109.5585	151.8136	108.7520	151.2864	108.2657	150.9354	105.0029	148.7861
0.1839	109.1620	152.6453	108.4360	152.1758	108.1026	151.9166	105.2780	150.0696
0.3647	109.0159	153.9599	108.3193	153.5076	108.0455	153.2739	105.5775	151.6414
0.4758	109.0761	155.0512	108.4098	154.6114	108.1858	154.3984	105.9139	152.8633
0.6891	109.6150	157.8274	109.0667	157.4358	108.8594	157.2073	106.9066	155.7774
0.8221	110.3567	160.0655	109.8685	159.6882	109.6846	159.4559	107.8616	158.0162
1.0000	111.7618	163.5143	111.3331	163.1366	111.1258	162.8592	109.5733	161.4568

Table F.2.8 Partial molar volumes (cm^3/g-mole) of cyclohexane (1) and n-heptane (2) system at 333.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	110.8456	153.2837	109.9925	152.7276	109.7059	152.4998	106.0208	150.0831
0.1839	110.6748	154.3822	109.9476	153.9115	109.6056	153.6409	106.3545	151.5239
0.3647	110.4500	155.8185	109.7781	155.3789	109.5036	155.1357	106.6731	153.2657
0.4758	110.4998	157.0354	109.9425	156.6593	109.6435	156.3881	107.0814	154.6516
0.6891	110.8600	160.0015	110.3998	159.6597	110.1624	159.3949	107.9936	157.7851
0.8221	111.4793	162.3584	111.0958	162.0442	110.8705	161.7636	108.9001	160.1712
1.0000	112.9983	166.1395	112.6067	165.7771	112.3932	165.4730	110.5318	163.7630

Table F.2.9 Partial molar volumes (cm^3/g-mole) of benzene (1) and n-heptane (2) system at 308.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	88.5124	148.5655	87.7612	148.0825	87.3248	147.7593	84.7695	146.0897
0.2778	90.1176	150.9129	89.4229	150.4926	88.7537	150.0441	87.0541	148.9640
0.4214	89.9568	151.6874	89.5375	151.4325	89.0365	151.0857	87.8322	150.3075
0.5685	89.3899	152.3973	88.9060	152.1143	88.4624	151.8023	87.4970	151.1662
0.6876	89.4976	153.3613	88.9991	153.0748	88.6760	152.8263	87.8126	152.2477
0.8822	90.3960	155.3846	90.0685	155.1860	89.8840	155.0039	89.1504	154.4856
1.0000	90.1463	156.1586	89.8229	155.9571	89.5716	155.7385	88.5400	155.0549

Table F.2.10 Partial molar volumes (cm^3/g-mole) of benzene (1) and n-heptane (2) system at 313.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	89.7970	149.8609	89.1296	149.4273	88.8453	149.1937	85.8022	147.2101
0.2778	91.0209	151.9829	90.4458	151.6287	89.9334	151.2645	88.3016	150.2128
0.4214	90.3240	152.4640	89.7872	152.1417	89.4824	151.8978	88.4640	151.2122
0.5685	89.7772	153.1977	89.3366	152.9354	89.1412	152.7500	88.1707	152.1015
0.6876	89.7116	154.0805	89.3214	153.8483	89.1409	153.6688	88.3477	153.1177
0.8822	90.9221	156.2753	90.5885	156.0720	90.4542	155.9107	89.7547	155.4019
1.0000	90.6801	157.0576	90.3674	156.8611	90.1401	156.6507	89.0051	155.9074

Table F.2.11 Partial molar volumes (cm^3/g-mole) of benzene (1) and n-heptane (2) system at 323.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	92.1745	151.8136	91.3430	151.2864	90.8685	150.9354	87.5095	148.7861
0.2778	92.9173	153.9468	92.2096	153.5200	91.7367	153.1741	90.3197	152.2446
0.4214	91.8279	154.4592	91.1742	154.0717	90.8817	153.8246	89.8122	153.0978
0.5685	90.9807	155.3421	90.5208	155.0634	90.2372	154.8160	89.4145	154.2210
0.6876	91.1104	156.6121	90.6399	156.3261	90.4309	156.1126	89.5822	155.4953
0.8822	92.1782	159.2426	91.8175	159.0041	91.6106	158.7788	90.8308	158.1681
1.0000	91.7851	160.1618	91.4841	159.9460	91.2991	159.7296	89.9646	158.7680

Table F.2.12 Partial molar volumes (cm^3/g-mole) of benzene (1) and n-heptane (2) system at 333.15 K.

x_1	1.01325 bar		2 bar		5 bar		10 bar	
	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$	$\overline{V}_1$	$\overline{V}_2$
0.0000	92.9790	153.2837	92.1054	152.7276	91.8472	152.4998	88.0748	150.0831
0.2778	94.7189	156.1512	93.8922	155.6526	93.5868	155.3896	92.2673	154.4957
0.4214	92.9166	156.3589	92.3301	156.0028	92.0316	155.7390	91.0064	155.0139
0.5685	92.0263	157.3315	91.5826	157.0553	91.3986	156.8465	90.4172	156.1405
0.6876	92.1663	158.7059	91.7040	158.4168	91.5173	158.1992	90.6732	157.5557
0.8822	93.2152	161.4845	92.9121	161.2702	92.6768	161.0109	91.9887	160.4194
1.0000	92.9383	162.5361	92.6374	162.3116	92.4882	162.0996	90.9663	160.9853

Table F.2.13 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 308.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	106.0277	104.2037	104.1385	104.1433	104.8114
0.3770	103.3697	103.0243	103.0230	103.0244	103.2106
0.5843	99.6083	99.7449	99.7567	99.7581	99.8137
0.7851	96.1452	94.6325	94.5749	94.5812	95.0987
0.9088	93.6907	90.9074	90.7961	90.8058	91.6980

Table F.2.14 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 308.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	105.5992	104.1843	104.1192	104.1240	104.7878
0.3770	103.0004	103.0023	103.0011	103.0024	103.1855
0.5843	99.2356	99.7238	99.7356	99.7370	99.7900
0.7851	95.8192	94.6167	94.5591	94.5654	95.0795
0.9088	93.3649	90.8953	90.7842	90.7939	91.6825

Table F.2.15 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 308.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	105.3548	104.1253	104.0607	104.0654	104.7163
0.3770	102.7381	102.9358	102.9345	102.9358	103.1094
0.5843	99.0187	99.6600	99.6716	99.6730	99.7180
0.7851	95.6311	94.5685	94.5112	94.5175	95.0215
0.9088	93.1636	90.8587	90.7482	90.7578	91.6353

Table F.2.16 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 308.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	104.5992	104.0276	103.9636	103.9683	104.5981
0.3770	101.9932	102.8254	102.8241	102.8254	102.9837
0.5843	98.2608	99.5541	99.5656	99.5669	99.5990
0.7851	94.9780	94.4885	94.4318	94.4380	94.9256
0.9088	92.4965	90.7978	90.6883	90.6978	91.5573

Table F.2.17 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 313.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	106.4993	104.7767	104.7145	104.7190	105.4646
0.3770	103.8482	103.5846	103.5827	103.5820	103.8477
0.5843	100.1304	100.2807	100.2908	100.2901	100.4235
0.7851	96.7308	95.1401	95.0844	95.0909	95.6777
0.9088	94.2147	91.3899	91.2830	91.2947	92.2533

Table F.2.18 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 313.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	106.1921	104.7563	104.6942	104.6987	105.4398
0.3770	103.5593	103.5616	103.5597	103.5590	103.8213
0.5843	99.8081	100.2587	100.2687	100.2680	100.3986
0.7851	96.4254	95.1234	95.0678	95.0744	95.6576
0.9088	93.9234	91.3771	91.2705	91.2822	92.2369

Table F.2.19 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 313.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	106.0725	104.6943	104.6326	104.6371	105.3644
0.3770	103.3893	103.4919	103.4900	103.4893	103.7414
0.5843	99.6613	100.1919	100.2018	100.2011	100.3230
0.7851	96.2886	95.0728	95.0175	95.0240	95.5966
0.9088	93.7577	91.3385	91.2324	91.2441	92.1871

Table F.2.20 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 313.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	105.3280	104.5915	104.5304	104.5349	105.2400
0.3770	102.6273	103.3763	103.3744	103.3737	103.6094
0.5843	98.9494	100.0811	100.0909	100.0902	100.1983
0.7851	95.5966	94.9888	94.9340	94.9405	95.4957
0.9088	93.1085	91.2744	91.1692	91.1807	92.1048

Table F.2.21 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 323.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	108.1906	106.1275	106.0720	106.0786	106.9539
0.3770	105.3664	104.9985	104.9973	104.9974	105.3664
0.5843	101.6132	101.6570	101.6659	101.6662	101.8933
0.7851	98.1208	96.3494	96.2983	96.3079	97.0071
0.9088	95.5375	92.4590	92.3615	92.3776	93.4647

Table F.2.22 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 323.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	107.6256	106.1044	106.0491	106.0557	106.9260
0.3770	104.9692	104.9726	104.9713	104.9715	105.3367
0.5843	101.2012	101.6321	101.6410	101.6414	101.8652
0.7851	97.7572	96.3306	96.2796	96.2892	96.9845
0.9088	95.2149	92.4447	92.3474	92.3635	93.4463

Table F.2.23 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 323.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	107.5152	106.0346	105.9797	105.9862	106.8413
0.3770	104.7597	104.8939	104.8927	104.8928	105.2468
0.5843	101.0174	101.5568	101.5656	101.5659	101.7804
0.7851	97.5782	96.2736	96.2229	96.2325	96.9161
0.9088	95.0262	92.4013	92.3046	92.3205	93.3905

Table F.2.24 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 323.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	106.7917	105.9188	105.8645	105.8710	106.7015
0.3770	103.9999	104.7637	104.7624	104.7625	105.0985
0.5843	100.2686	101.4320	101.4406	101.4410	101.6402
0.7851	96.8901	96.1792	96.1290	96.1384	96.8029
0.9088	94.3617	92.3293	92.2335	92.2493	93.2982

Table F.2.25 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 333.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	109.6572	107.4817	107.4345	107.4412	108.3609
0.3770	106.6746	106.3677	106.3673	106.3665	106.7121
0.5843	102.7973	102.9773	102.9848	102.9843	103.1741
0.7851	99.3198	97.5529	97.5076	97.5181	98.2477
0.9088	96.6373	93.5638	93.4775	93.4959	94.6787

Table F.2.26 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 333.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	109.2580	107.4559	107.4088	107.4155	108.3299
0.3770	106.3062	106.3388	106.3384	106.3375	106.6794
0.5843	102.4655	102.9496	102.9571	102.9566	103.1433
0.7851	98.9596	97.5320	97.4867	97.4972	98.2227
0.9088	96.3355	93.5478	93.4617	93.4800	94.6582

Table F.2.27 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 333.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	109.0365	107.3778	107.3310	107.3376	108.2361
0.3770	106.1298	106.2511	106.2507	106.2498	106.5806
0.5843	102.2926	102.8657	102.8731	102.8726	103.0502
0.7851	98.5849	97.4684	97.4234	97.4338	98.1471
0.9088	96.1859	93.4992	93.4136	93.4318	94.5961

Table F.2.28 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 333.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2181	108.3364	107.2483	107.2021	107.2086	108.0814
0.3770	105.3257	106.2490	106.2485	106.2477	106.4177
0.5843	101.6081	102.8714	102.8789	102.8784	102.8966
0.7851	98.1123	97.3630	97.3185	97.3288	98.0221
0.9088	95.5201	93.4186	93.3338	93.3519	94.4934

Table F.2.29 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	141.8759	143.0483	142.9933	143.0191	143.7456
0.3647	134.9325	135.2060	135.1959	135.2032	135.3420
0.4758	130.5782	130.2217	130.2208	130.2202	130.1906
0.6891	122.2110	120.2562	120.2274	120.2217	120.3299
0.8221	116.8751	113.7680	113.6924	113.6905	114.2028

Table F.2.30 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	141.3624	143.0227	142.9678	142.9936	143.7134
0.3647	134.4863	135.1817	135.1716	135.1788	135.3130
0.4758	130.1980	130.1986	130.1976	130.1971	130.1636
0.6891	121.8003	120.2360	120.2073	120.2016	120.3062
0.8221	116.5105	113.7503	113.6748	113.6729	114.1810

Table F.2.31 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	140.9322	142.9452	142.8907	142.9163	143.6161
0.3647	134.1269	135.1079	135.0978	135.1051	135.2255
0.4758	129.8619	130.1283	130.1273	130.1267	130.0816
0.6891	121.5280	120.1749	120.1463	120.1407	120.2343
0.8221	116.2148	113.6963	113.6213	113.6194	114.1149

Table F.2.32 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	139.2691	142.8165	142.7626	142.7878	143.4555
0.3647	132.5423	134.9855	134.9754	134.9826	135.0808
0.4758	128.3886	130.0116	130.0105	130.0100	129.9462
0.6891	120.1165	120.0733	120.0451	120.0395	120.1154
0.8221	114.8830	113.6066	113.5324	113.5305	114.0056

Table F.2.33 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 313.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	142.6584	143.8151	143.7646	143.7910	144.5908
0.3647	135.6698	135.9219	135.9148	135.9217	136.1031
0.4758	131.3080	130.9076	130.9094	130.9082	130.9116
0.6891	122.8815	120.8893	120.8641	120.8583	120.9992
0.8221	117.5175	114.3719	114.3012	114.3002	114.8579

Table F.2.34 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 313.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	142.2037	143.7880	143.7376	143.7639	144.5568
0.3647	135.2265	135.8962	135.8891	135.8960	136.0726
0.4758	130.8846	130.8831	130.8849	130.8837	130.8831
0.6891	122.4595	120.8680	120.8429	120.8371	120.9742
0.8221	117.1489	114.3531	114.2826	114.2816	114.8349

Table F.2.35 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 313.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	141.9857	143.7058	143.6558	143.6819	144.4539
0.3647	135.0020	135.8182	135.8112	135.8179	135.9803
0.4758	130.6648	130.8089	130.8106	130.8094	130.7968
0.6891	122.2781	120.8034	120.7785	120.7727	120.8985
0.8221	116.9898	114.2961	114.2260	114.2250	114.7652

Table F.2.36 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 313.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	140.1644	143.5694	143.5199	143.5457	144.2840
0.3647	133.3120	135.6888	135.6818	135.6884	135.8279
0.4758	129.0544	130.6857	130.6873	130.6861	130.6543
0.6891	120.7788	120.6963	120.6716	120.6659	120.7735
0.8221	115.5251	114.2014	114.1320	114.1310	114.6500

Table F.2.37 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 323.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	144.6487	145.5252	145.4787	145.5069	146.4337
0.3647	137.5688	137.5854	137.5761	137.5847	137.8061
0.4758	133.1763	132.5241	132.5220	132.5228	132.5388
0.6891	124.6042	122.3719	122.3455	122.3424	122.5035
0.8221	119.1999	115.7423	115.6761	115.6784	116.3012

Table F.2.38 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 323.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	144.1321	145.4944	145.4481	145.4761	146.3954
0.3647	137.0274	137.5562	137.5469	137.5555	137.7718
0.4758	132.6287	132.4963	132.4942	132.4949	132.5069
0.6891	124.1046	122.3478	122.3215	122.3183	122.4755
0.8221	118.7314	115.7211	115.6550	115.6573	116.2755

Table F.2.39 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 323.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	143.8592	145.4011	145.3551	145.3830	146.2795
0.3647	136.7791	137.4676	137.4583	137.4668	137.6682
0.4758	132.4105	132.4119	132.4098	132.4106	132.4102
0.6891	123.8908	122.2746	122.2485	122.2454	122.3908
0.8221	118.5389	115.6566	115.5909	115.5932	116.1974

Table F.2.40 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 323.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	141.8324	145.2464	145.2010	145.2284	146.0882
0.3647	134.8419	137.3207	137.3115	137.3198	137.4971
0.4758	130.5248	132.2721	132.2699	132.2707	132.2504
0.6891	122.1006	122.1533	122.1274	122.1243	122.2508
0.8221	116.7841	115.5496	115.4846	115.4869	116.0685

Table F.2.41 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 333.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	146.3444	147.3711	147.3316	147.3580	148.4138
0.3647	139.2726	139.3871	139.3789	139.3859	139.6393
0.4758	134.8938	134.2762	134.2737	134.2733	134.2912
0.6891	126.1381	123.9758	123.9516	123.9485	124.1210
0.8221	120.5307	117.2188	117.1601	117.1634	117.8489

Table F.2.42 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 333.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	145.8265	147.3361	147.2966	147.3230	148.3705
0.3647	138.7483	139.3538	139.3455	139.3526	139.6007
0.4758	134.4315	134.2444	134.2420	134.2416	134.2553
0.6891	125.7147	123.9483	123.9242	123.9211	124.0896
0.8221	120.1595	117.1947	117.1361	117.1394	117.8199

Table F.2.43 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 333.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	145.5428	147.2299	147.1907	147.2168	148.2395
0.3647	138.4937	139.2527	139.2445	139.2515	139.4840
0.4758	134.1470	134.1483	134.1458	134.1454	134.1465
0.6891	125.4688	123.8651	123.8411	123.8381	123.9945
0.8221	119.9244	117.1216	117.0634	117.0667	117.7323

Table F.2.44 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 333.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1839	143.2173	147.0539	147.0152	147.0409	148.0236
0.3647	136.2733	139.0854	139.0772	139.0841	139.2914
0.4758	132.0177	133.9889	133.9864	133.9860	133.9670
0.6891	123.4738	123.7271	123.7034	123.7004	123.8374
0.8221	118.0212	117.0003	116.9428	116.9461	117.5875

Table F.2.45 Calculated molar volumes of benzene (1) and n-heptane (2) system at 308.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	134.0240	134.1673	134.1414	134.1552	134.5105
0.4214	125.6741	125.3708	125.3694	125.3709	125.3752
0.5685	116.5775	116.1744	116.1728	116.1675	116.0666
0.6876	109.4486	108.5839	108.5624	108.5564	108.5671
0.8822	98.0517	95.9043	95.8158	95.8178	96.3890

Table F.2.46 Calculated molar volumes of benzene (1) and n-heptane (2) system at 308.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	133.5274	134.1447	134.1189	134.1326	134.4829
0.4214	125.3500	125.3504	125.3490	125.3505	125.3512
0.5685	116.1804	116.1566	116.1550	116.1497	116.0458
0.6876	109.0163	108.5683	108.5469	108.5409	108.5488
0.8822	97.7394	95.8925	95.8041	95.8062	96.3742

Table F.2.47 Calculated molar volumes of benzene (1) and n-heptane (2) system at 308.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	133.0176	134.0760	134.0504	134.0641	134.3993
0.4214	124.9382	125.2886	125.2871	125.2886	125.2785
0.5685	115.7936	116.1025	116.1009	116.0956	115.9831
0.6876	108.7166	108.5210	108.4997	108.4937	108.4934
0.8822	97.5551	95.8567	95.7688	95.7709	96.3294

Table F.2.48 Calculated molar volumes of benzene (1) and n-heptane (2) system at 308.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	131.7654	133.9621	133.9367	133.9502	134.2612
0.4214	123.9804	125.1859	125.1844	125.1859	125.1582
0.5685	114.9703	116.0127	116.0111	116.0058	115.8793
0.6876	107.9421	108.4424	108.4213	108.4154	108.4016
0.8822	96.8469	95.7973	95.7101	95.7122	96.2551

Table F.2.49 Calculated molar volumes of benzene (1) and n-heptane (2) system at 313.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	135.0477	134.8958	134.8726	134.8893	135.2610
0.4214	126.2782	126.0490	126.0491	126.0538	126.0468
0.5685	117.1432	116.7990	116.7987	116.7968	116.6753
0.6876	109.8205	109.1639	109.1442	109.1417	109.1383
0.8822	98.6207	96.4093	96.3247	96.3302	96.9259

Table F.2.50 Calculated molar volumes of benzene (1) and n-heptane (2) system at 313.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	134.6321	134.8718	134.8486	134.8653	135.2319
0.4214	125.8655	126.0274	126.0275	126.0322	126.0215
0.5685	116.7795	116.7802	116.7798	116.7780	116.6535
0.6876	109.4796	109.1474	109.1277	109.1252	109.1191
0.8822	98.3024	96.3969	96.3123	96.3178	96.9103

Table F.2.51 Calculated molar volumes of benzene (1) and n-heptane (2) system at 313.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	134.2267	134.7990	134.7760	134.7926	135.1437
0.4214	125.5959	125.9619	125.9620	125.9666	125.9450
0.5685	116.5884	116.7229	116.7226	116.7207	116.5877
0.6876	109.2994	109.0974	109.0778	109.0753	109.0609
0.8822	98.1649	96.3591	96.2750	96.2804	96.8630

Table F.2.52 Calculated molar volumes of benzene (1) and n-heptane (2) system at 313.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	133.0138	134.6782	134.6553	134.6717	134.9981
0.4214	124.7701	125.8531	125.8531	125.8577	125.8185
0.5685	115.7569	116.6279	116.6275	116.6256	116.4787
0.6876	108.5819	109.0142	108.9948	108.9924	108.9646
0.8822	97.4879	96.2962	96.2128	96.2183	96.7848

Table F.2.53 Calculated molar volumes of benzene (1) and n-heptane (2) system at 323.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	136.9928	136.6472	136.6273	136.6448	137.0417
0.4214	128.0664	127.7496	127.7505	127.7557	127.7047
0.5685	118.7527	118.3926	118.3923	118.3913	118.2031
0.6876	111.5731	110.6276	110.6089	110.6081	110.5575
0.8822	100.0784	97.5826	97.5043	97.5137	98.1602

Table F.2.54 Calculated molar volumes of benzene (1) and n-heptane (2) system at 323.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	136.4879	136.6195	136.5997	136.6171	137.0087
0.4214	127.5667	127.7246	127.7255	127.7307	127.6760
0.5685	118.3709	118.3707	118.3705	118.3695	118.1785
0.6876	111.1603	110.6085	110.5899	110.5891	110.5358
0.8822	99.7321	97.5685	97.4903	97.4996	98.1427

Table F.2.55 Calculated molar volumes of benzene (1) and n-heptane (2) system at 323.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	136.1068	136.5358	136.5161	136.5334	136.9087
0.4214	127.3005	127.6489	127.6497	127.6548	127.5893
0.5685	118.1029	118.3045	118.3042	118.3032	118.1039
0.6876	110.9499	110.5508	110.5323	110.5315	110.4700
0.8822	99.5231	97.5254	97.4477	97.4569	98.0895

Table F.2.56 Calculated molar volumes of benzene (1) and n-heptane (2) system at 323.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	135.0418	136.3969	136.3773	136.3944	136.7438
0.4214	126.4293	127.5232	127.5240	127.5291	127.4461
0.5685	117.3785	118.1946	118.1943	118.1933	117.9806
0.6876	110.1734	110.4550	110.4366	110.4359	110.3612
0.8822	98.7631	97.4540	97.3769	97.3861	98.0015

Table F.2.57 Calculated molar volumes of benzene (1) and n-heptane (2) system at 333.15 K and 1.01325 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	139.0853	138.3566	138.3471	138.3485	138.9681
0.4214	129.6243	129.3595	129.3690	129.3549	129.5029
0.5685	120.2055	119.8806	119.8885	119.8686	119.8610
0.6876	112.9533	112.0021	111.9922	111.9758	112.0947
0.8822	101.2573	98.7460	98.6793	98.6834	99.4858

Table F.2.58 Calculated molar volumes of benzene (1) and n-heptane (2) system at 333.15 K and 2 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	138.4955	138.3252	138.3158	138.3172	138.9306
0.4214	129.1711	129.3311	129.3406	129.3266	129.4703
0.5685	119.8341	119.8559	119.8637	119.8438	119.8330
0.6876	112.5451	111.9806	111.9707	111.9543	112.0701
0.8822	100.9647	98.7300	98.6635	98.6675	99.4660

Table F.2.59 Calculated molar volumes of benzene (1) and n-heptane (2) system at 333.15 K and 5 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	138.2208	138.2302	138.2207	138.2221	138.8169
0.4214	128.8927	129.2453	129.2546	129.2407	129.3717
0.5685	119.6394	119.7809	119.7886	119.7689	119.7482
0.6876	112.3487	111.9153	111.9054	111.8892	111.9954
0.8822	100.7266	98.6815	98.6154	98.6194	99.4060

Table F.2.60 Calculated molar volumes of benzene (1) and n-heptane (2) system at 333.15 K and 10 bar.

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.2778	137.2087	138.0726	138.0632	138.0646	138.6294
0.4214	128.0411	129.1029	129.1120	129.0983	129.2088
0.5685	118.7768	119.6565	119.6641	119.6446	119.6081
0.6876	111.5673	111.8070	111.7972	111.7812	111.8720
0.8822	100.0498	98.6011	98.5355	98.5395	99.3067

Table F.2.61 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 298.15 K and 1.01325 bar, (Dimitri et al., 1991).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.0998	107.1389	103.4974	103.3640	103.3668	104.3084
0.1989	105.3552	103.1787	103.0940	103.0957	103.6908
0.2525	104.3865	102.9156	102.8572	102.8583	103.2675
0.3522	102.5621	102.1755	102.1597	102.1598	102.2677
0.3993	101.6846	101.6846	101.6838	101.6836	101.6851
0.4480	100.7541	101.0669	101.0764	101.0760	101.0010
0.5011	99.7275	100.2570	100.2713	100.2709	100.1566
0.5992	97.7958	98.3791	98.3833	98.3832	98.3237
0.6991	95.7824	95.9967	95.9689	95.9696	96.1138
0.8014	93.6713	93.1784	93.1053	93.1072	93.5507
0.9016	91.5497	90.1970	90.0792	90.0821	90.8298

Table F.2.62 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 298.15 K and 1.01325 bar, (Chevalier et al., 1990).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1591	106.0380	103.1068	103.0079	103.0108	103.7605
0.3447	102.6959	101.7833	101.7721	101.7740	101.9624
0.5201	99.3786	99.3886	99.4096	99.4112	99.3796
0.6432	96.9077	96.9079	96.9072	96.9091	96.9916
0.8559	92.5170	91.3776	91.2848	91.2879	91.9123

Table F.2.63 Calculated molar volumes of benzene (1) and cyclohexane (2) system at 293.15 K and 1.01325 bar, (Anwel et al., 1992).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1280	105.8932	102.8857	102.7870	102.7877	103.4373
0.2360	103.9937	102.4575	102.4371	102.4385	102.6097
0.3440	102.0322	101.7014	101.7505	101.7525	101.5067
0.4490	100.0670	100.5085	100.5992	100.6015	100.1060
0.5480	98.1624	98.8866	98.9807	98.9829	98.4555
0.6580	95.9815	96.5128	96.5691	96.5708	96.2465
0.7530	94.0550	94.0550	94.0536	94.0546	94.0549
0.8370	92.3039	91.6634	91.6038	91.6041	91.9426
0.9300	90.3421	88.8895	88.7694	88.7690	89.4702

Table F.2.64 Calculated molar volumes of cyclohexane(1) and n-heptane (2) system at 298.15 K and 1.01325 bar, (Dimitri et al., 1991).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1016	143.6467	145.4139	145.3207	145.3550	146.3543
0.2529	137.8994	139.5719	139.5393	139.5615	140.0139
0.3993	132.3109	133.5500	133.5543	133.5655	133.6558
0.4274	131.1571	132.3436	132.3515	132.3609	132.4075
0.5007	128.4045	129.1110	129.1222	129.1272	129.1059
0.5988	124.5809	124.5795	124.5801	124.5808	124.5807
0.6489	122.6829	122.1714	122.1600	122.1593	122.2211
0.7507	118.7004	117.0847	117.0364	117.0346	117.3239
0.7999	116.6795	114.5377	114.4667	114.4651	114.9082
0.8992	112.8346	109.2418	109.1190	109.1194	109.9385

Table F.2.65 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 298.15 K and 1.01325 bar, (Aminabhavi et al., 1996).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1013	143.6327	145.2119	145.1174	145.1498	146.1332
0.2027	139.7962	141.1401	141.0856	141.1083	141.7114
0.3040	135.9439	136.9494	136.9260	136.9398	137.2391
0.4037	132.1182	132.6846	132.6803	132.6864	132.7803
0.4998	128.4246	128.4252	128.4260	128.4263	128.4255
0.6018	124.5148	123.7305	123.7212	123.7175	123.7389
0.6985	120.7217	119.1079	119.0739	119.0687	119.2323
0.8024	116.6727	113.9567	113.8819	113.8777	114.3196
0.9002	112.7838	108.9460	108.8229	108.8218	109.6280

Table F.2.66 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 303.15 K and 1.01325 bar, (Aminabhavi et al., 1996).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1013	144.5595	146.0101	145.9188	145.9546	147.0237
0.2027	140.6889	141.9633	141.9103	141.9357	142.5936
0.3040	136.8023	137.7875	137.7643	137.7801	138.1082
0.4037	132.9616	133.5248	133.5198	133.5275	133.6313
0.4998	129.2530	129.2534	129.2532	129.2548	129.2538
0.6018	125.3074	124.5294	124.5192	124.5168	124.5372
0.6985	121.4797	119.8626	119.8285	119.8249	119.9964
0.8024	117.4099	114.6474	114.5739	114.5719	115.0405
0.9002	113.4852	109.5634	109.4437	109.4455	110.3026

Table F.2.67 Calculated molar volumes of cyclohexane (1) and n-heptane (2) system at 308.15 K and 1.01325 bar, (Aminabhavi et al., 1996).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1013	145.4984	146.8195	146.7316	146.7694	147.9261
0.2027	141.5929	142.7845	142.7327	142.7589	143.4732
0.3040	137.6716	138.6125	138.5888	138.6045	138.9635
0.4037	133.8159	134.3440	134.3375	134.3444	134.4609
0.4998	130.0553	130.0566	130.0545	130.0551	130.0570
0.6018	126.0926	125.3034	125.2916	125.2883	125.3106
0.6985	122.2641	120.5972	120.5624	120.5585	120.7399
0.8024	118.1406	115.3275	115.2552	115.2538	115.7503
0.9002	114.2107	110.1826	110.0664	110.0701	110.9789

Table F.2.68 Calculated molar volumes of benzene (1) and n-heptane (2) system at 298.15 K and 1.01325 bar, (Stefanos et al., 1989).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1067	141.4529	142.7559	142.6704	142.7023	143.6237
0.2013	136.1679	137.0277	136.9813	137.0050	137.5701
0.2691	130.9287	132.9015	132.8771	132.8956	133.2558
0.3238	129.2144	129.5594	129.5490	129.5636	129.7897
0.4005	124.7821	124.8529	124.8559	124.8658	124.9513
0.5039	118.8377	118.4695	118.4788	118.4836	118.4686
0.6016	113.1207	112.3962	112.3983	112.3997	112.3858
0.6259	110.8779	110.8791	110.8775	110.8784	110.8793
0.7001	107.3680	106.2309	106.2128	106.2125	106.2958
0.8027	101.3000	99.7636	99.7109	99.7104	99.9999
0.9050	95.3502	93.2693	93.1693	93.1703	93.7741

Table F.2.69 Calculated molar volumes of benzene (1) and n-heptane (2) system at 293.15 K and 1.01325 bar, (Anwel et al., 1992).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.9410	92.3765	90.5819	90.4562	90.4538	91.1605
0.7900	101.3819	100.2232	100.1667	100.1625	100.4267
0.7130	105.8932	105.0860	105.0551	105.0513	105.1707
0.6260	110.9819	110.5357	110.5246	110.5223	110.5450
0.5230	116.9253	116.9264	116.9257	116.9268	116.9267
0.4170	123.0122	123.4356	123.4310	123.4370	123.5151
0.3040	129.4371	130.3021	130.2777	130.2906	130.5614
0.1590	137.6043	139.0101	138.9391	138.9627	139.6373

Table F.2.70 Calculated molar volumes of benzene (1) and n-heptane (2) system at 297.85 K and 1.01325 bar, (Thomas et al., 1989).

x_1	Molar volume (cm^3/g-mole)				
	Expt	PR	PRSV	PRSV2	MRK
0.1007	141.6650	143.2352	143.1427	143.1737	144.1385
0.1109	141.2575	142.6343	142.5462	142.5762	143.4997
0.1922	136.6481	137.8204	137.7646	137.7865	138.4100
0.2760	131.8710	132.8108	132.7815	132.7959	133.1669
0.2915	130.8959	131.8786	131.8534	131.8666	132.1975
0.3953	125.0928	125.5889	125.5840	125.5895	125.7083
0.4839	120.1002	120.1525	120.1543	120.1548	120.1735
0.5204	117.8952	117.8940	117.8956	117.8944	117.8945
0.6729	108.9994	108.3348	108.3159	108.3111	108.3797
0.6893	107.9438	107.2948	107.2719	107.2669	107.3572
0.6967	107.4359	106.8248	106.8000	106.7950	106.8958
0.8532	98.3472	96.7757	96.6947	96.6918	97.1464
0.9152	94.5764	92.7394	92.6293	92.6287	93.2878

VITA

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