APPENDIX-IV

DATA PROCESSING TABLES FOR COMPUTER PROGRAMMING

DETAILS OF N.R.T.L METHOD

Table-1.1
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - H - Dmf - W at 20 0 C

	Hexane (1)	Dmf (2)	Water (3)	Benzene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1306	0.9140	0.5223
	2	0.8210	0.0583	0.4396
	3	0.0004	0.0005	0.0004
	4	0.0480	0.0273	0.0376
TIE LINE 2	1	0.1489	0.8549	0.5019
	2	0.0754	0.0579	0.4060
	3	0.0004	0.0005	0.0004
	4	0.0966	0.0867	0.0917
TIE LINE 3	1	0.1854	0.8335	0.5095
	2	0.6973	0.0578	0.3776
	3	0.0004	0.0005	0.0004
	4	0.1169	0.1082	0.1125
TIE LINE 4	1	0.2136	0.7903	0.5020
	2	0.6191	0.0725	0.3458
	3	0.0004	0.0005	0.0004
	4	0.1669	0.1367	0.1518
TIE LINE 5	1	0.2423	0.7047	0.4735
	2	0.5344	0.1138	0.3241
	3	0.0004	0.0005	0.0004
	4	0.2228	0.1810	0.2019
TIE LINE 6	1	0.0889	0.2691	0.1790
	2	0.4676	0.0098	0.2387
	3	0.2107	0.0044	0.1076
	4	0.2328	0.7166	0.4747
TIE LINE 7	1	0.0795	0.7028	0.3911
	2	0.5978	0.0255	0.3116
	3	0.2694	0.0115	0.1405
	4	0.0534	0.2602	0.1568
TIE LINE 8	1	0.0800	0.3301	0.2051
	2	0.5015	0.0197	0.2606
	3	0.2260	0.0089	0.1175
	4	0.1925	0.6412	0.4169
TIE LINE 9	1	0.0858	0.5082	0.2970
	2	0.5350	0.0225	0.2788
	3	0.2411	0.0104	0.1258
	4	0.1381	0.4589	0.2985

	Hexane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 10	1	0.0829	0.4199	0.2514
	2	0.5183	0.0199	0.2691
	3	0.2338	0.0090	0.1214
	4	0.1650	0.5512	0.3581
TIE LINE 11	1	0.0064	0.7038	0.3551
	2	0.4854	0.0443	0.2648
	3	0.4922	0.0449	0.2685
	4	0.0159	0.2070	0.1115
TIE LINE 12	1	0.0082	0.5059	0.2570
	2	0.4724	0.0221	0.2473
	3	0.4791	0.0224	0.2507
	4	0.0403	0.4496	0.2450
TIE LINE 13	1	0.0084	0.3642	0.1863
	2	0.4573	0.0088	0.2330
	3	0.4637	0.0089	0.2363
	4	0.0707	0.6181	0.3444
TIE LINE 14	1	0.0091	0.1277	0.0004
	2	0.3961	0.0086	0.2023
	3	0.4016	0.0087	0.2052
	4	0.1933	0.8550	0.5241
TIE LINE 15	1	0.0087	0.2445	0.1266
	2	0.4278	0.0087	0.2183
	3	0.4338	0.0088	0.2213
	4	0.1296	0.7380	0.4338

CONVERGENCE OBTAINED AFTER 5 ITERATIONS
OPTIMUM VALUE OF F = 0.0515839
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	735.507400	ITERATION CARRIED OUT Y
A (1 , 3) =	662.272800	ITERATION CARRIED OUT Y
A (1 , 4) =	379.325000	ITERATION CARRIED OUT Y
A (2 , 1) =	263.416600	ITERATION CARRIED OUT Y
A (2 , 3) =	-1269.148000	ITERATION CARRIED OUT Y
A (2 , 4) =	-37.299420	ITERATION CARRIED OUT Y
A (3 , 1) =	707.708300	ITERATION CARRIED OUT Y
A (3 , 2) =	-221.154000	ITERATION CARRIED OUT Y
A (3 , 4) =	426.654100	ITERATION CARRIED OUT Y
A (4 , 1) =	82.024700	ITERATION CARRIED OUT Y
A (4 , 2) =	585.679600	ITERATION CARRIED OUT Y
A (4 , 3) =	794.134900	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.1306	0.1549	0.9140	0.8975
	2	0.8210	0.8087	0.0583	0.0627
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0480	0.0431	0.0273	0.0320
TIE LINE 2	1	0.1489	0.1592	0.8549	0.8446
	2	0.7540	0.7396	0.0579	0.0724
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0966	0.1009	0.0867	0.0825
TIE LINE 3	1	0.1854	0.1861	0.8335	0.8231
	2	0.6973	0.6878	0.0578	0.0766
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1169	0.1251	0.1082	0.1003
TIE LINE 4	1	0.2136	0.2060	0.7903	0.7754
	2	0.6191	0.6262	0.0725	0.0867
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1669	0.1659	0.1367	0.1388
TIE LINE 5	1	0.2423	0.2413	0.7047	0.7057
	2	0.5344	0.5423	0.1138	0.1060
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2228	0.2162	0.1810	0.1876
TIE LINE 6	1	0.0889	0.0513	0.2691	0.2658
	2	0.4676	0.5021	0.0098	0.0595
	3	0.2107	0.2622	0.0044	0.0024
	4	0.2328	0.1861	0.7166	0.6731
TIE LINE 7	1	0.0795	0.0689	0.7028	0.7347
	2	0.5978	0.5732	0.0255	0.0327
	3	0.2694	0.2721	0.0115	0.0000
	4	0.0534	0.1029	0.2602	0.2142
TIE LINE 8	1	0.0800	0.0579	0.3301	0.3255
	2	0.5015	0.5074	0.0197	0.0567
	3	0.2260	0.2583	0.0089	0.0022
	4	0.1925	0.1753	0.6412	0.0614

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0858	0.0718	0.5082	0.5128
	2	0.5350	0.5194	0.0225	0.0482
	3	0.2411	0.2553	0.0104	0.0017
	4	0.1381	0.1537	0.4589	0.4372
TIE LINE 10	1	0.0829	0.0702	0.4199	0.4179
	2	0.5183	0.5044	0.0199	0.0530
	3	0.2338	0.2513	0.0090	0.0020
	4	0.1650	0.1731	0.5512	0.5281
TIE LINE 11	1	0.0064	0.0352	0.7038	0.7034
	2	0.4854	0.4992	0.0443	0.0097
	3	0.4922	0.5148	0.0449	0.0004
	4	0.0159	0.0531	0.2070	0.1750
TIE LINE 12	1	0.0082	0.0355	0.5059	0.5017
	2	0.4724	0.4578	0.0221	0.0148
	3	0.4791	0.4770	0.0224	0.0008
	4	0.0403	0.0828	0.4496	0.4240
TIE LINE 13	1	0.0084	0.0343	0.3642	0.3564
	2	0.4573	0.4271	0.0088	0.0157
	3	0.4637	0.4471	0.0089	0.0002
	4	0.7070	0.1036	0.6181	0.6141
TIE LINE 14	1	0.0091	0.0170	0.1277	0.1132
	2	0.3961	0.4117	0.0086	0.0193
	3	0.4016	0.4369	0.0087	0.0026
	4	0.1933	0.1334	0.8550	0.8657
TIE LINE 15	1	0.0087	0.0279	0.2445	0.2630
	2	0.4278	0.4156	0.0087	0.1890
	3	0.4338	0.4378	0.0088	0.0027
	4	0.1296	0.1192	0.7380	0.7516

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0243	-0.0165
	2	-0.0123	0.0044
	3	0.0005	-0.0005
	4	-0.0049	0.0047
TIE LINE 2	1	0.0103	-0.0103
	2	-0.0144	0.0145
	3	0.0005	-0.0005
	4	0.0043	-0.0042
TIE LINE 3	1	0.0007	-0.0104
	2	-0.0095	0.0188
	3	0.0005	-0.0005
	4	0.0082	-0.0079
TIE LINE 4	1	-0.0076	-0.0149
	2	0.0071	0.0142
	3	0.0005	-0.0005
	4	-0.0010	0.0021
TIE LINE 5	1	-0.0011	0.0011
	2	0.0078	-0.0078
	3	0.0005	-0.0005
	4	-0.0066	0.0066
TIE LINE 6	1	-0.0375	-0.0033
	2	0.0345	0.0497
	3	0.0515	-0.0021
	4	-0.0497	-0.0435
TIE LINE 7	1	-0.0106	0.0320
	2	-0.0245	0.0072
	3	0.0028	-0.0115
	4	0.0496	-0.0460
TIE LINE 8	1	-0.2210	-0.0047
	2	0.0059	0.0390
	3	0.0323	-0.0066
	4	-0.0172	-0.0268

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	-0.0140	0.0046
	2	-0.0156	0.0257
	3	0.0141	-0.0087
	4	0.0080	-0.0217
TIE LINE 10	1	-0.0127	-0.0020
	2	-0.0139	0.0331
	3	0.0176	-0.0070
	4	0.0080	-0.0217
TIE LINE 11	1	0.0288	-0.0004
	2	0.0138	-0.0346
	3	0.0226	-0.0445
	4	0.0372	-0.0320
TIE LINE 12	1	0.0273	-0.0042
	2	-0.0146	
	3	-0.0020	-0.0216
	4	0.0425	-0.0256
TIE LINE 13	1	0.0260	-0.0077
	2	-0.0302	0.0069
	3	-0.0165	-0.0088
	4	0.0329	-0.0040
TIE LINE 14	1	0.0080	-0.0144
	2	0.0156	0.0107
	3	0.0353	-0.0061
	4	-0.0599	0.0107
TIE LINE 15	1	0.0192	-0.0182
	2	-0.0122	0.0102
	3	0.0040	-0.0061
	4	-0.0105	0.0136

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.54815

Table-1.2

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - H - Dmf - W at 30 0 C

	Hexane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1619	0.9019	0.5319
	2	0.7894	0.0814	0.4354
	3	0.0004	0.0005	0.0004
	4	0.0483	0.0163	0.0323
TIE LINE 2	1	0.1894	0.8412	0.5153
	2	0.7324	0.1130	0.4227
	3	0.0004	0.0005	0.0004
	4	0.0778	0.0453	0.0615
TIE LINE 3	1	0.2218	0.7765	0.4992
	2	0.6799	0.1373	0.4086
	3	0.0004	0.0005	0.0004
	4	0.0979	0.0857	0.0918
TIE LINE 4	1	0.1727	0.7651	0.4689
	2	0.7865	0.2184	0.5025
	3	0.0004	0.0005	0.0004
	4	0.0404	0.0160	0.0282
TIE LINE 5	1	0.2023	0.8336	0.5180
	2	0.7759	0.1552	0.4655
	3	0.0004	0.0005	0.0004
	4	0.0214	0.0108	0.0161
TIE LINE 6	1	0.1801	0.5819	0.3810
	2	0.7613	0.3763	0.5688
	3	0.0004	0.0004	0.0004
	4	0.0581	0.0414	0.0498
TIE LINE 7	1	0.0683	0.6561	0.3622
	2	0.6163	0.0454	0.3308
	3	0.2777	0.0205	0.1461
	4	0.0377	0.2780	0.1578
TIE LINE 8	1	0.1014	0.4574	0.2794
	2	0.5148	0.4260	0.2787
	3	0.2320	0.0192	0.1256
	4	0.1518	0.4809	0.3163

COMPONENT	Hexane (1) COMPONENT	Dmf (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 9	1	0.1194	0.2509	0.1852
	2	0.4716	0.0293	0.2504
	3	0.2125	0.0132	0.1129
	4	0.1964	0.7067	0.4515
TIE LINE 10	1	0.0449	0.8317	0.4383
	2	0.6446	0.0156	0.3301
	3	0.2905	0.0070	0.1488
	4	0.0200	0.1457	0.0828
TIE LINE 11	1	0.0866	0.2054	0.1460
	2	0.3616	0.0234	0.1925
	3	0.1630	0.0105	0.0868
	4	0.3888	0.7607	0.5748
TIE LINE 12	1	0.0067	0.7341	0.3704
	2	0.4844	0.0444	0.2644
	3	0.4912	0.0450	0.2681
	4	0.0177	0.1765	0.0971
TIE LINE 13	1	0.0055	0.5228	0.2641
	2	0.4706	0.0393	0.2549
	3	0.4772	0.0398	0.2585
	4	0.0467	0.3981	0.2224
TIE LINE 14	1	0.0041	0.4973	0.2507
	2	0.4682	0.0309	0.2494
	3	0.4748	0.0311	0.2529
	4	0.0529	0.4409	0.2469
TIE LINE 15	1	0.0029	0.2644	0.1337
	2	0.4303	0.0044	0.2173
	3	0.4363	0.0044	0.2204
	4	0.1306	0.7267	0.4287
TIE LINE 16	1	0.0028	0.3997	0.2013
	2	0.4500	0.0044	0.2272
	3	0.4565	0.0045	0.2305
	4	0.0907	0.5914	0.3410

CONVERGENCE OBTAINED AFTER 20 ITERATIONS

OPTIMUM VALUE OF F =0.0467786

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	586.266500	ITERATION CARRIED OUT Y
A (1 , 3) =	815.058700	ITERATION CARRIED OUT Y
A (1 , 4) =	658.457300	ITERATION CARRIED OUT Y
A (2 , 1) =	317.777000	ITERATION CARRIED OUT Y
A (2 , 3) =	-215.568300	ITERATION CARRIED OUT Y
A (2 , 4) =	298.710900	ITERATION CARRIED OUT Y
A (3 , 1) =	773.736400	ITERATION CARRIED OUT Y
A (3 , 2) =	-909.202300	ITERATION CARRIED OUT Y
A (3 , 4) =	307.406000	ITERATION CARRIED OUT Y
A (4 , 1) =	-267.972700	ITERATION CARRIED OUT Y
A (4 , 2) =	196.730400	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	PHASE CALC
TIE LINE 1	1	0.1619	0.1950	0.8354
	2	0.7874	0.7758	0.1287
	3	0.0004	0.0009	0.0000
	4	0.0483	0.0279	0.0362
TIE LINE 2	1	0.1894	0.2186	0.7808
	2	0.7324	0.7267	0.1508
	3	0.0004	0.0009	0.0000
	4	0.0778	0.0530	0.0692
TIE LINE 3	1	0.2218	0.2450	0.7192
	2	0.6799	0.6740	0.1790
	3	0.0004	0.0010	0.0000
	4	0.0979	0.0789	0.1029
TIE LINE 4	1	0.1727	0.1645	0.7836
	2	0.7864	0.8362	0.1790
	3	0.0000	0.0001	0.0000
	4	0.0404	0.0226	0.0340
TIE LINE 5	1	0.2023	0.1814	0.6597
	2	0.7759	0.8065	0.2452
	3	0.0004	0.0009	0.0000
	4	0.0214	0.0140	0.0181
TIE LINE 6	1	0.1801	0.1715	0.6597
	2	0.7613	0.8097	0.2482
	3	0.0004	0.0008	0.0000
	4	0.0581	0.0384	0.0649
TIE LINE 7	1	0.0683	0.0533	0.6821
	2	0.6163	0.6064	0.0455
	3	0.2777	0.2897	0.0035
	4	0.0377	0.0503	0.0269
TIE LINE 8	1	0.1014	0.0448	0.4473
	2	0.0515	0.5834	0.0605
	3	0.0232	0.2919	0.0065
	4	0.1518	0.0788	0.4864

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	PHASE CALC
TIE LINE 9	1	0.1184	0.0313	0.2794
	2	0.4716	0.5691	0.0693
	3	0.2125	0.2953	0.0092
	4	0.1964	0.1028	0.6498
TIE LINE 10	1	0.0449	0.0508	0.8258
	2	0.6446	0.6241	0.0361
	3	0.2905	0.2956	0.0020
	4	0.0200	0.0291	0.1366
TIE LINE 11	1	0.0866	0.0233	0.1884
	2	0.3616	0.5511	0.0684
	3	0.1630	0.3055	0.0111
	4	0.3888	0.1173	0.7331
TIE LINE 12	1	0.0067	0.0411	0.8006
	2	0.4840	0.4569	0.0129
	3	0.4912	0.4678	0.0071
	4	0.0177	0.0345	0.1789
TIE LINE 13	1	0.0055	0.0366	0.5448
	2	0.4706	0.4451	0.0204
	3	0.4772	0.4576	0.0130
	4	0.0467	0.0614	0.4210
TIE LINE 14	1	0.0041	0.0352	0.5037
	2	0.4682	0.4435	0.0216
	3	0.4748	0.4565	0.0140
	4	0.0529	0.0657	0.4598
TIE LINE 15	1	0.0029	0.0216	0.2327
	2	0.4303	0.4301	0.0292
	3	0.4363	0.4458	0.0210
	4	0.1306	0.1014	0.7180
TIE LINE 16	1	0.0028	0.0295	0.3664
	2	0.4500	0.4373	0.0253
	3	0.4565	0.4523	0.0174
	4	0.0907	0.0817	0.5903

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0331	-0.0665
	2	-0.0136	0.0473
	3	0.0005	-0.0005
	4	-0.0204	0.0199
TIE LINE 2	1	0.0292	-0.0604
	2	-0.0057	0.0377
	3	0.0005	-0.0005
	4	-0.0248	0.0239
TIE LINE 3	1	0.0232	-0.0574
	2	-0.0059	0.0416
	3	0.0005	-0.0005
	4	-0.0178	0.0172
TIE LINE 4	1	-0.0082	0.0184
	2	0.0497	-0.0609
	3	0.0004	-0.0005
	4	-0.0178	0.0180
TIE LINE 5	1	-0.0209	0.0264
	2	0.0306	-0.0361
	3	0.0005	-0.0005
	4	-0.0074	0.0074
TIE LINE 6	1	-0.0086	0.0779
	2	0.0483	-0.1281
	3	0.0003	-0.0004
	4	-0.0197	0.0235
TIE LINE 7	1	-0.0150	0.0260
	2	-0.0099	0.0001
	3	0.0120	-0.0170
	4	0.0126	-0.0088
TIE LINE 8	1	-0.0566	-0.0100
	2	0.0685	0.0179
	3	0.0599	-0.0127
	4	-0.0729	0.0055

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	-0.0878	0.0215
	2	0.0975	0.0400
	3	0.0827	-0.0040
	4	-0.0936	-0.0569
TIE LINE 10	1	0.0058	-0.0058
	2	-0.0205	0.0205
	3	0.0050	-0.0050
	4	0.0091	-0.0091
TIE LINE 11	1	-0.0632	-0.0170
	2	0.1895	0.0451
	3	0.1425	0.0005
	4	-0.2715	-0.0277
TIE LINE 12	1	0.0344	0.0665
	2	-0.0275	-0.0315
	3	-0.0233	-0.0379
	4	0.0168	0.0024
TIE LINE 13	1	0.0311	0.0220
	2	-0.0255	-0.0188
	3	-0.0196	-0.0269
	4	0.0147	0.0229
TIE LINE 14	1	0.0311	0.0064
	2	-0.0247	-0.0091
	3	-0.0183	-0.0172
	4	0.0127	0.0189
TIE LINE 15	1	0.0188	-0.0317
	2	-0.0002	0.0248
	3	0.0095	0.0165
	4	-0.0291	-0.0087
TIE LINE 16	1	0.0266	-0.0333
	2	-0.0127	0.0209
	3	-0.0042	0.0129
	4	-0.0090	-0.0011

ABSOLUTE MEAN DEVIATION (MOLE %) IS 2.89683

Table-1.3
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System T - H - Dmf - W at 20 0 C

	Hexane (1)	Dmf (2)	Water (3)	Toulene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1170	0.8361	0.4766
	2	0.8020	0.0808	0.4414
	3	0.0004	0.0005	0.0004
	4	0.0806	0.0827	0.0816
TIE LINE 2	1	0.1764	0.7415	0.4589
	2	0.6878	0.0998	0.3938
	3	0.0004	0.0005	0.0005
	4	0.1354	0.1583	0.1468
TIE LINE 3	1	0.3280	0.6915	0.5098
	2	0.4918	0.1173	0.3045
	3	0.0004	0.0005	0.0005
	4	0.1797	0.1908	0.1852
TIE LINE 4	1	0.2483	0.7208	0.4845
	2	0.5964	0.1114	0.3539
	3	0.0004	0.0005	0.0005
	4	0.1548	0.1203	0.1611
TIE LINE 5	1	0.1703	0.7855	0.4779
	2	0.7154	0.0937	0.4045
	3	0.0005	0.0005	0.0005
	4	0.1139	0.1203	0.1171
TIE LINE 6	1	0.0053	0.6696	0.3375
	2	0.4889	0.0415	0.2652
	3	0.4958	0.0421	0.2689
	4	0.0100	0.2469	0.1284

	Hexane (1)	Dmf (2)	Water (3)	Toulene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 7	1	0.0066	0.3573	0.1821
	2	0.4714	0.2730	0.2494
	3	0.4780	0.0277	0.2529
	4	0.0440	0.5874	0.3157
TIE LINE 8	1	0.0056	0.1854	0.0955
	2	0.4679	0.0243	0.2461
	3	0.4744	0.0246	0.2495
	4	0.0521	0.7657	0.4089
TIE LINE 9	1	0.0055	0.4240	0.2147
	2	0.4780	0.0331	0.2555
	3	0.4846	0.0336	0.2591
	4	0.0319	0.5092	0.2706

CONVERGENCE OBTAINED AFTER 29 ITERATIONS
OPTIMUM VALUE OF F = 0.3641742
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	263.973400	ION CARRIED OUT Y
A (1 , 3) =	373.194700	ION CARRIED OUT Y
A (1 , 4) =	273.121300	ION CARRIED OUT Y
A (2 , 1) =	465.828600	ION CARRIED OUT Y
A (2 , 3) =	-80.082150	ION CARRIED OUT Y
A (2 , 4) =	602.011100	ION CARRIED OUT Y
A (3 , 1) =	470.852200	ION CARRIED OUT Y
A (3 , 2) =	10.435820	ION CARRIED OUT Y
A (3 , 4) =	367.255000	ION CARRIED OUT Y
A (4 , 1) =	-203.478700	ION CARRIED OUT Y
A (4 , 2) =	582.383500	ION CARRIED OUT Y
A (4 , 3) =	520.948900	ION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.1170	0.1732	0.8361	0.6535
	2	0.8020	0.8062	0.0808	0.2285
	3	0.0004	0.0009	0.0005	0.0002
	4	0.0806	0.0183	0.0827	0.1185
TIE LINE 2	1	0.1764	0.1400	0.7415	0.6078
	2	0.6878	0.8321	0.0998	0.1892
	3	0.0004	0.0010	0.0005	0.0002
	4	0.1354	0.0251	0.1583	0.2036
TIE LINE 3	1	0.3280	0.0699	0.6915	0.5644
	2	0.4918	0.5206	0.1173	0.2201
	3	0.0004	0.0008	0.0005	0.0003
	4	0.1797	0.1062	0.1908	0.2162
TIE LINE 4	1	0.2483	0.1426	0.7208	0.6055
	2	0.5964	0.8272	0.1114	0.1865
	3	0.0004	0.0012	0.0005	0.0002
	4	0.1548	0.0264	0.1674	0.2088
TIE LINE 5	1	0.1703	0.1566	0.7855	0.6318
	2	0.7154	0.8181	0.0937	0.2065
	3	0.0005	0.0010	0.0005	0.0002
	4	0.1139	0.0225	0.1203	0.1625
TIE LINE 6	1	0.0053	0.1059	0.6696	0.6012
	2	0.4889	0.4266	0.0415	0.0810
	3	0.4958	0.4360	0.0421	0.0782
	4	0.0100	0.0323	0.2469	0.2381
TIE LINE 7	1	0.0066	0.0481	0.3575	0.3183
	2	0.4714	0.4476	0.0273	0.0478
	3	0.4780	0.4451	0.0277	0.0574
	4	0.0440	0.0600	0.5874	0.5757
TIE LINE 8	1	0.0056	0.0236	0.1854	0.1670
	2	0.4679	0.4569	0.0243	0.0363
	3	0.4744	0.4506	0.0246	0.0495
	4	0.0521	0.0698	0.7657	0.7464
TIE LINE 9	1	0.0055	0.0594	0.4240	0.3818
	2	0.4780	0.4433	0.0331	0.0537
	3	0.4846	0.4431	0.0334	0.0614
	4	0.0319	0.0550	0.5092	0.5023

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0562	-0.1826
	2	0.0042	0.1478
	3	0.0005	-0.0003
	4	-0.0623	0.0359
TIE LINE 2	1	-0.0364	-0.1337
	2	0.1443	0.0894
	3	0.0006	-0.0003
	4	-0.1102	0.0453
TIE LINE 3	1	0.0418	-0.1270
	2	0.0288	0.1028
	3	0.0004	-0.0002
	4	-0.0736	0.0254
TIE LINE 4	1	-0.1057	-0.1153
	2	0.2308	0.1127
	3	0.0007	-0.0003
	4	-0.1284	0.0421
TIE LINE 5	1	-0.0137	-0.1537
	2	0.1027	0.1127
	3	0.0006	-0.0003
	4	-0.0914	0.0421
TIE LINE 6	1	0.1005	-0.0678
	2	-0.0623	0.0395
	3	-0.0597	0.0361
	4	0.0223	-0.0088
TIE LINE 7	1	0.0414	-0.0392
	2	-0.0237	0.0205
	3	-0.0329	0.0297
	4	0.0160	-0.0118
TIE LINE 8	1	0.0180	-0.0183
	2	-0.0109	0.0120
	3	-0.0238	0.0248
	4	0.0176	-0.0193
TIE LINE 9	1	0.0539	-0.0423
	2	-0.0347	0.0206
	3	-0.0416	0.0278
	4	0.0231	-0.0069

ABSOLUTE MEAN DEVIATION (MOLE %) IS 5.10046

Table-1.4

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System T - H - Dmf - W at 30 0 C

	Hexane	Dmf	Water	Toulene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1490	0.8652	0.5071
	2	0.8218	0.1159	0.4689
	3	0.0004	0.0005	0.0004
	4	0.0287	0.0184	0.0235
TIE LINE 2	1	0.1551	0.8373	0.4962
	2	0.7761	0.1161	0.4461
	3	0.0004	0.0005	0.0004
	4	0.0684	0.0461	0.0572
TIE LINE 3	1	0.1613	0.7681	0.4647
	2	0.7292	0.1393	0.4343
	3	0.0004	0.0005	0.0004
	4	0.1090	0.0921	0.1005
TIE LINE 4	1	0.1993	0.7292	0.4643
	2	0.6731	0.1487	0.4109
	3	0.0004	0.0005	0.0005
	4	0.1271	0.1217	0.1244
TIE LINE 5	1	0.2585	0.6105	0.4345
	2	0.5770	0.2246	0.4008
	3	0.0004	0.0005	0.0005
	4	0.1641	0.1644	0.1643
TIE LINE 6	1	0.0327	0.7291	0.3809
	2	0.6325	0.0724	0.3524
	3	0.2850	0.0326	0.1588
	4	0.0498	0.1659	0.1058
TIE LINE 7	1	0.0419	0.6403	0.3411
	2	0.6037	0.0778	0.3407
	3	0.2721	0.0351	0.1536
	4	0.0824	0.2469	0.1643
TIE LINE 8	1	0.0424	0.0534	0.2880
	2	0.5919	0.0843	0.3381
	3	0.2667	0.0380	0.1524
	4	0.0990	0.3441	0.2216
TIE LINE 9	1	0.0256	0.3629	0.1942
	2	0.5540	0.1041	0.3290
	3	0.2497	0.0469	0.1483
	4	0.1707	0.4862	0.3284

COMPONENT	Hexane (1) COMPONENT	Dmf (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 10	1	0.0231	0.0243	0.1331
	2	0.4899	0.0645	0.2772
	3	0.2208	0.0291	0.1249
	4	0.2663	0.6633	0.3284
TIE LINE 11	1	0.0088	0.4993	0.2541
	2	0.4729	0.0420	0.2574
	3	0.4796	0.0426	0.2611
	4	0.0387	0.4162	0.2274
TIE LINE 12	1	0.0101	0.4609	0.2355
	2	0.4655	0.0421	0.2538
	3	0.4721	0.0427	0.2574
	4	0.0523	0.4543	0.2533
TIE LINE 13	1	0.0090	0.3579	0.1834
	2	0.4633	0.0333	0.2483
	3	0.4698	0.0337	0.2518
	4	0.0578	0.5751	0.3165
TIE LINE 14	1	0.0069	0.2349	0.1209
	2	0.4532	0.0289	0.2410
	3	0.4595	0.0293	0.2444
	4	0.0804	0.7069	0.3937
TIE LINE 15	1	0.0075	0.3000	0.1538
	2	0.4853	0.0288	0.2570
	3	0.4921	0.0292	0.2606
	4	0.0151	0.6420	0.3286

CONVERGENCE OBTAINED AFTER 7 ITERATIONS

OPTIMUM VALUE OF F = 0.0863915

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	433.726100	ITERATION CARRIED OUT Y
A (1 , 3) =	408.599500	ITERATION CARRIED OUT Y
A (1 , 4) =	254.091400	ITERATION CARRIED OUT Y
A (2 , 1) =	492.321000	ITERATION CARRIED OUT Y
A (2 , 3) =	-312.089100	ITERATION CARRIED OUT Y
A (2 , 4) =	381.322900	ITERATION CARRIED OUT Y
A (3 , 1) =	933.884200	ITERATION CARRIED OUT Y
A (3 , 2) =	-567.860700	ITERATION CARRIED OUT Y
A (3 , 4) =	451.365500	ITERATION CARRIED OUT Y
A (4 , 1) =	293.504000	ITERATION CARRIED OUT Y
A (4 , 2) =	138.568700	ITERATION CARRIED OUT Y
A (4 , 3) =	496.387800	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.1490	0.1274	0.8652	0.8382
	2	0.8218	0.8474	0.1159	0.1389
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0287	0.0231	0.0184	0.0239
TIE LINE 2	1	0.1551	0.1409	0.8373	0.7912
	2	0.7761	0.8002	0.1161	0.1522
	3	0.0004	0.0010	0.0005	0.0000
	4	0.0684	0.0568	0.0461	0.0576
TIE LINE 3	1	0.1613	0.1619	0.7681	0.7282
	2	0.7292	0.7352	0.1487	0.1724
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1090	0.1009	0.0921	0.1003
TIE LINE 4	1	0.1993	0.1782	0.7292	0.6929
	2	0.6731	0.6936	0.1487	0.1849
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1271	0.1260	0.1217	0.1231
TIE LINE 5	1	0.2585	0.2493	0.6105	0.6197
	2	0.5770	0.5813	0.2246	0.2203
	3	0.0004	0.0008	0.0004	0.0001
	4	0.1641	0.1696	0.1644	0.1590
TIE LINE 6	1	0.0327	0.0468	0.7291	0.7682
	2	0.6325	0.0652	0.0724	0.0594
	3	0.2850	0.2885	0.0326	0.0085
	4	0.0498	0.0602	0.1659	0.1630
TIE LINE 7	1	0.0419	0.0470	0.6403	0.6606
	2	0.6037	0.5882	0.0778	0.0719
	3	0.2721	0.2852	0.0351	0.0106
	4	0.0824	0.0805	0.2469	0.2560
TIE LINE 8	1	0.0424	0.0464	0.5336	0.5429
	2	0.5919	0.5758	0.0843	0.0872
	3	0.2667	0.2841	0.0380	0.0133
	4	0.0990	0.0939	0.3441	0.3562

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0256	0.0472	0.3629	0.3142
	2	0.5540	0.5382	0.1041	0.1199
	3	0.2497	0.2777	0.0469	0.0188
	4	0.1707	0.1369	0.4862	0.5200
TIE LINE 10	1	0.0231	0.0344	0.2431	0.1814
	2	0.4899	0.5423	0.0645	0.1207
	3	0.2208	0.2984	0.0291	0.0225
	4	0.2663	0.1232	0.6633	0.6665
TIE LINE 11	1	0.0088	0.0329	0.4993	0.5230
	2	0.4729	0.4357	0.0420	0.0407
	3	0.4796	0.4540	0.0426	0.0225
	4	0.0387	0.0781	0.4162	0.4089
TIE LINE 12	1	0.0101	0.0324	0.4609	0.0473
	2	0.4655	0.4337	0.0421	0.0436
	3	0.4721	0.4538	0.0427	0.0278
	4	0.0523	0.0809	0.4543	0.4549
TIE LINE 13	1	0.0090	0.0306	0.3579	0.3505
	2	0.4633	0.4295	0.0333	0.0503
	3	0.4698	0.4538	0.0337	0.0309
	4	0.0578	0.0868	0.5751	0.5676
TIE LINE 14	1	0.0069	0.0257	0.2349	0.2163
	2	0.4532	0.4260	0.0289	0.0557
	3	0.4595	0.4552	0.0293	0.0332
	4	0.0804	0.0940	0.7069	0.6939
TIE LINE 15	1	0.0075	0.0294	0.3000	0.3016
	2	0.4853	0.4288	0.0288	0.0529
	3	0.4921	0.4530	0.0292	0.0319
	4	0.0151	0.0894	0.6420	0.6129

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0216	-0.0270
	2	0.0255	0.0229
	3	0.0050	-0.0005
	4	-0.0056	0.0055
TIE LINE 2	1	-0.0142	-0.0461
	2	0.0241	0.0360
	3	0.0005	-0.0005
	4	-0.0116	0.0116
TIE LINE 3	1	0.0006	-0.0399
	2	0.0060	0.0331
	3	0.0005	-0.0004
	4	-0.0081	0.0082
TIE LINE 4	1	-0.2110	-0.0362
	2	0.0205	0.0361
	3	0.0005	-0.0004
	4	-0.0011	0.0014
TIE LINE 5	1	-0.0092	0.0092
	2	0.0043	-0.0043
	3	0.0004	-0.0004
	4	0.0055	-0.0055
TIE LINE 6	1	0.0141	0.0391
	2	-0.0273	-0.0130
	3	0.0035	-0.0241
	4	0.0105	-0.0029
TIE LINE 7	1	0.0051	0.0203
	2	-0.0155	-0.0059
	3	0.0131	-0.0245
	4	-0.0019	0.0092
TIE LINE 8	1	0.0041	0.0093
	2	-0.0161	0.0029
	3	0.0174	-0.0247
	4	-0.0051	0.0122

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0217	-0.0217
	2	-0.0158	0.0158
	3	0.0281	-0.0281
	4	-0.0339	0.0339
TIE LINE 10	1	0.0113	-0.0518
	2	0.0524	0.0562
	3	0.0776	-0.0066
	4	-0.1431	0.0032
TIE LINE 11	1	0.0241	0.0237
	2	-0.0372	-0.0012
	3	-0.0256	-0.0161
	4	0.0394	-0.0072
TIE LINE 12	1	0.0224	0.0119
	2	-0.0319	0.0015
	3	-0.0183	-0.0148
	4	0.0285	0.0006
TIE LINE 13	1	0.0216	-0.0074
	2	-0.0339	0.0170
	3	-0.0160	-0.0028
	4	0.0290	-0.0076
TIE LINE 14	1	0.0188	-0.0186
	2	-0.0271	0.0268
	3	-0.0043	0.0039
	4	0.0136	-0.0130
TIE LINE 15	1	0.0219	0.0016
	2	-0.0565	0.0241
	3	-0.0391	0.0027
	4	0.0743	-0.0291

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.87058

Table-1.5
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System T - H - Dmf - W at 40 0 C

COMPONENT	Hexane (1) COMPONENT	Dmf (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 1	1	0.2450	0.6936	0.4493
	2	0.6527	0.2288	0.4407
	3	0.0004	0.0005	0.0004
	4	0.1019	0.0771	0.0895
TIE LINE 2	1	0.2345	0.7460	0.4903
	2	0.6807	0.1897	0.4352
	3	0.0004	0.0005	0.0004
	4	0.0844	0.0638	0.0741
TIE LINE 3	1	0.1771	0.7904	0.4838
	2	0.7727	0.1897	0.4727
	3	0.0004	0.0005	0.0004
	4	0.0497	0.0365	0.0431
TIE LINE 4	1	0.1961	0.7719	0.4840
	2	0.7409	0.1728	0.4569
	3	0.0004	0.0005	0.0004
	4	0.0625	0.0548	0.0587
TIE LINE 5	1	0.2163	0.2197	0.4580
	2	0.6906	0.2098	0.4502
	3	0.0004	0.0005	0.0004
	4	0.0927	0.0700	0.0814
TIE LINE 6	1	0.0244	0.3549	0.1896
	2	0.6097	0.1187	0.3642
	3	0.2480	0.0535	0.1641
	4	0.0912	0.4729	0.2821
TIE LINE 7	1	0.0301	0.2424	0.1362
	2	0.5184	0.0697	0.2940
	3	0.2336	0.0314	0.1325
	4	0.2179	0.6565	0.4372
TIE LINE 8	1	0.0164	0.1369	0.0766
	2	0.4086	0.0112	0.2099
	3	0.1842	0.0050	0.0946
	4	0.3908	0.8469	0.6189

	Hexane	Dmf	Water	Toulene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 9	1	0.0346	0.5707	0.3026
	2	0.6165	0.1026	0.3595
	3	0.2778	0.0463	0.1620
	4	0.0712	0.2804	0.1758
TIE LINE 10	1	0.0253	0.5595	0.1570
	2	0.5671	0.1046	0.3359
	3	0.2556	0.0471	0.1514
	4	0.1520	0.5595	0.3558
TIE LINE 11	1	0.1477	0.7455	0.4466
	2	0.3252	0.0142	0.1697
	3	0.3297	0.0144	0.1721
	4	0.1974	0.2258	0.2116
TIE LINE 12	1	0.0100	0.5288	0.2694
	2	0.4710	0.0144	0.2427
	3	0.4776	0.0146	0.2461
	4	0.0414	0.4423	0.2418
TIE LINE 13	1	0.0091	0.2349	0.1220
	2	0.4214	0.0289	0.2252
	3	0.4273	0.0293	0.2283
	4	0.1421	0.7069	0.4245
TIE LINE 14	1	0.0109	0.5680	0.2894
	2	0.4785	0.0462	0.2624
	3	0.4852	0.0468	0.2660
	4	0.0254	0.3389	0.1822
TIE LINE 15	1	0.0116	0.3546	0.1831
	2	0.4478	0.0287	0.2382
	3	0.4540	0.0291	0.2416
	4	0.0866	0.5876	0.3371

CONVERGENCE OBTAINED AFTER 81 ITERATIONS

OPTIMUM VALUE OF F = 0.2254088

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	549.311500	ITERATION CARRIED OUT Y
A (1 , 3) =	529.554800	ITERATION CARRIED OUT Y
A (1 , 4) =	-13.083090	ITERATION CARRIED OUT Y
A (2 , 1) =	271.438600	ITERATION CARRIED OUT Y
A (2 , 3) =	53.367580	ITERATION CARRIED OUT Y
A (2 , 4) =	161.282000	ITERATION CARRIED OUT Y
A (3 , 1) =	615.613000	ITERATION CARRIED OUT Y
A (3 , 2) =	250.345600	ITERATION CARRIED OUT Y
A (3 , 4) =	616.010700	ITERATION CARRIED OUT Y
A (4 , 1) =	-257.989600	ITERATION CARRIED OUT Y
A (4 , 2) =	392.733900	ITERATION CARRIED OUT Y
A (4 , 3) =	464.800400	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.2450	0.2719	0.6936	0.6773
	2	0.6527	0.6753	0.2288	0.1937
	3	0.0004	0.0008	0.0005	0.0001
	4	0.1019	0.0522	0.0771	0.1288
TIE LINE 2	1	0.2345	0.2765	0.7460	0.7040
	2	0.6807	0.6846	0.1897	0.1858
	3	0.0004	0.0008	0.0005	0.0001
	4	0.0844	0.0379	0.0638	0.1103
TIE LINE 3	1	0.1771	0.2224	0.7904	0.7452
	2	0.7727	0.7609	0.1726	0.1845
	3	0.0004	0.0008	0.0005	0.0001
	4	0.0497	0.0170	0.0365	0.0692
TIE LINE 4	1	0.1961	0.2380	0.7719	0.7280
	2	0.7409	0.7328	0.1728	0.1831
	3	0.0004	0.0008	0.0005	0.0001
	4	0.0625	0.0275	0.0548	0.0896
TIE LINE 5	1	0.2163	0.2528	0.7197	0.6905
	2	0.6906	0.7023	0.2098	0.1894
	3	0.0004	0.0008	0.0005	0.0001
	4	0.0927	0.0437	0.0700	0.1203
TIE LINE 6	1	0.0244	0.0570	0.3549	0.3549
	2	0.6097	0.5592	0.1187	0.1213
	3	0.2748	0.2704	0.0535	0.0318
	4	0.0912	0.1142	0.4729	0.4911
TIE LINE 7	1	0.0301	0.0375	0.2424	0.2042
	2	0.5184	0.5154	0.0697	0.1417
	3	0.2336	0.2653	0.0314	0.0411
	4	0.2179	0.1806	0.6565	0.6139
TIE LINE 8	1	0.0164	0.0319	0.1369	0.0899
	2	0.4086	0.3946	0.0112	0.1551
	3	0.1842	0.2171	0.0050	0.0582
	4	0.3908	0.3531	0.8469	0.6978

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 9	1	0.0346	0.0870	0.5707	0.5579
	2	0.6165	0.5797	0.1026	0.0989
	3	0.2778	0.2770	0.0463	0.0260
	4	0.0712	0.0571	0.2804	0.3163
TIE LINE 10	1	0.0253	0.0439	0.2888	0.2673
	2	0.5671	0.5424	0.1046	0.1345
	3	0.2556	0.2692	0.0471	0.0364
	4	0.1520	0.1443	0.5595	0.5620
TIE LINE 11	1	0.1477	0.0714	0.7455	0.6159
	2	0.3252	0.4248	0.0142	0.0546
	3	0.3297	0.4668	0.0144	0.0391
	4	0.1974	0.0351	0.2258	0.2913
TIE LINE 12	1	0.0100	0.0517	0.5288	0.4771
	2	0.4710	0.4312	0.0144	0.0628
	3	0.4776	0.4606	0.0146	0.0414
	4	0.0414	0.0575	0.4423	0.4178
TIE LINE 13	1	0.0091	0.0225	0.2349	0.2017
	2	0.4214	0.4029	0.0289	0.0828
	3	0.4273	0.4460	0.0293	0.0539
	4	0.1421	0.1274	0.7069	0.6626
TIE LINE 14	1	0.0109	0.0618	0.5680	0.5560
	2	0.4785	0.4358	0.0462	0.0592
	3	0.4852	0.4596	0.0468	0.0393
	4	0.0254	0.4535	0.3389	0.3445
TIE LINE 15	1	0.0116	0.0331	0.3546	0.3187
	2	0.4478	0.4204	0.0287	0.0736
	3	0.4540	0.4566	0.0291	0.0472
	4	0.0866	0.0902	0.5876	0.5603

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0268	-0.0163
	2	0.0226	-0.0350
	3	0.0003	-0.0003
	4	-0.0497	0.0517
TIE LINE 2	1	0.0420	-0.0420
	2	0.0039	-0.0039
	3	0.0004	-0.0004
	4	-0.0464	0.0464
TIE LINE 3	1	0.0452	-0.0452
	2	-0.1190	0.0119
	3	0.0004	-0.0004
	4	-0.0327	0.0327
TIE LINE 4	1	0.0419	-0.0439
	2	-0.0081	0.0103
	3	0.0004	-0.0004
	4	-0.0350	-0.0347
TIE LINE 5	1	0.0365	-0.0291
	2	0.0117	-0.0204
	3	0.0003	-0.0004
	4	-0.0490	0.0503
TIE LINE 6	1	0.0326	0.0000
	2	-0.0505	0.0026
	3	-0.0044	-0.0217
	4	0.0231	0.0181
TIE LINE 7	1	0.0074	-0.0382
	2	-0.0030	0.0720
	3	0.0317	0.0097
	4	-0.0374	-0.4260
TIE LINE 8	1	0.0155	-0.0470
	2	-0.0140	0.1439
	3	0.0330	0.0532
	4	-0.0337	-0.1491

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0524	-0.0127
	2	-0.0247	-0.0037
	3	0.0136	-0.0203
	4	-0.0077	0.0358
TIE LINE 10	1	0.0186	-0.0214
	2	-0.0247	0.0299
	3	0.0136	-0.0107
	4	-0.0077	0.0024
TIE LINE 11	1	-0.0764	-0.1296
	2	0.0996	0.0404
	3	0.1370	0.0247
	4	-0.1623	0.0654
TIE LINE 12	1	0.0417	-0.5160
	2	-0.0398	0.0484
	3	-0.0170	0.0268
	4	0.0161	-0.0245
TIE LINE 13	1	0.0134	-0.0332
	2	-0.0186	0.0539
	3	0.0187	0.0246
	4	-0.1470	-0.0443
TIE LINE 14	1	0.0509	-0.0120
	2	-0.0427	0.0130
	3	-0.0256	-0.0075
	4	0.0182	0.0055
TIE LINE 15	1	0.0215	-0.0360
	2	-0.0274	0.0449
	3	0.0026	0.0181
	4	0.0035	-0.0270

ABSOLUTE MEAN DEVIATION (MOLE %) IS 3.09568

Table-1.6
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System X - H - Dmf - W at 20 0 C

	Hexano	Dmf	Water	Xylene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1531	0.9109	0.5320
	2	0.7757	0.0496	0.4126
	3	0.0004	0.0005	0.0005
	4	0.0707	0.039	0.0549
TIE LINE 2	1	0.1767	0.8631	0.5199
	2	0.7290	0.0536	0.3913
	3	0.0004	0.0005	0.0005
	4	0.0939	0.0828	0.0884
TIE LINE 3	1	0.2093	0.8058	0.5075
	2	0.6637	0.0637	0.3637
	3	0.0004	0.0005	0.0005
	4	0.1266	0.1300	0.1283
TIE LINE 4	1	0.1899	0.8294	0.8060
	2	0.7032	0.0716	0.3874
	3	0.0004	0.0005	0.0005
	4	0.1065	0.0985	0.1025
TIE LINE 5	1	0.1982	0.7891	0.4937
	2	0.6869	0.0954	0.3912
	3	0.0004	0.0005	0.0005
	4	0.1145	0.1150	0.1147
TIE LINE 6	1	0.0425	0.7381	0.3903
	2	0.6411	0.0621	0.3516
	3	0.2887	0.0280	0.1584
	4	0.0276	0.1719	0.0997
TIE LINE 7	1	0.0401	0.6174	0.3287
	2	0.6288	0.0606	0.3447
	3	0.2834	0.0273	0.1553
	4	0.0477	0.2948	0.1712
TIE LINE 8	1	0.0344	0.4132	0.2238
	2	0.5993	0.0577	0.3285
	3	0.2701	0.0260	0.1481
	4	0.0961	0.5031	0.2996
TIE LINE 9	1	0.0239	0.3639	0.1939
	2	0.5951	0.0572	0.3262
	3	0.2682	0.0258	0.1470
	4	0.1128	0.5532	0.3330

	Hexano	Dmf	Water	Xylene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 10	1	0.0280	0.5075	0.2678
	2	0.6210	0.0673	0.3442
	3	0.2799	0.0303	0.1551
	4	0.0711	0.3948	0.2329
TIE LINE 11	1	0.0140	0.6866	0.3503
	2	0.4870	0.0715	0.2792
	3	0.4938	0.0725	0.2831
	4	0.0052	0.1695	0.0873
TIE LINE 12	1	0.0108	0.5746	0.2927
	2	0.4848	0.0576	0.2712
	3	0.4916	0.0584	0.2750
	4	0.0127	0.3095	0.1611
TIE LINE 13	1	0.0107	0.4328	0.2237
	2	0.4808	0.0518	0.2663
	3	0.4875	0.0526	0.2700
	4	0.0208	0.4590	0.2399
TIE LINE 14	1	0.0104	0.3583	0.1844
	2	0.4794	0.0421	0.2608
	3	0.4681	0.0427	0.2644
	4	0.0240	0.5569	0.2905
TIE LINE 15	1	0.0103	0.2035	0.1069
	2	0.4613	0.0291	0.2452
	3	0.4678	0.0295	0.2487
	4	0.0606	0.7378	0.3992

CONVERGENCE OBTAINED AFTER 119 ITERATIONS

OPTIMUM VALUE OF F = 0.1824451

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	982.600800	ITERATION CARRIED OUT Y
A (1 , 3) =	641.195800	ITERATION CARRIED OUT Y
A (1 , 4) =	-247.456100	ITERATION CARRIED OUT Y
A (2 , 1) =	47.146360	ITERATION CARRIED OUT Y
A (2 , 3) =	52.203750	ITERATION CARRIED OUT Y
A (2 , 4) =	347.490700	ITERATION CARRIED OUT Y
A (3 , 1) =	661.254100	ITERATION CARRIED OUT Y
A (3 , 2) =	180.619300	ITERATION CARRIED OUT Y
A (3 , 4) =	657.934800	ITERATION CARRIED OUT Y
A (4 , 1) =	106.104200	ITERATION CARRIED OUT Y
A (4 , 2) =	660.421900	ITERATION CARRIED OUT Y
A (4 , 3) =	585.557700	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0821	-0.0590
	2	-0.0260	-0.0002
	3	0.0004	-0.0004
	4	-0.0561	0.0592
TIE LINE 2	1	0.0438	-0.0631
	2	0.0260	-0.0025
	3	0.0004	-0.0004
	4	-0.0711	0.0669
TIE LINE 3	1	0.0693	-0.0631
	2	0.0101	-0.0025
	3	0.0004	-0.0004
	4	-0.0711	0.0669
TIE LINE 4	1	0.0230	-0.0519
	2	0.0560	-0.0198
	3	0.0004	-0.0004
	4	-0.0804	0.073
TIE LINE 5	1	0.0067	-0.0333
	2	0.0775	-0.0431
	3	0.0004	-0.0004
	4	-0.0804	0.0775
TIE LINE 6	1	0.0985	-0.0050
	2	-0.0626	-0.0225
	3	-0.0301	-0.0075
	4	-0.0052	0.0342
TIE LINE 7	1	0.0676	-0.0176
	2	-0.0372	-0.0186
	3	-0.0183	-0.0065
	4	-0.0113	0.0418
TIE LINE 8	1	0.0279	-0.0239
	2	0.0056	-0.0124
	3	0.0013	-0.0044
	4	-0.0355	0.0414

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0279	-0.0286
	2	0.0126	-0.0112
	3	0.0046	-0.0040
	4	-0.0458	0.0446
TIE LINE 10	1	0.0535	-0.0219
	2	-0.0201	-0.0236
	3	-0.0103	-0.0092
	4	-0.0225	0.0538
TIE LINE 11	1	0.0890	0.0539
	2	-0.0504	-0.0405
	3	-0.0491	-0.0443
	4	0.0109	0.0302
TIE LINE 12	1	0.0659	0.0181
	2	-0.0420	-0.0205
	3	-0.0392	-0.0298
	4	0.0158	0.0358
TIE LINE 13	1	0.0414	0.0059
	2	-0.0328	-0.0174
	3	-0.0288	-0.0234
	4	0.0208	0.0340
TIE LINE 14	1	0.0292	-0.0018
	2	-0.0293	-0.0066
	3	-0.0245	-0.0129
	4	0.0253	0.0204
TIE LINE 15	1	0.0087	-0.0082
	2	-0.0095	0.0082
	3	-0.0029	0.0015
	4	0.0044	-0.0022

ABSOLUTE MEAN DEVIATION (MOLE %) IS 2.98251

Table-1.7
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System X - H - Dmf - W at 40 0 C

	Hexano (1)	Dmf (2)	Water (3)	Xylene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0362	0.7537	0.1950
	2	0.5915	0.0528	0.3221
	3	0.2666	0.0238	0.1452
	4	0.1058	0.5697	0.3377
TIE LINE 2	1	0.0590	0.7270	0.3930
	2	0.6294	0.0606	0.3450
	3	0.2837	0.0276	0.1556
	4	0.0279	0.1848	0.1063
TIE LINE 3	1	0.0513	0.5645	0.3079
	2	0.6065	0.0591	0.3328
	3	0.2732	0.0266	0.1499
	4	0.0689	0.3498	0.2094
TIE LINE 4	1	0.0499	0.4669	0.2584
	2	0.6011	0.0538	0.3274
	3	0.2709	0.0242	0.1476
	4	0.0781	0.4551	0.2666
TIE LINE 5	1	0.0455	0.4449	0.2452
	2	0.5913	0.0518	0.3216
	3	0.2665	0.0234	0.1449
	4	0.0967	0.4800	0.2883
TIE LINE 6	1	0.0170	0.6369	0.3270
	2	0.4790	0.0637	0.2714
	3	0.4858	0.0646	0.2752
	4	0.0182	0.2347	0.1265
TIE LINE 7	1	0.0217	0.5546	0.2882
	2	0.4722	0.0469	0.2596
	3	0.4789	0.0476	0.2632
	4	0.0272	0.3509	0.1890

COMPONENT	Hexano (1) COMPONENT	Dmf (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 8	1	0.0095	0.3793	0.1944
	2	0.4734	0.0380	0.2557
	3	0.4801	0.0386	0.2593
	4	0.0371	0.5441	0.2906
TIE LINE 9	1	0.0900	0.4579	0.2385
	2	0.4725	0.0498	0.2611
	3	0.4758	0.0505	0.2631
	4	0.0327	0.4419	0.2373
TIE LINE 10	1	0.0176	0.5827	0.3002
	2	0.4763	0.0636	0.2699
	3	0.4830	0.0645	0.2738
	4	0.0230	0.2892	0.1561

CONVERGENCE OBTAINED AFTER 94 ITERATIONS
OPTIMUM VALUE OF F = 0.0192564
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	606.306500	ITERATION CARRIED OUT Y
A (1 , 3) =	448.076900	ITERATION CARRIED OUT Y
A (1 , 4) =	56.872630	ITERATION CARRIED OUT Y
A (2 , 1) =	414.565700	ITERATION CARRIED OUT Y
A (2 , 3) =	-227.683900	ITERATION CARRIED OUT Y
A (2 , 4) =	228.220300	ITERATION CARRIED OUT Y
A (3 , 1) =	516.286000	ITERATION CARRIED OUT Y
A (3 , 2) =	104.338300	ITERATION CARRIED OUT Y
A (3 , 4) =	440.574000	ITERATION CARRIED OUT Y
A (4 , 1) =	-595.241100	ITERATION CARRIED OUT Y
A (4 , 2) =	487.402300	ITERATION CARRIED OUT Y
A (4 , 3) =	397.792000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0362	0.0270	0.3537	0.3426
	2	0.5915	0.6012	0.0528	0.0769
	3	0.2666	0.2736	0.0238	0.0323
	4	0.1058	0.0971	0.5697	0.5492
TIE LINE 2	1	0.0590	0.0674	0.7270	0.7234
	2	0.6294	0.6342	0.0606	0.0517
	3	0.2837	0.2850	0.0276	0.0245
	4	0.0279	0.0131	0.1848	0.2009
TIE LINE 3	1	0.0513	0.0438	0.5645	0.5506
	2	0.6065	0.6310	0.0591	0.0588
	3	0.2732	0.2845	0.0266	0.0262
	4	0.0689	0.0399	0.3498	0.3652
TIE LINE 4	1	0.0499	0.0353	0.4669	0.4575
	2	0.6011	0.6209	0.0538	0.0654
	3	0.2709	0.2811	0.0242	0.0284
	4	0.0781	0.0616	0.4551	0.4496
TIE LINE 5	1	0.0455	0.0328	0.4449	0.4275
	2	0.5913	0.6169	0.0518	0.0681
	3	0.2665	0.2797	0.0234	0.0292
	4	0.0967	0.0697	0.4800	0.4760
TIE LINE 6	1	0.0170	0.0540	0.6369	0.6606
	2	0.4790	0.4634	0.0637	0.0367
	3	0.4858	0.4651	0.0646	0.0431
	4	0.0182	0.0182	0.2347	0.2589
TIE LINE 7	1	0.0217	0.0408	0.5546	0.5562
	2	0.4722	0.4621	0.0469	0.0401
	3	0.4789	0.4644	0.0476	0.0452
	4	0.0272	0.0334	0.3509	0.3577
TIE LINE 8	1	0.0095	0.0172	0.3793	0.3715
	2	0.4734	0.4604	0.0380	0.0510
	3	0.4801	0.4656	0.0386	0.0531
	4	0.0371	0.0575	0.5441	0.5236
TIE LINE 9	1	0.0190	0.0323	0.4579	0.4652
	2	0.4725	0.4582	0.0498	0.0444
	3	0.4785	0.4586	0.0505	0.0481
	4	0.0327	0.0515	0.4419	0.0442
TIE LINE 10	1	0.0176	0.0465	0.5827	0.6046
	2	0.4763	0.4631	0.0636	0.0382
	3	0.4830	0.4652	0.0645	0.0440
	4	0.0230	0.0258	0.2892	0.3125

	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0092	-0.0111
	2	0.0097	0.0241
	3	0.0070	0.0085
	4	-0.0086	-0.0205
TIE LINE 2	1	0.0083	-0.0037
	2	0.0048	-0.0089
	3	0.0013	-0.0031
	4	-0.0147	0.0161
TIE LINE 3	1	-0.0075	-0.0139
	2	0.0244	-0.0089
	3	0.0113	-0.0031
	4	-0.0291	0.0161
TIE LINE 4	1	-0.0146	-0.0094
	2	0.0198	0.0117
	3	0.0102	0.0041
	4	-0.0164	-0.0055
TIE LINE 5	1	-0.0127	-0.0174
	2	0.0256	0.0162
	3	0.0132	0.0059
	4	-0.0270	-0.0040
TIE LINE 6	1	0.0370	0.0237
	2	-0.0157	-0.0271
	3	-0.0207	-0.0215
	4	-0.0001	0.0242
TIE LINE 7	1	0.0191	0.0016
	2	-0.0101	-0.0069
	3	-0.1450	-0.0024
	4	0.0062	0.0068
TIE LINE 8	1	0.0078	-0.0078
	2	-0.0130	0.0130
	3	-0.0145	0.0145
	4	0.0204	-0.0204
TIE LINE 9	1	0.0133	0.0073
	2	-0.0143	-0.0054
	3	-0.0172	-0.0023
	4	0.0188	-0.0003
TIE LINE 10	1	0.0289	0.0218
	2	-0.0132	-0.0254
	3	-0.0178	-0.0205
	4	0.0027	0.0233

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.32106

Table-1.8

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Hep - Dmf - W at 20 0 C

COMPONENT	Heptane (1)	Dmf (2)	Water (3)	Benzene (4)
	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1221	0.8728	0.4974
	2	0.8579	0.0994	0.4786
	3	0.0004	0.0005	0.0005
	4	0.0196	0.0273	0.0234
TIE LINE 2	1	0.1342	0.8510	0.4926
	2	0.8359	0.1028	0.4693
	3	0.0004	0.0005	0.0005
	4	0.0295	0.0456	0.0376
TIE LINE 3	1	0.1547	0.7136	0.4341
	2	0.7953	0.1931	0.4942
	3	0.0004	0.0005	0.0005
	4	0.0496	0.0927	0.0712
TIE LINE 4	1	0.0482	0.5861	0.3172
	2	0.5841	0.0156	0.2999
	3	0.2632	0.007	0.1351
	4	0.1044	0.3913	0.2478
TIE LINE 5	1	0.0427	0.7356	0.3892
	2	0.6100	0.0168	0.3134
	3	0.2749	0.0073	0.1411
	4	0.0723	0.2403	0.1563
TIE LINE 6	1	0.0510	0.3606	0.2058
	2	0.5160	0.0318	0.2649
	3	0.2324	0.0062	0.1193
	4	0.2006	0.6194	0.4100
TIE LINE 7	1	0.0490	0.4461	0.2476
	2	0.5611	0.0151	0.2881
	3	0.2529	0.0068	0.1299
	4	0.1370	0.5320	0.3345
TIE LINE 8	1	0.0500	0.3982	0.2241
	2	0.5402	0.0144	0.2773
	3	0.2435	0.0062	0.1248
	4	0.1663	0.5811	0.3737

CONVERGENCE OBTAINED AFTER 183 ITERATIONS

OPTIMUM VALUE OF F = 0.0876058

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	521.371800	ITERATION CARRIED OUT Y
A (1 , 3) =	321.438200	ITERATION CARRIED OUT Y
A (1 , 4) =	10.510030	ITERATION CARRIED OUT Y
A (2 , 1) =	346.117500	ITERATION CARRIED OUT Y
A (2 , 3) =	-177.281600	ITERATION CARRIED OUT Y
A (2 , 4) =	192.286700	ITERATION CARRIED OUT Y
A (3 , 1) =	485.905100	ITERATION CARRIED OUT Y
A (3 , 2) =	-125.784200	ITERATION CARRIED OUT Y
A (3 , 4) =	349.816900	ITERATION CARRIED OUT Y
A (4 , 1) =	-337.891200	ITERATION CARRIED OUT Y
A (4 , 2) =	561.835600	ITERATION CARRIED OUT Y
A (4 , 3) =	406.434000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.1221	0.1483	0.8728	0.8432
	2	0.8579	0.8469	0.0994	0.1137
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0196	0.0044	0.0273	0.0423
TIE LINE 2	1	0.1342	0.1480	0.8510	0.8238
	2	0.8359	0.8427	0.1028	0.1105
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0295	0.0075	0.0456	0.0665
TIE LINE 3	1	0.1547	0.1295	0.7136	0.7640
	2	0.7953	0.8525	0.1931	0.1062
	3	0.0004	0.0008	0.0005	0.0001
	4	0.0496	0.0164	0.0927	0.1305
TIE LINE 4	1	0.0482	0.0596	0.5861	0.5170
	2	0.5841	0.6068	0.0156	0.0617
	3	0.2632	0.2747	0.0070	0.0269
	4	0.1044	0.0577	0.3913	0.3953
TIE LINE 5	1	0.0427	0.0809	0.7356	0.6511
	2	0.6100	0.6110	0.0168	0.0606
	3	0.2749	0.2756	0.0073	0.0269
	4	0.0723	0.0314	0.2403	0.2624
TIE LINE 6	1	0.0510	0.0344	0.3606	0.3115
	2	0.5160	0.5841	0.0138	0.0680
	3	0.2324	0.2660	0.0062	0.0288
	4	0.2006	0.1139	0.6194	0.5927
TIE LINE 7	1	0.0490	0.0439	0.4461	0.3953
	2	0.5611	0.5958	0.0151	0.0648
	3	0.2529	0.2706	0.0068	0.0277
	4	0.1370	0.0884	0.5320	0.5131
TIE LINE 8	1	0.0500	0.0386	0.3982	0.3492
	2	0.5402	0.5900	0.0144	0.0665
	3	0.2435	0.2681	0.0062	0.0282
	4	0.1663	0.1019	0.5811	0.5570

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0265	-0.0296
	2	-0.0110	0.0143
	3	0.0005	-0.0005
	4	-0.0152	0.015
TIE LINE 2	1	0.0138	-0.0272
	2	0.0068	0.0077
	3	0.0005	-0.0005
	4	-0.0220	0.0208
TIE LINE 3	1	-0.0251	0.0504
	2	0.0572	-0.0869
	3	0.0004	-0.0005
	4	-0.0332	0.0377
TIE LINE 4	1	0.0114	-0.0691
	2	0.0227	0.0461
	3	0.0114	0.0198
	4	-0.0467	0.0041
TIE LINE 5	1	0.0381	-0.0845
	2	0.0010	0.0438
	3	0.0007	0.0196
	4	-0.0409	0.0221
TIE LINE 6	1	-0.0165	-0.0491
	2	0.0681	0.0542
	3	0.0336	0.0226
	4	-0.0867	-0.0267
TIE LINE 7	1	-0.0050	-0.0508
	2	0.0347	0.0497
	3	0.0177	0.0209
	4	-0.0487	-0.0188
TIE LINE 8	1	-0.0114	-0.0490
	2	0.0498	0.0521
	3	0.0247	0.0220
	4	-0.0645	-0.0241

ABSOLUTE MEAN DEVIATION (MOLE %) IS 2.94784

Table-1.9

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Hep - Dmf - W at 30 ^{0} C

	Heptane (1)	Dmf (2)	Water (3)	Benzene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1302	0.8688	0.4995
	2	0.8399	0.1059	0.4729
	3	0.0004	0.0005	0.0005
	4	0.0295	0.0248	0.0271
TIE LINE 2	1	0.1547	0.8192	0.4869
	2	0.7953	0.1437	0.4695
	3	0.0004	0.0005	0.0005
	4	0.0496	0.0367	0.0431
TIE LINE 3	1	0.1882	0.7880	0.4881
	2	0.7289	0.1606	0.4448
	3	0.0004	0.0005	0.0005
	4	0.0825	0.0509	0.0667
TIE LINE 4	1	0.2052	0.7654	0.4853
	2	0.7033	0.1738	0.4386
	3	0.0004	0.0005	0.0005
	4	0.0911	0.0602	0.0757
TIE LINE 5	1	0.0648	0.6717	0.3682
	2	0.5885	0.0914	0.3400
	3	0.2652	0.0410	0.1531
	4	0.0815	0.1959	0.1387
TIE LINE 6	1	0.0733	0.4834	0.2784
	2	0.5102	0.0698	0.2900
	3	0.2299	0.0312	0.1306
	4	0.1865	0.4156	0.3011
TIE LINE 7	1	0.0726	0.3336	0.2031
	2	0.4234	0.0333	0.2283
	3	0.1908	0.0150	0.1029
	4	0.3132	0.6181	0.4657
TIE LINE 8	1	0.0660	0.5717	0.3188
	2	0.5523	0.0835	0.3179
	3	0.2491	0.0376	0.1434
	4	0.1326	0.3072	0.2199

	Heptane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 9	1	0.0743	0.4061	0.2402
	2	0.4666	0.0526	0.2596
	3	0.2103	0.0237	0.1170
	4	0.2488	0.5176	0.3832
TIE LINE 10	1	0.0191	0.4881	0.2536
	2	0.4642	0.0470	0.2556
	3	0.4707	0.0476	0.2592
	4	0.0460	0.4174	0.2317
TIE LINE 11	1	0.0101	0.2623	0.1362
	2	0.4172	0.0270	0.2221
	3	0.4230	0.0273	0.2252
	4	0.1496	0.6834	0.4165
TIE LINE 12	1	0.0080	0.1393	0.0736
	2	0.3771	0.0218	0.1995
	3	0.3824	0.0221	0.2023
	4	0.2325	0.8168	0.5246
TIE LINE 13	1	0.0138	0.3727	0.1932
	2	0.4419	0.0367	0.2393
	3	0.4481	0.0373	0.2427
	4	0.0962	0.5533	0.3247
TIE LINE 14	1	0.0052	0.2004	0.1028
	2	0.4000	0.0239	0.2120
	3	0.4056	0.0243	0.2150
	4	0.1891	0.7514	0.4703

CONVERGENCE OBTAINED AFTER 178 ITERATIONS
OPTIMUM VALUE OF F = 0.3062868
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	727.825100	ITERATION CARRIED OUT Y
A (1 , 3) =	856.155700	ITERATION CARRIED OUT Y
A (1 , 4) =	387.738300	ITERATION CARRIED OUT Y
A (2 , 1) =	326.573200	ITERATION CARRIED OUT Y
A (2 , 3) =	5.741276	ITERATION CARRIED OUT Y
A (2 , 4) =	590.278700	ITERATION CARRIED OUT Y
A (3 , 1) =	758.854900	ITERATION CARRIED OUT Y
A (3 , 2) =	680.777300	ITERATION CARRIED OUT Y
A (3 , 4) =	627.692900	ITERATION CARRIED OUT Y
A (4 , 1) =	505.693500	ITERATION CARRIED OUT Y
A (4 , 2) =	501.437000	ITERATION CARRIED OUT Y
A (4 , 3) =	641.183500	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT
TIE LINE 1	1	0.1302	0.1340	0.8688
	2	0.8399	0.8451	0.1059
	3	0.0004	0.0008	0.0005
	4	0.0295	0.0204	0.0248
TIE LINE 2	1	0.1547	0.1420	0.8192
	2	0.7953	0.8241	0.1437
	3	0.0004	0.0008	0.0005
	4	0.0496	0.0327	0.0367
TIE LINE 3	1	0.1882	0.1447	0.7880
	2	0.7289	0.8044	0.1606
	3	0.0004	0.0008	0.0005
	4	0.0825	0.0491	0.0509
TIE LINE 4	1	0.2052	0.1456	0.7654
	2	0.7033	0.7975	0.1738
	3	0.0004	0.0008	0.0005
	4	0.0911	0.0551	0.0602
TIE LINE 5	1	0.0648	0.1088	0.6717
	2	0.5885	0.5452	0.0914
	3	0.2652	0.2504	0.0410
	4	0.0815	0.0963	0.1959
TIE LINE 6	1	0.0733	0.1193	0.4834
	2	0.5102	0.5298	0.0698
	3	0.2299	0.2429	0.0312
	4	0.1865	0.1067	0.4156
TIE LINE 7	1	0.0726	0.1260	0.3360
	2	0.4234	0.5316	0.3330
	3	0.1908	0.2334	0.0150
	4	0.3132	0.1067	0.6181

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT
TIE LINE 8	1	0.0660	0.1087	0.5717
	2	0.5523	0.5372	0.0835
	3	0.2491	0.2486	0.0376
	4	0.1326	0.1063	0.3072
TIE LINE 9	1	0.0743	0.1257	0.4061
	2	0.4666	0.5283	0.0526
	3	0.2103	0.2378	0.0237
	4	0.2488	0.1064	0.5176
TIE LINE 10	1	0.0191	0.0528	0.4881
	2	0.4642	0.4180	0.0470
	3	0.4707	0.4658	0.0476
	4	0.0460	0.0624	0.4174
TIE LINE 11	1	0.0101	0.0834	0.0262
	2	0.4172	0.3898	0.0270
	3	0.4230	0.4240	0.0273
	4	0.1496	0.1016	0.6834
TIE LINE 12	1	0.0080	0.0525	0.1393
	2	0.3771	0.4096	0.0218
	3	0.3824	0.4443	0.0221
	4	0.2325	0.0927	0.8168
TIE LINE 13	1	0.0138	0.0860	0.3727
	2	0.4419	0.3911	0.0367
	3	0.4481	0.4320	0.0373
	4	0.0962	0.0919	0.5533
TIE LINE 14	1	0.0052	0.0698	0.2004
	2	0.4000	0.4003	0.0239
	3	0.4056	0.4333	0.0243
	4	0.1891	0.0953	0.7514

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0038	0.0287
	2	0.0052	-0.0383
	3	0.0004	-0.0004
	4	-0.0091	0.0097
TIE LINE 2	1	-0.0127	0.0554
	2	0.0288	-0.728
	3	0.0004	-0.0004
	4	-0.0169	0.0182
TIE LINE 3	1	-0.0434	0.0526
	2	0.0755	-0.0851
	3	0.0004	-0.0004
	4	-0.0334	0.0338
TIE LINE 4	1	-0.0596	0.0616
	2	0.0942	-0.0964
	3	0.0004	-0.0004
	4	-0.0360	0.0361
TIE LINE 5	1	0.0440	0.0347
	2	-0.0433	-0.0190
	3	-0.0148	-0.0147
	4	0.0148	-0.0019
TIE LINE 6	1	0.0459	-0.0857
	2	0.0196	0.0403
	3	0.0129	0.0151
	4	-0.0798	0.0313
TIE LINE 7	1	0.0534	-0.0979
	2	0.1082	0.0670
	3	0.0426	0.0328
	4	-0.2064	-0.0008

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 8	1	0.0427	-0.0422
	2	-0.0151	0.0146
	3	-0.0005	0.0003
	4	-0.0262	0.0265
TIE LINE 9	1	0.0513	-0.1011
	2	0.0617	0.0551
	3	0.0275	0.0250
	4	-0.1423	0.0221
TIE LINE 10	1	0.0337	-0.0337
	2	-0.0462	0.0462
	3	-0.0048	0.0048
	4	0.0164	-0.0164
TIE LINE 11	1	0.0732	-0.0814
	2	-0.2730	0.0534
	3	0.0009	0.0299
	4	-0.0480	-0.0009
TIE LINE 12	1	0.0445	-0.0527
	2	0.0325	0.0486
	3	0.0619	0.0315
	4	-0.1398	-0.0268
TIE LINE 13	1	0.0722	-0.0755
	2	-0.0508	0.0554
	3	-0.0162	0.0219
	4	-0.0043	-0.0028
TIE LINE 14	1	0.0646	-0.0735
	2	0.0003	0.0504
	3	0.0277	0.0311
	4	-0.0938	-0.0071

ABSOLUTE MEAN DEVIATION (MOLE %) IS 3.92413

Table-1.10
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - Hep - Dmf - W at 40 0 C

	Heptane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.1571	0.7335	0.4453
	2	0.7177	0.1281	0.4229
	3	0.0004	0.0005	0.0005
	4	0.1247	0.1378	0.1313
TIE LINE 2	1	0.1466	0.7591	0.4528
	2	0.7986	0.1863	0.4924
	3	0.0004	0.0005	0.0005
	4	0.0544	0.0541	0.0543
TIE LINE 3	1	0.1799	0.6904	0.4352
	2	0.7293	0.2146	0.4719
	3	0.0004	0.0005	0.0005
	4	0.0903	0.0945	0.0924
TIE LINE 4	1	0.1406	0.8809	0.5107
	2	0.8373	0.1062	0.4717
	3	0.0004	0.0005	0.0005
	4	0.0217	0.0124	0.0170
TIE LINE 5	1	0.1464	0.8283	0.4874
	2	0.8151	0.1375	0.4763
	3	0.0004	0.0001	0.0005
	4	0.0381	0.0337	0.0359
TIE LINE 6	1	0.0661	0.6415	0.3538
	2	0.5680	0.0546	0.3113
	3	0.2560	0.0246	0.1403
	4	0.1099	0.2793	0.1946
TIE LINE 7	1	0.0886	0.4715	0.2800
	2	0.5192	0.0323	0.2758
	3	0.2340	0.0146	0.1243
	4	0.1583	0.4816	0.3199
TIE LINE 8	1	0.0989	0.3875	0.2432
	2	0.4434	0.0358	0.2396
	3	0.1998	0.0161	0.1080
	4	0.2579	0.5606	0.4093

	Heptane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 9	1	0.0778	0.5644	0.3211
	2	0.5434	0.0385	0.2909
	3	0.2451	0.1744	0.1311
	4	0.1337	0.3797	0.2567
TIE LINE 10	1	0.0936	0.4396	0.2666
	2	0.4820	0.0268	0.2544
	3	0.2172	0.0121	0.1147
	4	0.2071	0.5216	0.3643
TIE LINE 11	1	0.0198	0.3668	0.1933
	2	0.4403	0.0186	0.2295
	3	0.4465	0.0189	2327.0000
	4	0.0935	0.5957	0.3445
TIE LINE 12	1	0.0214	0.6776	0.3495
	2	0.4692	0.0201	0.2447
	3	0.4758	0.0204	0.2481
	4	0.0335	0.2819	0.1577
TIE LINE 13	1	0.0245	0.4796	0.2520
	2	0.4485	0.0190	0.2337
	3	0.4548	0.0192	0.2370
	4	0.0722	0.4832	0.2773
TIE LINE 14	1	0.0201	0.2535	0.1369
	2	0.4291	0.0269	0.2280
	3	0.4351	0.0273	0.2146
	4	0.1158	0.6923	0.4704
TIE LINE 15	1	0.0159	0.1910	0.1035
	2	0.3839	0.0393	0.2116
	3	0.3893	0.0398	0.2146
	4	0.2109	0.7299	0.4704

CONVERGENCE OBTAINED AFTER 178 ITERATIONS

OPTIMUM VALUE OF F = 0.0600729

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	616.238500	ITERATION CARRIED OUT Y
A (1 , 3) =	477.398300	ITERATION CARRIED OUT Y
A (1 , 4) =	7.341990	ITERATION CARRIED OUT Y
A (2 , 1) =	333.487200	ITERATION CARRIED OUT Y
A (2 , 3) =	-673.415200	ITERATION CARRIED OUT Y
A (2 , 4) =	-438.627800	ITERATION CARRIED OUT Y
A (3 , 1) =	422.402000	ITERATION CARRIED OUT Y
A (3 , 2) =	-1018.699000	ITERATION CARRIED OUT Y
A (3 , 4) =	650.321800	ITERATION CARRIED OUT Y
A (4 , 1) =	-243.144800	ITERATION CARRIED OUT Y
A (4 , 2) =	367.764400	ITERATION CARRIED OUT Y
A (4 , 3) =	787.042200	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.1571	0.1982	0.7335	0.6768
	2	0.7177	0.6803	0.1281	0.1819
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1247	0.1208	0.1378	0.1411
TIE LINE 2	1	0.1466	0.1510	0.7591	0.7547
	2	0.7986	0.8304	0.1863	0.1545
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0544	0.0467	0.0541	0.0618
TIE LINE 3	1	0.1799	0.1781	0.6904	0.6993
	2	0.7293	0.7541	0.2146	0.1820
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0903	0.0829	0.0945	0.1022
TIE LINE 4	1	0.1406	0.1522	0.8809	0.8693
	2	0.8373	0.8418	0.1062	0.1017
	3	0.0004	0.0010	0.0005	0.0000
	4	0.0217	0.0150	0.0124	0.0191
TIE LINE 5	1	0.1464	0.1534	0.8283	0.8214
	2	0.8151	0.8327	0.1375	0.1199
	3	0.0004	0.0010	0.0005	0.0000
	4	0.0381	0.0315	0.0337	0.0403
TIE LINE 6	1	0.0661	0.0582	0.6415	0.6590
	2	0.5680	0.5756	0.0546	0.0384
	3	0.2560	0.2743	0.0246	0.0019
	4	0.1099	0.0917	0.2793	0.0403
TIE LINE 7	1	0.0886	0.0522	0.4715	0.4824
	2	0.5192	0.5213	0.0323	0.0577
	3	0.2340	0.2608	0.0146	0.0030
	4	0.1583	0.1647	0.4816	0.4578

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 8	1	0.0989	0.0461	0.3875	0.3803
	2	0.4434	0.4852	0.0358	0.0688
	3	0.1998	0.2571	0.0161	0.0042
	4	0.2579	0.2103	0.5606	0.5476
TIE LINE 9	1	0.0778	0.0558	0.5644	0.5715
	2	0.5434	0.5491	0.0385	0.0473
	3	0.2451	0.2678	0.0174	0.0023
	4	0.1337	0.1266	0.3797	0.3796
TIE LINE 10	1	0.0936	0.0493	0.4396	0.4333
	2	0.4820	0.5042	0.0268	0.0628
	3	0.2172	0.2596	0.0121	0.0035
	4	0.2071	0.1859	0.5216	0.5012
TIE LINE 11	1	0.0198	0.0304	0.3668	0.3854
	2	0.4403	0.4049	0.0186	0.0224
	3	0.4465	0.4242	0.0189	0.0066
	4	0.0935	0.1412	0.5957	0.5845
TIE LINE 12	1	0.0214	0.0492	0.6776	0.6998
	2	0.4692	0.4462	0.0201	0.0096
	3	0.4758	0.4552	0.0204	0.0065
	4	0.0335	0.0499	0.2819	0.2835
TIE LINE 13	1	0.0245	0.0377	0.4796	0.4998
	2	0.4485	0.4216	0.0190	0.0166
	3	0.4548	0.4366	0.0192	0.0063
	4	0.0722	0.1045	0.4822	0.4798
TIE LINE 14	1	0.0201	0.0233	0.2535	0.2783
	2	0.4291	0.3872	0.0269	0.0295
	3	0.4351	0.4107	0.0273	0.0073
	4	0.1158	0.1794	0.6923	0.6842
TIE LINE 15	1	0.0159	0.0167	0.1910	0.1977
	2	0.3839	0.3734	0.0393	0.0358
	3	0.3893	0.4046	0.3980	0.0081
	4	0.2109	0.2052	0.7299	0.7584

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0410	-0.0568
	2	-0.0374	0.0538
	3	0.0005	-0.0005
	4	-0.0039	0.0033
TIE LINE 2	1	0.0044	-0.0044
	2	0.0318	-0.0318
	3	0.0005	-0.0005
	4	-0.0078	0.0078
TIE LINE 3	1	-0.0018	0.0089
	2	0.0248	-0.0326
	3	0.0005	-0.0005
	4	-0.0075	0.0077
TIE LINE 4	1	0.0116	-0.0116
	2	0.0045	-0.0045
	3	0.0005	-0.0005
	4	-0.0066	0.0066
TIE LINE 5	1	0.0070	-0.0070
	2	0.0176	-0.0176
	3	0.0005	-0.0005
	4	-0.0066	0.0066
TIE LINE 6	1	-0.0079	0.0175
	2	0.0076	-0.0162
	3	0.0184	-0.0227
	4	-0.0182	0.0215
TIE LINE 7	1	-0.0364	0.0109
	2	0.0021	0.0254
	3	0.0268	-0.0116
	4	0.0065	-0.0238
TIE LINE 8	1	-0.5280	-0.0072
	2	0.0418	0.0330
	3	0.0573	-0.0119
	4	-0.0477	-0.0129

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	-0.0220	0.0071
	2	0.0057	0.0088
	3	0.2270	-0.0150
	4	-0.0072	-0.0001
TIE LINE 10	1	-0.0443	-0.0063
	2	0.0222	0.0361
	3	0.0423	-0.0085
	4	-0.0212	0.0204
TIE LINE 11	1	0.0107	0.0186
	2	-0.0354	0.0038
	3	-0.0222	-0.0122
	4	0.0477	-0.0111
TIE LINE 12	1	0.0278	0.0221
	2	-0.0300	-0.0105
	3	-0.0206	-0.0139
	4	0.0164	0.0016
TIE LINE 13	1	0.0132	0.0202
	2	-0.0269	-0.0024
	3	-0.0182	-0.0129
	4	0.0323	-0.0054
TIE LINE 14	1	0.0032	0.0248
	2	-0.0419	0.0026
	3	-0.0243	-0.0200
	4	0.0636	-0.0081
TIE LINE 15	1	0.0008	0.0067
	2	-0.0105	-0.0035
	3	0.0153	-0.0317
	4	-0.0057	0.0285

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.669075

Table-1.11
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - Oct - Dmf - W at 20 0 C

COMPONENT	Octane (1) COMPONENT	Dmf (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0477	0.9130	0.4804
	2	0.9143	0.0296	0.4719
	3	0.0004	0.0006	0.0005
	4	0.0375	0.0568	0.0472
TIE LINE 2	1	0.0626	0.8216	0.4421
	2	0.8444	0.0391	0.4418
	3	0.0004	0.0006	0.0005
	4	0.0925	0.1386	0.1156
TIE LINE 3	1	0.0912	0.6442	0.3677
	2	0.7294	0.0498	0.3896
	3	0.0004	0.0006	0.0005
	4	0.1791	0.3054	0.2422
TIE LINE 4	1	0.1014	0.5801	0.3407
	2	0.6969	0.0527	0.3748
	3	0.0004	0.0005	0.0005
	4	0.2013	0.3666	0.2840
TIE LINE 5	1	0.1170	0.5261	0.3215
	2	0.6447	0.0546	0.3497
	3	0.0004	0.0005	0.0005
	4	0.2379	0.4188	0.3283
TIE LINE 6	1	0.0256	0.6102	0.3179
	2	0.6060	0.0135	0.3098
	3	0.2731	0.0061	0.1396
	4	0.0953	0.3702	0.2328
TIE LINE 7	1	0.0241	0.7087	0.3664
	2	0.6339	0.0140	0.3239
	3	0.2857	0.0063	0.1460
	4	0.0563	0.2710	0.1639
TIE LINE 8	1	0.0229	0.7512	0.3870
	2	0.6474	0.0143	0.3309
	3	0.2918	0.0064	0.1491
	4	0.0379	0.2281	0.1330
TIE LINE 9	1	0.0248	0.6673	0.3461
	2	0.6201	0.0138	0.3169
	3	0.2794	0.0062	0.1428
	4	0.0757	0.3127	0.1942

	Octane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 10	1	0.0257	0.5585	0.2921
	2	0.5921	0.0125	0.3023
	3	0.2669	0.0054	0.1361
	4	0.1153	0.4236	0.2694
TIE LINE 11	1	0.0029	0.4462	0.2245
	2	0.4685	0.0105	0.2395
	3	0.4750	0.0104	0.2427
	4	0.0536	0.5329	0.2933
TIE LINE 12	1	0.0021	0.7735	0.3878
	2	0.4893	0.0121	0.2507
	3	0.4963	0.0123	0.2543
	4	0.0123	0.2021	0.1072
TIE LINE 13	1	0.0025	0.6538	0.3281
	2	0.4843	0.0113	0.2478
	3	0.4912	0.0118	0.2515
	4	0.0219	0.3231	0.1725
TIE LINE 14	1	0.0036	0.2670	0.1353
	2	0.4516	0.0094	0.2305
	3	0.4579	0.0097	0.2338
	4	0.0868	0.7139	0.4004
TIE LINE 15	1	0.0037	0.1765	0.0901
	2	0.4244	0.0090	0.2167
	3	0.4303	0.0088	0.2196
	4	0.1415	0.8057	0.4736

CONVERGENCE OBTAINED AFTER 178 ITERATIONS
OPTIMUM VALUE OF F = 0.0650122
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1047.577000	ITERATION CARRIED OUT Y
A (1 , 3) =	-47.093140	ITERATION CARRIED OUT Y
A (1 , 4) =	-613.842300	ITERATION CARRIED OUT Y
A (2 , 1) =	160.380200	ITERATION CARRIED OUT Y
A (2 , 3) =	-1246.199000	ITERATION CARRIED OUT Y
A (2 , 4) =	-436.984500	ITERATION CARRIED OUT Y
A (3 , 1) =	995.069000	ITERATION CARRIED OUT Y
A (3 , 2) =	-821.137100	ITERATION CARRIED OUT Y
A (3 , 4) =	507.061200	ITERATION CARRIED OUT Y
A (4 , 1) =	-427.583200	ITERATION CARRIED OUT Y
A (4 , 2) =	411.951500	ITERATION CARRIED OUT Y
A (4 , 3) =	352.934700	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0477	0.1195	0.9130	0.8413
	2	0.9143	0.9155	0.0296	0.0283
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0375	0.0081	0.0568	0.0862
TIE LINE 2	1	0.0626	0.1128	0.8216	0.7714
	2	0.8444	0.849	0.0391	0.0346
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0925	0.0379	0.1386	0.1932
TIE LINE 3	1	0.0912	0.1098	0.6442	0.6031
	2	0.7294	0.7508	0.0498	0.0597
	3	0.0004	0.0010	0.0006	0.0000
	4	0.1791	0.1374	0.3054	0.3380
TIE LINE 4	1	0.1014	0.1115	0.5801	0.5476
	2	0.6969	0.7092	0.0527	0.0729
	3	0.0004	0.0010	0.0005	0.0000
	4	0.2379	0.1775	0.3666	0.3801
TIE LINE 5	1	0.1170	0.1057	0.5261	0.4918
	2	0.6447	0.6793	0.0546	0.0896
	3	0.0004	0.0011	0.0005	0.000
	4	0.2379	0.2128	0.4188	0.4195
TIE LINE 6	1	0.0256	0.0238	0.6102	0.5822
	2	0.606	0.6375	0.0135	0.0151
	3	0.2731	0.2941	0.0061	0.0007
	4	0.0953	0.0440	0.3702	0.4024
TIE LINE 7	1	0.0241	0.0324	0.7087	0.6879
	2	0.6339	0.6490	0.0140	0.0110
	3	0.2857	0.2969	0.0063	0.0007
	4	0.0563	0.0210	0.2710	0.3009
TIE LINE 8	1	0.0229	0.0376	0.7512	0.7382
	2	0.6474	0.6507	0.0143	0.0095
	3	0.2918	0.2967	0.0064	0.0007
	4	0.0379	0.0143	0.2281	0.2522

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 9	1	0.0248	0.0284	0.6673	0.6409
	2	0.6201	0.6448	0.0138	0.0126
	3	0.2794	0.2959	0.0062	0.0007
	4	0.0757	0.0299	0.3127	0.3466
TIE LINE 10	1	0.0257	0.0205	0.5585	0.5299
	2	0.5921	0.6273	0.0125	0.0178
	3	0.2669	0.2908	0.0054	0.0008
	4	0.1153	0.0606	0.4236	0.4522
TIE LINE 11	1	0.0029	0.0082	0.4462	0.4488
	2	0.4685	0.4653	0.0105	0.0054
	3	0.4750	0.4726	0.0104	0.0044
	4	0.0536	0.0543	0.5329	0.5410
TIE LINE 12	1	0.0021	0.0264	0.7735	0.7756
	2	0.4893	0.4824	0.0121	0.0020
	3	0.4963	0.4861	0.1230	0.0055
	4	0.0123	0.0051	0.2021	0.2168
TIE LINE 13	1	0.0025	0.0178	0.6538	0.6539
	2	0.4843	0.4813	0.0113	0.0027
	3	0.4912	0.4864	0.0118	0.0049
	4	0.0219	0.0146	0.3231	0.3383
TIE LINE 14	1	0.0036	0.0040	0.2670	0.2804
	2	0.4516	0.4298	0.0094	0.0104
	3	0.4579	0.4412	0.0097	0.0047
	4	0.0868	0.1254	0.7139	0.7041
TIE LINE 15	1	0.0037	0.0025	0.1765	0.1866
	2	0.4244	0.3989	0.0090	0.0160
	3	0.4303	0.4140	0.0088	0.0055
	4	0.1415	0.1853	0.8057	0.7910

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0717	-0.0717
	2	0.0012	-0.0013
	3	0.0006	-0.0006
	4	-0.0294	0.0294
TIE LINE 2	1	0.0502	-0.0502
	2	0.0046	-0.0046
	3	0.0006	-0.0006
	4	-0.0546	0.0546
TIE LINE 3	1	0.0187	-0.0411
	2	0.0214	0.0099
	3	0.0006	-0.0006
	4	-0.0417	0.0326
TIE LINE 4	1	0.0102	-0.0325
	2	0.0123	0.0202
	3	0.0006	-0.0005
	4	-0.0238	0.0134
TIE LINE 5	1	-0.0113	-0.0343
	2	0.0346	0.035
	3	0.0007	-0.0005
	4	-0.0250	0.0007
TIE LINE 6	1	-0.0018	-0.0280
	2	0.0315	0.0016
	3	0.0210	-0.0053
	4	-0.0513	0.0322
TIE LINE 7	1	0.0083	-0.0208
	2	0.0151	-0.0029
	3	0.0112	-0.0056
	4	-0.3530	0.0299
TIE LINE 8	1	0.0147	-0.0130
	2	0.0032	-0.0048
	3	0.0050	-0.0057
	4	-0.2360	0.0242

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0036	-0.2840
	2	0.0247	-0.0012
	3	0.0165	-0.0055
	4	-0.0457	0.0339
TIE LINE 10	1	-0.0053	-0.0286
	2	0.0352	0.0054
	3	0.0240	-0.0047
	4	-0.0546	0.0286
TIE LINE 11	1	0.0053	0.0026
	2	-0.0031	-0.0051
	3	-0.0024	-0.0060
	4	0.0007	0.0080
TIE LINE 12	1	0.0243	0.0021
	2	-0.0068	-0.0101
	3	-0.0102	-0.0068
	4	-0.0072	0.0147
TIE LINE 13	1	0.0153	0.0001
	2	-0.0030	-0.0086
	3	-0.0048	-0.0069
	4	-0.0073	0.0152
TIE LINE 14	1	0.0004	0.0133
	2	-0.0218	0.0010
	3	-0.0167	-0.0050
	4	0.0386	-0.0098
TIE LINE 15	1	-0.0013	0.0101
	2	-0.0254	0.0071
	3	-0.0163	-0.0033
	4	0.0438	-0.0147

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.66133

Table-1.12
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - Oct - Dmf - W at 30 0 C

	Octane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0830	0.7861	0.4346
	2	0.7912	0.0501	0.4207
	3	0.0004	0.0006	0.0005
	4	0.1254	0.1632	0.1443
TIE LINE 2	1	0.0961	0.7515	0.4238
	2	0.7371	0.0531	0.3961
	3	0.0004	0.0006	0.0005
	4	0.1664	0.1948	0.1796
TIE LINE 3	1	0.1042	0.6657	0.3849
	2	0.7070	0.0627	0.3848
	3	0.0004	0.0006	0.0005
	4	0.1884	0.2711	0.2297
TIE LINE 4	1	0.1109	0.6081	0.3595
	2	0.6751	0.0724	0.3738
	3	0.0004	0.0006	0.0005
	4	0.2136	0.3190	0.2663
TIE LINE 5	1	0.1214	0.5421	0.3318
	2	0.6397	0.0865	0.3631
	3	0.0004	0.0005	0.0005
	4	0.2384	0.3709	0.3046
TIE LINE 6	1	0.0307	0.7485	0.3896
	2	0.6292	0.0193	0.3243
	3	0.2834	0.0087	0.1460
	4	0.0567	0.2235	0.1401
TIE LINE 7	1	0.0370	0.6403	0.3387
	2	0.5957	0.0189	0.3073
	3	0.2685	0.0084	0.1384
	4	0.0988	0.3324	0.2156
TIE LINE 8	1	0.0406	0.5564	0.2985
	2	0.5647	0.0084	0.2866
	3	0.2547	0.038	0.1292
	4	0.1400	0.4313	0.2857
TIE LINE 9	1	0.0443	0.3902	0.2173
	2	0.5054	0.0181	0.2617
	3	0.2276	0.0081	0.1179
	4	0.2227	0.5836	0.4031

	Octane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 10	1	0.0437	0.3090	0.1763
	2	0.4774	0.0186	0.2480
	3	0.2153	0.0084	0.1118
	4	0.2637	0.6641	0.4639
TIE LINE 11	1	0.0087	0.5475	0.2781
	2	0.4710	0.0117	0.2413
	3	0.4777	0.0119	0.2448
	4	0.0426	0.4289	0.2358
TIE LINE 12	1	0.0121	0.3728	0.1924
	2	0.4560	0.0104	0.2332
	3	0.4624	0.0106	0.2365
	4	0.0695	0.6062	0.3378
TIE LINE 13	1	0.0139	0.2018	0.1079
	2	0.4253	0.0042	0.2148
	3	0.4313	0.0043	0.2178
	4	0.1295	0.7879	0.4596
TIE LINE 14	1	0.0118	0.4578	0.2348
	2	0.4629	0.0108	0.2369
	3	0.4694	0.0104	0.2399
	4	0.0559	0.5209	0.2884
TIE LINE 15	1	0.0130	0.2811	0.1470
	2	0.4410	0.0101	0.2255
	3	0.4472	0.0102	0.2287
	4	0.0988	0.6987	0.3988

CONVERGENCE OBTAINED AFTER 19 ITERATIONS
OPTIMUM VALUE OF F = 0.1618726
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1069.417000	ITERATION CARRIED OUT Y
A (1 , 3) =	637.546800	ITERATION CARRIED OUT Y
A (1 , 4) =	-396.073200	ITERATION CARRIED OUT Y
A (2 , 1) =	933.026800	ITERATION CARRIED OUT Y
A (2 , 3) =	23.426790	ITERATION CARRIED OUT Y
A (2 , 4) =	-131.113200	ITERATION CARRIED OUT Y
A (3 , 1) =	681.026800	ITERATION CARRIED OUT Y
A (3 , 2) =	362.876800	ITERATION CARRIED OUT Y
A (3 , 4) =	815.986600	ITERATION CARRIED OUT Y
A (4 , 1) =	734.890400	ITERATION CARRIED OUT Y
A (4 , 2) =	667.566800	ITERATION CARRIED OUT Y
A (4 , 3) =	1036.577000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0830	0.0106	0.7861	0.8038
	2	0.7912	0.8922	0.0501	0.1000
	3	0.0004	0.0010	0.0006	0.0001
	4	0.1254	0.0956	0.1632	0.1866
TIE LINE 2	1	0.0961	0.0112	0.7515	0.7615
	2	0.7391	0.8664	0.0531	0.0112
	3	0.0004	0.0010	0.0006	0.0001
	4	0.1644	0.1202	0.1948	0.2282
TIE LINE 3	1	0.1042	0.0120	0.6657	0.6974
	2	0.7070	0.8282	0.0627	0.0134
	3	0.0004	0.0010	0.0006	0.0001
	4	0.1884	0.1581	0.2711	0.2897
TIE LINE 4	1	0.1109	0.0395	0.6081	0.6795
	2	0.6751	0.7323	0.0724	0.0152
	3	0.0004	0.0009	0.0006	0.0001
	4	0.2136	0.2282	0.3190	0.3043
TIE LINE 5	1	0.1214	0.0135	0.5421	0.6045
	2	0.6397	0.7663	0.0865	0.0176
	3	0.0004	0.0010	0.0005	0.0001
	4	0.2384	0.2183	0.3709	0.3786
TIE LINE 6	1	0.0307	0.0170	0.7485	0.7623
	2	0.6292	0.6392	0.0193	0.0094
	3	0.2834	0.2770	0.0087	0.0151
	4	0.0567	0.0665	0.2235	0.2137
TIE LINE 7	1	0.0370	0.0151	0.6403	0.6507
	2	0.5957	0.6129	0.0189	0.0126
	3	0.2685	0.2666	0.0084	0.0148
	4	0.0988	0.1046	0.3324	0.3227
TIE LINE 8	1	0.0406	0.0155	0.5564	0.5544
	2	0.5647	0.5851	0.0084	0.0167
	3	0.2547	0.2565	0.0038	0.0143
	4	0.1400	0.1419	0.4313	0.4156

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0443	0.0158	0.3902	0.3867
	2	0.5054	0.5348	0.0181	0.0292
	3	0.2276	0.2402	0.0081	0.0138
	4	0.2227	0.2082	0.5836	0.5690
TIE LINE 10	1	0.0437	0.0157	0.3090	0.3043
	2	0.4774	0.5082	0.0186	0.0406
	3	0.2153	0.2345	0.0084	0.0141
	4	0.2637	0.2405	0.6641	0.6419
TIE LINE 11	1	0.0087	0.0160	0.5475	0.5619
	2	0.4710	0.4511	0.0117	0.0143
	3	0.4777	0.4545	0.0119	0.0177
	4	0.0426	0.0791	0.4289	0.4054
TIE LINE 12	1	0.0121	0.0140	0.3728	0.3815
	2	0.4560	0.4282	0.0104	0.0266
	3	0.4624	0.4445	0.0106	0.0161
	4	0.0695	0.1140	0.6062	0.5750
TIE LINE 13	1	0.0139	0.0108	0.2018	0.1897
	2	0.4253	0.3965	0.0042	0.0615
	3	0.1313	0.4565	0.0043	0.0166
	4	0.1295	0.1355	0.7897	0.7328
TIE LINE 14	1	0.0118	0.0150	0.4578	0.4701
	2	0.4629	0.4400	0.0108	0.0194
	3	0.4694	0.4483	0.0104	0.0168
	4	0.0559	0.0975	0.5209	0.4928
TIE LINE 15	1	0.0130	0.0123	0.2811	0.2790
	2	0.4410	0.4144	0.0101	0.0405
	3	0.4472	0.4460	0.0102	0.0158
	4	0.0988	0.1281	0.6987	0.6639

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0724	0.0177
	2	0.1010	-0.0402
	3	0.0006	-0.0005
	4	-0.0297	0.0235
TIE LINE 2	1	-0.0849	0.0100
	2	0.1273	-0.0420
	3	0.0006	-0.0005
	4	-0.0442	0.0334
TIE LINE 3	1	-0.0922	0.0317
	2	0.1212	-0.0493
	3	0.0006	-0.0005
	4	-0.0303	0.0187
TIE LINE 4	1	-0.0714	0.0714
	2	0.0573	-0.0573
	3	0.0005	-0.0005
	4	0.0147	-0.0147
TIE LINE 5	1	-0.1079	0.0624
	2	0.1266	-0.0689
	3	0.0005	-0.0004
	4	-0.0201	0.0077
TIE LINE 6	1	-0.0138	0.0624
	2	0.0100	-0.0689
	3	-0.0064	-0.0004
	4	0.0098	0.0077
TIE LINE 7	1	-0.0219	0.0104
	2	0.0171	-0.0063
	3	-0.0019	0.0065
	4	0.0058	-0.0097
TIE LINE 8	1	-0.0251	-0.0021
	2	0.0204	0.0083
	3	0.0018	0.0104
	4	0.0019	-0.0157

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	-0.0285	-0.0015
	2	0.0295	0.0112
	3	0.0125	0.0057
	4	-0.0145	-0.0145
TIE LINE 10	1	-0.0280	-0.0047
	2	0.0309	0.0221
	3	0.0192	0.0057
	4	-0.0232	-0.0222
TIE LINE 11	1	0.0072	0.0144
	2	-0.0199	0.0026
	3	-0.0231	0.0058
	4	0.0365	-0.0235
TIE LINE 12	1	0.0019	0.0088
	2	-0.0278	0.0162
	3	-0.0179	0.0055
	4	0.0445	-0.3120
TIE LINE 13	1	-0.0031	-0.0121
	2	-0.0288	0.0573
	3	0.0252	0.0123
	4	0.0060	-0.0569
TIE LINE 14	1	0.0032	0.0123
	2	-0.0229	0.0086
	3	-0.0211	0.0063
	4	0.0416	-0.0281
TIE LINE 15	1	-0.0007	-0.0021
	2	-0.0266	0.0304
	3	-0.0011	0.0056
	4	0.0293	-0.0348

ABSOLUTE MEAN DEVIATION (MOLE %) IS 2.44740

Table-1.13

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B B - Oct - Dmf - W at 40 ^{0} C

COMPONENT	Octane (1) COMPONENT NUMBER	Dmf (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0794	0.8415	0.4604
	2	0.8268	0.054	0.4404
	3	0.0004	0.0006	0.0005
	4	0.0934	0.1039	0.0986
TIE LINE 2	1	0.0843	0.8296	0.4570
	2	0.8087	0.0553	0.4320
	3	0.0004	0.0006	0.0005
	4	0.1065	0.1145	0.1105
TIE LINE 3	1	0.1099	0.7402	0.4250
	2	0.7149	0.0653	0.3901
	3	0.0004	0.0006	0.0005
	4	0.1748	0.1939	0.1843
TIE LINE 4	1	0.1478	0.5995	0.3736
	2	0.6049	0.0951	0.3500
	3	0.0004	0.0006	0.0005
	4	0.2469	0.3049	0.2459
TIE LINE 5	1	0.0260	0.7780	0.4020
	2	0.6138	0.0515	0.3327
	3	0.2766	0.0232	0.1499
	4	0.0836	0.1472	0.1154
TIE LINE 6	1	0.0374	0.6701	0.3538
	2	0.5719	0.0496	0.3107
	3	0.2577	0.0224	0.1400
	4	0.1330	0.2579	0.1954
TIE LINE 7	1	0.0507	0.5354	0.2931
	2	0.4838	0.0588	0.2713
	3	0.2181	0.0265	0.1223
	4	0.2474	0.3792	0.3133
TIE LINE 8	1	0.0526	0.4138	0.2332
	2	0.4133	0.0672	0.2393
	3	0.1854	0.0303	0.1078
	4	0.3506	0.4888	0.4197

	Octane	Dmf	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 9	1	0.0356	0.3173	0.1765
	2	0.3593	0.0699	0.2146
	3	0.1619	0.0315	0.0967
	4	0.4431	0.5813	0.5122
TIE LINE 10	1	0.0171	0.7804	0.3987
	2	0.4729	0.0309	0.2519
	3	0.4796	0.0312	0.2554
	4	0.0304	0.1575	0.0940
TIE LINE 11	1	0.0172	0.5714	0.3443
	2	0.4650	0.0340	0.2495
	3	0.4716	0.0345	0.2530
	4	0.0461	0.2602	0.1532
TIE LINE 12	1	0.0098	0.5441	0.2770
	2	0.4531	0.0324	0.2428
	3	0.4594	0.0329	0.2465
	4	0.0777	0.3905	0.2341
TIE LINE 13	1	0.0073	0.4906	0.2489
	2	0.4496	0.0368	0.2432
	3	0.4559	0.0373	0.2466
	4	0.0873	0.4353	0.2613
TIE LINE 14	1	0.0127	0.5998	0.3062
	2	0.4596	0.0373	0.2484
	3	0.4660	0.0378	0.2519
	4	0.0618	0.3252	0.1935

CONVERGENCE OBTAINED AFTER 156 ITERATIONS
OPTIMUM VALUE OF F = 0.2773978
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	715.962500	ITERATION CARRIED OUT Y
A (1 , 3) =	502.398600	ITERATION CARRIED OUT Y
A (1 , 4) =	-24.243930	ITERATION CARRIED OUT Y
A (2 , 1) =	487.651200	ITERATION CARRIED OUT Y
A (2 , 3) =	-182.741500	ITERATION CARRIED OUT Y
A (2 , 4) =	126.622100	ITERATION CARRIED OUT Y
A (3 , 1) =	458.604900	ITERATION CARRIED OUT Y
A (3 , 2) =	-21.706720	ITERATION CARRIED OUT Y
A (3 , 4) =	317.102600	ITERATION CARRIED OUT Y
A (4 , 1) =	-59.902440	ITERATION CARRIED OUT Y
A (4 , 2) =	167.544100	ITERATION CARRIED OUT Y
A (4 , 3) =	384.516200	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.0794	0.0855	0.8415	0.7937
	2	0.8268	0.8527	0.0540	0.0739
	3	0.0004	0.0010	0.0006	0.0001
	4	0.0934	0.0598	0.1039	0.1331
TIE LINE 2	1	0.0843	0.0873	0.8296	0.7751
	2	0.8087	0.8432	0.0553	0.0782
	3	0.0004	0.0010	0.0006	0.0001
	4	0.1065	0.0676	0.1145	0.1475
TIE LINE 3	1	0.1099	0.1018	0.7402	0.6598
	2	0.7149	0.7752	0.0653	0.1104
	3	0.0004	0.0010	0.0006	0.0001
	4	0.1748	0.1208	0.1939	0.2305
TIE LINE 4	1	0.1478	0.1368	0.5995	0.5132
	2	0.6049	0.6548	0.0951	0.1703
	3	0.0004	0.0010	0.0006	0.0002
	4	0.2469	0.2058	0.3049	0.3172
TIE LINE 5	1	0.0260	0.0683	0.7780	0.7357
	2	0.6138	0.6085	0.0515	0.0569
	3	0.2766	0.2723	0.0232	0.0275
	4	0.0836	0.0527	0.1472	0.1802
TIE LINE 6	1	0.0374	0.0856	0.6701	0.6032
	2	0.5719	0.5551	0.0496	0.0835
	3	0.2577	0.1537	0.0224	0.0343
	4	0.1330	0.1067	0.2579	0.278
TIE LINE 7	1	0.0507	0.1071	0.5354	0.4230
	2	0.4838	0.4668	0.0588	0.1347
	3	0.2181	0.2215	0.0265	0.0530
	4	0.2474	0.2033	0.3792	0.3902

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 8	1	0.0526	0.1415	0.4138	0.2693
	2	0.4113	0.3493	0.0672	0.1960
	3	0.1854	0.1697	0.0303	0.0835
	4	0.3506	0.3374	0.4888	0.4520
TIE LINE 9	1	0.0356	0.1314	0.3173	0.1847
	2	0.3593	0.2775	0.0699	0.2031
	3	0.1619	0.1346	0.0315	0.0898
	4	0.4431	0.4327	0.5813	0.5230
TIE LINE 10	1	0.0171	0.0827	0.7804	0.7621
	2	0.4729	0.4393	0.0308	0.0365
	3	0.4796	0.4368	0.0312	0.0469
	4	0.0304	0.0419	0.1575	0.1538
TIE LINE 11	1	0.0172	0.0517	0.6714	0.6369
	2	0.4650	0.4460	0.0340	0.0530
	3	0.4716	0.4485	0.0345	0.0575
	4	0.0461	0.0547	0.2602	0.2517
TIE LINE 12	1	0.0098	0.0829	0.5441	0.4986
	2	0.4531	0.3900	0.0324	0.0746
	3	0.4594	0.3989	0.0329	0.0717
	4	0.0777	0.1290	0.3905	0.3542
TIE LINE 13	1	0.0073	0.0834	0.4906	0.4435
	2	0.4496	0.3766	0.0368	0.0863
	3	0.4559	0.3881	0.0373	0.0802
	4	0.0873	0.1526	0.4353	0.3890
TIE LINE 14	1	0.0127	0.0829	0.5998	0.5720
	2	0.4596	0.4056	0.0373	0.0614
	3	0.4660	0.4110	0.0378	0.0626
	4	0.0618	0.1020	0.3252	0.3032

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0061	-0.0478
	2	0.0259	0.0199
	3	0.0006	-0.0005
	4	-0.0336	0.0293
TIE LINE 2	1	0.0029	-0.0546
	2	0.0345	0.0229
	3	0.0006	-0.0005
	4	-0.0390	0.0330
TIE LINE 3	1	-0.0081	-0.0803
	2	0.0603	0.0451
	3	0.0006	-0.0005
	4	-0.0540	0.0366
TIE LINE 4	1	-0.0110	-0.0863
	2	0.0500	0.0753
	3	0.0006	-0.0004
	4	-0.0411	0.0123
TIE LINE 5	1	0.0423	-0.0423
	2	-0.0054	0.0054
	3	-0.0043	0.0043
	4	-0.0329	0.0329
TIE LINE 6	1	0.0482	-0.0669
	2	-0.0168	0.0339
	3	-0.0040	0.0120
	4	-0.0263	0.0201
TIE LINE 7	1	0.0564	-0.1124
	2	-0.0170	0.0759
	3	0.0034	0.0264
	4	-0.0441	0.0109

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 8	1	0.0888	-0.1445
	2	-0.0620	0.1288
	3	-0.0157	0.0533
	4	-0.0132	-0.0367
TIE LINE 9	1	0.0958	-0.1329
	2	-0.0818	0.1332
	3	-0.0273	0.0583
	4	0.0099	-0.0583
TIE LINE 10	1	0.0656	-0.0184
	2	-0.0337	0.0057
	3	-0.0428	0.0157
	4	0.0115	-0.0037
TIE LINE 11	1	0.0344	-0.0344
	2	-0.0190	0.0190
	3	-0.0230	0.0230
	4	0.0085	-0.0085
TIE LINE 12	1	0.0731	-0.0456
	2	-0.0631	0.0422
	3	-0.0605	0.0388
	4	0.0512	-0.0363
TIE LINE 13	1	0.0762	-0.0471
	2	-0.0730	0.0495
	3	-0.0677	0.0428
	4	0.0653	-0.0462
TIE LINE 14	1	0.0702	-0.0278
	2	-0.0539	0.0241
	3	-0.0550	0.0248
	4	0.0394	-0.0219

N DEVIATION (MOLE %) IS 3.89405*

Table-2.1

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - H - Dmso - W at 20 °C

	Hexane	Dmso	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1.000	0.0593	0.7203	0.3898
	2.000	0.7579	0.0322	0.3950
	3.000	0.0004	0.0005	0.0005
	4.000	0.1824	0.2470	0.2147
TIE LINE 2	1.000	0.0638	0.6322	0.3480
	2.000	0.7143	0.0160	0.3652
	3.000	0.0004	0.0005	0.0004
	4.000	0.2214	0.3514	0.2864
TIE LINE 3	1.000	0.0638	0.5354	0.2996
	2.000	0.6942	0.0264	0.3603
	3.000	0.0004	0.0005	0.0004
	4.000	0.2415	0.4377	0.3396
TIE LINE 4	1.000	0.0547	0.4949	0.2748
	2.000	0.6735	0.0318	0.3526
	3.000	0.0004	0.0005	0.0004
	4.000	0.2714	0.4728	0.3721
TIE LINE 5	1.000	0.0451	0.4355	0.2403
	2.000	0.6431	0.0313	0.3372
	3.000	0.0004	0.0050	0.0004
	4.000	0.3114	0.5327	0.4220
TIE LINE 6	1.000	0.0528	0.5963	0.3245
	2.000	0.7156	0.0212	0.3684
	3.000	0.0004	0.0005	0.0004
	4.000	0.2312	0.3820	0.3066
TIE LINE 7	1.000	0.0069	0.7572	0.3821
	2.000	0.6549	0.0193	0.3371
	3.000	0.3155	0.0093	0.1624
	4.000	0.0227	0.2142	0.1185
TIE LINE 8	1.000	0.0070	0.6026	0.3048
	2.000	0.6019	0.0190	0.3104
	3.000	0.2900	0.0091	0.1496
	4.000	0.1011	0.3963	0.2352

COMPONENT	(1) COMPONENT	(2) EXTRACT	(3) RAFFINATE	(4) FEED
TIE LINE 1	1.000	0.0593	0.7203	0.3898
TIE LINE 9	1.000	0.0075	0.2920	0.1497
	2.000	0.4689	0.0634	0.2661
	3.000	0.2259	0.0305	0.1282
	4.000	0.2977	0.6140	0.4559
TIE LINE 10	1.000	0.0001	0.7151	0.3576
	2.000	0.4769	0.0128	0.2448
	3.000	0.5170	0.0138	0.2654
	4.000	0.0060	0.2583	0.1322
TIE LINE 11	1.000	0.0001	0.4738	0.2370
	2.000	0.4739	0.0166	0.2453
	3.000	0.5139	0.0179	0.2659
	4.000	0.0121	0.4917	0.2519
TIE LINE 12	1.000	0.0001	0.1916	0.0958
	2.000	0.4651	0.0161	0.2406
	3.000	0.5042	0.0175	0.2608
	4.000	0.0306	0.7749	0.4027
TIE LINE 13	1.000	0.0001	0.0909	0.0455
	2.000	0.4605	0.0080	0.2343
	3.000	0.4993	0.0087	0.2540
	4.000	0.0400	0.8924	0.4662

* CONVERGENCE OBTAINED AFTER 10 ITERATIONS*
OPTIMUM VALUE OF F=0.0841786
OPTIMUM VALUE OF VARIABLES

A (1 , 2) = 1123.624000	ITERATION CARRIED OUT Y
A (1 ,3) = 680.575100	ITERATION CARRIED OUT Y
A (1, 4) = 319.720700	ITERATION CARRIED OUT Y
A (2, 1) = 714.575100	ITERATION CARRIED OUT Y
A (2, 3) = -214.424900	ITERATION CARRIED OUT Y
A (2 ,4) = -67.424910	ITERATION CARRIED OUT Y
A (3, 1) = 2110.575000	ITERATION CARRIED OUT Y
A (3, 2) = -800.454000	ITERATION CARRIED OUT Y
A (3, 4) = 646.575100	ITERATION CARRIED OUT Y
A (4, 1) = 646.575100	ITERATION CARRIED OUT Y
A (4, 2) = 631.575100	ITERATION CARRIED OUT Y
A (4, 3) = 786.575100	ITERATION CARRIED OUT Y

COMPONENT	Component No.	Extract Phase		Raffinate Phase	
		EXPT	CALC	EXPT	CALC
TIE LINE 1	1.000	0.0593	0.0436	0.7203	0.7360
	2.000	0.7579	0.7717	0.0322	0.0183
	3.000	0.0004	0.0009	0.0005	0.0000
	4.000	0.1824	0.1833	0.2470	0.2461
TIE LINE 2	1.000	0.0638	0.0416	0.6322	0.6260
	2.000	0.7143	0.7358	0.0160	0.0288
	3.000	0.0004	0.0009	0.0005	0.0000
	4.000	0.2214	0.2207	0.3514	0.3460
TIE LINE 3	1.000	0.0638	0.0469	0.5354	0.5441
	2.000	0.6942	0.6914	0.0264	0.4010
	3.000	0.0004	0.0009	0.0005	0.0000
	4.000	0.2415	0.2598	0.4377	0.4168
TIE LINE 4	1.000	0.0547	0.0502	0.4949	0.4933
	2.000	0.6735	0.6645	0.0318	0.0492
	3.000	0.0004	0.0009	0.0005	0.0000
	4.000	0.2714	0.2838	0.4728	0.4581
TIE LINE 5	1.000	0.0451	0.0534	0.4355	0.4136
	2.000	0.6431	0.6280	0.3130	0.0676
	3.000	0.0004	0.0090	0.0005	0.0000
	4.000	0.3114	0.3186	0.5327	0.5179
TIE LINE 6	1.000	0.0528	0.0436	0.5963	0.5937
	2.000	0.7156	0.7187	0.0212	0.0328
	3.000	0.0004	0.0009	0.0005	0.0000
	4.000	0.2312	0.2359	0.3820	0.3743
TIE LINE 7	1.000	0.0069	0.0094	0.7572	0.7846
	2.000	0.6549	0.6468	0.0193	0.0026
	3.000	0.3155	0.3126	0.0093	0.0001
	4.000	0.0227	0.0495	0.2142	0.1929
TIE LINE 8	1.000	0.0070	0.0105	0.6026	0.6009
	2.000	0.6019	0.6083	0.0190	0.0107
	3.000	0.2900	0.2965	0.0091	0.0016
	4.000	0.1011	0.0841	0.3693	0.2873
TIE LINE 9	1.000	0.0075	0.0086	0.2920	0.2607
	2.000	0.4689	0.5669	0.0634	0.0298
	3.000	0.2259	0.2881	0.0305	0.0026
	4.000	0.2977	0.1353	0.6140	0.7079
TIE LINE 10	1.000	0.0001	0.0050	0.7151	0.7422
	2.000	0.4769	0.4691	0.0128	0.0001
	3.000	0.5170	0.5059	0.0138	0.0031
	4.000	0.0060	0.0374	0.2583	0.2356
TIE LINE 11	1.000	0.0001	0.0052	0.4738	0.5116
	2.000	0.4739	0.4477	0.0166	0.0054
	3.000	0.5139	0.4854	0.0179	0.0059
	4.000	0.0121	0.0622	0.4917	0.4766
TIE LINE 12	1.000	0.0001	0.0037	0.1916	0.2066
	2.000	0.4651	0.4305	0.0161	0.0123
	3.000	0.5042	0.4725	0.0175	0.0065
	4.000	0.0306	0.0938	0.7749	0.7740
TIE LINE 13	1.000	0.0001	0.0021	0.0909	0.0958
	2.000	0.4605	0.4229	0.0080	0.0156
	3.000	0.4993	0.4673	0.0087	0.0067
	4.000	0.4000	0.1082	0.8924	0.8812

COMPONENT	COMPONENT	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1.000	-0.0157	0.0157
	2.000	0.0139	-0.0139
	3.000	0.0005	-0.0005
	4.000	0.0009	-0.0009
TIE LINE 2	1.000	-0.0222	-0.0061
	2.000	0.0215	0.0128
	3.000	0.0005	-0.0005
	4.000	-0.0007	-0.0054
TIE LINE 3	1.000	-0.0169	0.0086
	2.000	-0.0028	0.0137
	3.000	0.0005	-0.0005
	4.000	0.0183	-0.0210
TIE LINE 4	1.000	-0.0045	-0.0016
	2.000	-0.0089	0.0173
	3.000	0.0005	-0.0005
	4.000	0.0123	-0.0147
TIE LINE 5	1.000	0.0084	-0.0219
	2.000	-0.0151	0.0363
	3.000	0.0005	-0.0005
	4.000	0.0072	-0.0147
TIE LINE 6	1.000	-0.0091	-0.0026
	2.000	0.0031	0.0116
	3.000	0.0005	-0.0005
	4.000	0.0047	-0.0077
TIE LINE 7	1.000	0.0025	0.0273
	2.000	-0.0081	-0.0167
	3.000	-0.0029	-0.0091
	4.000	0.0268	-0.0213
TIE LINE 8	1.000	0.0035	-0.0016
	2.000	0.0064	-0.0083
	3.000	0.0066	-0.0075
	4.000	-0.0170	-0.0180
TIE LINE 9	1.000	0.0011	-0.0313
	2.000	0.0980	-0.0336
	3.000	0.0622	-0.0280
	4.000	-0.1625	0.0938
TIE LINE 10	1.000	0.0049	0.0271
	2.000	-0.0078	-0.0126
	3.000	-0.0111	-0.0107
	4.000	0.0314	-0.0227
TIE LINE 11	1.000	0.0051	0.0378
	2.000	-0.0263	-0.0111
	3.000	-0.0285	-0.0121
	4.000	0.0501	-0.0150
TIE LINE 12	1.000	0.0035	0.0150
	2.000	-0.0345	-0.0038
	3.000	-0.0317	-0.0110
	4.000	0.0632	-0.0009
TIE LINE 13	1.000	0.0020	0.0049
	2.000	-0.0376	0.0076
	3.000	-0.0320	-0.0020
	4.000	0.0682	-0.0112

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.68877

Table-2.2
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - H - Dmso - W at 30 °C

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0109	0.8047	0.4078
	2	0.9086	0.0325	0.4705
	3	0.0004	0.0005	0.0005
	4	0.0801	0.1624	0.1212
TIE LINE 2	1	0.0437	0.7099	0.3768
	2	0.7982	0.0149	0.4066
	3	0.0004	0.0005	0.0005
	4	0.1577	0.2747	0.2162
TIE LINE 3	1	0.0593	0.5776	0.3184
	2	0.7009	0.0286	0.3648
	3	0.0004	0.0005	0.0004
	4	0.2379	0.3933	0.3164
TIE LINE 4	1	0.0730	0.4563	0.2647
	2	0.5559	0.7530	0.3156
	3	0.0004	0.0005	0.0004
	4	0.3706	0.4678	0.4192
TIE LINE 5	1	0.1500	0.3376	0.2438
	2	0.3979	0.1407	0.2693
	3	0.0004	0.0004	0.0004
	4	0.4517	0.5213	0.4865
TIE LINE 6	1	0.0034	0.8007	0.4021
	2	0.6469	0.0145	0.3307
	3	0.3116	0.0070	0.1593
	4	0.0380	0.1777	0.1079
TIE LINE 7	1	0.0052	0.6541	0.3297
	2	0.6260	0.0167	0.3213
	3	0.3016	0.0083	0.1549
	4	0.0673	0.3210	0.1941
TIE LINE 8	1	0.0063	0.5542	0.2803
	2	0.6105	0.0133	0.3119
	3	0.2941	0.0064	0.1502
	4	0.0891	0.4262	0.2576
TIE LINE 9	1	0.0070	0.3561	0.1815
	2	0.5796	0.0166	0.2981
	3	0.2792	0.0080	0.1438
	4	0.1342	0.6193	0.3767

COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0109	0.8047	0.4078
TIE LINE 10	1	0.0056	0.6047	0.3051
	2	0.6191	0.0095	0.3143
	3	0.2982	0.0046	0.1514
	4	0.0771	0.3812	0.2292
TIE LINE 11	1	0.0005	0.8363	0.4184
	2	0.4784	0.0086	0.2435
	3	0.5186	0.0094	0.2640
	4	0.0024	0.1457	0.0740
TIE LINE 12	1	0.0005	0.7076	0.3536
	2	0.4773	0.0094	0.2386
	3	0.5173	0.0102	0.2586
	4	0.0048	0.2737	0.2493
TIE LINE 13	1	0.0005	0.5064	0.2535
	2	0.4747	0.0025	0.2386
	3	0.5145	0.0027	0.2586
	4	0.0103	0.4883	0.2493
TIE LINE 14	1	0.0011	0.2985	0.1498
	2	0.4729	0.0057	0.2393
	3	0.5126	0.0062	0.2594
	4	0.0133	0.6895	0.3514
TIE LINE 15	1	0.0005	0.5954	0.2980
	2	0.4761	0.0126	0.2444
	3	0.5161	0.0137	0.2649
	4	0.0072	0.3783	0.1928

CONVERGENCE OBTAINED AFTER 21 ITERATIONS

OPTIMUM VALUE OF F =0.0192064

OPTIMUM VALUE OF VARIABLES

A (1 , 2) = 748.094700 ITERATION CARRIED OUT Y
A (1 , 3) = 452.094800 ITERATION CARRIED OUT Y
A (1 , 4) = 400.371400 ITERATION CARRIED OUT Y
A (2 , 1) = 721.534800 ITERATION CARRIED OUT Y
A (2 , 3) = -231.905100 ITERATION CARRIED OUT Y
A (2 , 4) = 153.754100 ITERATION CARRIED OUT Y
A (3 , 1) = 1126.871000 ITERATION CARRIED OUT Y
A (3 , 2) = 243.094900 ITERATION CARRIED OUT Y
A (3 , 4) = 1415.484000 ITERATION CARRIED OUT Y
A (4 , 1) = 237.094900 ITERATION CARRIED OUT Y
A (4 , 2) = 814.575800 ITERATION CARRIED OUT Y
A (4 , 3) = 1206.095000 ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0109	0.0266	0.8047	0.7889
	2	0.9086	0.9258	0.0325	0.0153
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0801	0.0903	0.1624	0.1521
TIE LINE 2	1	0.0437	0.0406	0.7099	0.7105
	2	0.7982	0.7907	0.0149	0.0235
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1577	0.1674	0.2747	0.2647
TIE LINE 3	1	0.0593	0.0564	0.5776	0.5741
	2	0.7009	0.6899	0.0286	0.0476
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2394	0.2521	0.3933	0.3791
TIE LINE 4	1	0.0730	0.0831	0.4563	0.4313
	2	0.5559	0.5619	0.0753	0.0897
	3	0.0004	0.0009	0.0005	0.0000
	4	0.3706	0.3531	0.4678	0.4799
TIE LINE 5	1	0.1500	0.1441	0.3376	0.3434
	2	0.3979	0.4021	0.1407	0.1365
	3	0.0004	0.0009	0.0004	0.0000
	4	0.4517	0.4536	0.5213	0.5195
TIE LINE 6	1	0.0034	0.0087	0.8007	0.8073
	2	0.6469	0.6485	0.0145	0.0033
	3	0.3116	0.3135	0.0070	0.0006
	4	0.0380	0.0294	0.1777	0.1888
TIE LINE 7	1	0.0052	0.0086	0.6541	0.6541
	2	0.6260	0.6325	0.0167	0.0068
	3	0.3016	0.3076	0.0083	0.0006
	4	0.0673	0.0513	0.3210	0.3385
TIE LINE 8	1	0.0063	0.0084	0.5542	0.5455
	2	0.6105	0.6207	0.0133	0.0106
	3	0.2941	0.3035	0.0064	0.0007
	4	0.0891	0.0670	0.4262	0.4436

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0070	0.0071	0.3561	0.3429
	2	0.5796	0.5970	0.0166	0.0215
	3	0.2792	0.2978	0.0080	0.0010
	4	0.1342	0.0974	0.6193	0.6353
TIE LINE 10	1	0.0056	0.0086	0.6047	0.5961
	2	0.6191	0.6257	0.0095	0.0087
	3	0.2982	0.3050	0.0046	0.0007
	4	0.0771	0.0599	0.3812	0.3952
TIE LINE 11	1	0.0005	0.0047	0.8363	0.8427
	2	0.4784	0.4810	0.0086	0.0000
	3	0.5186	0.5185	0.0094	0.0030
	4	0.0024	0.0134	0.1457	0.1362
TIE LINE 12	1	0.0005	0.0046	0.7067	0.7202
	2	0.4773	0.4748	0.0094	0.0002
	3	0.5173	0.5125	0.0102	0.0038
	4	0.0048	0.0247	0.2737	0.4706
TIE LINE 13	1	0.0005	0.0043	0.5064	0.5224
	2	0.4747	0.4568	0.0025	0.0031
	3	0.5145	0.4974	0.0027	0.0038
	4	0.0103	0.0443	0.4883	0.4706
TIE LINE 14	1	0.0011	0.0033	0.2985	0.3148
	2	0.4729	0.4464	0.0057	0.0062
	3	0.5126	0.4863	0.0062	0.0039
	4	0.0133	0.0643	0.6895	0.6748
TIE LINE 15	1	0.0005	0.0044	0.5954	0.6158
	2	0.4761	0.4701	0.0126	0.0000
	3	0.5161	0.5081	0.0137	0.0016
	4	0.0072	0.0341	0.3783	0.3646

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0157	-0.0157
	2	0.0171	-0.0172
	3	0.0005	-0.0005
	4	0.0102	-0.0102
TIE LINE 2	1	-0.0031	0.0006
	2	-0.0076	0.0104
	3	0.0005	-0.0005
	4	0.0097	-0.0101
TIE LINE 3	1	-0.0029	-0.0035
	2	-0.0111	0.0190
	3	0.0005	-0.0005
	4	0.0127	-0.0143
TIE LINE 4	1	-0.0101	-0.0251
	2	0.0060	0.0144
	3	0.0005	-0.0005
	4	-0.0176	0.0121
TIE LINE 5	1	-0.0058	0.0058
	2	0.0042	-0.0042
	3	0.0004	-0.0004
	4	0.0019	-0.0019
TIE LINE 6	1	0.0052	0.0066
	2	0.0017	-0.0112
	3	0.0018	-0.0064
	4	-0.0087	0.0110
TIE LINE 7	1	0.0034	0.0001
	2	0.0065	-0.0099
	3	0.0060	-0.0076
	4	-0.0160	0.0175
TIE LINE 8	1	0.0021	-0.0087
	2	0.0101	-0.0026
	3	0.0094	-0.0057
	4	-0.0221	0.0174

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0002	-0.0132
	2	0.0174	0.0049
	3	0.0185	-0.0070
	4	-0.0368	0.0160
TIE LINE 10	1	0.0030	-0.0086
	2	0.0067	-0.0008
	3	0.0068	-0.0039
	4	-0.0172	0.0141
TIE LINE 11	1	0.0041	0.0064
	2	0.0026	-0.0086
	3	-0.0001	-0.0064
	4	0.0110	-0.0095
TIE LINE 12	1	0.0040	0.0135
	2	-0.0024	-0.0092
	3	-0.0049	-0.0076
	4	0.0199	-0.0142
TIE LINE 13	1	0.0038	0.0160
	2	-0.0178	0.0005
	3	-0.0198	0.0011
	4	0.0340	-0.0177
TIE LINE 14	1	0.0022	0.0163
	2	-0.0266	0.0004
	3	-0.0264	-0.0023
	4	0.0510	-0.0147
TIE LINE 15	1	0.0039	0.0204
	2	-0.0061	-0.0126
	3	-0.0080	-0.0121
	4	0.0268	-0.0137

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.54738

Table-2.3
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - H - Dmso - W at 40 °C

	Hexane (1)	Dmso (2)	Water (3)	Benzene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0364	0.7835	0.4099
	2	0.8879	0.0540	0.4710
	3	0.0004	0.0005	0.0005
	4	0.0753	0.1621	0.1187
TIE LINE 2	1	0.0648	0.6066	0.3375
	2	0.6744	0.0425	0.3584
	3	0.0004	0.0005	0.0004
	4	0.2567	0.3505	0.3036
TIE LINE 3	1	0.0141	0.6175	0.3158
	2	0.6105	0.0114	0.3109
	3	0.2941	0.0055	0.1498
	4	0.0814	0.3655	0.2235
TIE LINE 4	1	0.0142	0.5419	0.2780
	2	0.5859	0.0095	0.2977
	3	0.2822	0.0046	0.1434
	4	0.1177	0.4441	0.2809
TIE LINE 5	1	0.0139	0.8234	0.4186
	2	0.6345	0.0097	0.3221
	3	0.3057	0.0047	0.1552
	4	0.0460	0.1622	0.1041
TIE LINE 6	1	0.0054	0.8205	0.4130
	2	0.4735	0.0129	0.2432
	3	0.5132	0.0130	0.2631
	4	0.0078	0.1553	0.0807

	Hexane (1)	Dmso (2)	Water (3)	Benzene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 7	1	0.0005	0.6076	0.3041
	2	0.4729	0.0084	0.2407
	3	0.5126	0.0092	0.2609
	4	0.0139	0.3748	0.1943
TIE LINE 8	1	0.0006	0.4632	0.2319
	2	0.4552	0.0058	0.2305
	3	0.4934	0.0063	0.2499
	4	0.0509	0.5246	0.2877
TIE LINE 9	1	0.0003	0.8985	0.4494
	2	0.4791	0.0113	0.2452
	3	0.5170	0.0122	0.2646
	4	0.0036	0.0780	0.0408
TIE LINE 10	1	0.0005	0.7002	0.3504
	2	0.4702	0.0169	0.2436
	3	0.5185	0.0183	0.2684
	4	0.0108	0.2645	0.1337

CONVERGENCE OBTAINED AFTER 58 ITERATIONS

OPTIMUM VALUE OF F = 0.0099850

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1082.717000	ITERATION CARRIED OUT Y
A (1 , 3) =	629.736700	ITERATION CARRIED OUT Y
A (1 , 4) =	206.200800	ITERATION CARRIED OUT Y
A (2 , 1) =	597.332600	ITERATION CARRIED OUT Y
A (2 , 3) =	-316.411700	ITERATION CARRIED OUT Y
A (2 , 4) =	-204.921100	ITERATION CARRIED OUT Y
A (3 , 1) =	2087.281000	ITERATION CARRIED OUT Y
A (3 , 2) =	-1110.065000	ITERATION CARRIED OUT Y
A (3 , 4) =	856.752100	ITERATION CARRIED OUT Y
A (4 , 1) =	-149.418500	ITERATION CARRIED OUT Y
A (4 , 2) =	644.902600	ITERATION CARRIED OUT Y
A (4 , 3) =	768.841100	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0364	0.0389	0.7835	0.7809
	2	0.8879	0.9205	0.0540	0.0215
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0735	0.0895	0.1621	0.1478
TIE LINE 2	1	0.0648	0.0732	0.6066	0.5942
	2	0.6744	0.6778	0.0425	0.0483
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2567	0.2476	0.3505	0.3580
TIE LINE 3	1	0.0141	0.0139	0.6175	0.6180
	2	0.6105	0.6117	0.0114	0.0099
	3	0.2941	0.2984	0.0055	0.0010
	4	0.0814	0.0755	0.3655	0.3715
TIE LINE 4	1	0.0142	0.0137	0.5419	0.5289
	2	0.5859	0.5974	0.0095	0.0132
	3	0.2822	0.2933	0.0046	0.0011
	4	0.1177	0.0947	0.4441	0.4575
TIE LINE 5	1	0.0139	0.0149	0.8234	0.8234
	2	0.6345	0.6395	0.0097	0.0047
	3	0.3057	0.3095	0.0047	0.0009
	4	0.0460	0.0352	0.1622	0.1730
TIE LINE 6	1	0.0054	0.0073	0.8205	0.8387
	2	0.4735	0.4749	0.0129	0.0001
	3	0.5132	0.5105	0.0130	0.0035
	4	0.0078	0.0175	0.1535	0.1470
TIE LINE 7	1	0.0005	0.0072	0.6076	0.6319
	2	0.4729	0.4562	0.0084	0.0028
	3	0.5126	0.4928	0.0092	0.0049
	4	0.0139	0.0440	0.3748	0.3603
TIE LINE 8	1	0.0006	0.0065	0.4632	0.4685
	2	0.4552	0.4456	0.0058	0.0047
	3	0.4934	0.4831	0.0063	0.0050
	4	0.0509	0.0654	0.5246	0.5211
TIE LINE 9	1	0.0003	0.0072	0.8985	0.9601
	2	0.4791	0.4824	0.0113	0.0002
	3	0.5170	0.5170	0.0122	0.0390
	4	0.0036	0.0088	0.0780	0.0739
TIE LINE 10	1	0.0005	0.0070	0.7002	0.7204
	2	0.4702	0.4694	0.0169	0.0002
	3	0.5185	0.5146	0.0183	0.0032
	4	0.0108	0.0299	0.2645	0.2538

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0025	-0.0025
	2	0.0326	-0.0326
	3	0.0005	-0.0005
	4	0.0143	-0.0143
TIE LINE 2	1	0.0048	-0.0124
	2	0.0034	0.0058
	3	0.0005	-0.0005
	4	-0.0091	0.0075
TIE LINE 3	1	-0.0002	0.0004
	2	0.0013	-0.0016
	3	0.0043	-0.0045
	4	-0.0059	0.0060
TIE LINE 4	1	-0.0005	-0.0129
	2	0.0115	0.0038
	3	0.0111	-0.0034
	4	-0.0229	0.0134
TIE LINE 5	1	0.0010	-0.0010
	2	0.0051	-0.0051
	3	0.0038	-0.0038
	4	-0.0108	0.0108
TIE LINE 6	1	0.0019	0.0182
	2	0.0014	-0.0128
	3	-0.0027	-0.0095
	4	0.0097	-0.0066
TIE LINE 7	1	0.0067	0.0242
	2	-0.0167	-0.0057
	3	-0.0199	-0.0043
	4	0.0301	-0.0145
TIE LINE 8	1	0.0059	0.0053
	2	-0.0096	-0.0011
	3	-0.0103	-0.0013
	4	0.0146	-0.0035
TIE LINE 9	1	0.0070	0.0075
	2	0.0033	-0.0111
	3	0.0000	-0.0083
	4	0.0052	-0.0041
TIE LINE 10	1	0.0064	0.0202
	2	-0.0008	-0.0167
	3	-0.0039	-0.0151
	4	0.0191	-0.0108

ABSOLUTE MEAN DEVIATION (MOLE %) IS 0.83040

Table-2.4
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System T - H - Dmso - W at 20 °C

	Hexane (1)	Dmso (2)	Water (3)	Toulene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0464	0.7153	0.3809
	2	0.8402	0.0280	0.4341
	3	0.0004	0.0005	0.0005
	4	0.1129	0.2562	0.1846
TIE LINE 2	1	0.0473	0.3976	0.2225
	2	0.7309	0.0513	0.3911
	3	0.0005	0.0005	0.0005
	4	0.2213	0.5506	0.3860
TIE LINE 3	1	0.0468	0.5534	0.3001
	2	0.7951	0.0039	0.4145
	3	0.0004	0.0005	0.0005
	4	0.1576	0.4122	0.2849
TIE LINE 4	1	0.0467	0.6343	0.3405
	2	0.8087	0.0304	0.4195
	3	0.0004	0.0005	0.0005
	4	0.1441	0.3348	0.2395
TIE LINE 5	1	0.0471	0.4731	0.2601
	2	0.7604	0.0454	0.4029
	3	0.0005	0.0005	0.0005
	4	0.1920	0.4810	0.3365
TIE LINE 6	1	0.0035	0.3215	0.1625
	2	0.6394	0.0786	0.3590
	3	0.3080	0.0378	0.1729
	4	0.0491	0.5621	0.3056
TIE LINE 7	1	0.0035	0.2884	0.1460
	2	0.6302	0.0397	0.3350
	3	0.3036	0.0191	0.1641
	4	0.0627	0.6527	0.3577
TIE LINE 8	1	0.0007	0.1843	0.0925
	2	0.6205	0.0052	0.3129
	3	0.2989	0.0025	0.1507
	4	0.0798	0.8079	0.4439
TIE LINE 9	1	0.0007	0.4419	0.2213
	2	0.6525	0.0675	0.3600
	3	0.3144	0.3250	0.1734
	4	0.0324	0.4582	0.2453

COMPONENT	(1) COMPONENT	(2) EXTRACT	(3) RAFFINATE	(4) FEED
TIE LINE 10	1	0.0007	0.5828	0.2917
	2	0.6592	0.0477	0.3535
	3	0.3176	0.0230	0.1703
	4	0.0225	0.3465	0.1845
TIE LINE 11	1	0.0001	0.7073	0.3537
	2	0.4774	0.0089	0.2431
	3	0.5175	0.0097	0.2636
	4	0.0051	0.2741	0.1396
TIE LINE 12	1	0.0001	0.3452	0.1726
	2	0.4780	0.0136	0.2458
	3	0.5117	0.0148	0.2632
	4	0.0102	0.6264	0.3183
TIE LINE 13	1	0.0001	0.2997	0.1499
	2	0.4744	0.0137	0.2440
	3	0.5143	0.0148	0.2645
	4	0.0113	0.6718	0.3416
TIE LINE 14	1	0.0001	0.1513	0.0757
	2	0.4711	0.0138	0.2425
	3	0.5107	0.0150	0.2628
	4	0.0181	0.8119	0.4190
TIE LINE 15	1	0.0001	0.5243	0.2622
	2	0.4761	0.0135	0.2448
	3	0.5161	0.0146	0.2654
	4	0.0077	0.4476	0.2276

CONVERGENCE OBTAINED AFTER 39 ITERATIONS

OPTIMUM VALUE OF F = 0.0458642

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	656.387200	ITERATION CARRIED OUT Y
A (1 , 3) =	360.498900	ITERATION CARRIED OUT Y
A (1 , 4) =	315.750300	ITERATION CARRIED OUT Y
A (2 , 1) =	681.991700	ITERATION CARRIED OUT Y
A (2 , 3) =	-3240.460300	ITERATION CARRIED OUT Y
A (2 , 4) =	102.285500	ITERATION CARRIED OUT Y
A (3 , 1) =	858.178500	ITERATION CARRIED OUT Y
A (3 , 2) =	151.418400	ITERATION CARRIED OUT Y
A (3 , 4) =	1235.048000	ITERATION CARRIED OUT Y
A (4 , 1) =	145.638300	ITERATION CARRIED OUT Y
A (4 , 2) =	790.620900	ITERATION CARRIED OUT Y
A (4 , 3) =	1114.365000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0464	0.0404	0.7153	0.7038
	2	0.8402	0.8402	0.0280	0.0489
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1129	0.1178	0.2562	0.2479
TIE LINE 2	1	0.0473	0.0411	0.3976	0.3725
	2	0.7309	0.7739	0.0513	0.0745
	3	0.0005	0.0010	0.0005	0.0000
	4	0.2213	0.1832	0.5506	0.5537
TIE LINE 3	1	0.0468	0.0424	0.5534	0.5349
	2	0.7951	0.8012	0.0339	0.0623
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1576	0.1544	0.4122	0.4038
TIE LINE 4	1	0.0467	0.0419	0.6343	0.6137
	2	0.8087	0.8170	0.0304	0.0559
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1441	0.1392	0.3348	0.3312
TIE LINE 5	1	0.0471	0.0423	0.4731	0.4498
	2	0.7604	0.7864	0.0454	0.0690
	3	0.0005	0.0010	0.0005	0.0000
	4	0.1920	0.1694	0.4810	0.4821
TIE LINE 6	1	0.0035	0.0225	0.3215	0.3454
	2	0.6394	0.6034	0.0786	0.0396
	3	0.3080	0.3007	0.0378	0.0060
	4	0.0491	0.0739	0.5621	0.6082
TIE LINE 7	1	0.0035	0.0207	0.2884	0.2849
	2	0.6302	0.6009	0.0397	0.0399
	3	0.3036	0.3022	0.0191	0.0051
	4	0.0627	0.0769	0.6527	0.6693
TIE LINE 8	1	0.0007	0.0151	0.1843	0.1663
	2	0.6205	0.5978	0.0052	0.0394
	3	0.2989	0.3040	0.0025	0.0035
	4	0.0798	0.0838	0.8079	0.7895
TIE LINE 9	1	0.0007	0.0248	0.4419	0.4767
	2	0.6525	0.6082	0.0675	0.0374
	3	0.3144	0.3006	0.0325	0.0082
	4	0.0324	0.0672	0.4582	0.4768

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 10	1	0.0007	0.0264	0.5828	0.6174
	2	0.6592	0.6143	0.0477	0.0333
	3	0.3176	0.3003	0.0230	0.0106
	4	0.0225	0.0594	0.3465	0.3381
TIE LINE 11	1	0.0001	0.0227	0.7073	0.7016
	2	0.4774	0.4558	0.0089	0.0196
	3	0.5175	0.4944	0.0097	0.0209
	4	0.0051	0.0275	0.2741	0.2575
TIE LINE 12	1	0.0001	0.0181	0.3452	0.3413
	2	0.4780	0.4493	0.0136	0.0237
	3	0.5117	0.4963	0.0148	0.0088
	4	0.0102	0.0371	0.6264	0.6254
TIE LINE 13	1	0.0001	0.0169	0.2997	0.2949
	2	0.4744	0.4462	0.0137	0.0234
	3	0.5143	0.5000	0.0148	0.0077
	4	0.0113	0.0376	0.6718	0.6731
TIE LINE 14	1	0.0001	0.0110	0.1513	0.1456
	2	0.4711	0.4459	0.0138	0.0228
	3	0.5107	0.5020	0.0150	0.0046
	4	0.0181	0.0416	0.8199	0.8266
TIE LINE 15	1	0.0001	0.2090	0.5243	0.5239
	2	0.4761	0.4499	0.0135	0.0223
	3	0.5161	0.4968	0.0146	0.0144
	4	0.0077	0.0329	0.4476	0.4388

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0061	-0.0115
	2	0.0001	0.0209
	3	0.0005	-0.0004
	4	0.0048	-0.0083
TIE LINE 2	1	-0.0062	-0.0251
	2	0.0430	0.0232
	3	0.0006	-0.0005
	4	-0.0382	0.0031
TIE LINE 3	1	-0.0044	-0.0186
	2	0.0060	0.0284
	3	0.0005	-0.0005
	4	-0.0032	-0.0084
TIE LINE 4	1	-0.0048	-0.0206
	2	0.0083	0.0256
	3	0.0005	-0.0005
	4	-0.0049	-0.0036
TIE LINE 5	1	-0.0048	-0.0233
	2	0.0259	0.0236
	3	0.0005	-0.0005
	4	-0.0227	0.0011
TIE LINE 6	1	0.0190	0.0239
	2	-0.0360	-0.0389
	3	-0.0073	-0.0318
	4	0.0248	0.0461
TIE LINE 7	1	0.0172	-0.0034
	2	-0.0293	0.0002
	3	-0.0014	-0.0140
	4	0.0142	0.0165
TIE LINE 8	1	0.0144	-0.0175
	2	-0.0228	0.0342
	3	0.0051	0.0010
	4	0.0040	-0.0184

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0241	0.0348
	2	-0.0444	-0.0301
	3	-0.0138	-0.0243
	4	0.0348	0.0187
TIE LINE 10	1	0.0257	0.0346
	2	-0.0448	-0.0144
	3	-0.0172	-0.0123
	4	0.0368	-0.0084
TIE LINE 11	1	0.0227	-0.0057
	2	-0.0216	0.0107
	3	-0.0230	0.0112
	4	0.0223	0.0166
TIE LINE 12	1	0.0180	-0.0038
	2	-0.0287	0.0100
	3	-0.0154	-0.0060
	4	0.0269	-0.0010
TIE LINE 13	1	0.0168	-0.0048
	2	-0.0281	0.0098
	3	-0.0142	-0.0072
	4	0.0263	0.0013
TIE LINE 14	1	0.0109	-0.0058
	2	-0.0253	0.0090
	3	-0.0087	-0.0104
	4	0.0235	0.0067
TIE LINE 15	1	0.0209	-0.0004
	2	-0.0262	0.0088
	3	-0.0194	-0.0002
	4	0.0252	-0.0087

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.54738

Table-2.5

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System T - H - Dmso - W at 30 °C

COMPONENT	Hexane (1) COMPONENT NUMBER	Dmso (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 1	1	0.0373	0.7111	0.3742
	2	0.8182	0.0224	0.4203
	3	0.0004	0.0005	0.00005
	4	0.1440	0.266	0.2050
TIE LINE 2	1	0.0463	0.8381	0.4472
	2	0.8624	0.0387	0.4506
	3	0.0000	0.0005	0.0005
	4	0.0909	0.1127	0.1018
TIE LINE 3	1	0.0464	0.8295	0.4380
	2	0.8491	0.0167	0.4329
	3	0.0004	0.0005	0.0005
	4	0.1041	0.1535	0.1287
TIE LINE 4	1	0.0372	0.7497	0.3935
	2	0.8362	0.0224	0.4293
	3	0.0004	0.0005	0.0005
	4	0.1262	0.2274	0.1768
TIE LINE 5	1	0.0374	0.6505	0.3440
	2	0.8002	0.0448	0.4225
	3	0.0004	0.0005	0.0005
	4	0.1620	0.3042	0.1216
TIE LINE 6	1	0.0104	0.7406	0.3755
	2	0.6490	0.0298	0.3394
	3	0.3127	0.0144	0.1635
	4	0.0279	0.2153	0.1216
TIE LINE 7	1	0.0104	0.3603	0.2854
	2	0.6459	0.0202	0.3330
	3	0.3111	0.0097	0.1604
	4	0.0325	0.4097	0.2211
TIE LINE 8	1	0.0091	0.3493	0.1792
	2	0.6390	0.0306	0.3348
	3	0.3077	0.0147	0.1612
	4	0.0442	0.8195	0.4605
TIE LINE 9	1	0.0145	0.1574	0.0859
	2	0.5966	0.0156	0.3061
	3	0.2874	0.0075	0.1475
	4	0.1016	0.8195	0.4605

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 10	1	0.0144	0.2540	0.1342
	2	0.6062	0.0257	0.3160
	3	0.2920	0.0124	0.1522
	4	0.0874	0.7079	0.3976
TIE LINE 11	1	0.0017	0.7486	0.3752
	2	0.4772	0.0176	0.2473
	3	0.5172	0.0191	0.2681
	4	0.0041	0.2147	0.1094
TIE LINE 12	1	0.0016	0.5464	0.2740
	2	0.4754	0.0179	0.2466
	3	0.5153	0.0194	0.2673
	4	0.0077	0.4164	0.2121
TIE LINE 13	1	0.0011	0.3285	0.1648
	2	0.4744	0.0181	0.2463
	3	0.5142	0.0196	0.2669
	4	0.0103	0.6337	0.3220
TIE LINE 14	1	0.0006	0.1572	0.0789
	2	0.4705	0.0092	0.2140
	3	0.5132	0.0100	0.2616
	4	0.0129	0.8235	0.4182
TIE LINE 15	1	0.0018	0.6669	0.3343
	2	0.4763	0.0045	0.2404
	3	0.5164	0.0049	0.2606
	4	0.0056	0.3238	0.1647

CONVERGENCE OBTAINED AFTER 21 ITERATIONS

OPTIMUM VALUE OF F =0.0192064

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	648.0947	ITERATION CARRIED OUT Y
A (1 , 3) =	352.0948	ITERATION CARRIED OUT Y
A (1 , 4) =	300.3714	ITERATION CARRIED OUT Y
A (2 , 1) =	621.5348	ITERATION CARRIED OUT Y
A (2 , 3) =	-131.9051	ITERATION CARRIED OUT Y
A (2 , 4) =	53.7541	ITERATION CARRIED OUT Y
A (3 , 1) =	926.8710	ITERATION CARRIED OUT Y
A (3 , 2) =	343.0949	ITERATION CARRIED OUT Y
A (3 , 4) =	1615.4840	ITERATION CARRIED OUT Y
A (4 , 1) =	137.0949	ITERATION CARRIED OUT Y
A (4 , 2) =	914.5758	ITERATION CARRIED OUT Y
A (4 , 3) =	1406.0950	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0373	0.0374	0.7111	0.6973
	2	0.8182	0.8171	0.0224	0.0397
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1440	0.1439	0.2660	0.2637
TIE LINE 2	1	0.0463	0.0364	0.8481	0.8580
	2	0.8624	0.8716	0.0387	0.0296
	3	0.0004	0.0009	0.0005	0.0000
	4	0.0909	0.0904	0.1127	0.1131
TIE LINE 3	1	0.0464	0.0337	0.8295	0.8180
	2	0.8491	0.8594	0.0167	0.0319
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1041	0.1054	0.2274	0.1506
TIE LINE 4	1	0.0372	0.0358	0.7497	0.7420
	2	0.8362	0.8322	0.0224	0.0367
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1262	0.1315	0.2274	0.2210
TIE LINE 5	1	0.0374	0.0373	0.6505	0.6435
	2	0.8002	0.8105	0.0448	0.0435
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1620	0.1503	0.3042	0.3139
TIE LINE 6	1	0.0104	0.0210	0.7406	0.7665
	2	0.6490	0.6257	0.0298	0.0236
	3	0.3127	0.3009	0.0144	0.0120
	4	0.0279	0.0530	0.2153	0.1973
TIE LINE 7	1	0.0104	0.0206	0.5603	0.3519
	2	0.6459	0.6154	0.0202	0.0367
	3	0.3111	0.3021	0.0097	0.0058
	4	0.0325	0.0626	0.4097	0.6049
TIE LINE 8	1	0.0091	0.0195	0.3493	0.3519
	2	0.6390	0.6105	0.0306	0.0367
	3	0.3077	0.3050	0.0147	0.0058
	4	0.0442	0.0657	0.6054	0.6049

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0145	0.0140	0.1574	0.1508
	2	0.5966	0.6045	0.0156	0.0372
	3	0.2874	0.3074	0.0075	0.0033
	4	0.1016	0.0735	0.8195	0.8093
TIE LINE 10	1	0.0144	0.0180	0.2540	0.2460
	2	0.6062	0.6054	0.0257	0.0374
	3	0.2920	0.3057	0.0124	0.0044
	4	0.8740	0.0700	0.7079	0.7131
TIE LINE 11	1	0.0017	0.0153	0.7486	0.7643
	2	0.4770	0.4602	0.0176	0.0169
	3	0.5172	0.4987	0.0191	0.0187
	4	0.0041	0.0262	0.2147	0.1994
TIE LINE 12	1	0.0016	0.0148	0.5464	0.5550
	2	0.4754	0.4540	0.0179	0.0217
	3	0.5153	0.5020	0.0194	0.0129
	4	0.0077	0.0300	0.4164	0.4094
TIE LINE 13	1	0.0011	0.0139	0.3285	0.3291
	2	0.4744	0.4501	0.0181	0.0244
	3	0.5142	0.5052	0.0196	0.0075
	4	0.0103	0.0314	0.6337	0.6384
TIE LINE 14	1	0.0006	0.0099	0.1572	0.1510
	2	0.4734	0.4492	0.0092	0.0242
	3	0.5132	0.5079	0.0100	0.0043
	4	0.0129	0.0338	0.8235	0.8198
TIE LINE 15	1	0.0018	0.0114	0.6669	0.6572
	2	0.4763	0.4601	0.0045	0.0207
	3	0.5164	0.5061	0.0049	0.0151
	4	0.0056	0.0232	0.3238	0.3062

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0001	-0.0137
	2	-0.0012	0.0173
	3	0.0005	-0.0004
	4	-0.0001	-0.0024
TIE LINE 2	1	-0.0098	0.0098
	2	0.0092	-0.0092
	3	0.0004	-0.0004
	4	-0.0005	0.0005
TIE LINE 3	1	-0.0127	-0.0115
	2	0.0103	0.0152
	3	0.0005	-0.0004
	4	0.0013	-0.0027
TIE LINE 4	1	-0.0014	-0.0078
	2	-0.0040	0.0144
	3	0.0005	-0.0004
	4	0.0053	-0.0065
TIE LINE 5	1	-0.0001	-0.0070
	2	0.0104	-0.0013
	3	0.0005	-0.0004
	4	-0.0117	0.0097
TIE LINE 6	1	0.0106	0.0260
	2	-0.0234	-0.0062
	3	-0.0118	-0.0024
	4	0.0251	-0.0180
TIE LINE 7	1	0.0102	0.0082
	2	-0.0305	0.0109
	3	-0.0090	-0.0008
	4	0.0300	-0.0191
TIE LINE 8	1	0.0104	0.0026
	2	-0.0285	0.0061
	3	-0.0027	-0.0090
	4	0.0215	-0.0005

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	-0.0005	-0.0066
	2	0.0079	0.0215
	3	0.0200	-0.0042
	4	-0.0281	-0.0101
TIE LINE 10	1	0.0037	-0.0080
	2	-0.0009	0.0116
	3	0.0137	-0.0080
	4	-0.0174	0.0052
TIE LINE 11	1	0.0138	0.0157
	2	-0.0168	-0.0007
	3	-0.0185	-0.0004
	4	0.0221	-0.0153
TIE LINE 12	1	0.0132	0.0086
	2	-0.0213	0.0039
	3	-0.0133	-0.0065
	4	0.0223	-0.0070
TIE LINE 13	1	0.0128	0.0006
	2	-0.0243	0.0062
	3	-0.0090	-0.0122
	4	0.0211	0.0047
TIE LINE 14	1	0.0093	-0.0063
	2	-0.0242	0.0150
	3	-0.0053	-0.0057
	4	0.0209	-0.0037
TIE LINE 15	1	0.0096	-0.0096
	2	-0.0162	0.0162
	3	-0.0102	0.0102
	4	0.0176	-0.0176

ABSOLUTE MEAN DEVIATION (MOLE %) IS 0.99164

Table-2.6
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System T - H - Dmso - W at 40 °C

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 1	1	0.0566	0.7401	0.3983
	2	0.7489	0.0224	0.3856
	3	0.0005	0.0005	0.0005
	4	0.1940	0.2371	0.2156
TIE LINE 2	1	0.0717	0.5200	0.2959
	2	0.6594	0.0430	0.3512
	3	0.0005	0.0005	0.0005
	4	0.2684	0.4902	0.3524
TIE LINE 3	1	0.0925	0.4470	0.2697
	2	0.6098	0.0623	0.3361
	3	0.0005	0.0005	0.0005
	4	0.2973	0.4902	0.3937
TIE LINE 4	1	0.0710	0.6839	0.3774
	2	0.7223	0.0225	0.3724
	3	0.0005	0.0005	0.0005
	4	0.2062	0.2932	0.2497
TIE LINE 5	1	0.0748	0.5866	0.3307
	2	0.6793	0.0250	0.3521
	3	0.0005	0.0005	0.0005
	4	0.2454	0.3879	0.3167
TIE LINE 6	1	0.0054	0.5319	0.2687
	2	0.6278	0.0498	0.3388
	3	0.3024	0.0240	0.1632
	4	0.0643	0.3943	0.2293
TIE LINE 7	1	0.0036	0.3342	0.1689
	2	0.6090	0.0842	0.3466
	3	0.2934	0.0405	0.1670
	4	0.0940	0.5411	0.3175
TIE LINE 8	1	0.0032	0.1340	0.0686
	2	0.5731	0.0511	0.3121
	3	0.2761	0.0246	0.1504
	4	0.1475	0.7903	0.4689
TIE LINE 9	1	0.0143	0.4320	0.2232
	2	0.6110	0.0598	0.3354
	3	0.0294	0.0288	0.1616
	4	0.0803	0.4793	0.2798

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Toulene (4) FEED
TIE LINE 10	1	0.0102	0.1843	0.0973
	2	0.5869	0.1039	0.3454
	3	0.2827	0.0500	0.1664
	4	0.1201	0.6617	0.3909
TIE LINE 11	1	0.0021	0.7358	0.3689
	2	0.4725	0.0219	0.2472
	3	0.5120	0.0238	0.2679
	4	0.0134	0.2185	0.1160
TIE LINE 12	1	0.0011	0.5077	0.2500
	2	0.4685	0.0351	0.2100
	3	0.5078	0.0381	0.2729
	4	0.0226	0.4190	0.2208
TIE LINE 13	1	0.0013	0.3324	0.1668
	2	0.4637	0.0356	0.2496
	3	0.5025	0.0385	0.2703
	4	0.0326	0.5935	0.3130
TIE LINE 14	1	0.0021	0.6294	0.3158
	2	0.4698	0.0242	0.2470
	3	0.5093	0.0263	0.2678
	4	0.0188	0.3201	0.1694

CONVERGENCE OBTAINED AFTER 132 ITERATIONS

OPTIMUM VALUE OF F =0.0492756

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	680.555100	ITERATION CARRIED OUT Y
A (1 , 3) =	433.734900	ITERATION CARRIED OUT Y
A (1 , 4) =	86.569210	ITERATION CARRIED OUT Y
A (2 , 1) =	704.277200	ITERATION CARRIED OUT Y
A (2 , 3) =	-189.439300	ITERATION CARRIED OUT Y
A (2 , 4) =	64.521610	ITERATION CARRIED OUT Y
A (3 , 1) =	953.325900	ITERATION CARRIED OUT Y
A (3 , 2) =	280.250700	ITERATION CARRIED OUT Y
A (3 , 4) =	1304.902000	ITERATION CARRIED OUT Y
A (4 , 1) =	553.284600	ITERATION CARRIED OUT Y
A (4 , 2) =	741.477100	ITERATION CARRIED OUT Y
A (4 , 3) =	1158.113000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.5660	0.0456	0.7401	0.7100
	2	0.7489	0.7661	0.0224	0.0495
	3	0.0005	0.0009	0.0005	0.0001
	4	0.1940	0.1865	0.2371	0.2412
TIE LINE 2	1	0.0717	0.0537	0.5200	0.5110
	2	0.6594	0.6668	0.0430	0.0709
	3	0.0005	0.0009	0.0005	0.0001
	4	0.2684	0.2776	0.4365	0.4189
TIE LINE 3	1	0.0925	0.0551	0.4470	0.4448
	2	0.6098	0.6484	0.6230	0.0813
	3	0.0005	0.0010	0.0005	0.0001
	4	0.2973	0.2945	0.4902	0.4747
TIE LINE 4	1	0.0710	0.0477	0.6839	0.6651
	2	0.7223	0.7381	0.0225	0.0533
	3	0.0005	0.0009	0.0005	0.0001
	4	0.2062	0.2122	0.2932	0.2824
TIE LINE 5	1	0.0748	0.0519	0.5866	0.5701
	2	0.6793	0.6887	0.0250	0.0632
	3	0.0005	0.0009	0.0005	0.0001
	4	0.2454	0.2573	0.3879	0.3676
TIE LINE 6	1	0.0054	0.0305	0.5319	0.5581
	2	0.6278	0.5816	0.0498	0.0437
	3	0.3024	0.2853	0.0240	0.0149
	4	0.0643	0.1034	0.3943	0.3823
TIE LINE 7	1	0.0036	0.0289	0.3342	0.3481
	2	0.6090	0.5706	0.0842	0.0598
	3	0.2934	0.2886	0.0405	0.0113
	4	0.0940	0.1127	0.5411	0.5798

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 8	1	0.0032	0.0188	0.1340	0.1184
	2	0.5731	0.5544	0.0511	0.0699
	3	0.2761	0.2937	0.0246	0.0071
	4	0.1475	0.1324	0.7903	0.8054
TIE LINE 9	1	0.0143	0.0298	0.4320	0.4528
	2	0.6110	0.5747	0.0598	0.0706
	3	0.2944	0.2867	0.0288	0.0083
	4	0.0803	0.1097	0.4793	0.7329
TIE LINE 10	1	0.0102	0.0252	0.1843	0.1876
	2	0.5869	0.5646	0.1039	0.0706
	3	0.2827	0.2925	0.0500	0.0083
	4	0.1201	0.1182	0.6617	0.7329
TIE LINE 11	1	0.0021	0.0255	0.7358	0.7451
	2	0.4725	0.4504	0.0219	0.0246
	3	0.5120	0.4879	0.2380	0.0269
	4	0.0134	0.0368	0.2185	0.2028
TIE LINE 12	1	0.0011	0.0235	0.5077	0.5258
	2	0.4685	0.4378	0.0351	0.0332
	3	0.5078	0.4886	0.0381	0.1940
	4	0.0226	0.0507	0.4190	0.4208
TIE LINE 13	1	0.0013	0.0219	0.3324	0.3328
	2	0.4637	0.4311	0.0356	0.0418
	3	0.5025	0.4949	0.0385	0.0135
	4	0.0326	0.0526	0.5935	0.6113
TIE LINE 14	1	0.0021	0.0245	0.6294	0.6403
	2	0.4698	0.4432	0.2420	0.0285
	3	0.5093	0.4872	0.0263	0.0233
	4	0.0188	0.0458	0.3201	0.3071

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.1100	-0.0301
	2	0.0171	0.0272
	3	0.0005	-0.0004
	4	-0.0076	0.0042
TIE LINE 2	1	-0.0181	-0.0090
	2	0.0074	0.0190
	3	0.0005	-0.0004
	4	0.0092	-0.0176
TIE LINE 3	1	-0.0373	-0.0022
	2	0.0386	0.0190
	3	0.0005	-0.0004
	4	-0.0028	-0.0155
TIE LINE 4	1	-0.0232	-0.1880
	2	0.0158	0.0309
	3	0.0005	-0.0004
	4	0.0060	-0.0617
TIE LINE 5	1	-0.0229	-0.0165
	2	0.0094	0.0382
	3	0.0005	-0.0004
	4	0.0119	-0.0203
TIE LINE 6	1	0.0251	0.0262
	2	-0.4620	-0.0061
	3	-0.0172	-0.0091
	4	0.0391	-0.0120
TIE LINE 7	1	0.0253	0.0140
	2	-0.0385	-0.0244
	3	-0.0048	-0.0293
	4	0.0187	0.0387

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 8	1	0.0155	-0.0155
	2	-0.0187	0.0187
	3	0.0176	-0.0176
	4	-0.0151	0.0151
TIE LINE 9	1	0.0155	0.0207
	2	-0.0364	-0.0084
	3	-0.0077	-0.0157
	4	0.0293	0.0025
TIE LINE 10	1	0.0150	0.0030
	2	-0.0223	-0.0333
	3	0.0097	-0.0417
	4	-0.0019	0.0711
TIE LINE 11	1	0.0234	0.0093
	2	-0.0220	0.0027
	3	-0.0241	0.0031
	4	0.0233	0.0158
TIE LINE 12	1	0.0224	0.0180
	2	-0.0306	-0.0020
	3	-0.0192	-0.0186
	4	0.0280	0.0018
TIE LINE 13	1	0.0207	0.0004
	2	-0.0326	0.0620
	3	-0.0076	-0.0250
	4	0.0200	0.0178
TIE LINE 14	1	0.0224	0.0108
	2	-0.0266	0.0042
	3	-0.0221	-0.0029
	4	0.0270	-0.0129

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.69440

Table-2.7
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System X - H - Dmso - W at 20 °C

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 1	1	0.0173	0.6064	0.3119
	2	0.9771	0.0239	0.5005
	3	0.0004	0.005	0.0005
	4	0.0552	0.3692	0.1872
TIE LINE 2	1	0.0176	0.4799	0.2488
	2	0.9671	0.0282	0.4977
	3	0.0004	0.0005	0.0005
	4	0.0148	0.4914	0.2531
TIE LINE 3	1	0.0184	0.2977	0.1580
	2	0.9514	0.0393	0.4954
	3	0.0004	0.0005	0.0005
	4	0.0298	0.6624	0.3461
TIE LINE 4	1	0.0146	0.4272	0.2209
	2	0.9672	0.0356	0.5014
	3	0.0004	0.0005	0.0005
	4	0.0178	0.5367	0.2772
TIE LINE 5	1	0.0165	0.3720	0.1942
	2	0.9638	0.0338	0.4988
	3	0.0004	0.0005	0.0005
	4	0.0193	0.5937	0.3065
TIE LINE 6	1	0.0066	0.5624	0.2845
	2	0.6697	0.0444	0.3570
	3	0.3228	0.0214	0.1721
	4	0.0010	0.3718	0.1864
TIE LINE 7	1	0.0065	0.3978	0.2021
	2	0.6696	0.0560	0.3628
	3	0.3228	0.0267	0.1747
	4	0.0011	0.5196	0.2603
TIE LINE 8	1	0.0064	0.3767	0.1916
	2	0.6696	0.0567	0.3632
	3	0.3226	0.0273	0.1749
	4	0.0014	0.5393	0.2703
TIE LINE 9	1	0.0063	0.2691	0.1377
	2	0.6695	0.0564	0.3629
	3	0.3226	0.0269	0.1747
	4	0.0017	0.6476	0.3246

COMPONENT	(1) COMPONENT	(2) EXTRACT	(3) RAFFINATE	(4) FEED
TIE LINE 10	1	0.0061	0.1703	0.0882
	2	0.6692	0.0485	0.3588
	3	0.3224	0.0232	0.1728
	4	0.0022	0.7581	0.3801
TIE LINE 11	1	0.4781	0.3250	0.2516
	2	0.0092	0.3000	0.2010
	3	0.5184	0.0273	0.2727
	4	0.0004	0.4277	0.2141
TIE LINE 12	1	0.0033	0.3640	0.1836
	2	0.4781	0.0264	0.2523
	3	0.5181	0.0287	0.2734
	4	0.0006	0.7362	0.2908
TIE LINE 13	1	0.0041	0.2141	0.1091
	2	0.4775	0.0238	0.2506
	3	0.5175	0.0258	0.2717
	4	0.0009	0.7362	0.3686
TIE LINE 14	1	0.0041	0.0970	0.0505
	2	0.4773	0.0188	0.2480
	3	0.5173	0.0204	0.2688
	4	0.0013	0.8639	0.4326
TIE LINE 15	1	0.0033	0.6636	0.3334
	2	0.4781	0.0231	0.2506
	3	0.5182	0.0250	0.2716
	4	0.0004	0.2884	0.1444

CONVERGENCE OBTAINED AFTER 87 ITERATIONS

OPTIMUM VALUE OF F =0.0124217

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	879.142600	ITERATION CARRIED OUT Y
A (1 , 3) =	521.136500	ITERATION CARRIED OUT Y
A (1 , 4) =	189.969000	ITERATION CARRIED OUT Y
A (2 , 1) =	790.301400	ITERATION CARRIED OUT Y
A (2 , 3) =	169.899700	ITERATION CARRIED OUT Y
A (2 , 4) =	102.686900	ITERATION CARRIED OUT Y
A (3 , 1) =	845.430900	ITERATION CARRIED OUT Y
A (3 , 2) =	140.271300	ITERATION CARRIED OUT Y
A (3 , 4) =	906.815300	ITERATION CARRIED OUT Y
A (4 , 1) =	309.748800	ITERATION CARRIED OUT Y
A (4 , 2) =	358.264300	ITERATION CARRIED OUT Y
A (4 , 3) =	835.382800	ITERATION CARRIED OUT Y

COMPONENT	Component NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0173	0.0124	0.6064	0.6075
	2	0.9771	0.9768	0.0239	0.0303
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0052	0.0098	0.3692	0.3623
TIE LINE 2	1	0.0176	0.0118	0.4799	0.4759
	2	0.9671	0.9760	0.0282	0.0391
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0148	0.0107	0.4914	0.4855
TIE LINE 3	1	0.0184	0.0104	0.2977	0.2939
	2	0.9514	0.9767	0.0393	0.0526
	3	0.0004	0.0010	0.0005	0.0001
	4	0.0298	0.0115	0.6624	0.6539
TIE LINE 4	1	0.0146	0.0115	0.4272	0.4232
	2	0.9672	0.9761	0.0356	0.0430
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0178	0.0109	0.5367	0.5344
TIE LINE 5	1	0.0165	0.0111	0.3720	0.3676
	2	0.9638	0.9759	0.0338	0.0471
	3	0.0004	0.0009	0.0005	0.0001
	4	0.0193	0.0113	0.5937	0.5860
TIE LINE 6	1	0.0066	0.0143	0.5624	0.5797
	2	0.6697	0.6611	0.0444	0.0248
	3	0.3228	0.3146	0.0214	0.0164
	4	0.0011	0.0103	0.3718	0.3788
TIE LINE 7	1	0.0065	0.0132	0.3978	0.4134
	2	0.6696	0.6577	0.0560	0.0330
	3	0.3228	0.3182	0.0267	0.0143
	4	0.0011	0.0112	0.5196	0.5389

COMPONENT	Component NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 8	1	0.0064	0.0130	0.3767	0.3914
	2	0.6696	0.6572	0.0567	0.0341
	3	0.3226	0.3188	0.0269	0.0140
	4	0.0014	0.0113	0.6476	0.5601
TIE LINE 9	1	0.0063	0.0117	0.2691	0.2770
	2	0.6695	0.6552	0.0564	0.0398
	3	0.3226	0.3216	0.0269	0.0124
	4	0.0017	0.0119	0.6476	0.6704
TIE LINE 10	1	0.0061	0.0094	0.1703	0.1721
	2	0.6692	0.6541	0.0485	0.0446
	3	0.3224	0.3249	0.0232	0.0109
	4	0.0022	0.0124	0.7581	0.7719
TIE LINE 11	1	0.0032	0.0147	0.5200	0.5251
	2	0.4781	0.4661	0.0250	0.0227
	3	0.5182	0.5092	0.0273	0.0204
	4	0.0004	0.0103	0.4277	0.4314
TIE LINE 12	1	0.0033	0.0133	0.2640	0.3646
	2	0.4781	0.4624	0.0264	0.0290
	3	0.5181	0.5143	0.0287	0.0174
	4	0.0006	0.0109	0.5809	0.5880
TIE LINE 13	1	0.0041	0.0109	0.2141	0.2111
	2	0.4775	0.4586	0.0238	0.0347
	3	0.5175	0.5195	0.0258	0.0144
	4	0.0009	0.0117	0.7362	0.7390
TIE LINE 14	1	0.0041	0.0059	0.0970	0.0952
	2	0.4773	0.4583	0.0188	0.0378
	3	0.5173	0.5255	0.0204	0.0122
	4	0.0013	0.0105	0.8639	0.8547
TIE LINE 15	1	0.0033	0.0158	0.6636	0.6711
	2	0.4781	0.4699	0.0231	0.0173
	3	0.5182	0.5055	0.0250	0.0229
	4	0.0004	0.0091	0.2884	0.2883

COMPONENT	Component NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0049	-0.0011
	2	-0.0003	0.0064
	3	0.0004	-0.0004
	4	0.0046	-0.0069
TIE LINE 2	1	-0.0058	-0.0040
	2	0.0089	0.0109
	3	0.0005	-0.0005
	4	-0.0041	-0.0059
TIE LINE 3	1	-0.0080	-0.0038
	2	0.0253	0.0133
	3	0.0005	-0.0005
	4	-0.0183	-0.0085
TIE LINE 4	1	-0.0031	-0.0040
	2	0.0089	0.0074
	3	0.0005	-0.0005
	4	-0.0068	-0.0023
TIE LINE 5	1	-0.0053	-0.0044
	2	0.0120	0.0133
	3	0.0005	-0.0005
	4	-0.0080	-0.0077
TIE LINE 6	1	0.0077	0.0173
	2	-0.0086	-0.0196
	3	-0.0082	-0.0050
	4	0.0093	0.0070
TIE LINE 7	1	0.0067	0.0157
	2	-0.0119	-0.0230
	3	-0.0046	-0.0124
	4	0.0101	0.0193
TIE LINE 8	1	0.0066	0.0147
	2	-0.0124	-0.0226
	3	-0.0038	-0.0133
	4	0.0100	0.0208

COMPONENT	Component NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0054	0.0079
	2	-0.0143	-0.0166
	3	-0.0010	-0.0145
	4	0.0102	0.0228
TIE LINE 10	1	0.0032	0.0018
	2	-0.0152	-0.0038
	3	0.0025	-0.0123
	4	0.0102	0.0135
TIE LINE 11	1	0.0115	0.0051
	2	-0.0121	-0.0023
	3	0.0090	-0.0069
	4	0.0099	0.0038
TIE LINE 12	1	0.0100	0.0006
	2	-0.0157	0.0026
	3	-0.0037	-0.0113
	4	0.0104	0.0070
TIE LINE 13	1	0.0068	-0.0030
	2	-0.0188	0.0109
	3	0.0020	-0.0114
	4	0.0108	0.0028
TIE LINE 14	1	0.0018	-0.0018
	2	-0.0190	0.0190
	3	0.0082	-0.0082
	4	0.0092	-0.0092
TIE LINE 15	1	0.0125	0.0075
	2	-0.0081	-0.0057
	3	-0.0127	-0.0010
	4	0.0086	-0.0001

ABSOLUTE MEAN DEVIATION (MOLE %) IS 0.83067

Table-2.8

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System X - H - Dmso - W at 30 0 C

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 1	1	0.0222	0.7277	0.3750
	2	0.9343	0.0281	0.4812
	3	0.0004	0.0005	0.0005
	4	0.0430	0.2437	0.1434
TIE LINE 2	1	0.0242	0.6365	0.3303
	2	0.9113	0.0320	0.4716
	3	0.0004	0.0005	0.0005
	4	0.0641	0.3310	0.1976
TIE LINE 3	1	0.0236	0.3549	0.1906
	2	0.8839	0.0518	0.4678
	3	0.0004	0.0005	0.0005
	4	0.0894	0.5927	0.3411
TIE LINE 4	1	0.0255	0.6887	0.3571
	2	0.9237	0.0308	0.4773
	3	0.0004	0.0005	0.0005
	4	0.0503	0.2800	0.1652
TIE LINE 5	1	0.0242	0.5163	0.2703
	2	0.9054	0.0472	0.4763
	3	0.0004	0.0005	0.0005
	4	0.0699	0.4360	0.2529
TIE LINE 6	1	0.0075	0.4645	0.2360
	2	0.6668	0.0984	0.3826
	3	0.3212	0.0474	0.1843
	4	0.0044	0.3897	0.1971
TIE LINE 7	1	0.0069	0.4600	0.2334
	2	0.6665	0.0947	0.3806
	3	0.3211	0.0456	0.1833
	4	0.0056	0.3997	0.2026
TIE LINE 8	1	0.0062	0.2733	0.1397
	2	0.6651	0.0922	0.3787
	3	0.3204	0.0444	0.1824
	4	0.0084	0.5900	0.2992
TIE LINE 9	1	0.0053	0.1989	0.1021
	2	0.6641	0.0648	0.3644
	3	0.3199	0.0309	0.1754
	4	0.0107	0.7055	0.3581

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 10	1	0.0075	0.6098	0.3086
	2	0.6675	0.0908	0.3791
	3	0.3214	0.0437	0.1826
	4	0.0036	0.2557	0.1297
TIE LINE 11	1	0.0051	0.6384	0.3218
	2	0.4771	0.0492	0.2631
	3	0.5171	0.0533	0.2852
	4	0.0007	0.2591	0.1299
TIE LINE 12	1	0.0053	0.3893	0.1973
	2	0.4768	0.0528	0.2648
	3	0.5169	0.0708	0.2938
	4	0.0011	0.4872	0.2441
TIE LINE 13	1	0.0050	0.2433	0.1242
	2	0.4767	0.0414	0.2590
	3	0.5168	0.0448	0.2808
	4	0.0016	0.6704	0.3360
TIE LINE 14	1	0.0052	0.5172	0.2612
	2	0.4769	0.0511	0.2640
	3	0.5170	0.0598	0.2884
	4	0.0009	0.3720	0.1864
TIE LINE 15	1	0.0051	0.3201	0.1626
	2	0.4768	0.0480	0.2624
	3	0.5167	0.0521	0.2844
	4	0.0013	0.5798	0.2905

CONVERGENCE OBTAINED AFTER 42 ITERATIONS

OPTIMUM VALUE OF F =0.053982

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	763.406300	ITERATION CARRIED OUT Y
A (1 , 3) =	397.327900	ITERATION CARRIED OUT Y
A (1 , 4) =	346.916300	ITERATION CARRIED OUT Y
A (2 , 1) =	790.757200	ITERATION CARRIED OUT Y
A (2 , 3) =	381.137600	ITERATION CARRIED OUT Y
A (2 , 4) =	923.499800	ITERATION CARRIED OUT Y
A (3 , 1) =	967.103500	ITERATION CARRIED OUT Y
A (3 , 2) =	342.732700	ITERATION CARRIED OUT Y
A (3 , 4) =	1049.656000	ITERATION CARRIED OUT Y
A (4 , 1) =	486.833500	ITERATION CARRIED OUT Y
A (4 , 2) =	296.137100	ITERATION CARRIED OUT Y
A (4 , 3) =	725.685700	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0222	0.0196	0.7277	0.7090
	2	0.9343	0.9497	0.0281	0.0407
	3	0.0004	0.0007	0.0005	0.0003
	4	0.0430	0.0291	0.2437	0.2508
TIE LINE 2	1	0.0242	0.0195	0.6365	0.6032
	2	0.9113	0.9501	0.0320	0.0517
	3	0.0004	0.0007	0.0005	0.0003
	4	0.0641	0.0292	0.3310	0.3454
TIE LINE 3	1	0.0263	0.0213	0.3549	0.3248
	2	0.8839	0.9503	0.0518	0.0854
	3	0.0004	0.0008	0.0005	0.0002
	4	0.0894	0.0266	0.5927	0.5903
TIE LINE 4	1	0.0255	0.0195	0.6887	0.6660
	2	0.9237	0.9497	0.0308	0.0450
	3	0.0004	0.0007	0.0005	0.0003
	4	0.0503	0.0294	0.2800	0.2894
TIE LINE 5	1	0.0242	0.0199	0.5163	0.4871
	2	0.9054	0.9508	0.0472	0.0653
	3	0.0004	0.0007	0.0005	0.0003
	4	0.0699	0.0279	0.4360	0.4479
TIE LINE 6	1	0.0075	0.0243	0.4645	0.4911
	2	0.6668	0.6517	0.0984	0.0584
	3	0.3212	0.2992	0.0474	0.0459
	4	0.0044	0.0256	0.3897	0.4037
TIE LINE 7	1	0.0069	0.0244	0.4600	0.4814
	2	0.6665	0.6513	0.0947	0.0594
	3	0.3211	0.2996	0.0456	0.0454
	4	0.0056	0.0255	0.3997	0.4128
TIE LINE 8	1	0.0062	0.0265	0.2733	0.2692
	2	0.6651	0.6393	0.0922	0.0805
	3	0.3204	0.3111	0.0444	0.0353
	4	0.0084	0.0239	0.5900	0.6141

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0053	0.0193	0.1989	0.1849
	2	0.6641	0.6432	0.0648	0.0857
	3	0.3199	0.3194	0.0309	0.0314
	4	0.0107	0.0184	0.7055	0.6978
TIE LINE 10	1	0.0075	0.0239	0.6098	0.6513
	2	0.6675	0.6593	0.0908	0.0420
	3	0.3214	0.2913	0.0437	0.0517
	4	0.0036	0.0263	0.2557	0.2541
TIE LINE 11	1	0.0051	0.0242	0.6384	0.6537
	2	0.4771	0.4618	0.0492	0.0416
	3	0.5171	0.4936	0.0533	0.0528
	4	0.0007	0.0210	0.2591	0.2514
TIE LINE 12	1	0.0053	0.0254	0.3893	0.3910
	2	0.4768	0.4387	0.0528	0.0688
	3	0.5169	0.5173	0.0708	0.0419
	4	0.0011	0.0192	0.4872	0.4977
TIE LINE 13	1	0.0050	0.0189	0.2433	0.2294
	2	0.4767	0.4396	0.0414	0.0785
	3	0.5168	0.5271	0.0448	0.0345
	4	0.0016	0.0137	0.6704	0.6583
TIE LINE 14	1	0.0052	0.0243	0.5172	0.5255
	2	0.4769	0.4518	0.0511	0.0545
	3	0.5170	0.5039	0.0598	0.0479
	4	0.0009	0.0205	0.3720	0.3715
TIE LINE 15	1	0.0051	0.0263	0.3201	0.3068
	2	0.4768	0.4377	0.0480	0.0770
	3	0.5167	0.5178	0.0521	0.0375
	4	0.0013	0.0189	0.5798	0.5780

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0026	-0.0187
	2	0.0154	0.0126
	3	0.0002	-0.0002
	4	-0.0140	0.0071
TIE LINE 2	1	-0.0047	-0.0333
	2	0.0388	0.0197
	3	0.0003	-0.0002
	4	-0.0350	0.0144
TIE LINE 3	1	-0.0050	-0.0301
	2	0.0664	0.0335
	3	0.0004	-0.0003
	4	-0.0628	-0.0024
TIE LINE 4	1	-0.0060	-0.0227
	2	0.0260	0.0142
	3	0.0003	-0.0002
	4	-0.0209	0.0094
TIE LINE 5	1	-0.0043	-0.0292
	2	0.0453	0.0182
	3	0.0003	-0.0003
	4	-0.0420	0.0119
TIE LINE 6	1	0.0168	0.0266
	2	-0.0151	-0.0401
	3	-0.0220	-0.0016
	4	0.0211	0.0140
TIE LINE 7	1	0.0176	0.0214
	2	-0.0152	-0.0353
	3	-0.0215	-0.0002
	4	-0.0199	0.0131
TIE LINE 8	1	0.0203	-0.0041
	2	-0.0258	-0.0117
	3	-0.0093	-0.0092
	4	0.0155	0.0241

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0140	-0.0140
	2	-0.0210	0.0210
	3	-0.0005	0.0005
	4	0.0077	-0.0077
TIE LINE 10	1	0.0164	0.0415
	2	-0.0082	-0.0488
	3	-0.0301	0.0080
	4	0.0226	-0.0016
TIE LINE 11	1	0.0191	0.0152
	2	-0.0153	-0.0076
	3	-0.0235	-0.0005
	4	0.0203	-0.0077
TIE LINE 12	1	0.0201	0.0017
	2	-0.0381	0.0160
	3	0.0005	-0.0289
	4	0.0181	0.0105
TIE LINE 13	1	0.0139	-0.0139
	2	-0.0371	0.0371
	3	0.0103	-0.0103
	4	0.0121	-0.0121
TIE LINE 14	1	0.0191	0.0083
	2	-0.0251	0.0034
	3	-0.0131	-0.0119
	4	0.0196	-0.0005
TIE LINE 15	1	0.0213	-0.0133
	2	-0.0391	0.0289
	3	0.0010	-0.0146
	4	0.0175	-0.0018

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.65215

Table-2.9

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System X - H - Dmso - W at 40 0 C

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 1	1	0.0167	0.8006	0.4087
	2	0.9025	0.0358	0.4691
	3	0.0004	0.0005	0.0005
	4	0.0803	0.1631	0.1217
TIE LINE 2	1	0.0188	0.7710	0.3949
	2	0.8855	0.0338	0.4597
	3	0.0004	0.0005	0.0005
	4	0.0953	0.1948	0.1450
TIE LINE 3	1	0.0298	0.6968	0.3633
	2	0.8625	0.0505	0.4565
	3	0.0005	0.0005	0.0005
	4	0.1073	0.2522	0.1797
TIE LINE 4	1	0.0124	0.5242	0.2683
	2	0.8382	0.0542	0.4462
	3	0.0005	0.0005	0.0005
	4	0.1489	0.4210	0.2850
TIE LINE 5	1	0.0196	0.5827	0.3011
	2	0.8387	0.0583	0.4485
	3	0.0005	0.0005	0.0005
	4	0.1413	0.3585	0.2499
TIE LINE 6	1	0.0087	0.8883	0.4485
	2	0.6627	0.4850	0.3556
	3	0.3191	0.0231	0.1711
	4	0.0095	0.0400	0.0248
TIE LINE 7	1	0.0069	0.8619	0.4344
	2	0.6608	0.0464	0.3536
	3	0.3183	0.0223	0.1703
	4	0.0140	0.0694	0.0417
TIE LINE 8	1	0.0038	0.5159	0.2598
	2	0.6572	0.1280	0.3926
	3	0.3164	0.0617	0.1891
	4	0.0225	0.2944	0.1585
TIE LINE 9	1	0.0079	0.8754	0.4417
	2	0.6617	0.0472	0.3545
	3	0.3186	0.0227	0.1707
	4	0.0117	0.0547	0.0332
TIE LINE 10	1	0.0048	0.9014	0.4531
	2	0.6594	0.0488	0.3541
	3	0.3175	0.0235	0.1705
	4	0.0182	0.0263	0.0223

COMPONENT	Hexane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Xylene (4) FEED
TIE LINE 11	1	0.0111	0.7792	0.3951
	2	0.4698	0.0823	0.2781
	3	0.5106	0.0893	0.3014
	4	0.0085	0.0492	0.0421
TIE LINE 12	1	0.0055	0.7511	0.3783
	2	0.4733	0.0829	0.2781
	3	0.5131	0.0898	0.3014
	4	0.0081	0.0762	0.0421
TIE LINE 13	1	0.0028	0.6981	0.3504
	2	0.4736	0.0838	0.2787
	3	0.5133	0.0909	0.3021
	4	0.0103	0.1272	0.0688
TIE LINE 14	1	0.0055	0.7652	0.3854
	2	0.4738	0.0826	0.2782
	3	0.5135	0.0895	0.3015
	4	0.0072	0.0627	0.0349
TIE LINE 15	1	0.0028	0.7248	0.3638
	2	0.4741	0.0833	0.2787
	3	0.5139	0.0903	0.3021
	4	0.0092	0.1016	0.0554

CONVERGENCE OBTAINED AFTER 52 ITERATIONS

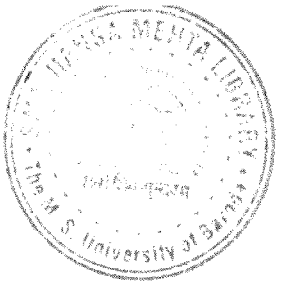
OPTIMUM VALUE OF I 0.1221319

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1045.488000	ITERATION CARRIED OUT Y
A (1 , 3) =	290.279300	ITERATION CARRIED OUT Y
A (1 , 4) =	341.287500	ITERATION CARRIED OUT Y
A (2 , 1) =	780.690200	ITERATION CARRIED OUT Y
A (2 , 3) =	288.868200	ITERATION CARRIED OUT Y
A (2 , 4) =	819.018200	ITERATION CARRIED OUT Y
A (3 , 1) =	891.483200	ITERATION CARRIED OUT Y
A (3 , 2) =	199.791500	ITERATION CARRIED OUT Y
A (3 , 4) =	962.414800	ITERATION CARRIED OUT Y
A (4 , 1) =	490.577400	ITERATION CARRIED OUT Y
A (4 , 2) =	107.820700	ITERATION CARRIED OUT Y
A (4 , 3) =	922.202300	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 1	1	0.0167	0.0234	0.8006	0.8154
	2	0.9025	0.8927	0.0358	0.0220
	3	0.0004	0.0007	0.0005	0.0002
	4	0.0803	0.0841	0.1631	0.1614
TIE LINE 2	1	0.0188	0.0248	0.7710	0.7809
	2	0.8855	0.8754	0.0338	0.0260
	3	0.0004	0.0007	0.0005	0.0002
	4	0.0953	0.0998	0.1948	0.1921
TIE LINE 3	1	0.0298	0.0265	0.6968	0.7138
	2	0.8625	0.8623	0.0505	0.0353
	3	0.0005	0.0007	0.0005	0.0002
	4	0.1073	0.1123	0.2522	0.2497
TIE LINE 4	1	0.0124	0.0263	0.5242	0.4680
	2	0.8382	0.8717	0.5420	0.0950
	3	0.0005	0.0008	0.0005	0.0002
	4	0.1489	0.1000	0.4210	0.4377
TIE LINE 5	1	0.0196	0.0272	0.5827	0.5584
	2	0.8387	0.8538	0.0583	0.0678
	3	0.0005	0.0008	0.0005	0.0002
	4	0.1413	0.1172	0.3585	0.3746
TIE LINE 6	1	0.0087	0.0259	0.8883	0.8910
	2	0.6627	0.6832	0.0485	0.0127
	3	0.3191	0.2775	0.0231	0.0598
	4	0.0095	0.0139	0.0400	0.0361
TIE LINE 7	1	0.0069	0.0265	0.8619	0.8642
	2	0.6608	0.6753	0.0464	0.0146
	3	0.3183	0.2759	0.0223	0.0591
	4	0.0140	0.0229	0.0694	0.0615
TIE LINE 8	1	0.0038	0.0296	0.5159	0.5959
	2	0.6572	0.6285	0.1280	0.0483
	3	0.3164	0.2846	0.0617	0.0496
	4	0.0225	0.0579	0.2944	0.3053

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0079	0.0262	0.8754	0.8777
	2	0.6617	0.6792	0.0472	0.0136
	3	0.3186	0.2767	0.0227	0.0594
	4	0.0117	0.0185	0.0547	0.0487
TIE LINE 10	1	0.0048	0.0248	0.9014	0.8947
	2	0.6594	0.6854	0.0488	0.0124
	3	0.3175	0.2779	0.0235	0.0598
	4	0.0182	0.0122	0.0263	0.0326
TIE LINE 11	1	0.0111	0.0309	0.7792	0.8622
	2	0.4698	0.4810	0.0823	0.0132
	3	0.5106	0.4752	0.0893	0.0752
	4	0.0058	0.0134	0.0492	0.0488
TIE LINE 12	1	0.0055	0.0312	0.7511	0.8375
	2	0.4733	0.4770	0.0829	0.0150
	3	0.5131	0.4773	0.0898	0.0741
	4	0.0081	0.0189	0.0762	0.0729
TIE LINE 13	1	0.0028	0.0316	0.6981	0.7845
	2	0.4736	0.4692	0.0838	0.0193
	3	0.5133	0.4716	0.0909	0.0713
	4	0.0103	0.0281	0.1272	0.1242
TIE LINE 14	1	0.0055	0.0310	0.7652	0.8508
	2	0.4738	0.4793	0.0826	0.0140
	3	0.5135	0.4742	0.0895	0.0747
	4	0.0072	0.0160	0.0627	0.0598
TIE LINE 15	1	0.0028	0.0314	0.7248	0.8117
	2	0.4741	0.4729	0.0833	0.0170
	3	0.5139	0.4723	0.0903	0.0728
	4	0.0092	0.0238	0.1016	0.0979



COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0067	0.0148
	2	-0.0099	-0.0137
	3	0.0002	-0.0003
	4	0.0038	-0.0017
TIE LINE 2	1	0.0060	0.0099
	2	-0.0101	-0.0078
	3	0.0002	-0.0002
	4	0.0046	-0.0026
TIE LINE 3	1	-0.0043	0.0170
	2	-0.0001	-0.0152
	3	0.0003	-0.0003
	4	0.0050	-0.0025
TIE LINE 4	1	0.0139	-0.0562
	2	0.0335	0.0408
	3	0.0004	-0.0003
	4	-0.0490	0.0167
TIE LINE 5	1	0.0077	-0.0243
	2	0.0151	0.0094
	3	0.0003	-0.0003
	4	-0.0241	0.0161
TIE LINE 6	1	0.0172	0.0026
	2	0.0204	-0.0358
	3	-0.0417	0.0367
	4	0.0044	-0.0039
TIE LINE 7	1	0.0196	0.0023
	2	0.0145	-0.0318
	3	-0.0424	0.0367
	4	0.0089	-0.0079

TIE LINE 8	1	0.0258	0.0800
	2	-0.0287	-0.0797
	3	-0.0318	-0.0121
	4	0.0353	0.0109
TIE LINE 9	1	0.0183	0.0023
	2	0.0175	-0.0336
	3	-0.0419	0.0367
	4	0.0067	-0.0060
TIE LINE 10	1	0.0200	-0.0066
	2	0.0260	-0.0363
	3	-0.0396	0.0363
	4	-0.0060	0.0063
TIE LINE 11	1	0.0198	0.0830
	2	0.0112	-0.0691
	3	-0.0354	-0.0141
	4	0.0048	-0.0004
TIE LINE 12	1	0.0257	0.0864
	2	0.0036	-0.0678
	3	-0.0398	-0.0157
	4	0.0108	-0.0033
TIE LINE 13	1	0.0289	0.0863
	2	-0.0044	-0.0645
	3	-0.0417	-0.0195
	4	0.0177	-0.0030
TIE LINE 14	1	0.0255	0.0856
	2	0.0055	-0.0686
	3	-0.0393	-0.0148
	4	0.0088	-0.0029
TIE LINE 15	1	0.0287	0.0869
	2	-0.0012	-0.0663
	3	-0.0417	-0.0175
	4	0.0146	-0.0037

ABSOLUTE MEAN DEVIATION (MOLE %) IS 2.23821

Table-2.10

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Hep - Dmso - W at 20 0 C

COMPONENT	Heptane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0267	0.6968	0.3617
	2	0.8520	0.0275	0.4398
	3	0.0004	0.0005	0.0005
	4	0.1209	0.2752	0.1980
TIE LINE 2	1	0.0524	0.6173	0.3249
	2	0.7901	0.0299	0.4100
	3	0.0004	0.0005	0.0005
	4	0.1770	0.3522	0.2646
TIE LINE 3	1	0.0383	0.4153	0.2268
	2	0.7531	0.0514	0.4022
	3	0.0004	0.0005	0.0005
	4	0.2082	0.5328	0.3705
TIE LINE 4	1	0.0323	0.4023	0.2173
	2	0.7261	0.0518	0.3889
	3	0.0004	0.0005	0.0005
	4	0.2411	0.5455	0.3933
TIE LINE 5	1	0.0044	0.7684	0.3864
	2	0.6695	0.0285	0.3490
	3	0.3223	0.0136	0.1680
	4	0.0038	0.1895	0.0966
TIE LINE 6	1	0.0039	0.6375	0.3207
	2	0.6409	0.0353	0.3381
	3	0.3086	0.0167	0.1626
	4	0.0466	0.3105	0.1786
TIE LINE 7	1	0.0034	0.5153	0.2593
	2	0.6148	0.0427	0.3287
	3	0.2960	0.0206	0.1583
	4	0.0858	0.4214	0.2536
TIE LINE 8	1	0.0028	0.3966	0.1997
	2	0.5781	0.0484	0.3132
	3	0.2783	0.0232	0.1508
	4	0.1408	0.5318	0.3363
TIE LINE 9	1	0.0019	0.2960	0.1490
	2	0.5385	0.0504	0.2944
	3	0.2594	0.0240	0.1417
	4	0.2003	0.6296	0.4149

COMPONENT	(1) COMPONENT	(2) EXTRACT	(3) RAFFINATE	(4) FEED
TIE LINE 10	1	0.0016	0.2302	0.1159
	2	0.5155	0.0481	0.2818
	3	0.2481	0.0232	0.1338
	4	0.2348	0.6985	0.4667
TIE LINE 11	1	0.0014	0.8910	0.4462
	2	0.4728	0.0099	0.2412
	3	0.5125	0.0108	0.2616
	4	0.0133	0.0883	0.0508
TIE LINE 12	1	0.0012	0.7380	0.3696
	2	0.4676	0.0106	0.2391
	3	0.5068	0.0114	0.2591
	4	0.0244	0.2400	0.1322
TIE LINE 13	1	0.0010	0.6263	0.3136
	2	0.4641	0.0112	0.2377
	3	0.5031	0.0121	0.2576
	4	0.0319	0.3503	0.1911
TIE LINE 14	1	0.0007	0.4752	0.2379
	2	0.4603	0.0117	0.2360
	3	0.4989	0.0127	0.2558
	4	0.0401	0.5005	0.2703
TIE LINE 15	1	0.0005	0.3985	0.1995
	2	0.4574	0.0132	0.2353
	3	0.4957	0.0143	0.2550
	4	0.0464	0.5740	0.3102

CONVERGENCE OBTAINED AFTER 67 ITERATIONS
OPTIMUM VALUE OF F = 0.0248281
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	957.614700	ITERATION CARRIED OUT Y
A (1 , 3) =	1050.905000	ITERATION CARRIED OUT Y
A (1 , 4) =	26.019500	ITERATION CARRIED OUT Y
A (2 , 1) =	905.321900	ITERATION CARRIED OUT Y
A (2 , 3) =	-51.400130	ITERATION CARRIED OUT Y
A (2 , 4) =	-327.650300	ITERATION CARRIED OUT Y
A (3 , 1) =	997.496700	ITERATION CARRIED OUT Y
A (3 , 2) =	-402.999100	ITERATION CARRIED OUT Y
A (3 , 4) =	1109.512000	ITERATION CARRIED OUT Y
A (4 , 1) =	-258.258400	ITERATION CARRIED OUT Y
A (4 , 2) =	936.692000	ITERATION CARRIED OUT Y
A (4 , 3) =	1050.892000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0267	0.0197	0.6968	0.7038
	2	0.8520	0.8611	0.0275	0.0184
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1209	0.1172	0.2752	0.2788
TIE LINE 2	1	0.0324	0.0213	0.6173	0.6144
	2	0.7901	0.0144	0.0299	0.0244
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1770	0.1627	0.3522	0.3618
TIE LINE 3	1	0.0383	0.0257	0.4153	0.4399
	2	0.7531	0.7403	0.0514	0.0442
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2082	0.2577	0.5328	0.4899
TIE LINE 4	1	0.0323	0.0285	0.4023	0.4202
	2	0.7261	0.7077	0.0518	0.0463
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2411	0.2804	0.5455	0.5147
TIE LINE 5	1	0.0044	0.0072	0.7684	0.7805
	2	0.6695	0.6795	0.0285	0.0054
	3	0.3223	0.3295	0.0136	0.0001
	4	0.0038	0.0245	0.1895	0.1716
TIE LINE 6	1	0.0039	0.0075	0.6375	0.6508
	2	0.6409	0.6504	0.0353	0.0089
	3	0.3086	0.3168	0.1670	0.0001
	4	0.0466	0.0556	0.3105	0.3082
TIE LINE 7	1	0.0034	0.0078	0.5153	0.5274
	2	0.6148	0.6243	0.0427	0.0139
	3	0.2960	0.3067	0.0206	0.0002
	4	0.0858	0.0910	0.4214	0.4269
TIE LINE 8	1	0.0028	0.0080	0.3966	0.4085
	2	0.5781	0.5822	0.0484	0.0201
	3	0.2783	0.2890	0.0232	0.0001
	4	0.1408	0.1370	0.5318	0.5535

COMPONENT	COMPONENT NUMBER	EXTRACT PHASE EXPT	EXTRACT PHASE CALC	RAFFINATE PHASE EXPT	RAFFINATE PHASE CALC
TIE LINE 9	1	0.0019	0.0081	0.2960	0.3026
	2	0.5385	0.5366	0.0504	0.0303
	3	0.2594	0.2701	0.0240	0.0017
	4	0.2003	0.1862	0.6296	0.6644
TIE LINE 10	1	0.0016	0.0074	0.2302	0.2303
	2	0.5155	0.5133	0.0481	0.0378
	3	0.2481	0.2623	0.0232	0.0021
	4	0.2348	0.2178	0.6985	0.7289
TIE LINE 11	1	0.0014	0.0068	0.8910	0.7461
	2	0.4728	0.4732	0.0099	0.0043
	3	0.5125	0.5139	0.0108	0.0020
	4	0.0133	0.0061	0.0883	0.2476
TIE LINE 12	1	0.0012	0.0062	0.7380	0.7461
	2	0.4676	0.4657	0.0106	0.0043
	3	0.5068	0.5073	0.0114	0.0020
	4	0.0244	0.0208	0.2400	0.2476
TIE LINE 13	1	0.0010	0.0057	0.6263	0.6368
	2	0.4641	0.4584	0.0112	0.0059
	3	0.5031	0.5010	0.0121	0.0021
	4	0.0319	0.0353	0.3503	0.2476
TIE LINE 14	1	0.0007	0.0051	0.4752	0.4902
	2	0.4606	0.4455	0.0117	0.0091
	3	0.4989	0.4898	0.0127	0.0023
	4	0.0401	0.0599	0.5005	0.4981
TIE LINE 15	1	0.0005	0.0045	0.3985	0.4131
	2	0.4574	0.4415	0.0132	0.0093
	3	0.4957	0.4878	0.0143	0.0000
	4	0.0464	0.0738	0.5740	0.5692

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0070	0.0070
	2	0.0091	-0.0091
	3	0.0005	-0.0005
	4	-0.0036	0.0036
TIE LINE 2	1	-0.1111	-0.0029
	2	0.0242	-0.0055
	3	0.0005	-0.0005
	4	-0.0143	0.0096
TIE LINE 3	1	-0.1260	0.0245
	2	-0.0129	-0.0072
	3	0.0005	-0.0005
	4	0.0495	-0.0429
TIE LINE 4	1	-0.0038	0.0179
	2	-0.0184	-0.0054
	3	0.0005	-0.0005
	4	0.0392	-0.0308
TIE LINE 5	1	0.0028	0.0121
	2	0.0101	-0.0231
	3	0.0071	-0.0135
	4	0.0207	-0.0179
TIE LINE 6	1	0.0037	0.0133
	2	0.0094	-0.2630
	3	0.0082	-0.0166
	4	0.0090	-0.0023
TIE LINE 7	1	0.0043	0.0121
	2	0.0095	-0.0288
	3	0.0107	-0.0203
	4	0.0051	0.0055
TIE LINE 8	1	0.0052	0.0120
	2	0.0041	-0.0282
	3	0.0107	-0.0231
	4	-0.0038	0.0217

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0062	0.0066
	2	-0.0019	-0.0200
	3	0.0107	-0.0223
	4	-0.0141	0.0348
TIE LINE 10	1	0.0058	0.0001
	2	-0.0022	-0.0103
	3	0.0142	-0.0210
	4	-0.0170	0.0304
TIE LINE 11	1	0.0053	0.0076
	2	0.0004	-0.0072
	3	0.0014	-0.0088
	4	-0.0072	0.0085
TIE LINE 12	1	0.0050	0.0081
	2	-0.0019	-0.0072
	3	0.0005	-0.0088
	4	-0.0036	0.0076
TIE LINE 13	1	0.0048	0.0105
	2	-0.0057	-0.0053
	3	-0.0020	-0.0101
	4	0.0034	0.0044
TIE LINE 14	1	0.0043	0.0150
	2	-0.0148	-0.0026
	3	-0.0099	-0.0104
	4	0.0199	-0.0024
TIE LINE 15	1	0.0040	0.0147
	2	-0.0158	-0.0039
	3	-0.0080	-0.0143
	4	0.0274	-0.0047

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.08454

Table-2.11
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - Hep - Dmso - W at 30 0 C

COMPONENT	Heptane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0385	0.6007	0.3196
	2	0.7923	0.0304	0.4113
	3	0.0004	0.0005	0.0005
	4	0.1688	0.3684	0.2686
TIE LINE 2	1	0.0409	0.5207	0.2808
	2	0.7719	0.0659	0.4189
	3	0.0004	0.0005	0.0005
	4	0.1867	0.4128	0.2998
TIE LINE 3	1	0.0434	0.4676	0.2555
	2	0.7437	0.0453	0.3945
	3	0.0004	0.0005	0.0005
	4	0.2125	0.4866	0.3496
TIE LINE 4	1	0.0505	0.3308	0.1907
	2	0.6702	0.1222	0.3962
	3	0.0004	0.0005	0.0005
	4	0.2789	0.5465	0.4127
TIE LINE 5	1	0.0474	0.2819	0.1646
	2	0.6381	0.1511	0.3946
	3	0.0004	0.0005	0.0005
	4	0.3140	0.5666	0.4403
TIE LINE 6	1	0.0049	0.7274	0.3662
	2	0.6416	0.0433	0.3424
	3	0.3092	0.0211	0.1652
	4	0.0443	0.2082	0.1262
TIE LINE 7	1	0.0049	0.5733	0.2891
	2	0.6112	0.0387	0.3110
	3	0.2982	0.0184	0.1583
	4	0.0858	0.3696	0.2277
TIE LINE 8	1	0.0038	0.4728	0.2383
	2	0.5877	0.0343	0.3110
	3	0.2832	0.0165	0.1499
	4	0.1253	0.4764	0.3009

COMPONENT	(1) COMPONENT	(2) EXTRACT	(3) RAFFINATE	(4) FEED
TIE LINE 9	1	0.0035	0.3067	0.1551
	2	0.5658	0.0286	0.2972
	3	0.2724	0.0135	0.1430
	4	0.1583	0.6512	0.4047
TIE LINE 10	1	0.0028	0.2419	0.1224
	2	0.5491	0.0248	0.2870
	3	0.2647	0.0119	0.1383
	4	0.1834	0.7213	0.4523
TIE LINE 11	1	0.0002	0.8693	0.4358
	2	0.4729	0.0245	0.2487
	3	0.5126	0.0266	0.2696
	4	0.0121	0.0796	0.1176
TIE LINE 12	1	0.0024	0.7416	0.3720
	2	0.4670	0.0229	0.2449
	3	0.5062	0.0248	0.2655
	4	0.0245	0.2107	0.1176
TIE LINE 13	1	0.0024	0.6306	0.3165
	2	0.4579	0.0214	0.2396
	3	0.4964	0.0231	0.2597
	4	0.0433	0.3249	0.1684
TIE LINE 14	1	0.0025	0.4499	0.2262
	2	0.4457	0.0020	0.2326
	3	0.4826	0.0212	0.2519
	4	0.0692	0.5094	0.2893
TIE LINE 15	1	0.0019	0.2840	0.1430
	2	0.3370	0.0179	0.1774
	3	0.5813	0.0194	0.3004
	4	0.0798	0.6787	0.3792

CONVERGENCE OBTAINED AFTER 40 ITERATIONS

OPTIMUM VALUE OF F = 0.0229795

OPTIMUM VALUE OF VARIABLES

A (1 , 2) = 698.754000 ITERATION CARRIED OUT Y
A (1 , 3) = 1087.707000 ITERATION CARRIED OUT Y
A (1 , 4) = 101.872400 ITERATION CARRIED OUT Y
A (2 , 1) = 919.167200 ITERATION CARRIED OUT Y
A (2 , 3) = 202.875600 ITERATION CARRIED OUT Y
A (2 , 4) = -285.912900 ITERATION CARRIED OUT Y
A (3 , 1) = 1015.340000 ITERATION CARRIED OUT Y
A (3 , 2) = 469.296100 ITERATION CARRIED OUT Y
A (3 , 4) = 1094.590000 ITERATION CARRIED OUT Y
A (4 , 1) = 280.545900 ITERATION CARRIED OUT Y
A (4 , 2) = 1004.268000 ITERATION CARRIED OUT Y
A (4 , 3) = 1180.194000 ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0385	0.0292	0.6007	0.5771
	2	0.7923	0.8107	0.0304	0.0573
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1688	0.1583	0.3684	0.3663
TIE LINE 2	1	0.0409	0.0330	0.5207	0.5269
	2	0.7719	0.7763	0.0659	0.0642
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1867	0.1890	0.4128	0.4097
TIE LINE 3	1	0.0434	0.0383	0.4676	0.4629
	2	0.7437	0.7294	0.0453	0.0745
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2125	0.2316	0.4866	0.4622
TIE LINE 4	1	0.0505	0.0427	0.3308	0.3560
	2	0.6702	0.6637	0.1222	0.0972
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2789	0.2985	0.5465	0.5404
TIE LINE 5	1	0.0474	0.0448	0.2819	0.3087
	2	0.6381	0.6295	0.1511	0.1123
	3	0.0004	0.0008	0.0005	0.0000
	4	0.3140	0.3314	0.5666	0.5712
TIE LINE 6	1	0.0049	0.0085	0.7274	0.7381
	2	0.6416	0.6564	0.0433	0.0159
	3	0.3092	0.3238	0.0211	0.0002
	4	0.0443	0.0321	0.2082	0.5712
TIE LINE 7	1	0.0049	0.0090	0.5733	0.5834
	2	0.6112	0.6128	0.0387	0.0223
	3	0.2982	0.3081	0.0165	0.0009
	4	0.0858	0.0702	0.4764	0.3933
TIE LINE 8	1	0.0038	0.0090	0.4728	0.4705
	2	0.5877	0.5914	0.0343	0.0270
	3	0.2832	0.2969	0.0165	0.0009
	4	0.1253	0.1020	0.4764	0.5023

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0035	0.0078	0.3067	0.3048
	2	0.5658	0.5556	0.0286	0.0346
	3	0.2724	0.2825	0.0135	0.0012
	4	0.1583	0.1544	0.6512	0.6591
TIE LINE 10	1	0.0028	0.0070	0.2419	0.2370
	2	0.5491	0.5377	0.0248	0.0378
	3	0.2647	0.2762	0.0119	0.0013
	4	0.1834	0.1793	0.7213	0.7236
TIE LINE 11	1	0.0024	0.0073	0.8693	0.8906
	2	0.4729	0.4790	0.0245	0.0043
	3	0.5126	0.5234	0.0266	0.0002
	4	0.0121	0.0054	0.0796	0.0889
TIE LINE 12	1	0.0024	0.0067	0.7416	0.7595
	2	0.4670	0.4702	0.0229	0.0059
	3	0.5062	0.5157	0.0248	0.0001
	4	0.0245	0.0168	0.2107	0.2245
TIE LINE 13	1	0.0024	0.0062	0.6306	0.6433
	2	0.4579	0.4585	0.0214	0.0009
	3	0.0496	0.5047	0.0231	0.0017
	4	0.0433	0.0306	0.3249	0.3458
TIE LINE 14	1	0.0025	0.0051	0.4499	0.4553
	2	0.4457	0.4453	0.0195	0.0123
	3	0.4826	0.4933	0.0212	0.0018
	4	0.0692	0.0572	0.5094	0.5297
TIE LINE 15	1	0.0019	0.0027	0.2040	0.2844
	2	0.3370	0.3445	0.0179	0.0090
	3	0.5813	0.5959	0.0194	0.0024
	4	0.0798	0.0560	0.6787	0.7051

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0094	-0.0236
	2	0.0185	0.0269
	3	0.0006	-0.0005
	4	-0.0105	-0.0021
TIE LINE 2	1	-0.0079	0.0061
	2	0.0043	-0.0018
	3	0.0005	-0.0005
	4	0.0023	-0.0031
TIE LINE 3	1	-0.0050	-0.0047
	2	-0.0142	0.0293
	3	0.0005	-0.0005
	4	0.0191	-0.0244
TIE LINE 4	1	-0.0078	0.0252
	2	-0.0065	-0.0249
	3	0.0004	-0.0005
	4	0.0196	-0.0062
TIE LINE 5	1	-0.0026	0.0268
	2	-0.0087	-0.0387
	3	0.0004	-0.0005
	4	0.0174	0.0046
TIE LINE 6	1	0.0036	0.0107
	2	0.0148	-0.0274
	3	0.1460	-0.0210
	4	0.0122	0.0160
TIE LINE 7	1	0.0041	0.0102
	2	0.0002	-0.0163
	3	0.0099	-0.0176
	4	-0.0156	0.0236

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 8	1	0.0052	-0.0023
	2	0.0004	-0.0073
	3	0.0137	-0.0156
	4	-0.0233	0.0259
TIE LINE 9	1	0.0042	-0.0018
	2	-0.1020	0.0059
	3	0.0101	-0.1240
	4	-0.0039	0.0079
TIE LINE 10	1	0.0042	-0.0050
	2	-0.0114	0.0130
	3	0.0115	-0.0106
	4	-0.0041	0.0023
TIE LINE 11	1	0.0049	0.0213
	2	0.0061	-0.0202
	3	0.0108	-0.0264
	4	-0.0068	0.0093
TIE LINE 12	1	0.0043	0.0179
	2	0.0032	-0.0169
	3	0.0095	-0.0247
	4	-0.0076	0.0138
TIE LINE 13	1	0.0038	0.0127
	2	0.0006	-0.0122
	3	0.0084	-0.0214
	4	-0.0127	0.0209
TIE LINE 14	1	0.0026	0.0054
	2	-0.0004	-0.0072
	3	0.0107	-0.0194
	4	-0.0120	0.0203
TIE LINE 15	1	0.0008	0.0004
	2	0.0076	-0.0089
	3	0.0145	-0.0107
	4	-0.0238	0.0264

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.09647

Table-2.12

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Hep - Dmso - W at 40 0 C

	Heptane	Dmso	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0554	0.6724	0.3639
	2	0.8020	0.0833	0.4426
	3	0.0004	0.0005	0.0005
	4	0.1421	0.2439	0.1930
TIE LINE 2	1	0.0635	0.5806	0.3220
	2	0.7580	0.0698	0.4139
	3	0.0004	0.0005	0.0005
	4	0.1781	0.3491	0.2636
TIE LINE 3	1	0.0716	0.4280	0.2498
	2	0.7240	0.0896	0.4068
	3	0.0004	0.0005	0.0005
	4	0.2040	0.4818	0.3429
TIE LINE 4	1	0.0793	0.2683	0.1738
	2	0.6101	0.1720	0.3911
	3	0.0004	0.0005	0.0005
	4	0.3102	0.5592	0.4347
TIE LINE 5	1	0.0606	0.6137	0.3372
	2	0.7772	0.0867	0.4320
	3	0.0004	0.0005	0.0005
	4	0.1617	0.2992	0.2304
TIE LINE 6	1	0.0083	0.8490	0.4287
	2	0.6409	0.0397	0.3403
	3	0.3087	0.0191	0.1639
	4	0.0421	0.0921	0.0671
TIE LINE 7	1	0.0076	0.7466	0.3771
	2	0.6268	0.0377	0.3323
	3	0.2957	0.0182	0.1570
	4	0.0698	0.1975	0.1337
TIE LINE 8	1	0.0062	0.4956	0.2509
	2	0.5721	0.0319	0.3020
	3	0.2756	0.0156	0.1456
	4	0.1461	0.4569	0.3015
TIE LINE 9	1	0.0057	0.2528	0.1293
	2	0.5032	0.0262	0.2647
	3	0.2424	0.0129	0.1277
	4	0.2486	0.7081	0.4784

TIE LINE 10	1	0.0056	0.3716	0.1886
	2	0.5385	0.0280	0.2832
	3	0.2594	0.0138	0.1366
	4	0.1965	0.5866	0.3916
TIE LINE 11	1	0.0057	0.7854	0.3955
	2	0.4745	0.0306	0.2526
	3	0.5144	0.0332	0.2738
	4	0.0055	0.1508	0.0781
TIE LINE 12	1	0.0072	0.8422	0.4247
	2	0.4616	0.0291	0.2454
	3	0.5003	0.0316	0.2660
	4	0.0309	0.0971	0.0640
TIE LINE 13	1	0.0073	0.7187	0.3630
	2	0.4524	0.0274	0.2399
	3	0.4903	0.0297	0.2600
	4	0.0500	0.2243	0.1371
TIE LINE 14	1	0.0075	0.5098	0.2587
	2	0.4299	0.0251	0.2275
	3	0.4660	0.0273	0.2466
	4	0.0966	0.4378	0.2672
TIE LINE 15	1	0.0077	0.3381	0.1729
	2	0.4096	0.0232	0.2164
	3	0.4440	0.0252	0.2346
	4	0.1387	0.6134	0.3761

CONVERGENCE OBTAINED AFTER 18 ITERATIONS

OPTIMUM VALUE OF F = 0.0585277

OPTIMUM VALUE OF VARIABLES

A (1 , 2) = 636.633700 ITERATION CARRIED OUT Y
A (1 , 3) = 1183.902000 ITERATION CARRIED OUT Y
A (1 , 4) = 374.678900 ITERATION CARRIED OUT Y
A (2 , 1) = 1010.458000 ITERATION CARRIED OUT Y
A (2 , 3) = -105.097800 ITERATION CARRIED OUT Y
A (2 , 4) = -249.470200 ITERATION CARRIED OUT Y
A (3 , 1) = 1111.902000 ITERATION CARRIED OUT Y
A (3 , 2) = -361.095200 ITERATION CARRIED OUT Y
A (3 , 4) = 1190.902000 ITERATION CARRIED OUT Y
A (4 , 1) = -184.095200 ITERATION CARRIED OUT Y
A (4 , 2) = 1056.584000 ITERATION CARRIED OUT Y
A (4 , 3) = 1276.902000 ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0554	0.0349	0.6724	0.6948
	2	0.8020	0.8183	0.0833	0.0648
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1421	0.1454	0.2439	0.2409
TIE LINE 2	1	0.0635	0.0409	0.5806	0.5858
	2	0.7580	0.7652	0.0698	0.0844
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1781	0.1922	0.3491	0.3305
TIE LINE 3	1	0.0716	0.0520	0.4280	0.4511
	2	0.7240	0.6937	0.0896	0.1147
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2040	0.2539	0.4818	0.4335
TIE LINE 4	1	0.0793	0.0710	0.2683	0.3011
	2	0.6101	0.5741	0.1720	0.1645
	3	0.0004	0.0008	0.0005	0.0000
	4	0.3102	0.3549	0.5592	0.5335
TIE LINE 5	1	0.0606	0.0400	0.6137	0.6368
	2	0.7772	0.7864	0.0867	0.0746
	3	0.0004	0.0009	0.0005	0.0000
	4	0.1617	0.1723	0.2992	0.2891
TIE LINE 6	1	0.0083	0.0093	0.8490	0.8714
	2	0.6409	0.6433	0.0397	0.0204
	3	0.3087	0.3183	0.0191	0.0009
	4	0.0421	0.0291	0.1975	0.1072
TIE LINE 7	1	0.0076	0.0104	0.7466	0.7559
	2	0.6268	0.6276	0.0377	0.0272
	3	0.2957	0.3079	0.0182	0.0010
	4	0.0698	0.0547	0.1975	0.2153
TIE LINE 8	1	0.0062	0.0116	0.4956	0.4762
	2	0.5721	0.5775	0.0319	0.0426
	3	0.2756	0.2987	0.0156	0.0015
	4	0.1461	0.1117	0.4569	0.4803

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0057	0.0091	0.2528	0.2254
	2	0.5032	0.5332	0.0262	0.0501
	3	0.2424	0.2850	0.0129	0.0019
	4	0.2486	0.1720	0.7081	0.7232
TIE LINE 10	1	0.0056	0.0110	0.3716	0.3430
	2	0.5385	0.5540	0.0280	0.0479
	3	0.2594	0.2917	0.0138	0.0017
	4	0.1965	0.1423	0.5866	0.6083
TIE LINE 11	1	0.0057	0.0066	0.7854	0.8090
	2	0.4745	0.4801	0.0306	0.0107
	3	0.5144	0.5311	0.0332	0.0002
	4	0.0055	0.0191	0.1508	0.1409
TIE LINE 12	1	0.0072	0.0070	0.8422	0.8703
	2	0.4616	0.4667	0.0291	0.0092
	3	0.5003	0.5152	0.0316	0.0000
	4	0.0309	0.0162	0.0971	0.1150
TIE LINE 13	1	0.0073	0.0071	0.7187	0.7359
	2	0.4524	0.4549	0.0274	0.0146
	3	0.4903	0.5063	0.0297	0.0019
	4	0.0500	0.0318	0.2243	0.2475
TIE LINE 14	1	0.0075	0.0094	0.5098	0.5079
	2	0.4299	0.4356	0.0251	0.0195
	3	0.4660	0.4910	0.0273	0.0022
	4	0.0966	0.0650	0.4378	0.4694
TIE LINE 15	1	0.0077	0.0054	0.3381	0.3257
	2	0.4096	0.4277	0.0232	0.0237
	3	0.4440	0.4893	0.0252	0.0022
	4	0.1387	0.0765	0.6134	0.6494

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0205	0.0224
	2	0.0163	-0.0184
	3	0.0005	-0.0005
	4	0.0032	-0.003
TIE LINE 2	1	-0.0226	0.0052
	2	0.0071	0.0146
	3	0.0005	-0.0005
	4	0.0141	-0.0186
TIE LINE 3	1	-0.0195	0.0231
	2	-0.0303	0.0251
	3	0.0005	-0.0005
	4	0.0499	-0.0483
TIE LINE 4	1	-0.0083	0.0328
	2	-0.0360	-0.0076
	3	0.0004	-0.0004
	4	0.0448	-0.0257
TIE LINE 5	1	-0.0207	0.0231
	2	0.0091	-0.0121
	3	0.0005	-0.0005
	4	0.0106	-0.0101
TIE LINE 6	1	0.0010	0.0223
	2	0.0025	-0.0193
	3	0.0096	-0.0182
	4	-0.0130	0.0151
TIE LINE 7	1	0.0029	0.0223
	2	0.0007	-0.0193
	3	0.0121	-0.0182
	4	-0.0152	0.0151
TIE LINE 8	1	0.0054	-0.0193
	2	0.0053	0.0107
	3	0.0230	-0.0142
	4	-0.0344	0.0234

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0033	-0.0275
	2	0.0300	0.0239
	3	0.0426	-0.0110
	4	-0.0767	0.0152
TIE LINE 10	1	0.0053	-0.0286
	2	0.0156	0.0199
	3	0.0323	-0.0120
	4	-0.0542	0.0216
TIE LINE 11	1	0.0010	0.0236
	2	0.0055	-0.0199
	3	0.0167	-0.0330
	4	0.0136	-0.0099
TIE LINE 12	1	-0.0002	0.0281
	2	0.0051	-0.0199
	3	0.0149	-0.0315
	4	-0.0147	0.0179
TIE LINE 13	1	-0.0002	0.0172
	2	0.0025	-0.0128
	3	0.0160	-0.0278
	4	-0.0182	0.0233
TIE LINE 14	1	0.0018	-0.0018
	2	0.0056	-0.0056
	3	0.0250	-0.0250
	4	-0.0315	0.0315
TIE LINE 15	1	-0.0023	-0.0124
	2	0.0181	0.0005
	3	0.0454	-0.0230
	4	-0.0623	0.0359

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.70940

Table-2.13
Prediction of quaternary L-L equilibrium data by NRTL method
Processing Data Tables for System B - Oct - Dmso - W at 20 0 C

COMPONENT	Octane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 1	1	0.0069	0.7362	0.3715
	2	0.9827	0.0087	0.4957
	3	0.0004	0.0006	0.0005
	4	0.0100	0.2546	0.1323
TIE LINE 2	1	0.0082	0.6161	0.3122
	2	0.9632	0.0071	0.4851
	3	0.0004	0.0006	0.0005
	4	0.0281	0.3763	0.2022
TIE LINE 3	1	0.0151	0.4626	0.2389
	2	0.5234	0.0091	0.4162
	3	0.0004	0.0005	0.0005
	4	0.1611	0.5278	0.3444
TIE LINE 4	1	0.0277	0.3220	0.1748
	2	0.6529	0.0689	0.3609
	3	0.0004	0.0005	0.0005
	4	0.3189	0.6086	0.4638
TIE LINE 5	1	0.0098	0.5635	0.2867
	2	0.9526	0.0135	0.4830
	3	0.0004	0.0005	0.0005
	4	0.0372	0.4225	0.2298
TIE LINE 6	1	0.0001	0.4053	0.2027
	2	0.6324	0.0053	0.3189
	3	0.3047	0.0026	0.1536
	4	0.0063	0.5868	0.3248
TIE LINE 7	1	0.0007	0.3170	0.1589
	2	0.6303	0.0052	0.3177
	3	0.3038	0.0025	0.1531
	4	0.0652	0.6754	0.3703
TIE LINE 8	1	0.0006	0.2449	0.1228
	2	0.5845	0.0073	0.2959
	3	0.2816	0.0039	0.1427
	4	0.1332	0.7439	0.4386
TIE LINE 9	1	0.0004	0.1433	0.0719
	2	0.4863	0.0210	0.2536
	3	0.2346	0.0101	0.1223
	4	0.2787	0.8256	0.5522

COMPONENT	Octane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 10	1	0.0013	0.1734	0.0873
	2	0.4671	0.0039	0.2355
	3	0.5063	0.0042	0.2552
	4	0.0254	0.8185	0.4219
TIE LINE 11	1	0.0019	0.3350	0.1684
	2	0.4758	0.0041	0.2400
	3	0.5157	0.0045	0.2601
	4	0.0066	0.6563	0.3315
TIE LINE 12	1	0.0015	0.2139	0.1077
	2	0.4710	0.0039	0.2375
	3	0.5105	0.0043	0.2574
	4	0.0170	0.7779	0.3975
TIE LINE 13	1	0.0011	0.1343	0.0677
	2	0.4631	0.0038	0.2335
	3	0.5020	0.0041	0.2531
	4	0.0338	0.8577	0.4458
TIE LINE 14	1	0.0017	0.2730	0.1373
	2			
	3			
	4			
TIE LINE 15	1	0.0068	0.6102	0.3085
	2	0.4541	0.0132	0.2337
	3	0.4922	0.0143	0.2533
	4	0.0468	0.3623	0.2046

CONVERGENCE OBTAINED AFTER 10 ITERATIONS
OPTIMUM VALUE OF F = 0.0388759
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1422.888000	ITERATION CARRIED OUT Y
A (1 , 3) =	721.701500	ITERATION CARRIED OUT Y
A (1 , 4) =	-261.487800	ITERATION CARRIED OUT Y
A (2 , 1) =	943.756700	ITERATION CARRIED OUT Y
A (2 , 3) =	-980.840900	ITERATION CARRIED OUT Y
A (2 , 4) =	-268.008700	ITERATION CARRIED OUT Y
A (3 , 1) =	-93.035420	ITERATION CARRIED OUT Y
A (3 , 2) =	-634.936700	ITERATION CARRIED OUT Y
A (3 , 4) =	1244.617000	ITERATION CARRIED OUT Y
A (4 , 1) =	-940.647500	ITERATION CARRIED OUT Y
A (4 , 2) =	646.394600	ITERATION CARRIED OUT Y
A (4 , 3) =	783.752700	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0069	0.0037	0.7362	0.7393
	2	0.9827	0.9856	0.0087	0.0058
	3	0.0004	1.0000	0.0006	0.0000
	4	0.0100	0.0103	0.2546	0.2543
TIE LINE 2	1	0.0082	0.0038	0.6161	0.6205
	2	0.9632	0.9591	0.0071	0.0112
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0281	0.0396	0.3763	0.3648
TIE LINE 3	1	0.0151	0.0094	0.4626	0.4501
	2	0.8234	0.8368	0.0091	0.0290
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1611	0.1522	0.5278	0.5214
TIE LINE 4	1	0.0277	0.0275	0.3220	0.3221
	2	0.6529	0.6624	0.0689	0.0594
	3	0.0004	0.0009	0.0005	0.0000
	4	0.3189	0.3086	0.6086	0.6190
TIE LINE 5	1	0.0098	0.0042	0.5635	0.5691
	2	0.9526	0.9515	0.0135	0.0146
	3	0.0004	0.0010	0.0005	0.0000
	4	0.0372	0.0584	0.4225	0.4012
TIE LINE 6	1	0.0001	0.0052	0.4053	0.4038
	2	0.6324	0.6217	0.0053	0.0105
	3	0.3047	0.3045	0.0026	0.0000
	4	0.0629	0.0707	0.5868	0.5836
TIE LINE 7	1	0.0007	0.0039	0.3170	0.3163
	2	0.6303	0.6142	0.0052	0.0166
	3	0.3038	0.3038	0.0025	0.0002
	4	0.0652	0.1001	0.6754	0.6447
TIE LINE 8	1	0.0006	0.0003	0.2449	0.2416
	2	0.5845	0.5694	0.0073	0.0240
	3	0.2816	0.2859	0.0039	0.0005
	4	0.1332	0.1422	0.7439	0.7332

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0004	0.0019	0.1433	0.1274
	2	0.4863	0.5225	0.0210	0.0401
	3	0.2346	0.2753	0.0101	0.0009
	4	0.2787	0.1991	0.8256	0.8325
TIE LINE 10	1	0.0013	0.0013	0.1734	0.1779
	2	0.4671	0.4522	0.0039	0.0075
	3	0.5063	0.4978	0.0042	0.0000
	4	0.0254	0.0795	0.8185	0.7822
TIE LINE 11	1	0.0019	0.0039	0.3350	0.3403
	2	0.4758	0.4670	0.0041	0.0029
	3	0.5157	0.5089	0.0045	0.0003
	4	0.0066	0.0439	0.6563	0.6319
TIE LINE 12	1	0.0015	0.0018	0.2139	0.2188
	2	0.4710	0.4577	0.0039	0.0063
	3	0.5105	0.5021	0.0043	0.0005
	4	0.0170	0.0697	0.7779	0.7416
TIE LINE 13	1	0.0011	0.0009	0.1343	0.1382
	2	0.4631	0.4456	0.0038	0.0096
	3	0.5020	0.4926	0.0041	0.0003
	4	0.0338	0.0892	0.8577	0.8221
TIE LINE 14	1	0.0017	0.0027	0.2730	0.2783
	2	0.4734	0.4627	0.0040	0.0041
	3	0.5131	0.5057	0.0044	0.0001
	4	0.0118	0.0566	0.7186	0.6885
TIE LINE 15	1	0.0068	0.0158	0.6102	0.5994
	2	0.4541	0.4677	0.0132	0.0011
	3	0.4922	0.5066	0.0143	0.0016
	4	0.0468	0.0097	0.3623	0.3982

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	-0.0031	0.0031
	2	0.0029	-0.0290
	3	0.0006	-0.0006
	4	0.0003	-0.0002
TIE LINE 2	1	-0.0045	0.0044
	2	-0.0041	0.0041
	3	0.0006	-0.0006
	4	0.0115	-0.0115
TIE LINE 3	1	-0.0057	-0.0125
	2	0.0135	0.0199
	3	0.0006	-0.0005
	4	-0.0089	-0.0064
TIE LINE 4	1	-0.0002	0.0002
	2	0.0095	-0.0095
	3	0.0005	-0.0005
	4	-0.0103	0.0103
TIE LINE 5	1	-0.0057	0.0057
	2	-0.0011	0.0011
	3	0.0005	-0.0005
	4	0.0212	-0.0212
TIE LINE 6	1	0.0051	-0.0015
	2	-0.0107	0.0052
	3	-0.0002	-0.0026
	4	0.0078	-0.0032
TIE LINE 7	1	0.0031	-0.0007
	2	-0.0161	0.0115
	3	0.0000	-0.0023
	4	0.0349	-0.0307
TIE LINE 8	1	0.0027	-0.0034
	2	-0.0151	0.0167
	3	0.0045	-0.0034
	4	0.0090	-0.0107

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0015	-0.0159
	2	0.0362	0.0192
	3	0.0407	-0.0092
	4	-0.0796	0.0060
TIE LINE 10	1	0.0000	0.0044
	2	-0.0149	0.0036
	3	-0.0085	-0.0042
	4	0.0541	-0.0365
TIE LINE 11	1	0.0021	0.0052
	2	-0.0088	-0.0012
	3	-0.0068	-0.0420
	4	0.0372	-0.0245
TIE LINE 12	1	0.0003	0.0049
	2	-0.0133	0.0023
	3	-0.0084	-0.0038
	4	0.0526	-0.0363
TIE LINE 13	1	-0.0001	0.0038
	2	-0.0175	0.0058
	3	-0.0094	-0.0039
	4	0.0554	-0.0357
TIE LINE 14	1	0.0010	0.0053
	2	-0.0107	0.0001
	3	-0.0074	-0.0043
	4	0.0447	-0.0301
TIE LINE 15	1	0.0090	-0.0108
	2	0.0136	-0.0121
	3	0.0143	-0.0127
	4	-0.0372	0.0359

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.12518

Table-2.14

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Oct - Dmso - W at 30 0 C

	Octane	Dmso	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0175	0.4714	0.2445
	2	0.7603	0.0203	0.3903
	3	0.0004	0.0005	0.0005
	4	0.2218	0.5078	0.3648
TIE LINE 2	1	0.0305	0.3642	0.1973
	2	0.6589	0.0222	0.3405
	3	0.0004	0.0005	0.0005
	4	0.3102	0.6131	0.4617
TIE LINE 3	1	0.0124	0.6766	0.3445
	2	0.9771	0.0144	0.4958
	3	0.0004	0.0006	0.0005
	4	0.0101	0.3084	0.1592
TIE LINE 4	1	0.0010	0.6313	0.3162
	2	0.6640	0.0099	0.3370
	3	0.3199	0.0045	0.1622
	4	0.0151	0.3543	0.1847
TIE LINE 5	1	0.0005	0.2482	0.1244
	2	0.5103	0.0086	0.2594
	3	0.2458	0.0039	0.1248
	4	0.2434	0.7394	0.4914
TIE LINE 6	1	0.0003	0.1972	0.0987
	2	0.4498	0.0142	0.2320
	3	0.2165	0.0066	0.1115
	4	0.3335	0.7820	0.5577
TIE LINE 7	1	0.0005	0.3107	0.1556
	2	0.5638	0.0092	0.2865
	3	0.2714	0.0044	0.1379
	4	0.1642	0.6756	0.4199
TIE LINE 8	1	0.0002	0.4671	0.2337
	2	0.4760	0.0058	0.2409
	3	0.5160	0.0063	0.2611
	4	0.0078	0.5208	0.2643
TIE LINE 9	1	0.0002	0.3540	0.1771
	2	0.4712	0.0037	0.2375
	3	0.5104	0.0040	0.2572
	4	0.0182	0.6383	0.3283

	Octane	Dmso	Water	Benzene
	(1)	(2)	(3)	(4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 10	1	0.0001	0.2735	0.1368
	2	0.4728	0.0036	0.2382
	3	0.4993	0.0039	0.2516
	4	0.0277	0.7190	0.3734
TIE LINE 11	1	0.0001	0.2122	0.1062
	2	0.4544	0.0007	0.2275
	3	0.4927	0.0071	0.2499
	4	0.0528	0.7800	0.4164
TIE LINE 12	1	0.0002	0.4093	0.2048
	2	0.4735	0.0047	0.2391
	3	0.5133	0.0051	0.2592
	4	0.0130	0.5808	0.2969
TIE LINE 13	1	0.0072	0.5664	0.2868
	2	0.4600	0.0167	0.2384
	3	0.4987	0.7000	0.2843
	4	0.0341	0.3469	0.1905
TIE LINE 14	1	0.0217	0.4371	0.2294
	2	0.7456	0.0216	0.3836
	3	0.0004	0.0005	0.0005
	4	0.2322	0.5407	0.3865

CONVERGENCE OBTAINED AFTER 11 ITERATIONS

OPTIMUM VALUE OF F = 0.0422470

OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1488.058000	ITERATION CARRIED OUT Y
A (1 , 3) =	877.024200	ITERATION CARRIED OUT Y
A (1 , 4) =	-256.231900	ITERATION CARRIED OUT Y
A (2 , 1) =	907.970200	ITERATION CARRIED OUT Y
A (2 , 3) =	-927.105500	ITERATION CARRIED OUT Y
A (2 , 4) =	-417.592300	ITERATION CARRIED OUT Y
A (3 , 1) =	-62.308920	ITERATION CARRIED OUT Y
A (3 , 2) =	-573.135800	ITERATION CARRIED OUT Y
A (3 , 4) =	1233.884000	ITERATION CARRIED OUT Y
A (4 , 1) =	-891.740800	ITERATION CARRIED OUT Y
A (4 , 2) =	823.253500	ITERATION CARRIED OUT Y
A (4 , 3) =	766.868200	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.0175	0.0180	0.4714	0.4583
	2	0.7603	0.7772	0.0203	0.0249
	3	0.0004	0.0009	0.0005	0.0000
	4	0.2218	0.2030	0.5078	0.5176
TIE LINE 2	1	0.0305	0.0318	0.3642	0.3583
	2	0.6589	0.6460	0.0222	0.0435
	3	0.0004	0.0010	0.0005	0.0000
	4	0.3102	0.3208	0.6131	0.5986
TIE LINE 3	1	0.0124	0.0054	0.6766	0.6835
	2	0.9771	0.9848	0.0144	0.0068
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0101	0.0289	0.3084	0.2895
TIE LINE 4	1	0.0010	0.0135	0.6313	0.6233
	2	0.6640	0.6661	0.0099	0.0030
	3	0.3199	0.3218	0.0045	0.0001
	4	0.0151	0.0225	0.3543	0.3493
TIE LINE 5	1	0.0005	0.0071	0.2482	0.2328
	2	0.5103	0.5131	0.0086	0.0249
	3	0.2458	0.2590	0.0039	0.0008
	4	0.2434	0.2216	0.7394	0.7408
TIE LINE 6	1	0.0003	0.0052	0.1972	0.1722
	2	0.4498	0.4851	0.0142	0.0333
	3	0.2165	0.2522	0.0066	0.0011
	4	0.3335	0.2565	0.7820	0.7942
TIE LINE 7	1	0.0005	0.0069	0.3107	0.3043
	2	0.5380	0.5546	0.0092	0.0184
	3	0.2714	0.2753	0.0044	0.0006
	4	0.3335	0.1627	0.6756	0.6771
TIE LINE 8	1	0.0002	0.0104	0.4671	0.4691
	2	0.4760	0.4685	0.0058	0.0009
	3	0.5160	0.5086	0.0063	0.0002
	4	0.0078	0.0363	0.5208	0.5047

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0002	0.0062	0.3540	0.3576
	2	0.4712	0.4596	0.0037	0.0027
	3	0.5104	0.5004	0.0040	0.0003
	4	0.0182	0.0640	0.6383	0.6075
TIE LINE 10	1	0.0001	0.0042	0.2735	0.2781
	2	0.4728	0.4569	0.0036	0.0053
	3	0.4993	0.4873	0.0039	0.0006
	4	0.0277	0.0897	0.7190	0.6755
TIE LINE 11	1	0.0001	0.0029	0.2122	0.2168
	2	0.4544	0.4339	0.0007	0.0065
	3	0.4927	0.4831	0.0071	0.0001
	4	0.0528	0.1098	0.7800	0.7449
TIE LINE 12	1	0.0002	0.0080	0.4093	0.4118
	2	0.4735	0.4646	0.0047	0.0019
	3	0.5133	0.5051	0.0051	0.0004
	4	0.0130	0.0494	0.5808	0.3739
TIE LINE 13	1	0.0072	0.0178	0.5664	0.5661
	2	0.4600	0.4677	0.0167	0.0003
	3	0.4987	0.5570	0.0700	0.0012
	4	0.0341	0.0138	0.3469	0.3739
TIE LINE 14	1	0.0217	0.0214	0.4371	0.4335
	2	0.7456	0.7458	0.0216	0.0285
	3	0.0004	0.0010	0.0005	0.0000
	4	0.2322	0.2313	0.5407	0.5387

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0006	-0.0131
	2	0.0169	0.0046
	3	0.0005	-0.0005
	4	-0.0188	0.0099
TIE LINE 2	1	0.0013	-0.0059
	2	-0.0128	0.0213
	3	0.0005	-0.0005
	4	0.0106	-0.0145
TIE LINE 3	1	-0.0069	0.0069
	2	0.0076	-0.0076
	3	0.0006	-0.0006
	4	0.0188	-0.0188
TIE LINE 4	1	0.0124	-0.0079
	2	0.0021	-0.0069
	3	0.0020	-0.0043
	4	0.0074	-0.0050
TIE LINE 5	1	0.0066	-0.0154
	2	0.0028	0.0164
	3	0.0132	-0.0030
	4	-0.0218	0.0014
TIE LINE 6	1	0.0049	-0.0250
	2	0.0353	0.0191
	3	0.0357	-0.0055
	4	-0.0770	0.0123
TIE LINE 7	1	0.0064	-0.0064
	2	-0.0092	0.0092
	3	0.0039	-0.0039
	4	-0.0015	0.0015
TIE LINE 8	1	0.0102	0.0020
	2	-0.0075	-0.0049
	3	-0.0074	-0.0061
	4	0.0285	-0.0161

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0060	0.0037
	2	-0.0116	-0.0010
	3	-0.0101	-0.0037
	4	0.0458	-0.0308
TIE LINE 10	1	0.0040	0.0046
	2	-0.0159	0.0017
	3	-0.0120	-0.0033
	4	0.0620	-0.0435
TIE LINE 11	1	0.0028	0.0045
	2	-0.0206	0.0058
	3	-0.0096	-0.0070
	4	0.0570	-0.0351
TIE LINE 12	1	0.0078	0.0025
	2	-0.0089	-0.0029
	3	-0.0081	-0.0047
	4	0.0364	-0.0235
TIE LINE 13	1	0.0106	-0.0003
	2	0.0077	-0.0165
	3	0.0583	-0.0688
	4	-0.0203	0.0271
TIE LINE 14	1	-0.0004	-0.0037
	2	0.0002	0.0069
	3	0.0005	-0.0005
	4	-0.0010	-0.0021

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.24104

Table-2.15

Prediction of quaternary L-L equilibrium data by NRTL method

Processing Data Tables for System B - Oct - Dmso - W at 40 0 C

	Octane (1)	Dmso (2)	Water (3)	Benzene (4)
COMPONENT	COMPONENT	EXTRACT	RAFFINATE	FEED
TIE LINE 1	1	0.0054	0.6675	0.3365
	2	0.9405	0.0088	0.4756
	3	0.0004	0.0006	0.0005
	4	0.0536	0.3231	0.1884
TIE LINE 2	1	0.0136	0.4571	0.2353
	2	0.8029	0.0096	0.4062
	3	0.0004	0.0005	0.0005
	4	0.1831	0.5328	0.1451
TIE LINE 3	1	0.0176	0.7215	0.3695
	2	0.9518	0.0180	0.4849
	3	0.0004	0.0006	0.0005
	4	0.0302	0.2599	0.1451
TIE LINE 4	1	0.0204	0.5797	0.3000
	2	0.8026	0.0191	0.4108
	3	0.0004	0.0006	0.0005
	4	0.4007	0.4007	0.2886
TIE LINE 5	1	0.0217	0.5340	0.2779
	2	0.7627	0.0231	0.3929
	3	0.0004	0.0005	0.0005
	4	0.2151	0.4425	0.3288
TIE LINE 6	1	0.0012	0.7232	0.3622
	2	0.6653	0.0257	0.3455
	3	0.3207	0.0126	0.1666
	4	0.0128	0.2384	0.1256
TIE LINE 7	1	0.0011	0.3319	0.1665
	2	0.5708	0.0130	0.2919
	3	0.2750	0.0600	0.1405
	4	0.1531	0.6491	0.4011
TIE LINE 8	1	0.0011	0.5216	0.2614
	2	0.6380	0.0189	0.3284
	3	0.3074	0.0091	0.1583
	4	0.0535	0.4505	0.2520
TIE LINE 9	1	0.0011	0.6179	0.3095
	2	0.6519	0.0236	0.3378
	3	0.2915	0.0111	0.1625
	4	0.0330	0.3474	0.1902

COMPONENT	Octane (1) COMPONENT	Dmso (2) EXTRACT	Water (3) RAFFINATE	Benzene (4) FEED
TIE LINE 10	1	0.0011	0.4230	0.2120
	2	0.6050	0.0161	0.3105
	3	0.2915	0.0077	0.1496
	4	0.1025	0.5532	0.3278
TIE LINE 11	1	0.0005	0.4744	0.2374
	2	0.4735	0.0078	0.2406
	3	0.5134	0.0084	0.2609
	4	0.0126	0.5094	0.2610
TIE LINE 12	1	0.0003	0.3602	0.1802
	2	0.4685	0.0060	0.2373
	3	0.5080	0.0065	0.2573
	4	0.0232	0.6272	0.3252
TIE LINE 13	1	0.0003	0.1350	0.1069
	2	0.4498	0.0043	0.2270
	3	0.4874	0.0047	0.2461
	4	0.0625	0.7775	0.4200
TIE LINE 14	1	0.0002	0.1157	0.0579
	2	0.4590	0.0034	0.2312
	3	0.4976	0.0036	0.2506
	4	0.0432	0.8773	0.4603

CONVERGENCE OBTAINED AFTER 41 ITERATIONS
OPTIMUM VALUE OF F = 0.0250098
OPTIMUM VALUE OF VARIABLES

A (1 , 2) =	1565.829000	ITERATION CARRIED OUT Y
A (1 , 3) =	955.301100	ITERATION CARRIED OUT Y
A (1 , 4) =	158.911600	ITERATION CARRIED OUT Y
A (2 , 1) =	993.888300	ITERATION CARRIED OUT Y
A (2 , 3) =	-874.060400	ITERATION CARRIED OUT Y
A (2 , 4) =	-285.482500	ITERATION CARRIED OUT Y
A (3 , 1) =	40.522380	ITERATION CARRIED OUT Y
A (3 , 2) =	-505.920800	ITERATION CARRIED OUT Y
A (3 , 4) =	1307.964000	ITERATION CARRIED OUT Y
A (4 , 1) =	-783.153000	ITERATION CARRIED OUT Y
A (4 , 2) =	888.370800	ITERATION CARRIED OUT Y
A (4 , 3) =	906.026000	ITERATION CARRIED OUT Y

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 1	1	0.5400	0.0083	0.6675	0.6647
	2	0.9405	0.9404	0.0088	0.0089
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0536	0.0595	0.3231	0.3173
TIE LINE 2	1	0.0136	0.0164	0.4571	0.4543
	2	0.8029	0.7849	0.0096	0.0276
	3	0.0004	0.0010	0.0005	0.0000
	4	0.1831	0.1976	0.5328	0.5183
TIE LINE 3	1	0.0176	0.0071	0.7215	0.7320
	2	0.9518	0.9637	0.0180	0.0276
	3	0.0004	0.0010	0.0006	0.0000
	4	0.0302	0.0345	0.2599	0.5183
TIE LINE 4	1	0.0204	0.0142	0.5797	0.5544
	2	0.8026	0.8541	0.0191	0.0164
	3	0.0004	0.0010	0.0006	0.0000
	4	0.1766	0.1299	0.4007	0.4299
TIE LINE 5	1	0.0217	0.0220	0.5340	0.5132
	2	0.7627	0.7979	0.0231	0.0205
	3	0.0004	0.0010	0.0005	0.0000
	4	0.2151	0.1784	0.4425	0.4670
TIE LINE 6	1	0.0012	0.0188	0.7232	0.7149
	2	0.6653	0.6804	0.0257	0.0016
	3	0.3207	0.3288	0.0126	0.0001
	4	0.0128	0.0134	0.2384	0.2408
TIE LINE 7	1	0.0011	0.0100	0.3319	0.3203
	2	0.5708	0.5713	0.0130	0.0174
	3	0.2750	0.2829	0.0060	0.0006
	4	0.1531	0.1359	0.6491	0.6617
TIE LINE 8	1	0.0011	0.0129	0.5216	0.5146
	2	0.6380	0.6440	0.0189	0.0067
	3	0.3074	0.3133	0.0091	0.0002
	4	0.0535	0.0584	0.4505	0.4493

COMPONENT	COMPONENT NUMBER	EXTRACT EXPT	PHASE CALC	RAFFINATE EXPT	PHASE CALC
TIE LINE 9	1	0.0011	0.0151	0.6179	0.6104
	2	0.6519	0.6645	0.0236	0.0037
	3	0.3139	0.3214	0.0111	0.0001
	4	0.3300	0.0328	0.3474	0.3511
TIE LINE 10	1	0.0011	0.0116	0.4230	0.4182
	2	0.6050	0.6021	0.0161	0.0106
	3	0.2915	0.2950	0.0077	0.0000
	4	0.1025	0.0969	0.5094	0.5654
TIE LINE 11	1	0.0005	0.0141	0.4744	0.4723
	2	0.4735	0.4679	0.0078	0.0017
	3	0.5134	0.5087	0.0084	0.0004
	4	0.0126	0.0365	0.5094	0.4971
TIE LINE 12	1	0.0003	0.0094	0.3602	0.3599
	2	0.4685	0.4596	0.0060	0.0036
	3	0.5080	0.5016	0.0065	0.0004
	4	0.0232	0.0560	0.6272	0.6083
TIE LINE 13	1	0.0003	0.0051	0.2135	0.2157
	2	0.4498	0.4318	0.0043	0.0082
	3	0.4874	0.4747	0.0047	0.0017
	4	0.0625	0.0886	0.7775	0.7740
TIE LINE 14	1	0.0002	0.0024	0.1157	0.1177
	2	0.4590	0.4360	0.0034	0.0106
	3	0.4976	0.4831	0.0036	0.0001
	4	0.0432	0.1017	0.8773	0.8465

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 1	1	0.0029	-0.0029
	2	-0.0001	0.0001
	3	0.0006	-0.0006
	4	0.0059	-0.0059
TIE LINE 2	1	0.0028	-0.0028
	2	-0.0180	0.0180
	3	0.0005	-0.0005
	4	0.0145	-0.0145
TIE LINE 3	1	-0.0105	0.0105
	2	0.0119	-0.0119
	3	0.0006	-0.0006
	4	0.0043	-0.0145
TIE LINE 4	1	-0.0062	-0.0253
	2	0.0515	-0.0026
	3	0.0006	-0.0006
	4	-0.0467	0.0292
TIE LINE 5	1	0.0002	-0.0208
	2	0.0351	-0.0026
	3	0.0006	-0.0005
	4	-0.0366	0.0292
TIE LINE 6	1	0.0176	-0.0084
	2	0.0151	-0.0241
	3	0.0082	-0.0125
	4	0.0006	0.0024
TIE LINE 7	1	0.0089	-0.0116
	2	0.0004	0.0044
	3	0.0079	-0.0054
	4	-0.0172	0.0126
TIE LINE 8	1	0.0117	-0.0069
	2	0.0061	-0.0122
	3	0.0059	-0.0089
	4	0.0049	-0.0012

COMPONENT	COMPONENT NUMBER	X (extract) DEV	X (raffinate) DEV
TIE LINE 9	1	0.0140	-0.0075
	2	0.0126	-0.0199
	3	0.0074	-0.0110
	4	-0.0002	0.0037
TIE LINE 10	1	0.0106	-0.0049
	2	-0.0029	-0.0054
	3	0.0036	-0.0077
	4	-0.0056	0.0122
TIE LINE 11	1	0.0136	-0.0021
	2	-0.0056	-0.0061
	3	-0.0047	-0.0080
	4	0.0239	-0.0123
TIE LINE 12	1	0.0091	-0.0003
	2	-0.0090	-0.0025
	3	-0.0064	-0.0061
	4	0.0328	-0.0189
TIE LINE 13	1	0.0048	0.0022
	2	-0.0180	0.0040
	3	-0.0126	-0.0030
	4	0.0261	-0.0034
TIE LINE 14	1	0.0022	0.0021
	2	-0.0231	0.0072
	3	-0.0144	-0.0036
	4	0.0585	-0.0308

ABSOLUTE MEAN DEVIATION (MOLE %) IS 1.02741