Journal of the Serbian Chemical Society
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J. Serb. Chem. Soc. 75 (2) I–XI (2010)
JSCS–3960SM

Supplementary material

SUPPLEMENTARY MATERIAL (ELECTRONIC VERSION ONLY) TO

Derived thermodynamic properties of alcohol + cyclohexylamine mixtures

J. *Serb. Chem. Soc.* **75** (2) (2010) 283–293

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(Received 2 April, revised 19 August 2009)

Table I. Partial molar volumes, $\bar{V}_i$, partial excess molar volumes, $\bar{V}_i^E$, thermal expansion coefficients, α, excess thermal expansion coefficients, α^E, and isothermal coefficients of pressure excess molar enthalpy, $(\partial H^E/\partial P)_{T,x}$, for alcohol (1) + cyclohexylamine (2) binary mixtures at different temperatures (288.15 to 323.15) K and atmospheric pressure

x_1	α / 10^{-3} K^{-1}	α^E / 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ / J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ / cm^3·mol^{-1}	$\bar{V}_2$ / cm^3·mol^{-1}	$\bar{V}_1^E$ / cm^3·mol^{-1}	$\bar{V}_2^E$ / cm^3·mol^{-1}
1-Propanol (1) + cyclohexylamine (2)							
T = 288.15 K							
0.0000	1.041	0	0	70.303[b]	113.827	–4.1012[d]	0
0.0509	1.034	–5.77	0.0439	70.458	113.823	–3.9462	–0.0032
0.1017	1.029	–9.73	0.0265	70.610	113.811	–3.7939	–0.0160
0.1486	1.025	–11.89	–0.0338	70.784	113.786	–3.6201	–0.0411
0.1992	1.023	–12.85	–0.1351	71.006	113.739	–3.3985	–0.0880
0.3007	1.021	–11.51	–0.4031	71.541	113.558	–2.8633	–0.2691
0.4009	1.021	–7.78	–0.6734	72.148	113.227	–2.2563	–0.5999
0.4998	1.021	–3.75	–0.8650	72.766	112.718	–1.6382	–1.1090
0.6002	1.020	–1.48	–0.9235	73.350	112.002	–1.0543	–1.8250
0.7000	1.015	–1.7	–0.8197	73.830	111.108	–0.5740	–2.7183
0.7997	1.008	–3.89	–0.5725	74.170	110.093	–0.2345	–3.7336
0.8500	1.005	–4.95	–0.4137	74.282	109.566	–0.1224	–4.2603
0.8998	1.002	–5.23	–0.2526	74.355	109.059	–0.0496	–4.7673
0.9502	1.001	–3.91	–0.1054	74.394	108.585	–0.0107	–5.2419
1.0000	1.001	0	0	74.404	108.193[c]	0	–5.6334[e]
T = 293.15 K							
0.0000	1.047	0	0	70.576	114.423	–4.1970	0
0.0509	1.040	–5.23	0.0288	70.757	114.419	–4.0168	–0.0038
0.1017	1.035	–8.73	–0.0011	70.929	114.405	–3.8447	–0.0182

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TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
1-Propanol (1) + cyclohexylamine (2)							
T = 293.15 K							
0.1486	1.032	–10.53	–0.0709	71.117	114.378	–3.6560	–0.0454
0.1992	1.030	–11.17	–0.1803	71.352	114.328	–3.4218	–0.0950
0.3007	1.029	–9.42	–0.4582	71.902	114.142	–2.8709	–0.2812
0.4009	1.029	–5.51	–0.7315	72.515	113.808	–2.2579	–0.6151
0.4998	1.029	–1.5	–0.9211	73.134	113.299	–1.6397	–1.1242
0.6002	1.027	0.63	–0.9739	73.715	112.586	–1.0579	–1.8376
0.7000	1.022	0.16	–0.8619	74.194	111.695	–0.5791	–2.7281
0.7997	1.015	–2.4	–0.6041	74.534	110.678	–0.2390	–3.7456
0.8500	1.011	–3.72	–0.4390	74.648	110.145	–0.1257	–4.2779
0.8998	1.008	–4.32	–0.2708	74.722	109.628	–0.0515	–4.7950
0.9502	1.006	–3.40	–0.1152	74.762	109.137	–0.0113	–5.2865
1.0000	1.006	0	0	74.773	108.721	0	–5.7025
T = 298.15 K							
0.0000	1.052	0	0	70.295	115.026	–4.2873	0
0.0509	1.046	–4.70	0.0135	71.066	115.021	–4.0826	–0.0044
0.1017	1.041	–7.74	–0.0292	71.257	115.005	–3.8915	–0.0204
0.1486	1.039	–9.19	–0.1086	71.460	114.976	–3.6887	–0.0496
0.1992	1.037	–9.52	–0.2262	71.706	114.924	–3.4426	–0.1017
0.3007	1.036	–7.35	–0.5142	72.272	114.733	–2.8769	–0.2926
0.4009	1.036	–3.28	–0.7906	72.890	114.396	–2.2585	–0.6293
1-Propanol (1) + cyclohexylamine (2)							
T = 298.15 K							
0.4998	1.037	0.73	–0.9781	73.508	113.888	–1.6406	–1.1381
0.6002	1.034	2.71	–1.0252	74.087	113.177	–1.0611	–1.8485
0.7000	1.029	1.99	–0.9047	74.564	112.290	–0.5840	–2.7360
0.7997	1.021	–0.94	–0.6362	74.905	111.270	–0.2434	–3.7555
0.8500	1.017	–2.51	–0.4647	75.019	110.733	–0.1290	–4.2931
0.8998	1.014	–3.42	–0.2893	75.095	110.206	–0.0534	–4.8201
0.9502	1.011	–2.9	–0.1252	75.137	109.698	–0.0119	–5.3279
1.0000	1.011	0	0	74.582	109.258	0	–5.7679
T = 308.15 K							
0.0000	1.063	0	0	71.468	116.248	–4.4513	0
0.0509	1.058	–3.66	–0.0180	71.719	116.243	–4.2003	–0.0055
0.1017	1.054	–5.81	–0.0869	71.945	116.224	–3.9735	–0.0244
0.1486	1.052	–6.57	–0.1860	72.175	116.191	–3.7441	–0.0574
0.1992	1.051	–6.29	–0.3203	72.443	116.134	–3.4760	–0.1141
0.3007	1.051	–3.31	–0.6290	73.035	115.935	–2.8837	–0.3136
0.4009	1.052	1.1	–0.9118	73.662	115.594	–2.2567	–0.6547
0.4998	1.052	5.09	–1.0951	74.278	115.087	–1.6404	–1.1620
0.6002	1.049	6.79	–1.1303	74.852	114.383	–1.0665	–1.8656
0.7000	1.044	5.59	–0.9926	75.326	113.502	–0.5931	–2.7462
0.7997	1.035	1.94	–0.7022	75.667	112.480	–0.2517	–3.7686

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
1-Propanol (1) + cyclohexylamine (2)							
T = 308.15 K							
0.8500	1.031	–0.12	–0.5175	75.784	111.932	–0.1353	–4.3163
0.8998	1.026	–1.64	–0.3272	75.862	111.386	–0.0570	–4.8623
0.9502	1.023	–1.91	–0.1456	75.906	110.847	–0.0131	–5.4016
1.0000	1.022	0	0	75.919	110.361	0	–5.8876
T = 313.15 K							
0.0000	1.069	0	0	71.790	116.869	–4.5251	0
0.0509	1.064	–3.15	–0.0341	72.063	116.863	–4.2521	–0.0060
0.1017	1.061	–4.86	–0.1164	72.307	116.843	–4.0086	–0.0263
0.1486	1.059	–5.28	–0.2257	72.548	116.808	–3.7670	–0.0610
0.1992	1.058	–4.7	–0.3685	72.826	116.749	–3.4887	–0.1198
0.3007	1.058	–1.32	–0.6879	73.431	116.545	–2.8845	–0.3232
0.4009	1.059	3.25	–0.9739	74.061	116.202	–2.2542	–0.6660
0.4998	1.060	7.22	–1.1550	74.676	115.695	–1.6395	–1.1719
0.6002	1.057	8.78	–1.1841	75.247	114.995	–1.0686	–1.8718
0.7000	1.051	7.34	–1.0376	75.718	114.118	–0.5973	–2.7486
0.7997	1.042	3.35	–0.7359	76.059	113.094	–0.2557	–3.7720
0.8500	1.037	1.04	–0.5445	76.177	112.541	–0.1383	–4.3243
0.8998	1.032	–0.79	–0.3466	76.256	111.986	–0.0588	–4.8793
0.9502	1.029	–1.44	–0.1561	76.302	111.431	–0.0136	–5.4337
1.0000	1.027	0	0	76.315	110.927	0	–5.9419
1-Butanol (1) + cyclohexylamine (2)[a]							
T = 288.15 K							
0.0000	1.041	0	0	87.398	113.827	–3.7317	0
0.0499	1.030	–6.75	0.0930	87.553	113.823	–3.5771	–0.0035
0.1019	1.022	–10.8	0.0899	87.707	113.810	–3.4224	–0.0164
0.1499	1.017	–12.31	0.0217	87.871	113.787	–3.2591	–0.0400
0.1997	1.013	–12.25	–0.0930	88.064	113.745	–3.0652	–0.0814
0.2995	1.007	–9.39	–0.3822	88.529	113.588	–2.6007	–0.2382
0.4000	1.002	–5.25	–0.6546	89.076	113.291	–2.0534	–0.5354
0.4994	0.996	–2.02	–0.8266	89.647	112.822	–1.4830	–1.0043
0.6006	0.988	–0.59	–0.8621	90.193	112.152	–0.9366	–1.6744
0.6977	0.978	–1.1	–0.7602	90.626	111.350	–0.5032	–2.4768
0.7497	0.972	–1.63	–0.6585	90.807	110.879	–0.3231	–2.9480
0.7984	0.966	–2.39	–0.5410	90.938	110.430	–0.1919	–3.3968
0.8500	0.960	–2.76	–0.4008	91.037	109.968	–0.0931	–3.8585
0.8993	0.954	–2.77	–0.2608	91.095	109.565	–0.0350	–4.2611
0.9508	0.949	–1.74	–0.1193	91.123	109.218	–0.0063	–4.6085
1.0000	0.945	0	0	91.130	109.003	0	–4.8234
T = 293.15 K							
0.0000	1.047	0	0	87.715	114.423	–3.8425	0
0.0499	1.037	–5.86	0.0666	87.906	114.419	–3.6514	–0.0044
0.1019	1.029	–9.53	0.0532	88.088	114.404	–3.4692	–0.0195

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
1-Butanol (1) + cyclohexylamine (2)[a]							
T = 293.15 K							
0.1499	1.024	–10.99	–0.0152	88.270	114.378	–3.2878	–0.0457
0.1997	1.020	–11.04	–0.1253	88.476	114.333	–3.0809	–0.0897
0.2995	1.014	–8.51	–0.4034	88.954	114.172	–2.6034	–0.2507
0.4000	1.009	–4.49	–0.6725	89.504	113.874	–2.0533	–0.5493
0.4994	1.003	–1.08	–0.8500	90.073	113.406	–1.4845	–1.0169
0.6006	0.995	0.62	–0.8933	90.617	112.739	–0.9401	–1.6845
0.6977	0.984	0.16	–0.7925	91.050	111.937	–0.5073	–2.4858
0.7497	0.978	–0.49	–0.6871	91.231	111.465	–0.3269	–2.9580
0.7984	0.972	–1.48	–0.5630	91.362	111.014	–0.1950	–3.4092
0.8500	0.965	–2.18	–0.4139	91.462	110.548	–0.0952	–3.8756
0.8993	0.959	–2.53	–0.2653	91.521	110.138	–0.0361	–4.2851
0.9508	0.954	–1.75	–0.1178	91.551	109.781	–0.0066	–4.6427
1.0000	0.950	0	0	91.557	109.553	0	–4.8702
T = 298.15 K							
0.0000	1.052	0	0	88.050	115.026	–3.9406	0
0.0499	1.043	–4.99	0.0397	88.271	115.021	–3.7196	–0.0051
0.1019	1.036	–8.27	0.0158	88.476	115.004	–3.5141	–0.0221
0.1499	1.030	–9.68	–0.0528	88.674	114.975	–3.3167	–0.0506
0.1997	1.026	–9.85	–0.1582	88.893	114.929	–3.0977	–0.0972
0.2995	1.019	–7.65	–0.4249	89.384	114.763	–2.6067	–0.2625
0.4000	1.014	–3.75	–0.6906	89.938	114.463	–2.0527	–0.5630
0.4994	1.008	–0.18	–0.8738	90.506	113.996	–1.4848	–1.0298
0.6006	1.000	1.8	–0.9251	91.048	113.331	–0.9427	–1.6947
0.6977	0.990	1.4	–0.8255	91.479	112.532	–0.5111	–2.4937
0.7497	0.983	0.62	–0.7161	91.660	112.060	–0.3306	–2.9661
0.7984	0.977	–0.6	–0.5854	91.792	111.607	–0.1983	–3.4190
0.8500	0.970	–1.63	–0.4272	91.893	111.136	–0.0975	–3.8898
0.8993	0.964	–2.3	–0.2698	91.953	110.719	–0.0374	–4.3065
0.9508	0.958	–1.78	–0.1162	91.983	110.350	–0.0070	–4.6759
1.0000	0.954	0	0	91.990	110.106	0	–4.9194
T = 308.15 K							
0.0000	1.063	0	0	88.781	116.248	–4.0982	0
0.0499	1.056	–3.28	–0.0154	89.041	116.242	–3.8379	–0.0061
0.1019	1.049	–5.81	–0.0609	89.281	116.223	–3.5985	–0.0258
0.1499	1.044	–7.13	–0.1298	89.504	116.190	–3.3750	–0.0581
0.1997	1.039	–7.51	–0.2256	89.745	116.139	–3.1344	–0.1092
0.2995	1.032	–5.96	–0.4691	90.264	115.965	–2.6153	–0.2836
0.4000	1.026	–2.29	–0.7279	90.829	115.659	–2.0501	–0.5900
0.4994	1.020	1.62	–0.9227	91.397	115.192	–1.4822	–1.0565
0.6006	1.013	4.12	–0.9902	91.934	114.533	–0.9450	–1.7152
0.6977	1.002	3.84	–0.8930	92.361	113.742	–0.5177	–2.5065
0.7497	0.995	2.81	–0.7755	92.541	113.272	–0.3380	–2.9768

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
1-Butanol (1) + cyclohexylamine (2)[a]							
T = 308.15 K							
0.7984	0.988	1.14	–0.6313	92.674	112.817	–0.2052	–3.4312
0.8500	0.981	–0.53	–0.4545	92.776	112.339	–0.1030	–3.9094
0.8993	0.973	–1.85	–0.2790	92.838	111.907	–0.0407	–4.3418
0.9508	0.967	–1.83	–0.1129	92.871	111.509	–0.0080	–4.7396
1.0000	0.963	0	0	92.879	111.223	0	–5.0250
T = 313.15 K							
0.0000	1.069	0	0	89.178	116.869	–4.1578	0
0.0499	1.063	–2.44	–0.0437	89.448	116.863	–3.8879	–0.0063
0.1019	1.056	–4.61	–0.1002	89.698	116.842	–3.6379	–0.0269
0.1499	1.051	–5.87	–0.1693	89.931	116.809	–3.4044	–0.0606
0.1997	1.046	–6.37	–0.2602	90.182	116.755	–3.1543	–0.1138
0.2995	1.038	–5.13	–0.4918	90.715	116.576	–2.6206	–0.2930
0.4000	1.032	–1.57	–0.7469	91.288	116.266	–2.0480	–0.6031
0.4994	1.027	2.5	–0.9477	91.857	115.799	–1.4792	–1.0703
0.6006	1.019	5.27	–1.0236	92.391	115.144	–0.9448	–1.7255
0.6977	1.009	5.04	–0.9276	92.815	114.358	–0.5205	–2.5113
0.7497	1.002	3.9	–0.8060	92.994	113.890	–0.3417	–2.9793
0.7984	0.994	2	–0.6549	93.127	113.436	–0.2090	–3.4334
0.8500	0.986	0	–0.4685	93.230	112.954	–0.1061	–3.9149
0.8993	0.979	–1.63	–0.2837	93.293	112.514	–0.0426	–4.3556
0.9508	0.972	–1.84	–0.1113	93.327	112.099	–0.0086	–4.7701
1.0000	0.968	0	0	93.336	111.788	0	–5.0814
1-Pentanol (1) + cyclohexylamine (2)							
T = 288.15 K							
0.0000	1.041	0	0	104.434	113.827	–3.2902	0
0.0506	1.027	–7.79	0.1404	104.539	113.824	–3.1855	–0.0025
0.1001	1.015	–12.78	0.1912	104.644	113.815	–3.0809	–0.0111
0.1500	1.006	–15.45	0.1704	104.772	113.797	–2.9528	–0.0296
0.2002	0.998	–16.21	0.0921	104.929	113.763	–2.7959	–0.0631
0.2997	0.987	–13.82	–0.1696	105.326	113.629	–2.3984	–0.1980
0.3995	0.979	–8.61	–0.4705	105.819	113.361	–1.9054	–0.4659
0.5004	0.970	–3.65	–0.7025	106.360	112.915	–1.3643	–0.9116
0.6003	0.959	–1.1	–0.7812	106.870	112.289	–0.8543	–1.5380
0.6998	0.944	–1.57	–0.6790	107.288	111.513	–0.4370	–2.3131
0.7962	0.928	–3.99	–0.4365	107.562	110.705	–0.1631	–3.1216
0.8500	0.919	–5.21	–0.2727	107.653	110.283	–0.0719	–3.5437
0.8995	0.912	–5.44	–0.1321	107.701	109.952	–0.0239	–3.8751
0.9501	0.906	–4.04	–0.0280	107.721	109.707	–0.0034	–4.1196
1.0000	0.903	0	0	107.725	109.578	0	–4.2484
T = 293.15 K							
0.0000	1.047	0	0	104.799	114.423	–3.4079	0
0.0506	1.033	–7.03	0.1185	104.936	114.420	–3.2708	–0.0033

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
1-Pentanol (1) + cyclohexylamine (2)							
T = 293.15 K							
0.1001	1.022	–11.6	0.1575	105.067	114.409	–3.1401	–0.0140
0.1500	1.013	–14.09	0.1322	105.216	114.388	–2.9911	–0.0355
0.2002	1.005	–14.86	0.0550	105.389	114.351	–2.8181	–0.0724
0.2997	0.994	–12.82	–0.1946	105.806	114.210	–2.4011	–0.2136
0.3995	0.985	–8.14	–0.4799	106.305	113.938	–1.9016	–0.4849
0.5004	0.975	–3.55	–0.7012	106.845	113.494	–1.3619	–0.9292
0.6003	0.964	–1.05	–0.7792	107.351	112.873	–0.8562	–1.5502
0.6998	0.949	–1.26	–0.6855	107.765	112.104	–0.4423	–2.3192
0.7962	0.934	–3.31	–0.4550	108.039	111.296	–0.1685	–3.1276
0.8500	0.925	–4.39	–0.2957	108.131	110.867	–0.0760	–3.5559
0.8995	0.917	–4.64	–0.1551	108.181	110.524	–0.0264	–3.8994
0.9501	0.911	–3.48	–0.0442	108.203	110.258	–0.0042	–4.1650
1.0000	0.907	0	0	108.207	110.097	0	–4.3266
T = 298.15 K							
0.0000	1.052	0	0	105.180	115.026	–3.5162	0
0.0506	1.039	–6.29	0.0962	105.346	115.022	–3.3503	–0.0040
0.1001	1.028	–10.44	0.1231	105.500	115.009	–3.1964	–0.0166
0.1500	1.019	–12.75	0.0933	105.668	114.985	–3.0284	–0.0408
0.2002	1.012	–13.52	0.0172	105.856	114.945	–2.8405	–0.0809
0.2997	1.000	–11.85	–0.2200	106.291	114.798	–2.4052	–0.2280
0.3995	0.990	–7.68	–0.4895	106.797	114.523	–1.8990	–0.5026
0.5004	0.980	–3.46	–0.7000	107.336	114.079	–1.3600	–0.9463
0.6003	0.968	–1.01	–0.7772	107.838	113.463	–0.8579	–1.5629
0.6998	0.954	–0.96	–0.6922	108.249	112.699	–0.4468	–2.3266
0.7962	0.938	–2.63	–0.4738	108.523	111.891	–0.1732	–3.1349
0.8500	0.930	–3.58	–0.3190	108.617	111.457	–0.0796	–3.5685
0.8995	0.922	–3.85	–0.1785	108.668	111.103	–0.0285	–3.9225
0.9501	0.916	–2.92	–0.0608	108.691	110.819	–0.0048	–4.2066
1.0000	0.911	0	0	108.696	110.629	0	–4.3972
T = 308.15 K							
0.0000	1.063	0	0	105.994	116.248	–3.7048	0
0.0506	1.051	–4.84	0.0506	106.207	116.243	–3.4920	–0.0052
0.1001	1.041	–8.16	0.0527	106.399	116.228	–3.2998	–0.0209
0.1500	1.032	–10.11	0.0135	106.599	116.199	–3.0997	–0.0496
0.2002	1.025	–10.9	–0.0602	106.812	116.153	–2.8861	–0.0951
0.2997	1.012	–9.94	–0.2722	107.281	115.995	–2.4178	–0.2530
0.3995	1.001	–6.77	–0.5091	107.801	115.714	–1.8978	–0.5348
0.5004	0.990	–3.27	–0.6975	108.341	115.269	–1.3578	–0.9790
0.6003	0.978	–0.93	–0.7730	108.838	114.659	–0.8604	–1.5896
0.6998	0.964	–0.36	–0.7059	109.245	113.903	–0.4538	–2.3453
0.7962	0.948	–1.3	–0.5123	109.518	113.096	–0.1806	–3.1530
0.8500	0.940	–1.99	–0.3669	109.613	112.654	–0.0853	–3.5946

TABLE I. Continued

x_1	α / 10^{-3} K^{-1}	α^E / 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ / J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ / cm^3·mol^{-1}	$\bar{V}_2$ / cm^3·mol^{-1}	$\bar{V}_1^E$ / cm^3·mol^{-1}	$\bar{V}_2^E$ / cm^3·mol^{-1}
1-Pentanol (1) + cyclohexylamine (2)							
T = 308.15 K							
0.8995	0.932	–2.28	–0.2264	109.667	112.284	–0.0319	–3.9649
0.9501	0.925	–1.82	–0.0948	109.693	111.970	–0.0059	–4.2781
1.0000	0.919	0	0	109.699	111.733	0	–4.5155
T = 313.15 K							
0.0000	1.069	0	0	106.427	116.869	–3.7850	0
0.0506	1.058	–4.13	0.0272	106.657	116.864	–3.5543	–0.0056
0.1001	1.048	–7.04	0.0166	106.865	116.847	–3.3469	–0.0226
0.1500	1.039	–8.82	–0.0274	107.078	116.816	–3.1338	–0.0532
0.2002	1.032	–9.61	–0.0999	107.302	116.768	–2.9094	–0.1010
0.2997	1.018	–9	–0.2990	107.785	116.606	–2.4263	–0.2637
0.3995	1.006	–6.32	–0.5191	108.313	116.320	–1.8992	–0.5491
0.5004	0.995	–3.19	–0.6962	108.854	115.875	–1.3575	–0.9946
0.6003	0.983	–0.88	–0.7708	109.350	115.265	–0.8613	–1.6038
0.6998	0.969	–0.07	–0.7129	109.756	114.513	–0.4561	–2.3567
0.7962	0.954	–0.65	–0.5320	110.029	113.705	–0.1832	–3.1638
0.8500	0.945	–1.21	–0.3914	110.124	113.261	–0.0873	–3.6081
0.8995	0.937	–1.51	–0.2509	110.179	112.885	–0.0331	–3.9842
0.9501	0.929	–1.29	–0.1122	110.205	112.561	–0.0063	–4.3081
1.0000	0.923	0	0	110.212	112.306	0	–4.5631
2-Butanol (1) + cyclohexylamine (2)							
T = 288.15 K							
0.0000	1.041	0	0	88.673	113.827	–2.7586	0
0.0495	1.039	–2.31	–0.0177	88.773	113.823	–2.6582	–0.0034
0.1011	1.037	–3.88	–0.0625	88.921	113.811	–2.5102	–0.0156
0.1505	1.036	–4.6	–0.1253	89.076	113.789	–2.3551	–0.0380
0.1995	1.036	–4.68	–0.2013	89.244	113.753	–2.1871	–0.0738
0.3004	1.037	–3.34	–0.3765	89.631	113.622	–1.8003	–0.2042
0.3996	1.039	–1.12	–0.5335	90.046	113.398	–1.3858	–0.4290
0.4974	1.041	0.77	–0.6323	90.454	113.064	–0.9778	–0.7622
0.5997	1.042	1.8	–0.6446	90.838	112.597	–0.5937	–1.2298
0.7000	1.041	1.25	–0.5546	91.134	112.047	–0.2972	–1.7794
0.7999	1.039	–0.37	–0.3789	91.327	111.474	–0.1048	–2.3522
0.8488	1.038	–1.19	–0.2745	91.382	111.216	–0.0495	–2.6106
0.8997	1.038	–1.63	–0.1652	91.415	110.987	–0.0161	–2.8400
0.9498	1.038	–1.38	–0.0692	91.429	110.823	–0.0024	–3.0037
1.0000	1.039	0	0	91.431	110.718	0	–3.1081
T = 293.15 K							
0.0000	1.047	0	0	89.082	114.423	–2.8071	0
0.0495	1.044	–2.67	–0.0045	89.194	114.420	–2.6957	–0.0037
0.1011	1.042	–4.55	–0.0382	89.352	114.407	–2.5373	–0.0167
0.1505	1.041	–5.52	–0.0924	89.515	114.383	–2.3741	–0.0403
0.1995	1.041	–5.84	–0.1609	89.690	114.346	–2.1999	–0.0774

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ $J\cdot MPa^{-1}\cdot mol^{-1}$	$\bar{V}_1$ $cm^3\cdot mol^{-1}$	$\bar{V}_2$ $cm^3\cdot mol^{-1}$	$\bar{V}_1^E$ $cm^3\cdot mol^{-1}$	$\bar{V}_2^E$ $cm^3\cdot mol^{-1}$
2-Butanol (1) + cyclohexylamine (2)							
T = 293.15 K							
0.3004	1.041	–4.97	–0.3221	90.084	114.213	–1.8052	–0.2104
0.3996	1.043	–3.29	–0.4646	90.502	113.987	–1.3878	–0.4367
0.4974	1.044	–1.97	–0.5481	90.910	113.653	–0.9799	–0.7698
0.5997	1.044	–1.54	–0.5452	91.293	113.187	–0.5968	–1.2361
0.7000	1.043	–2.48	–0.4462	91.589	112.639	–0.3010	–1.7846
0.7999	1.041	–4	–0.2756	91.782	112.063	–0.1078	–2.3598
0.8488	1.040	–4.46	–0.1823	91.838	111.801	–0.0517	–2.6220
0.8997	1.040	–4.23	–0.0928	91.872	111.565	–0.0174	–2.8584
0.9498	1.041	–2.91	–0.0267	91.887	111.391	–0.0028	–3.0327
1.0000	1.044	0	0	91.890	111.269	0	–3.1539
T = 298.15 K							
0.0000	1.052	0	0	89.500	115.026	–2.8609	0
0.0495	1.049	–3.02	0.0090	89.624	115.022	–2.7375	–0.0040
0.1011	1.047	–5.21	–0.0136	89.793	115.008	–2.5678	–0.0179
0.1505	1.045	–6.43	–0.0589	89.965	114.983	–2.3961	–0.0427
0.1995	1.045	–6.98	–0.1199	90.146	114.945	–2.2155	–0.0812
0.3004	1.045	–6.59	–0.2667	90.548	114.809	–1.8128	–0.2168
0.3996	1.046	–5.42	–0.3946	90.969	114.581	–1.3926	–0.4445
0.4974	1.046	–4.68	–0.4624	91.376	114.248	–0.9847	–0.7775
0.5997	1.046	–4.83	–0.4441	91.759	113.783	–0.6026	–1.2427
0.7000	1.044	–6.16	–0.3359	92.054	113.234	–0.3067	–1.7913
0.7999	1.042	–7.58	–0.1706	92.249	112.654	–0.1121	–2.3713
0.8488	1.042	–7.69	–0.0886	92.306	112.386	–0.0547	–2.6394
0.8997	1.043	–6.78	–0.0192	92.342	112.140	–0.0190	–2.8855
0.9498	1.045	–4.43	0.0166	92.358	111.952	–0.0033	–3.0742
1.0000	1.049	0	0	92.361	111.809	0	–3.2167
T = 308.15 K							
0.0000	1.063	0	0	90.366	116.248	–2.9837	0
0.0495	1.059	–3.72	0.0367	90.516	116.244	–2.8332	–0.0048
0.1011	1.056	–6.51	0.0370	90.711	116.228	–2.6389	–0.0207
0.1505	1.054	–8.22	0.0097	90.901	116.200	–2.4489	–0.0481
0.1995	1.053	–9.22	–0.0356	91.095	116.159	–2.2546	–0.0894
0.3004	1.052	–9.74	–0.1530	91.514	116.018	–1.8357	–0.2302
0.3996	1.052	–9.57	–0.2509	91.939	115.788	–1.4105	–0.4605
0.4974	1.052	–9.95	–0.2867	92.347	115.455	–1.0030	–0.7931
0.5997	1.050	–11.24	–0.2367	92.728	114.991	–0.6219	–1.2570
0.7000	1.048	–13.32	–0.1098	93.025	114.440	–0.3244	–1.8089
0.7999	1.046	–14.55	0.0448	93.225	113.842	–0.1243	–2.4063
0.8488	1.047	–13.98	0.1038	93.286	113.556	–0.0632	–2.6921
0.8997	1.049	–11.78	0.1318	93.326	113.282	–0.0235	–2.9660
0.9498	1.053	–7.39	0.1054	93.345	113.054	–0.0046	–3.1942
1.0000	1.060	0	0	93.350	112.855	0	–3.3935

TABLE I. Continued

x_1	α 10^{-3} K^{-1}	α^E 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ cm^3·mol^{-1}	$\bar{V}_2$ cm^3·mol^{-1}	$\bar{V}_1^E$ cm^3·mol^{-1}	$\bar{V}_2^E$ cm^3·mol^{-1}
2-Butanol (1) + cyclohexylamine (2)							
T = 313.15 K							
0.0000	1.069	0	0	90.817	116.869	–3.0529	0
0.0495	1.065	–4.06	0.0508	90.982	116.864	–2.8873	–0.0052
0.1011	1.062	–7.14	0.0629	91.190	116.847	–2.6795	–0.0221
0.1505	1.060	–9.09	0.0449	91.390	116.818	–2.4797	–0.0510
0.1995	1.058	–10.31	0.0075	91.591	116.775	–2.2782	–0.0938
0.3004	1.057	–11.27	–0.0948	92.019	116.632	–1.8510	–0.2372
0.3996	1.056	–11.58	–0.1773	92.446	116.400	–1.4235	–0.4687
0.4974	1.055	–12.5	–0.1966	92.853	116.068	–1.0163	–0.8011
0.5997	1.053	–14.35	–0.1304	93.234	115.604	–0.6355	–1.2648
0.7000	1.050	–16.8	0.0061	93.533	115.049	–0.3364	–1.8199
0.7999	1.049	–17.94	0.1551	93.737	114.439	–0.1322	–2.4298
0.8488	1.050	–17.04	0.2023	93.801	114.142	–0.0686	–2.7274
0.8997	1.052	–14.2	0.2092	93.843	113.850	–0.0264	–3.0194
0.9498	1.057	–8.83	0.1508	93.864	113.596	–0.0055	–3.2728
1.0000	1.066	0	0	93.870	113.362	0	–3.5075
2-Methyl-2-propanol (1) + cyclohexylamine (2)							
T = 308.15 K							
0.0000	1.063	0	0	92.833	116.248	–3.4054	0
0.0508	1.068	–8.5	0.1874	92.939	116.244	–3.3006	–0.0050
0.1002	1.074	–16.19	0.3500	93.142	116.227	–3.0978	–0.0217
0.1502	1.081	–23.51	0.5020	93.364	116.195	–2.8758	–0.0536
0.2001	1.088	–30.53	0.6477	93.596	116.145	–2.6437	–0.1030
0.3005	1.105	–43.97	0.9423	94.074	115.985	–2.1654	–0.2637
0.3991	1.122	–56.84	1.2505	94.534	115.736	–1.7051	–0.5123
0.4996	1.141	–69.35	1.5772	94.974	115.377	–1.2659	–0.8719
0.5998	1.164	–79.42	1.8698	95.368	114.893	–0.8714	–1.3551
0.6997	1.194	–84.09	2.0368	95.708	114.261	–0.5320	–1.9872
0.7999	1.235	–78.08	1.9322	95.981	113.437	–0.2585	–2.8114
0.8712	1.277	–62.86	1.5790	96.125	112.704	–0.1149	–3.5445
0.8992	1.296	–53.77	1.3533	96.167	112.376	–0.0724	–3.8723
0.9504	1.339	–30.83	0.7831	96.221	111.710	–0.0185	–4.5385
1.0000	1.389	0	0	96.239	111.019	0	–5.2294
T = 313.15 K							
0.0000	1.069	0	0	93.386	116.869	–3.5203	0
0.0508	1.075	–7.99	0.1727	93.499	116.864	–3.4088	–0.0052
0.1002	1.082	–15.39	0.3290	93.708	116.847	–3.1991	–0.0225
0.1502	1.089	–22.61	0.4814	93.936	116.814	–2.9717	–0.0551
0.2001	1.096	–29.68	0.6325	94.172	116.764	–2.7355	–0.1054
0.3005	1.112	–43.48	0.9463	94.656	116.601	–2.2512	–0.2681
0.3991	1.129	–56.7	1.2727	95.122	116.349	–1.7854	–0.5197
0.4996	1.149	–69.25	1.6055	95.569	115.983	–1.3381	–0.8860
0.5998	1.173	–78.78	1.8853	95.976	115.485	–0.9314	–1.3844

TABLE I. Continued

x_1	α / 10^{-3} K^{-1}	α^E / 10^{-6} K^{-1}	$(\partial H^E/\partial p)_{T,x}$ / J·MPa^{-1}·mol^{-1}	$\bar{V}_1$ / cm^3·mol^{-1}	$\bar{V}_2$ / cm^3·mol^{-1}	$\bar{V}_1^E$ / cm^3·mol^{-1}	$\bar{V}_2^E$ / cm^3·mol^{-1}
2-Methyl-2-propanol (1) + cyclohexylamine (2)							
T = 313.15 K							
0.6997	1.204	–82.44	2.0224	96.332	114.822	–0.5757	–2.0474
0.7999	1.247	–75.4	1.8839	96.624	113.940	–0.2834	–2.9293
0.8712	1.289	–59.98	1.5188	96.780	113.142	–0.1270	–3.7275
0.8992	1.309	–51.07	1.2948	96.827	112.781	–0.0804	–4.0879
0.9504	1.350	–29.01	0.7420	96.887	112.043	–0.0207	–4.8261
1.0000	1.399	0	0	96.907	111.266	0	–5.6027
T = 318.15 K							
0.0000	1.075	0	0	93.966	117.497	–3.6291	0
0.0508	1.081	–7.48	0.1578	94.082	117.492	–3.5137	–0.0054
0.1002	1.088	–14.6	0.3077	94.297	117.474	–3.2992	–0.0230
0.1502	1.095	–21.72	0.4604	94.528	117.441	–3.0681	–0.0562
0.2001	1.103	–28.85	0.6170	94.767	117.390	–2.8290	–0.1071
0.3005	1.119	–43	0.9504	95.256	117.225	–2.3395	–0.2715
0.3991	1.137	–56.57	1.2953	95.729	116.970	–1.8674	–0.5266
0.4996	1.157	–69.12	1.6343	96.186	116.596	–1.4105	–0.9009
0.5998	1.182	–78.13	1.9011	96.606	116.081	–0.9903	–1.4161
0.6997	1.214	–80.78	2.0078	96.979	115.386	–0.6175	–2.1114
0.7999	1.259	–72.74	1.8349	97.290	114.447	–0.3065	–3.0501
0.8712	1.301	–57.12	1.4576	97.458	113.587	–0.1382	–3.9098
0.8992	1.321	–48.39	1.2353	97.508	113.196	–0.0876	–4.3005
0.9504	1.362	–27.22	0.7002	97.573	112.393	–0.0226	–5.1044
1.0000	1.409	0	0	97.595	111.539	0	–5.9579
T = 323.15 K							
0.0000	1.081	0	0	94.572	118.130	–3.7317	0
0.0508	1.087	–6.98	0.1426	94.689	118.125	–3.6153	–0.0054
0.1002	1.095	–13.83	0.2861	94.906	118.107	–3.3982	–0.0233
0.1502	1.103	–20.85	0.4391	95.139	118.074	–3.1651	–0.0568
0.2001	1.110	–28.02	0.6013	95.380	118.022	–2.9242	–0.1081
0.3005	1.127	–42.52	0.9545	95.874	117.856	–2.4302	–0.2740
0.3991	1.144	–56.42	1.3182	96.353	117.597	–1.9511	–0.5329
0.4996	1.165	–68.99	1.6636	96.821	117.214	–1.4832	–0.9164
0.5998	1.191	–77.47	1.9171	97.256	116.680	–1.0479	–1.4502
0.6997	1.225	–79.14	1.9930	97.647	115.951	–0.6573	–2.1791
0.7999	1.271	–70.12	1.7851	97.976	114.957	–0.3280	–3.1736
0.8712	1.314	–54.31	1.3955	98.156	114.039	–0.1483	–4.0915
0.8992	1.333	–45.77	1.1749	98.210	113.620	–0.0941	–4.5100
0.9504	1.374	–25.46	0.6578	98.280	112.757	–0.0243	–5.3735
1.0000	1.419	0	0	98.304	111.835	0	–6.2949

[a]Calculations for system 1-butanol + cyclohexylamine are based on literature experimental data[3]; [b]partial molar volume at infinite dilution $\bar{V}_1^{\infty}$ at x_1 = 0; [c]partial molar volume at infinite dilution $\bar{V}_2^{\infty}$ at x_1 = 1; [d]partial excess molar volume at infinite dilution $\bar{V}_1^{E,\infty}$ at x_1 = 0; [e]partial excess molar volume at infinite dilution $\bar{V}_2^{E,\infty}$ at x_1 = 1

TABLE II. Molar volumes, V_1° and V_2°, partial molar volumes at infinite dilution, $\bar{V}_1^\infty$ and $\bar{V}_2^\infty$, and partial excess molar volumes at infinite dilution, $\bar{V}_1^{E,\infty}$ and $\bar{V}_2^{E,\infty}$

T / K	V_1° cm^3·mol^{-1}	V_2° cm^3·mol^{-1}	$\bar{V}_1^\infty$ cm^3·mol^{-1}	$\bar{V}_2^\infty$ cm^3·mol^{-1}	$\bar{V}_1^{E,\infty}$ cm^3·mol^{-1}	$\bar{V}_2^{E,\infty}$ cm^3·mol^{-1}
1-Propanol (1) + cyclohexylamine (2)						
288.15	74.404	113.827	70.388	107.992	–4.0167	–5.8346
293.15	74.773	114.423	70.662	108.534	–4.1111	–5.8894
298.15	75.148	115.026	70.946	109.083	–4.2023	–5.9428
303.15	75.530	115.634	71.241	109.638	–4.2896	–5.9959
308.15	75.919	116.248	71.555	110.206	–4.3637	–6.0421
313.15	76.315	116.869	71.886	110.800	–4.4289	–6.0689
1-Butanol(1) + cyclohexylamine (2)						
288.15	91.130	113.827	87.493	108.706	–3.6363	–5.1205
293.15	91.557	114.423	87.820	109.244	–3.7373	–5.1794
298.15	91.990	115.026	88.166	109.811	–3.8246	–5.2152
303.15	92.431	115.634	88.519	110.380	–3.9118	–5.2538
308.15	92.879	116.248	88.890	110.959	–3.9889	–5.2896
313.15	93.336	116.869	89.281	111.544	–4.0544	–5.3251
1-Pentanol (1) + cyclohexylamine (2)						
288.15	107.7247	113.827	104.588	109.374	–3.1369	–4.4529
293.15	108.2070	114.423	104.961	109.918	–3.2460	–4.5056
298.15	108.6963	115.026	105.338	110.466	–3.3586	–4.5601
303.15	109.1931	115.634	105.730	111.024	–3.4627	–4.6106
308.15	109.6986	116.248	106.145	111.589	–3.5537	–4.6595
313.15	110.2117	116.869	106.576	112.182	–3.6354	–4.6873
2-Butanol (1) + cyclohexylamine (2)						
288.15	91.431	113.827	88.651	110.572	–2.7800	–3.2544
293.15	91.890	114.423	89.067	111.125	–2.8223	–3.2985
298.15	92.361	115.026	89.471	111.672	–2.8903	–3.3541
303.15	92.847	115.634	89.889	112.209	–2.9587	–3.4249
308.15	93.350	116.248	90.327	112.736	–3.0222	–3.5120
313.15	93.870	116.869	90.786	113.252	–3.0831	–3.6169
2-Methyl-2-propanol (1) + cyclohexylamine (2)						
303.15	95.591	115.634	92.137	110.729	–3.4535	–4.9046
308.15	96.239	116.248	92.663	110.969	–3.5752	–5.2791
313.15	96.907	116.869	93.215	111.220	–3.6922	–5.6494
318.15	97.595	117.497	93.790	111.494	–3.8057	–6.0032
323.15	98.304	118.130	94.395	111.795	–3.9089	–6.3352