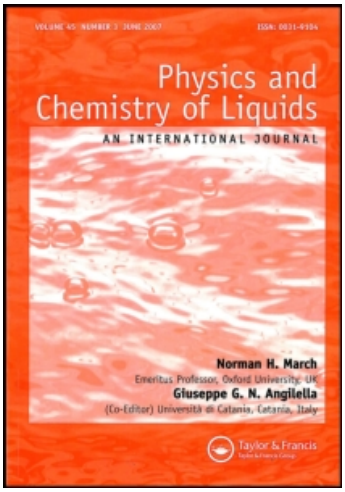

Physics and Chemistry of Liquids
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713646857

Influence of temperature on thermodynamics of ethanol + hydrocarbon gasoline additives

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Online publication date: 03 June 2010

To cite this Article Gonzalez-Olmos, R. , Iglesias, M. and Mattedi, S.(2010) 'Influence of temperature on thermodynamics of ethanol + hydrocarbon gasoline additives', Physics and Chemistry of Liquids, 48: 3, 337 — 384
To link to this Article: DOI: 10.1080/00319100902894223
URL: http://dx.doi.org/10.1080/00319100902894223

Physics and Chemistry of Liquids
Vol. 48, No. 3, June 2010, 337–384

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Influence of temperature on thermodynamics of ethanol + hydrocarbon gasoline additives

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(*Received 1 October 2008; final version received 14 March 2009*)

The densities and ultrasonic velocity of the binary mixtures ethanol + (benzene, toluene, ethylbenzene, isooctane, tert-butyl alcohol and xylene isomers) at the range 288.15–323.15 K and atmospheric pressure, have been measured over the whole concentration range. The experimental excess volumes and deviation of isentropic compressibilities data have been correlated with a Redlich–Kister type polynomial accurately. The gathered data improve open literature related to gasoline additives, as the comparison has proved, and help to understand the ethanol volumetric and acoustic trend into different chemical environment.

Keywords: densities; isentropic compressibilities; model; ethanol; temperature; ultrasonic velocities

1. Introduction

Oxygenated compounds are added to gasoline in order to improve fuel combustion efficiency and to lower exhaust emissions of CO and hydrocarbons. Examples of these compounds are alcohols (as methanol, ethanol, isopropyl alcohol, isobutyl alcohol and tert-butyl alcohol (TBA)) and ethers (as methyl tert-butyl ether (MTBE), ethyl tert-butyl ether (ETBE), tert-amyl methyl ether (TAME) and diisopropyl ether (DIPE)). Ethanol is largely used in Brazil as fuel additive to gasoline and also as alternative mixed fuel in flex motors (which works with mixtures of ethanol and gasoline in any composition). Moreover, ethanol is also used as a important commodity to regulate internal prices of fuels [1]. Gasoline compounds include several substances such as aromatic compounds as benzene, toluene, ethylbenzene and xylenes (BTEX). These compounds are ubiquitous environmental pollutants, some of which are well known to exhibit carcinogenic/mutagenic characteristics. However, when a gasoline spill occurs, one of the major concerns is the contamination of water supply for human consumption. Ethanol enhances the water solubility of some typical pollutants in gasoline spills. Primary alcohols

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ISSN 0031–9104 print/ISSN 1029–0451 online

DOI: 10.1080/00319100902894223
http://www.informaworld.com

(ethanol and methanol) are highly soluble in water and BTEX are soluble in these compounds. Ethanol is a cosolvent that has a salting-in effect for BTEX in water. When the ethanol + gasoline mixture contacts water, ethanol solubilises in water enhancing BTEX solubility. Moreover, ethanol is completely soluble in water and its concentration is superior than BTEX compounds in ground waters contaminated by ethanol + gasoline mixtures. Highly soluble compounds have a lower sorption power, and ethanol would have a higher mobility than BTEX in ground waters. When ethanol is present in high concentration, BTEX compounds can move more quickly, and also results that BTEX move to a greater distance [2,3]. So ethanol enhances the mobility of BTEX dissolved in ground water difficulting BTEX natural biodegradation and then BTEX has a higher persistence in water when ethanol is present. On the other hand, cleaning water processes are closely related on physical magnitudes of mixtures and their temperature and pressure dependence. In addition, knowledge of thermodynamic properties of fuel oxygenates as ethanol with the different compounds enclosed in a typical gasoline is of practical interest to the petrochemical industry. Moreover, this information is useful to develop removing units of spilled gasoline + ethanol in groundwater.

In accordance to that, in the last few years, a considerable effort has been developed in the field of thermodynamic properties although a great scarce of data is observed in open literature for mixtures enclosed into usual commercial gasoline. Such properties are strongly dependent of hydrogen-bond potency of hydroxyl groups, chain length, isomeric structures, and molecular package. As a part of an extensive study related to theoretical and experimental analysis of mixtures containing oxygenated and gasoline compounds [4–7], we present in this article the temperature dependence of the density and ultrasonic velocity of the binary mixtures of ethanol + (benzene, toluene, ethylbenzene, isooctane, TBA and xylene isomers) at the range 288.15–323.15 K and atmospheric pressure, as a function of molar fraction. From the experimental values, the corresponding derived properties (excess molar volumes and change of isentropic compressibilities) were fitted with a temperature dependent Redlich–Kister [8] type polynomial.

Open literature of recent published data present works on densities for mixtures ethanol + benzene [9] and ethanol + toluene [10]. Data obtained in this work are in good agreement with the works published previously. However, a systematic study for volumetric and acoustic properties for mixtures of ethanol + (benzene, toluene, ethylbenzene, isooctane, TBA and xylene isomers), as presented here, were not published yet. Finally the models, Collision Factor Theory (CFT) [11,12] and Free Length Theory (FLT) [11,13] were applied to predict deviations in the isentropic compressibilities of binary mixtures.

2. Experimental

All chemical solvents used in the preparation of samples were of Merck quality with richness better than 99.5%. The pure components were stored in sun light protected form and constant humidity and temperature. In order to reduce fraction molar errors, the vapour space into the vessels was minimised during samples preparation. Each vial was weighted with a precision $\pm 2 \times 10^{-5}$ g device (GRAM-VXI Serie Analytical Balance), the whole composition range of the binary mixtures being

Table 1. Physical properties of pure compounds: densities (ρ) and ultrasonic velocity (u) at 298.15 K.

	ρ (g cm^{-3})		u (m s^{-1})	
Component	Exptl.	Lit.	Exptl.	Lit.
Ethanol	0.785082	0.785085[16]	1142.40	1143.1[16]
Benzene	0.873520	0.87356 [17]	1298.27	1299 [18]
Toluene	0.862173	0.86214 [17]	1303.44	1304 [18]
Ethylbenzene	0.862459	0.86244 [17]	1318.36	1318 [18]
Isooctane	0.687749	0.68762 [19]	1082.20	1083 [20]
Tert-Butyl-Alcohol	0.775212	0.77572 [21]	1099.02	1104.8[22]
p-Xylene	0.856675	0.85658 [17]	1305.39	1308 [18]
m-Xylene	0.859890	0.85983 [17]	1320.92	1320 [18]
o-Xylene	0.874968	0.87573 [17]	1341.51	1348 [18]

covered. The accuracy in molar fractions was obtained as higher than $\pm 5 \times 10^{-4}$. The ultrasonic velocities and densities were measured with an Anton Paar DSA-5000 device. The uncertainty in the measurements was estimated in $\pm 0.1\,\mathrm{m\,s^{-1}}$ for ultrasonic velocity and $\pm 2 \times 10^{-6}\,\mathrm{g\,cm^{-3}}$ for density [14]. Calibration of the apparatus was performed periodically, in accordance with technical specifications, using Millipore quality water (resistivity, 18.2 MΩ cm) and ambient air. More details about techniques and procedure in our laboratory could be obtained from previously published works [11,15]. The values for the pure compounds, as well as open literature data are enclosed into Table 1.

3. Data procedure

3.1. *Correlation of derived magnitudes*

The experimental measurements of density and ultrasonic velocity and the corresponding derived properties are presented in Table 2 (to see the whole table with all temperatures see Appendix Table A1). The derived properties were computed from the Equation (1):

$$\delta Q = Q - \sum_{i=1}^{N} x_i Q_i. \tag{1}$$

In this equation, δQ means the variation of a magnitude Q (V^{E}, excess molar volumes and $\delta\kappa_{\mathrm{S}}$, changes of isentropic compressibilities calculated by the Laplace–Newton from density and ultrasonic velocity), Q_i is the pure solvent magnitude (mixing molar volume or mixing isentropic compressibility), x_i is the mole fraction and N is the number of components into the mixtures.

A Redlich–Kister equation type [8] was used to correlate the derived properties of the binary mixtures, by the unweighted least squares method, all experimental points weighting equally:

$$\delta Q_{ij} = x_i \cdot x_j \cdot \sum_{p=0}^{m} \mathrm{B}_p \cdot \left(x_i - x_j\right)^p, \tag{2}$$

Table 2. Densities, ultrasonic velocities, deviation of isentropic compressibilities and excess volumes for ethanol + (benzene, toluene, ethylbenzene, isooctane, tert butyl alcohol, *p*-xylene, *o*-xylene and *m*-xylene) in the range of (288.15–323.15) K.

x	ρ ($g\,cm^{-3}$)	u ($m\cdot s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u ($m\,s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u (ms^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)
Ethanol + Benzene												
	288.15 K				298.15 K				323.15 K			
0.000	0.884183	1345.47	0.000	0.000	0.873520	1298.27	0.000	0.000	0.846641	1184.63	0.000	0.000
0.083	0.878479	1323.10	1.906	0.061	0.867812	1277.50	2.250	0.075	0.840710	1168.05	3.118	0.135
0.102	0.877222	1319.41	1.062	0.065	0.866568	1274.09	1.392	0.081	0.839470	1164.84	3.006	0.148
0.189	0.871421	1304.75	−4.356	0.071	0.860856	1259.99	−3.542	0.092	0.833869	1151.65	0.972	0.180
0.321	0.862162	1286.57	−15.248	0.053	0.851790	1242.84	−14.374	0.075	0.825172	1136.50	−8.000	0.175
0.397	0.856505	1276.70	−21.395	0.029	0.846266	1233.82	−20.863	0.051	0.819934	1129.38	−14.971	0.152
0.489	0.849012	1264.48	−27.230	0.017	0.838968	1222.60	−27.014	0.036	0.813095	1119.71	−20.234	0.130
0.615	0.838210	1247.76	−33.256	−0.030	0.828460	1207.47	−33.750	−0.015	0.803302	1107.72	−27.542	0.064
0.691	0.830955	1236.73	−34.355	−0.051	0.821408	1197.16	−34.786	−0.039	0.796757	1099.70	−29.046	0.028
0.799	0.819746	1219.70	−31.878	−0.079	0.810509	1182.01	−33.212	−0.072	0.786670	1088.27	−28.755	−0.025
0.888	0.808927	1202.80	−22.800	−0.055	0.799988	1166.45	−24.087	−0.052	0.776953	1076.80	−21.185	−0.025
0.932	0.803252	1193.96	−16.444	−0.042	0.794463	1158.42	−17.847	−0.041	0.771849	1070.90	−15.799	−0.025
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000
Ethanol + Toluene												
	288.15 K				298.15 K				323.15 K			
0.000	0.871457	1347.50	0.000	0.000	0.862173	1303.44	0.000	0.000	0.838706	1196.60	0.000	0.000
0.053	0.868844	1334.51	−0.273	0.037	0.859452	1292.48	−1.601	0.053	0.835650	1190.98	−6.666	0.105
0.107	0.866415	1324.66	−3.766	0.030	0.856985	1282.73	−4.790	0.053	0.833006	1181.66	−8.690	0.132
0.211	0.861488	1311.60	−15.733	0.000	0.852033	1269.13	−15.962	0.029	0.827892	1167.75	−17.666	0.135
0.321	0.855793	1298.23	−27.693	−0.041	0.846347	1256.29	−28.291	−0.008	0.822121	1154.87	−28.324	0.114
0.399	0.851264	1288.05	−34.565	−0.062	0.841836	1246.48	−35.273	−0.029	0.817655	1146.46	−35.976	0.093
0.502	0.844764	1274.96	−42.976	−0.103	0.835393	1234.29	−44.339	−0.071	0.811321	1135.41	−44.924	0.045
0.592	0.838266	1262.45	−47.628	−0.124	0.828978	1222.34	−49.071	−0.096	0.805072	1125.16	−49.983	0.010
0.708	0.828671	1244.47	−49.019	−0.145	0.819511	1205.53	−50.781	−0.123	0.795937	1110.80	−51.693	−0.037
0.801	0.819505	1227.86	−44.468	−0.131	0.810497	1189.43	−45.428	−0.115	0.787316	1097.49	−46.400	−0.053
0.904	0.807469	1205.00	−29.565	−0.094	0.798668	1168.71	−31.149	−0.086	0.776032	1080.20	−31.145	−0.052
0.948	0.801575	1193.33	−18.699	−0.069	0.792885	1157.83	−20.040	−0.065	0.770553	1071.41	−19.827	−0.046
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000

(*Continued*)

Table 2. Continued.

x	ρ ($g\,cm^{-3}$)	u ($m\cdot s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u ($m\,s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u (ms^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)
Ethanol + Ethylbenzene												
	288.15 K				298.15 K				323.15 K			
0.000	0.871245	1360.73	0.000	0.000	0.862459	1318.36	0.000	0.000	0.840306	1205.79	−1.422	0.103
0.050	0.869062	1348.00	−1.044	0.040	0.860180	1305.64	−0.512	0.055	0.837722	1198.81	−11.033	0.212
0.112	0.866236	1339.32	−8.588	0.083	0.857275	1296.98	−8.121	0.110	0.834455	1188.00	−22.932	0.249
0.198	0.862318	1329.48	−21.007	0.097	0.853315	1287.86	−21.650	0.130	0.830348	1171.93	−41.449	0.209
0.333	0.855973	1313.13	−38.614	0.044	0.846937	1271.85	−39.987	0.079	0.823811	1161.56	−51.210	0.170
0.417	0.851492	1301.36	−47.048	0.003	0.842457	1260.89	−49.330	0.037	0.819248	1150.96	−61.675	0.118
0.509	0.845887	1288.68	−55.297	−0.033	0.836870	1248.78	−58.162	−0.002	0.813708	1139.23	−68.954	0.021
0.601	0.839953	1275.72	−62.202	−0.113	0.830960	1235.69	−64.661	−0.086	0.807819	1126.31	−76.538	−0.041
0.713	0.830892	1259.44	−67.218	−0.154	0.821952	1221.34	−71.622	−0.132	0.798891	1112.00	−72.338	−0.056
0.803	0.821619	1239.71	−60.161	−0.137	0.812764	1203.42	−65.560	−0.122	0.789946	1092.00	−53.520	−0.057
0.897	0.809910	1216.44	−45.008	−0.100	0.801185	1180.69	−48.968	−0.093	0.778718	1076.90	−32.037	−0.046
0.952	0.801860	1197.61	−25.816	−0.065	0.793222	1162.79	−28.902	−0.062	0.771030	1059.32	0.000	0.000
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1205.79	−1.422	0.103
Ethanol + Isooctane												
	288.15 K				298.15 K				323.15 K			
0.000	0.695948	1124.31	0.000	0.000	0.687749	1082.20	0.000	0.000	0.666832	979.25	0.000	0.000
0.053	0.697898	1123.96	9.646	−0.010	0.689510	1080.69	14.425	0.031	0.667911	976.40	27.689	0.196
0.108	0.699527	1120.89	25.764	0.098	0.691113	1077.77	32.908	0.144	0.669485	974.21	52.894	0.310
0.191	0.702166	1118.02	46.120	0.268	0.693721	1075.66	55.034	0.319	0.671898	971.82	87.694	0.521
0.296	0.706921	1118.00	62.347	0.312	0.698423	1075.85	74.029	0.366	0.676397	972.35	117.015	0.584
0.398	0.712526	1119.12	74.577	0.336	0.703952	1076.95	89.077	0.395	0.681832	974.90	137.134	0.603
0.504	0.720288	1121.13	82.481	0.225	0.711707	1079.71	97.483	0.272	0.689486	978.83	149.460	0.456
0.623	0.730923	1125.53	85.025	0.139	0.722326	1084.86	100.137	0.176	0.699782	986.42	151.503	0.363
0.701	0.739308	1129.78	82.633	0.116	0.730712	1090.07	96.399	0.145	0.708091	993.96	143.443	0.312
0.805	0.753138	1138.93	70.194	0.087	0.744534	1100.61	81.079	0.106	0.722207	1007.46	119.387	0.200
0.907	0.771213	1154.51	42.605	0.044	0.762645	1118.02	48.357	0.052	0.740572	1029.56	69.429	0.088
0.950	0.780803	1163.26	26.027	0.017	0.772241	1127.63	29.137	0.020	0.750233	1041.43	41.529	0.039
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000

(*Continued*)

Table 2. Continued.

x	ρ ($g\,cm^{-3}$)	u ($m\cdot s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u ($m\,s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u (ms^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)
Ethanol + tert-Butyl alcohol												
	300.65 K				310.65 K				323.15 K			
0.000	0.777762	1108.98	0.000	0.000	0.767391	1067.22	0.000	0.000	0.753891	1014.76	0.000	0.000
0.053	0.778529	1116.12	−11.598	−0.071	0.768242	1072.40	−8.198	−0.077	0.754973	1020.75	−10.525	−0.099
0.137	0.779356	1121.81	−18.742	−0.131	0.769508	1080.52	−20.490	−0.179	0.756621	1030.14	−26.184	−0.235
0.201	0.779873	1125.06	−21.948	−0.160	0.770269	1085.10	−25.987	−0.227	0.757676	1035.65	−33.361	−0.304
0.294	0.780435	1127.69	−22.593	−0.175	0.771132	1089.30	−28.572	−0.261	0.758923	1041.44	−37.884	−0.361
0.395	0.780863	1128.86	−19.979	−0.168	0.771834	1091.90	−26.964	−0.264	0.759988	1045.96	−37.882	−0.378
0.505	0.781046	1129.17	−15.019	−0.127	0.772217	1093.42	−21.991	−0.220	0.760711	1048.95	−32.551	−0.337
0.602	0.781387	1129.65	−11.281	−0.106	0.772686	1094.72	−17.755	−0.192	0.761398	1051.39	−27.515	−0.301
0.702	0.781674	1130.04	−7.154	−0.076	0.773045	1095.43	−11.957	−0.147	0.761917	1053.30	−20.611	−0.239
0.794	0.782073	1130.99	−4.547	−0.057	0.773463	1096.98	−8.458	−0.110	0.762386	1054.79	−13.558	−0.176
0.897	0.782583	1132.44	−2.400	−0.037	0.773949	1098.56	−4.271	−0.065	0.762907	1057.14	−7.190	−0.101
0.943	0.782826	1133.33	−1.848	−0.028	0.774168	1099.50	−2.804	−0.043	0.763108	1058.06	−3.920	−0.062
1.000	0.782926	1133.88	0.000	0.000	0.774228	1100.26	0.000	0.000	0.763177	1059.32	0.000	0.000
Ethanol + p-xylene												
	288.15 K				298.15 K				323.15 K			
0.000	0.865354	1347.94	0.000	0.000	0.856675	1305.39	0.000	0.000	0.834849	1211.00	0.000	0.000
0.058	0.862991	1338.54	−5.011	0.048	0.854197	1297.64	−6.556	0.065	0.831972	1200.00	−2.307	0.127
0.117	0.860771	1328.95	−10.179	0.047	0.851916	1287.93	−11.436	0.072	0.829441	1191.24	−8.254	0.168
0.200	0.857501	1319.16	−20.417	0.036	0.848583	1278.04	−21.684	0.068	0.825856	1180.46	−17.931	0.193
0.305	0.853017	1313.31	−39.685	−0.001	0.844055	1270.83	−40.256	0.036	0.821149	1170.88	−35.608	0.173
0.419	0.847618	1297.87	−49.920	−0.054	0.838642	1256.98	−52.126	−0.019	0.815619	1156.54	−47.023	0.119
0.503	0.842985	1287.00	−57.283	−0.093	0.834001	1245.87	−59.008	−0.059	0.810930	1146.88	−55.886	0.074
0.601	0.836737	1277.36	−67.692	−0.123	0.827764	1236.78	−70.144	−0.092	0.804680	1135.14	−63.255	0.030
0.710	0.829000	1259.39	−69.389	−0.199	0.820065	1219.80	−72.116	−0.174	0.797054	1121.36	−68.221	−0.074
0.804	0.819837	1239.92	−62.092	−0.154	0.810978	1201.02	−64.034	−0.135	0.788169	1105.01	−59.719	−0.060
0.902	0.808190	1219.00	−49.665	−0.093	0.799459	1180.26	−49.573	−0.084	0.777009	1085.55	−41.194	−0.043
0.951	0.801450	1204.50	−35.568	−0.054	0.792804	1167.13	−35.660	−0.050	0.770590	1074.47	−26.286	−0.028
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000

(*Continued*)

Table 2. Continued.

x	ρ ($g\,cm^{-3}$)	u ($m\cdot s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u ($m\,s^{-1}$)	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)	ρ ($g\,cm^{-3}$)	u (ms^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E ($cm^{-3}\,mol^{-1}$)
Ethanol + o-xylene												
	288.15 K				298.15 K				323.15 K			
0.000	0.883360	1381.29	0.000	0.000	0.874968	1341.51	0.000	0.000	0.853803	1240.87	0.000	0.000
0.058	0.880412	1377.32	−12.967	0.046	0.871883	1337.44	−13.725	0.064	0.850316	1240.09	−19.625	0.120
0.117	0.877668	1368.04	−21.335	0.041	0.869072	1327.82	−22.182	0.066	0.847237	1230.44	−28.500	0.153
0.201	0.873395	1355.76	−33.847	0.031	0.864723	1315.27	−35.068	0.063	0.842627	1217.98	−42.431	0.175
0.307	0.867577	1340.04	−48.392	−0.004	0.858835	1299.99	−50.764	0.032	0.836490	1203.08	−59.688	0.159
0.447	0.858671	1318.98	−64.983	−0.052	0.849881	1279.30	−68.446	−0.018	0.827343	1183.39	−79.414	0.108
0.506	0.854358	1309.26	−70.289	−0.072	0.845558	1269.84	−74.167	−0.039	0.822955	1174.32	−85.477	0.083
0.600	0.846633	1292.05	−75.401	−0.099	0.837823	1253.19	−79.795	−0.069	0.815144	1158.49	−90.996	0.045
0.697	0.837357	1271.58	−74.755	−0.110	0.828555	1233.52	−79.423	−0.085	0.805911	1141.01	−91.177	0.010
0.804	0.825112	1245.11	−65.414	−0.116	0.816351	1208.02	−69.744	−0.099	0.793807	1117.82	−79.686	−0.030
0.899	0.811792	1216.83	−45.084	−0.091	0.803099	1180.78	−48.311	−0.081	0.780755	1092.94	−54.122	−0.040
0.952	0.803003	1197.48	−25.347	−0.062	0.794379	1162.27	−27.627	−0.058	0.772237	1076.82	−31.212	−0.039
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000
Ethanol + m-xylene												
	288.15 K				298.15 K				323.15 K			
0.000	0.868459	1362.66	0.000	0.000	0.859890	1320.92	0.000	0.000	0.838289	1219.51	0.000	0.000
0.055	0.866066	1350.48	−2.790	0.054	0.857369	1309.70	−3.430	0.073	0.835372	1211.02	−5.825	0.133
0.127	0.863188	1339.27	−11.054	0.055	0.854415	1298.18	−11.465	0.084	0.832112	1199.53	−13.488	0.183
0.196	0.860286	1330.23	−19.730	0.055	0.851462	1289.40	−20.625	0.088	0.828953	1190.51	−22.466	0.211
0.312	0.854889	1315.10	−33.852	0.039	0.846012	1274.46	−35.261	0.076	0.823292	1176.22	−38.130	0.214
0.396	0.850583	1304.31	−43.453	0.014	0.841682	1263.89	−45.278	0.051	0.818820	1165.85	−48.327	0.195
0.506	0.844162	1288.67	−52.891	−0.017	0.835253	1248.92	−55.430	0.018	0.812347	1152.52	−60.199	0.152
0.607	0.837189	1272.63	−58.028	−0.039	0.828290	1233.54	−60.964	−0.008	0.805390	1138.69	−66.447	0.112
0.700	0.829788	1256.23	−58.626	−0.058	0.820916	1217.76	−61.586	−0.031	0.798065	1124.46	−66.861	0.071
0.805	0.819701	1234.11	−51.649	−0.065	0.810897	1196.86	−54.679	−0.047	0.788234	1106.33	−59.781	0.026
0.899	0.808607	1209.90	−35.015	−0.050	0.799898	1173.85	−37.400	−0.040	0.777511	1086.30	−40.759	0.002
0.950	0.801518	1194.38	−20.047	−0.031	0.792881	1159.11	−21.792	−0.027	0.770714	1073.61	−23.721	−0.006
1.000	0.793644	1177.30	0.000	0.000	0.785082	1142.40	0.000	0.000	0.763177	1059.32	0.000	0.000

where δQ_{ij} stands for the derived magnitude (V^{E} or δk_{s}) and m is the degree of the polynomial. B_p are the temperature dependent fitting parameters and are as follows:

$$\mathrm{B}_p = \sum_{j=0}^{2} \mathrm{B}_{ij} T^j. \tag{3}$$

The B_{ij} parameters were computed and enclosed with their root means square deviations in Tables 3 and 4. The root mean square deviations presented were computed using the Equation (4), where z is the value of the derived magnitude and n_{DAT} is the number of experimental data:

$$\sigma = \left(\frac{\sum_{i=1}^{n_{DAT}} (z_{\mathrm{exp}} - z_{\mathrm{pred}})^2}{n_{\mathrm{DAT}}} \right)^{1/2}. \tag{4}$$

No previously data have been found at the entire range of temperatures studied for this binary mixtures. Only a few collections of data related to excess volume for the range 288.15 until 323.15 K for ethanol + (benzene, toluene, ethylbenzene, tert-butyl alcohol, isooctane, p-xylene, m-xylene and o-xylene) was found. As far as we know, no previously wide study has been gathered until now, enclosing ultrasonic velocities. Curves of the experimentally-derived magnitudes' excess molar volume and changes of isentropic compressibility for the binary mixtures ethanol + (benzene, toluene, tert-butyl alcohol, ethylbenzene, isooctane, p-xylene, m-xylene and o-xylene), have been plotted in Figures 1 and 2, at 288.15, 303.15 and 318.15 K. As tert-butyl-alcohol is solid at 288.15 K, the mixture ethanol + TBA was measured only from 300.65 to 323.15 K and so the curves for this mixture were not included in Figures 1(a) and 2(a). Comparison of the fitted densities for the binary mixtures ethanol + (benzene and toluene) with open literature [5,6] have been plotted in Figures 3 and 4. The root mean square deviations in each case was 0.011339 $\mathrm{cm^3\,mol^{-1}}$ for the mixture ethanol + benzene (data of Figure 3) and 0.011237 $\mathrm{cm^3\,mol^{-1}}$ (data of Figure 4) for the mixture ethanol + toluene. These root mean square deviations were calculated using the literature excess volumes and those regressed by Equation (2) with the corresponding fitting parameters B_{ij}.

3.2. *Estimation models for isentropic compressibility: collision factor theory and free length theory*

Experimental data for the deviation of isentropic compressibility of the mixtures were compared with values determined by different mixing procedures. The CFT [11,12] (Equation (5)) and FLT [11,13], (Equation (6)) for the isentropic compressibilities were applied:

$$\kappa_{\mathrm{S}} = \left(\frac{1}{\rho^3} \right) \cdot \left(\frac{\mathrm{M}}{u_\infty \cdot \sum_i^N x_i \mathrm{S}_{\mathrm{s}} \cdot \sum_i^N x_i \mathrm{B}_{\mathrm{s}}} \right). \tag{5}$$

Table 3. Parameters of Equation (2) in the range (288.15–323.15) K for excess molar volumes and σ in accordance to Equation (4).

	E + Benzene	E + Toluene	E + Ethylbenzene	E + Isooctane	E + TBA	E + p-xylene	E + o-xylene	E + m-xylene
B_{00}	1.6304E + 01	1.1671E + 01	1.5181E + 01	2.5320E + 01	1.1607E + 01	1.5626E + 01	1.1869E + 01	1.4706E + 01
B_{01}	−1.1800E−01	−9.4472E−02	−1.1611E−01	−1.8625E−01	−4.3072E−02	−1.2183E−01	−9.5864E−02	−1.1416E−01
B_{02}	2.1365E−04	1.8251E−04	2.1796E−04	3.5249E−04	8.8954E−06	2.3039E−04	1.8637E−04	2.1850E−04
B_{10}	−3.5805E + 00	−2.1352E + 00	4.2494E−01	4.0789E + 01	−1.8326E + 01	−7.3420E−01	3.0632E + 00	−3.5311E + 00
B_{11}	2.6658E−02	1.5708E−02	−4.0675E−03	−2.6542E−01	1.1525E−01	4.0288E−03	−1.7844E−02	2.6725E−02
B_{12}	−5.5958E−05	−3.7217E−05	−6.2565E−06	4.0999E−04	−1.7359E−04	−1.7713E−05	1.7223E−05	−5.7244E−05
B_{20}	3.3978E + 00	1.5872E + 00	6.7600E + 00	8.9935E + 01	5.2481E + 01	5.4611E + 00	3.0109E + 00	5.1836E + 00
B_{21}	−2.7350E−02	−1.3055E−02	−5.3947E−02	−5.7030E−01	−3.4111E−01	−4.5741E−02	−2.3394E−02	−3.8237E−02
B_{22}	4.9225E−05	2.4491E−05	1.0583E−04	9.1632E−04	5.5003E−04	8.5634E−05	4.5536E−05	6.9008E−05
B_{30}	1.3523E−01	−5.3662E + 00	−2.2021E + 01	−2.1047E + 02	−7.6175E + 01	−1.9684E + 01	−2.2924E + 01	−4.4062E + 00
B_{31}	−6.9671E−03	3.7305E−02	1.5241E−01	1.3651E + 00	4.8706E−01	1.3345E−01	1.5071E−01	2.7610E−02
B_{32}	1.3027E−05	−5.8815E−05	−2.6202E−04	−2.1835E−03	−7.8051E−04	−2.2541E−04	−2.4587E−04	−3.9844E−05
B_{40}	1.1725E + 01	6.8390E + 00	5.8409E + 00	−1.2301E + 02	−1.1019E + 02	4.6643E + 00	−2.9672E + 00	−2.5815E + 00
B_{41}	−7.7136E−02	−5.1860E−02	−3.7556E−02	7.3190E−01	6.9836E−01	−2.7929E−02	1.1814E−02	1.1088E−02
B_{42}	1.3458E−04	1.0149E−04	6.1070E−05	−1.0976E−03	−1.1050E−03	5.5164E−05	−5.4804E−06	−2.1640E−06
B_{50}	−6.6692E−01	1.5971E + 01	2.3974E + 01	1.7887E + 02	1.8900E + 02	2.3752E + 01	3.4215E + 01	1.1039E + 01
B_{51}	1.7164E−02	−1.0119E−01	−1.5579E−01	−1.0748E + 00	−1.2035E + 00	−1.5044E−01	−2.2033E−01	−6.3203E−02
B_{52}	−4.5184E−05	1.4302E−04	2.5026E−04	1.5881E−03	1.9130E−03	2.3513E−04	3.4166E−04	7.6507E−05
σ	0.003	0.002	0.009	0.014	0.003	0.010	0.003	0.004

Table 4. Parameters of Equation (2) in the range (288.15–323.15) K for deviation of isentropic compressibility and σ in accordance to Equation (4).

	E + Benzene	E + Toluene	E + Ethylbenzene	E + Isooctane	E + TBA	E + p-xylene	E + o-xylene	E + m-xylene
B_{00}	1.9994E + 03	5.4451E + 02	1.1581E + 03	3.1023E + 03	−2.0190E + 03	3.8014E + 03	−2.9417E + 02	5.9308E + 02
B_{01}	−1.4497E + 01	−4.5227E + 00	−8.4398E + 00	−2.5195E + 01	1.5510E + 01	−2.6943E + 01	1.6614E + 00	−4.5105E + 00
B_{02}	2.4880E−02	7.0724E−03	1.2703E−02	5.3995E−02	−2.9934E−02	4.4845E−02	−5.5813E−03	5.9893E−03
B_{10}	2.3182E + 03	1.9199E + 03	−1.0834E + 03	−2.6121E + 02	1.5907E + 02	3.9581E + 03	2.1612E + 03	7.8695E + 02
B_{11}	−1.5782E + 01	−1.3261E + 01	6.7561E + 00	1.5665E + 00	−1.2474E + 00	−2.7317E + 01	−1.4509E + 01	−5.3931E + 00
B_{12}	2.5463E−02	2.1290E−02	−1.2569E−02	−8.8187E−04	3.3525E−03	4.4824E−02	2.2458E−02	7.4812E−03
B_{20}	7.4198E + 02	−3.3976E + 03	2.6780E + 03	1.6684E + 04	1.1761E + 04	−6.4754E + 03	−7.4304E + 02	8.5745E + 01
B_{21}	−5.6348E + 00	2.1150E + 01	−1.7573E + 01	−1.0735E + 02	−7.6119E + 01	4.4025E + 01	4.7897E + 00	−1.2207E + 00
B_{22}	1.0380E−02	−3.3032E−02	2.7083E−02	1.7383E−01	1.2256E−01	−7.5057E−02	−8.2413E−03	2.5593E−03
B_{30}	−2.8912E + 03	−8.6837E + 03	1.4517E + 04	−1.4183E + 04	−1.4247E + 04	−1.4719E + 04	−2.7737E + 03	−3.5103E + 02
B_{31}	1.9753E + 01	5.7368E + 01	−9.4247E + 01	8.9947E + 01	9.2044E + 01	9.9433E + 01	1.9070E + 01	2.4801E + 00
B_{32}	−3.4344E−02	−9.4990E−02	1.5202E−01	−1.4223E−01	−1.4841E−01	−1.6724E−01	−3.3438E−02	−4.8727E−03
B_{40}	1.6774E + 03	5.5415E + 03	−3.7240E + 03	−2.9712E + 04	−3.7000E + 04	1.9684E + 04	3.2237E + 02	8.0484E + 02
B_{41}	−9.0745E + 00	−3.2656E + 01	2.5524E + 01	1.8897E + 02	2.3532E + 02	−1.3650E + 02	−8.8685E−01	−3.2679E + 00
B_{42}	1.1643E−02	4.6957E−02	−4.3060E−02	−3.0001E−01	−3.7368E−01	2.3420E−01	−2.0975E−03	1.9181E−03
B_{50}	7.5594E + 03	1.7739E + 04	−5.3570E + 03	2.9320E + 04	5.1544E + 04	1.2943E + 04	8.7820E + 03	4.0421E + 03
B_{51}	−5.1671E + 01	−1.1974E + 02	3.3527E + 01	−1.8516E + 02	−3.2932E + 02	−9.3962E + 01	−6.0083E + 01	−2.7974E + 01
B_{52}	8.7972E−02	2.0113E−01	−5.3814E−02	2.9202E−01	5.2513E−01	1.6622E−01	1.0317E−01	4.7933E−02
σ	0.345	0.378	0.711	0.702	0.418	1.680	0.412	0.163

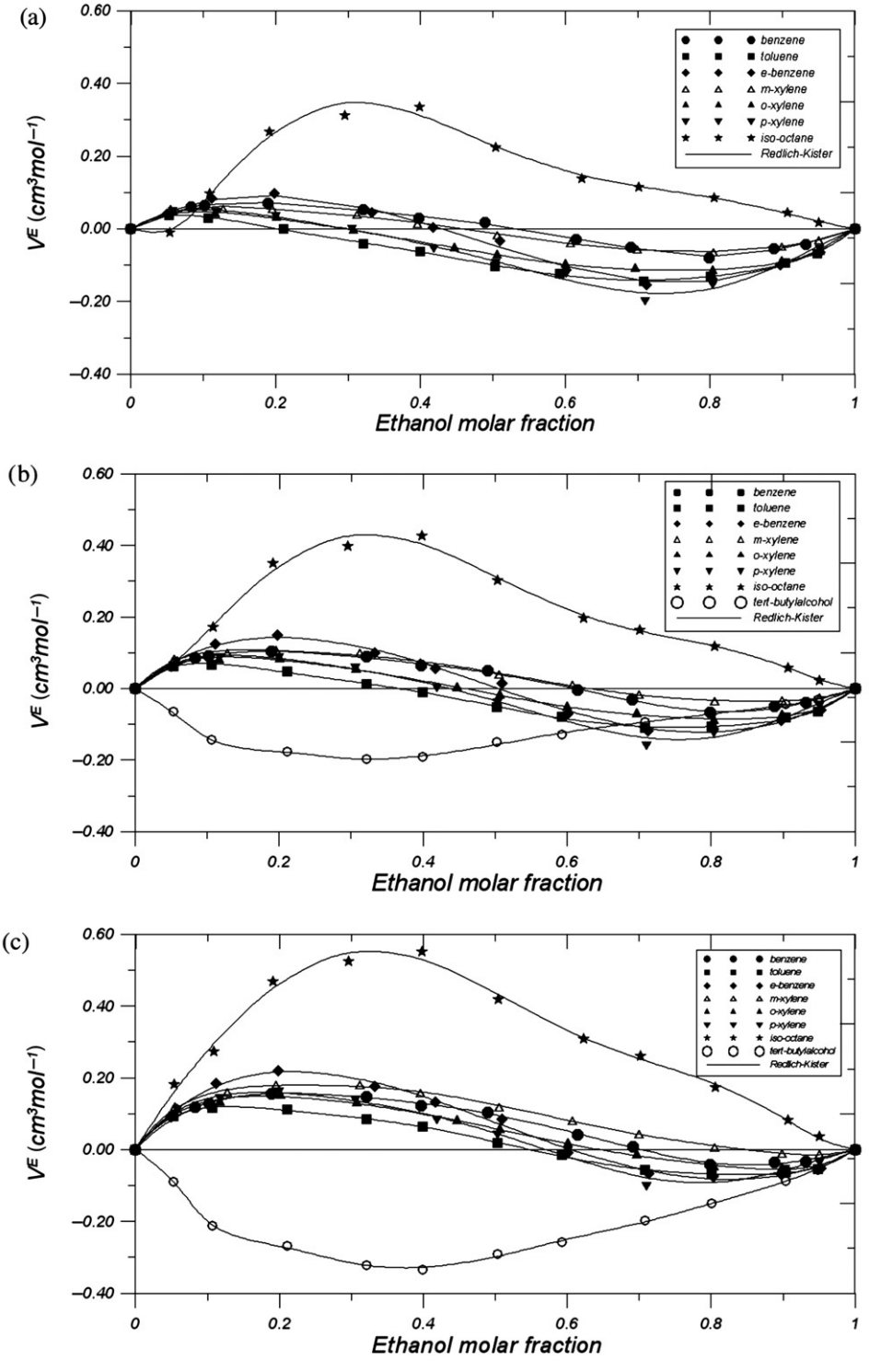

Figure 1. Excess molar volumes of mixtures of ethanol + (benzene, toluene, ethylbenzene, isooctane, TBA and xylene isomers) at (a) 288.15 K (b) 303.15 K and (c) 318.15 K. Redlich–Kister fitted curves (continuous line).

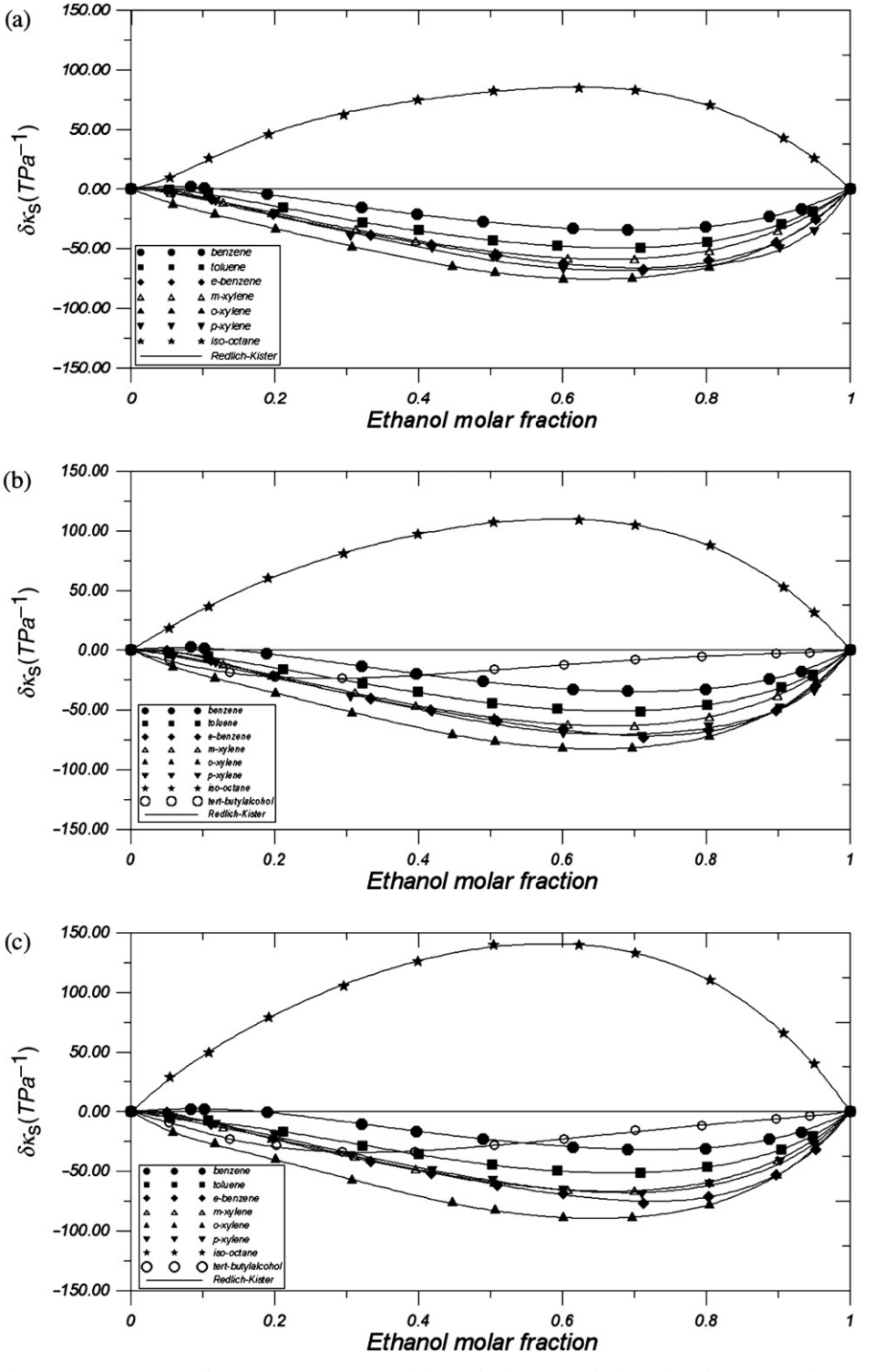

Figure 2. Deviation of isentropic compressibility of mixtures of ethanol + (benzene, toluene, ethylbenzene, isooctane, TBA and xylene isomers) at (a) 288.15 K (b) 303.15 K (c) 318.15 K. Redlich–Kister fitted curves (continuous line).

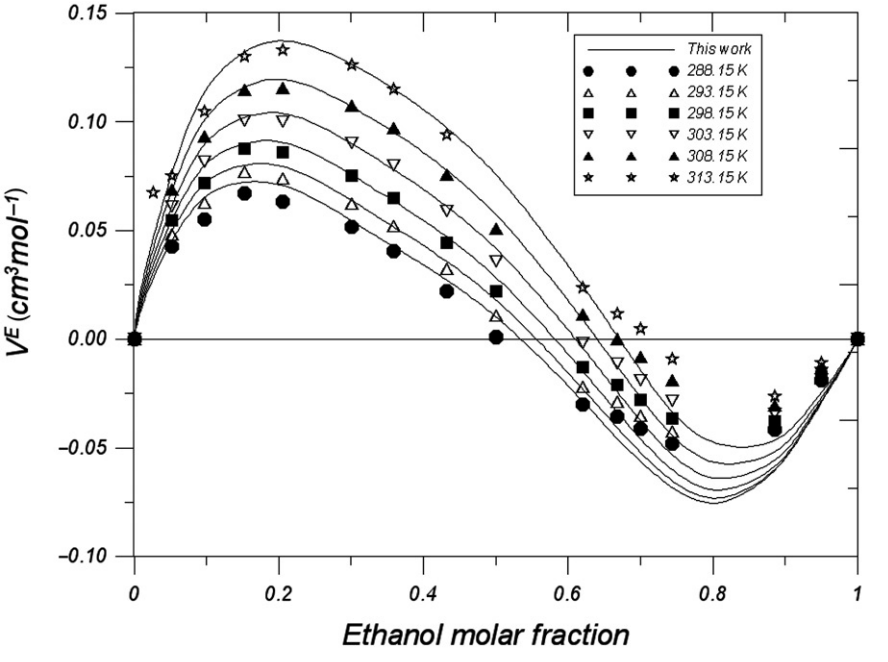

Figure 3. Comparison of the obtained fitted densities for mixtures of ethanol + benzene with open literature data from Serbanovic et al. [9].

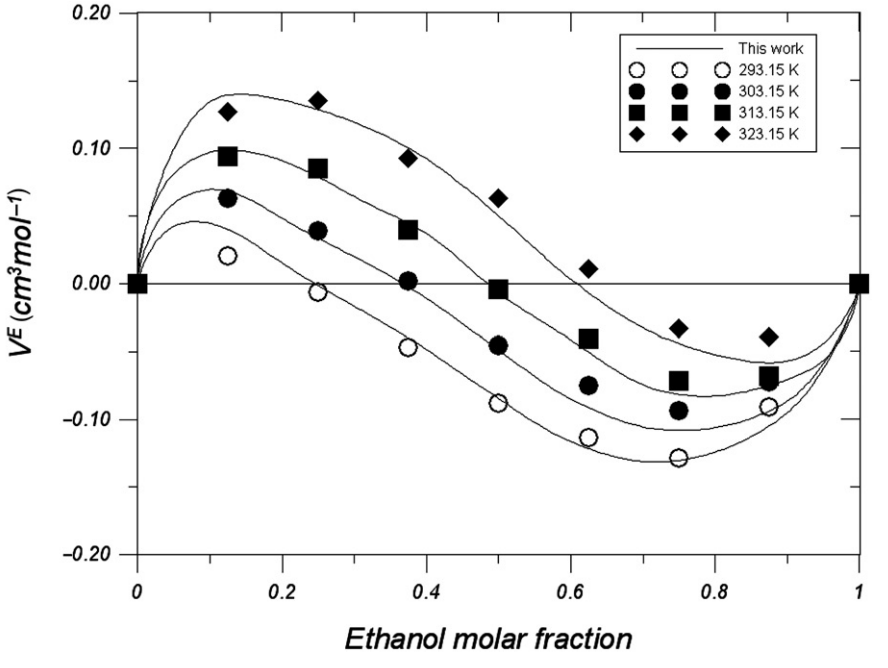

Figure 4. Comparison of the obtained fitted densities for mixtures of ethanol + toluene with open literature data from Zéberg-Mikkelsen et al. [10].

Table 5. Root mean square deviations for estimated deviation of isentropic compressibilities from experimental data for the mixtures at range of (288.15–323.15) K.

	CFT (Equation (5))			FLT (Equation (6))		
Mixture	288.15 K	303.15 K	323.15 K	288.15 K	303.15 K	323.15 K
Ethanol + Benzene	6.819	7.229	6.543	0.619	0.877	2.460
Ethanol + Toluene	11.968	12.206	12.568	1.101	1.050	4.176
Ethanol + Ethylbenzene	21.233	23.536	24.764	1.624	1.317	5.932
Ethanol + *p*-Xylene	25.651	25.351	19.449	1.795	1.273	5.211
Ethanol + *m*-Xylene	17.790	19.322	21.069	1.401	1.223	5.373
Ethanol + *o*-Xylene	25.717	28.145	32.665	2.016	1.510	7.471
Ethanol + Iso-octane	38.959	53.159	77.745	2.130	2.269	12.895
Ethanol + TBA	–	10.089	13.956	–	0.398	3.000

$$\kappa_S = \left(\frac{L_f^2}{K^2}\right). \tag{6}$$

The CFT is dependent on the collision factors among molecules as a function of temperature into pure solvent or mixture. The pertinent relations in these calculations and its theoretical basis were described in the literature cited above. The collision factors (S) and the characteristic molecular volumes (B) of the pure solvents used in the CFT calculations were estimated by using the experimental ultrasonic velocities, enclosed in this article, and the corresponding molar volumes.

The FLT estimates the isentropic compressibility of a mixture attending to the free displacement of molecules (L_f) as a main function of temperature. In the last few years different authors have compared the relative merits of the existent theories with the FLT, the FLT results in lower deviations of computed isentropic compressibilities from experimental values. The deviations of each procedure for the studied mixtures are gathered into Table 5. In Figure 5 the accuracy of the models could be observed for the binaries mixtures at 303.15 K, for comparison.

4. Discussion and conclusions

Studies on phase equilibrium and excess properties of liquid mixtures are of considerable importance for design of separation process equipment and theoretical modelling. Ethanol is used as gasoline additive in traditional vehicle motors and also as a gasoline + ethanol mix fuel in flex fuel motors. The phase equilibrium and excess properties for systems containing ethers, alcohols and hydrocarbons have been the subject of numerous works in the last few years. Nevertheless, more data are required to develop solution models and to design separation process units. For this aim, we present in this article the temperature dependence of the density and ultrasonic velocity of the binary mixtures of ethanol + (benzene, toluene, ethylbenzene, TBA, isooctane and xylene isomers) in the range (288.15–323.15) K and atmospheric pressure, as a function of molar fraction. From the experimental values, the corresponding derived properties (excess molar volumes and change of isentropic compressibilities) were fitted with a temperature dependent Redlich–Kister

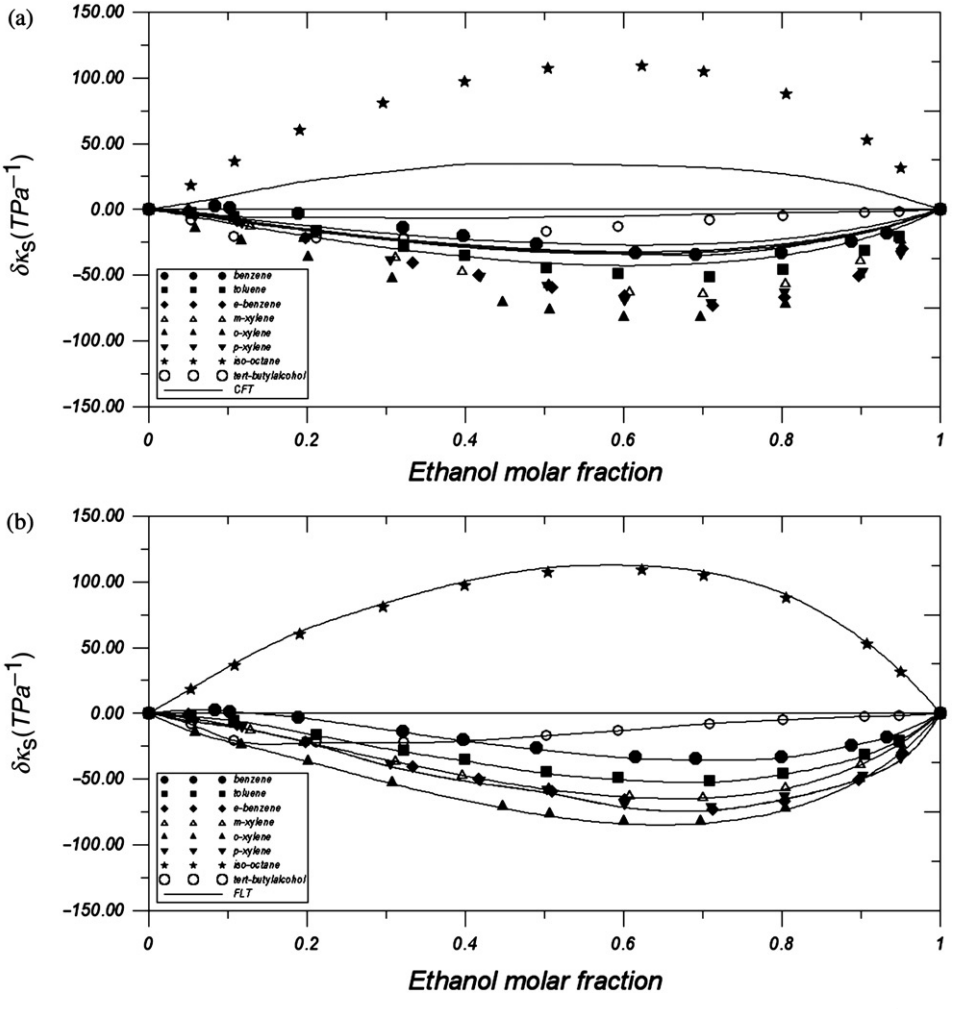

Figure 5. Comparison of the experimental deviation of isentropic compressibility (TPa^{-1}) and fitted by (a) CFT and (b) FLT of mixtures of ethanol + (benzene, toluene, ethylbenzene, isooctane, TBA and xylene isomers) at 303.15 K.

type polynomial. Due to the expense of the experimental measurement of such data and current processes design is strongly computer-oriented, consideration was also given to how accurate theoretical models work. At any system of this work, a slight dependence of temperature is observed for the studied range. The mixtures ethanol + (benzene, toluene, ethylbenzene, and xylene isomers) presents two regions of different character: one expansive region which is increased with higher temperatures and a contractive region with negative trend at high ethanol compositions due to the capability of the oxygen molecular group into the ethanol molecule to create dipole interactions among ethanol molecules. This negative gap was confirmed at any temperature and by repeated measurements diminished with increasing temperature. The mixture ethanol + isooctane presents an expansive character in all composition range except for the two lowest temperatures where

a very small contractive gap appears in dilute alcohol region. The mixture ethanol + TBA presents a contractive behaviour in all composition range, this effect diminish with the rise of ethanol molar fraction and is higher with temperature increasing, this effect is due to the interactions of the hydroxyl groups of the two alcohols. In terms of isentropic compressibilities, only negative deviations were obtained for ethanol + (toluene, TBA, ethylbenzene and xylene isomers) (Figure 2), this effect is slightly increased as the temperature rises, except for ethanol + p-xylene mixture in which the negative gap is inversely affected by temperature. The isentropic compressibilities for ethanol + isooctane mixture have the same characteristics of excess volume and only positive deviations is observed. Mixtures of ethanol + benzene present, as the other aryl compounds, a major negative trend for mixing isentropic compressibilities; however, in the ethanol dilute regions it has a small positive gap which is increased as temperature is raised. Attending to this fact, this trend would seem to indicate: (a) a more organised packing effect in equimolar compositions of ethanol + (benzene, toluene, ethylbenzene, TBA and xylene mixtures), (b) breakdown of ethanol–ethanol interaction for the mixture ethanol + isooctane and (c) positive effect for this binary mixture due to the stronger specific interactions of aliphatic ends by steric hindrance interactions. As shown in Table 5, the CFT method fails to describe the isentropic compressibilities, however, FLT is able to describe the data satisfactorily.

Acknowledgements

This work was supported by the CTQ2004-03346/PPQ Project (Ministerio de Educación y Ciencia, Secretaria General de Política Científica y Tecnológica, España).

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Appendix

Table A1. Densities, ultrasonic velocities, isentropic compresibilities and derived magnitudes on mixing for ethanol + (benzene, toluene, ethylbenzene, isooctane, p-xylene, m-xylene and o-xylene) at the range of (288.15–323.15) K.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + Benzene											
			288.15 K						290.65 K		
0.000	0.884183	1345.47	624.755	0.000	0.000	0.000	0.881521	1333.44	638.000	0.000	0.000
0.083	0.878479	1323.10	650.254	1.906	0.061	0.083	0.875826	1311.64	663.671	1.840	0.063
0.102	0.877222	1319.41	654.834	1.062	0.065	0.102	0.874573	1308.08	668.244	0.935	0.068
0.189	0.871421	1304.75	674.089	−4.356	0.071	0.189	0.868799	1293.59	687.840	−4.393	0.075
0.321	0.862162	1286.57	700.720	−15.248	0.053	0.321	0.859587	1275.64	714.914	−15.221	0.057
0.397	0.856505	1276.70	716.296	−21.395	0.029	0.397	0.853964	1266.03	730.588	−21.490	0.033
0.489	0.849012	1264.48	736.652	−27.230	0.017	0.489	0.846519	1254.00	751.222	−27.312	0.020
0.615	0.838210	1247.76	766.276	−33.256	−0.030	0.615	0.835791	1237.75	780.974	−33.570	−0.028
0.691	0.830955	1236.73	786.815	−34.355	−0.051	0.691	0.828585	1226.94	801.708	−34.693	−0.049
0.799	0.819746	1219.70	820.001	−31.878	−0.079	0.799	0.817453	1210.36	835.042	−32.380	−0.078
0.888	0.808927	1202.80	854.484	−22.800	−0.055	0.888	0.806708	1193.77	869.846	−23.236	−0.055
0.932	0.803252	1193.96	873.310	−16.444	−0.042	0.932	0.801071	1185.16	888.741	−16.939	−0.043
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.878856	1321.59	651.462	0.000	0.000	0.000	0.876190	1309.88	665.179	0.000	0.000
0.083	0.873157	1300.26	677.403	1.864	0.067	0.083	0.870486	1288.80	691.619	2.084	0.071
0.102	0.871909	1296.76	682.040	0.965	0.072	0.102	0.869241	1285.35	696.333	1.199	0.077
0.189	0.866158	1282.32	702.118	−4.137	0.080	0.189	0.863510	1271.14	716.714	−3.892	0.086
0.321	0.856998	1264.73	729.499	−15.049	0.062	0.321	0.854396	1253.75	744.593	−14.748	0.069
0.397	0.851407	1255.28	745.387	−21.330	0.038	0.397	0.848840	1244.51	760.637	−21.129	0.044
0.489	0.844011	1243.54	766.183	−27.263	0.025	0.489	0.841494	1233.07	781.580	−27.224	0.031
0.615	0.833356	1227.69	796.145	−33.683	−0.024	0.615	0.830913	1217.58	811.801	−33.805	−0.019
0.691	0.826201	1217.03	817.169	−34.742	−0.046	0.691	0.823808	1207.08	833.109	−34.835	−0.042
0.799	0.815147	1200.97	850.550	−32.700	−0.077	0.799	0.812833	1191.47	866.627	−33.019	−0.074
0.888	0.804474	1184.69	885.683	−23.492	−0.054	0.888	0.802235	1175.54	902.035	−23.836	−0.053
0.932	0.798875	1176.27	904.705	−17.198	−0.042	0.932	0.796673	1167.32	921.171	−17.575	−0.042
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.873520	1298.27	679.199	0.000	0.000	0.000	0.870847	1286.68	693.613	0.000	0.000
0.083	0.867812	1277.50	706.078	2.250	0.075	0.083	0.865130	1266.29	720.862	2.369	0.080
0.102	0.866568	1274.09	710.881	1.392	0.081	0.102	0.863890	1262.90	725.778	1.565	0.086
0.189	0.860856	1259.99	731.704	−3.542	0.092	0.189	0.858198	1248.90	747.063	−3.170	0.098
0.321	0.851790	1242.84	760.041	−14.374	0.075	0.321	0.849175	1232.01	775.844	−13.959	0.082
0.397	0.846266	1233.82	776.228	−20.863	0.051	0.397	0.843685	1223.16	792.233	−20.478	0.058
0.489	0.838968	1222.60	797.418	−27.014	0.036	0.489	0.836433	1212.22	813.591	−26.741	0.043
0.615	0.828460	1207.47	827.896	−33.750	−0.015	0.615	0.825999	1197.37	844.430	−33.496	−0.010
0.691	0.821408	1197.16	849.448	−34.786	−0.039	0.691	0.818998	1187.28	866.185	−34.560	−0.035
0.799	0.810509	1182.01	883.080	−33.212	−0.072	0.799	0.808178	1172.53	900.005	−33.126	−0.069
0.888	0.799988	1166.45	918.722	−24.087	−0.052	0.888	0.797733	1157.36	935.848	−24.072	−0.051
0.932	0.794463	1158.42	937.981	−17.847	−0.041	0.932	0.792249	1149.53	955.207	−17.866	−0.041
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.868172	1275.13	708.411	0.000	0.000	0.000	0.865490	1263.59	723.645	0.000	0.000
0.083	0.862444	1255.17	735.977	2.437	0.084	0.083	0.859752	1244.14	751.430	2.410	0.089
0.102	0.861207	1251.79	741.019	1.703	0.091	0.102	0.858517	1240.76	756.616	1.763	0.096
0.189	0.855530	1237.87	762.807	−2.789	0.105	0.189	0.852855	1226.92	778.919	−2.471	0.112
0.321	0.846553	1221.23	792.047	−13.513	0.090	0.321	0.843919	1210.49	808.680	−13.065	0.097
0.397	0.841092	1212.53	808.670	−20.026	0.065	0.397	0.838492	1201.95	825.521	−19.588	0.073
0.489	0.833889	1201.80	830.285	−26.306	0.050	0.489	0.831333	1191.41	847.427	−25.850	0.057
0.615	0.823527	1187.28	861.422	−33.139	−0.004	0.615	0.821044	1177.21	878.872	−32.747	0.002
0.691	0.816577	1177.44	883.335	−34.273	−0.030	0.691	0.814145	1167.62	900.939	−33.953	−0.025
0.799	0.805839	1163.08	917.345	−32.971	−0.067	0.799	0.803488	1153.64	935.147	−32.772	−0.063
0.888	0.795470	1148.30	953.379	−23.994	−0.049	0.888	0.793197	1139.28	971.310	−23.931	−0.048
0.932	0.790028	1140.70	972.780	−17.876	−0.040	0.932	0.787796	1131.88	990.799	−17.856	−0.039
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.862805	1252.08	739.304	0.000	0.000	0.000	0.860118	1240.69	755.293	0.000	0.000
0.083	0.857053	1233.16	767.279	2.357	0.094	0.083	0.854350	1222.24	783.522	2.368	0.099
0.102	0.855821	1229.81	772.576	1.764	0.102	0.102	0.853115	1218.90	788.962	1.864	0.108
0.189	0.850174	1216.04	795.420	−2.183	0.119	0.189	0.847480	1205.21	812.354	−1.790	0.127
0.321	0.841277	1199.80	825.740	−12.606	0.106	0.321	0.838622	1189.15	843.258	−12.015	0.115
0.397	0.835878	1191.40	842.834	−19.100	0.081	0.397	0.833254	1180.91	860.576	−18.508	0.091
0.489	0.828767	1181.06	865.015	−25.357	0.065	0.489	0.826189	1170.76	883.049	−24.743	0.073
0.615	0.818550	1167.19	896.751	−32.331	0.008	0.615	0.816043	1157.20	915.103	−31.765	0.016
0.691	0.811703	1157.86	918.948	−33.630	−0.020	0.691	0.809248	1148.11	937.457	−33.130	−0.014
0.799	0.801126	1144.26	953.344	−32.578	−0.060	0.799	0.798752	1134.89	972.032	−32.216	−0.056
0.888	0.790913	1130.29	989.673	−23.834	−0.046	0.888	0.788618	1121.32	1008.496	−23.597	−0.044
0.932	0.785558	1123.10	1009.218	−17.831	−0.039	0.932	0.783307	1114.35	1028.075	−17.689	−0.038
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.857425	1229.29	771.783	0.000	0.000	0.000	0.854730	1217.94	788.713	0.000	0.000
0.083	0.851637	1211.35	800.214	2.320	0.105	0.083	0.848916	1200.50	817.355	2.285	0.111
0.102	0.850402	1208.05	805.760	1.864	0.114	0.102	0.847683	1197.23	823.022	1.893	0.121
0.189	0.844779	1194.46	829.686	−1.517	0.136	0.189	0.842067	1183.72	847.531	−1.162	0.145
0.321	0.835960	1178.57	861.199	−11.530	0.125	0.321	0.833282	1168.01	879.660	−10.950	0.136
0.397	0.830619	1170.45	878.805	−17.966	0.100	0.397	0.827966	1160.08	897.453	−17.425	0.111
0.489	0.823597	1160.49	901.576	−24.180	0.083	0.489	0.820995	1150.27	920.577	−23.560	0.092
0.615	0.813524	1147.24	933.944	−31.266	0.023	0.615	0.810991	1137.32	953.276	−30.686	0.032
0.691	0.806780	1138.41	956.417	−32.741	−0.007	0.691	0.804300	1128.74	975.875	−32.260	0.000
0.799	0.796364	1125.55	991.194	−31.950	−0.051	0.799	0.793965	1116.24	1010.842	−31.598	−0.047
0.888	0.786313	1112.39	1027.757	−23.503	−0.041	0.888	0.783995	1103.48	1047.509	−23.311	−0.039
0.932	0.781043	1105.62	1047.402	−17.660	−0.036	0.932	0.778766	1096.89	1067.252	−17.501	−0.035
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.852032	1206.70	806.019	0.000	0.000	0.000	0.849331	1195.55	823.735	0.000	0.000
0.083	0.846190	1189.67	834.986	2.362	0.118	0.083	0.843455	1178.88	853.098	2.503	0.125
0.102	0.844953	1186.39	840.838	2.099	0.129	0.102	0.842215	1175.66	859.040	2.271	0.137
0.189	0.839346	1173.02	865.861	−0.701	0.155	0.189	0.836613	1162.33	884.742	−0.117	0.166
0.321	0.830591	1157.47	898.656	−10.217	0.147	0.321	0.827889	1146.96	918.187	−9.388	0.160
0.397	0.825304	1149.86	916.423	−16.944	0.123	0.397	0.822626	1139.66	935.938	−16.369	0.136
0.489	0.818376	1140.06	940.138	−22.762	0.103	0.489	0.815743	1129.87	960.262	−21.862	0.115
0.615	0.808443	1127.41	973.166	−29.934	0.041	0.615	0.805879	1117.54	993.583	−29.126	0.051
0.691	0.801805	1119.09	995.867	−31.633	0.007	0.691	0.799289	1109.38	1016.566	−30.777	0.016
0.799	0.791551	1106.92	1031.071	−31.057	−0.041	0.799	0.789118	1097.60	1051.889	−30.415	−0.035
0.888	0.781664	1094.58	1067.788	−22.986	−0.036	0.888	0.779318	1085.68	1088.633	−22.592	−0.032
0.932	0.776477	1088.20	1087.562	−17.275	−0.033	0.932	0.774172	1079.54	1108.371	−17.052	−0.031
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.846641	1184.63	841.657	0.000	0.000						
0.083	0.840710	1168.05	871.828	3.118	0.135						
0.102	0.839470	1164.84	877.935	3.006	0.148						
0.189	0.833869	1151.65	904.193	0.972	0.180						
0.321	0.825172	1136.50	938.246	−8.000	0.175						
0.397	0.819934	1129.38	956.183	−14.971	0.152						
0.489	0.813095	1119.71	980.952	−20.234	0.130						
0.615	0.803302	1107.72	1014.521	−27.542	0.064						
0.691	0.796757	1099.70	1037.829	−29.046	0.028						
0.799	0.786670	1088.27	1073.332	−28.755	−0.025						
0.888	0.776953	1076.80	1110.031	−21.185	−0.025						
0.932	0.771849	1070.90	1129.717	−15.799	−0.025						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + Toluene											
			288.15 K						290.65 K		
0.000	0.871457	1347.50	631.970	0.000	0.000	0.000	0.869144	1336.32	644.299	0.000	0.000
0.053	0.868844	1334.51	646.271	−0.273	0.037	0.053	0.866502	1323.85	658.496	−0.577	0.041
0.107	0.866415	1324.66	657.757	−3.766	0.030	0.107	0.864065	1314.03	670.260	−3.996	0.035
0.211	0.861488	1311.60	674.758	−15.733	0.000	0.211	0.859134	1300.88	687.804	−15.817	0.007
0.321	0.855793	1298.23	693.311	−27.693	−0.041	0.321	0.853442	1287.65	706.692	−27.858	−0.033
0.399	0.851264	1288.05	708.060	−34.565	−0.062	0.399	0.848919	1277.63	721.645	−34.824	−0.055
0.502	0.844764	1274.96	728.235	−42.976	−0.103	0.502	0.842433	1264.72	742.123	−43.322	−0.096
0.592	0.838266	1262.45	748.497	−47.628	−0.124	0.592	0.835959	1252.35	762.717	−47.982	−0.118
0.708	0.828671	1244.47	779.200	−49.019	−0.145	0.708	0.826393	1234.65	793.827	−49.406	−0.140
0.801	0.819505	1227.86	809.377	−44.468	−0.131	0.801	0.817264	1218.19	824.532	−44.677	−0.127
0.904	0.807469	1205.00	852.904	−29.565	−0.094	0.904	0.805279	1195.79	868.448	−29.776	−0.092
0.948	0.801575	1193.33	876.062	−18.699	−0.069	0.948	0.799411	1184.40	891.729	−18.956	−0.068
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.866823	1325.34	656.773	0.000	0.000	0.000	0.864500	1314.33	669.617	0.000	0.000
0.053	0.864156	1313.30	670.934	−0.820	0.045	0.053	0.861807	1302.81	683.641	−1.180	0.049
0.107	0.861709	1303.57	682.921	−4.229	0.041	0.107	0.859349	1293.12	695.910	−4.536	0.047
0.211	0.856772	1290.17	701.198	−15.731	0.014	0.211	0.854404	1279.59	714.817	−15.848	0.022
0.321	0.851085	1277.18	720.316	−27.978	−0.026	0.321	0.848720	1266.73	734.290	−28.206	−0.017
0.399	0.846566	1267.28	735.519	−35.001	−0.047	0.399	0.844205	1256.90	749.809	−35.243	−0.038
0.502	0.840094	1254.61	756.231	−43.673	−0.088	0.502	0.837748	1244.44	770.795	−44.077	−0.080
0.592	0.833639	1242.34	777.215	−48.299	−0.111	0.592	0.831314	1232.32	792.114	−48.747	−0.104
0.708	0.824105	1224.92	808.727	−49.778	−0.134	0.708	0.821816	1215.25	823.937	−50.405	−0.129
0.801	0.815016	1208.52	840.091	−44.756	−0.123	0.801	0.812759	1198.92	855.969	−45.106	−0.119
0.904	0.803081	1186.66	884.276	−29.994	−0.090	0.904	0.800879	1177.55	900.481	−30.454	−0.088
0.948	0.797241	1175.53	907.701	−19.205	−0.067	0.948	0.795067	1166.68	924.044	−19.714	−0.066
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.862173	1303.44	682.690	0.000	0.000	0.000	0.859845	1292.64	696.025	0.000	0.000
0.053	0.859452	1292.48	696.515	−1.601	0.053	0.053	0.857100	1282.22	709.649	−2.019	0.057
0.107	0.856985	1282.73	709.180	−4.790	0.053	0.107	0.854613	1272.39	722.753	−4.991	0.060
0.211	0.852033	1269.13	728.671	−15.962	0.029	0.211	0.849652	1258.75	742.814	−16.023	0.038
0.321	0.846347	1256.29	748.638	−28.291	−0.008	0.321	0.843961	1245.92	763.304	−28.283	0.002
0.399	0.841836	1246.48	764.543	−35.273	−0.029	0.399	0.839459	1236.06	779.689	−35.105	−0.019
0.502	0.835393	1234.29	785.733	−44.339	−0.071	0.502	0.833027	1224.13	801.098	−44.377	−0.062
0.592	0.828978	1222.34	807.371	−49.071	−0.096	0.592	0.826628	1212.11	823.390	−48.825	−0.088
0.708	0.819511	1205.53	839.632	−50.781	−0.123	0.708	0.817195	1195.76	855.828	−50.835	−0.116
0.801	0.810497	1189.43	872.109	−45.428	−0.115	0.801	0.808226	1179.93	888.699	−45.469	−0.111
0.904	0.798668	1168.71	916.685	−31.149	−0.086	0.904	0.796448	1159.94	933.193	−31.697	−0.084
0.948	0.792885	1157.83	940.806	−20.040	−0.065	0.948	0.790697	1149.05	957.882	−20.202	−0.064
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.857513	1281.88	709.683	0.000	0.000	0.000	0.855175	1271.16	723.677	0.000	0.000
0.053	0.854733	1271.79	723.334	−2.209	0.063	0.053	0.852367	1261.49	737.235	−2.523	0.067
0.107	0.852240	1262.15	736.574	−5.269	0.066	0.107	0.849854	1251.97	750.702	−5.582	0.074
0.211	0.847267	1248.43	757.271	−16.096	0.047	0.211	0.844870	1238.18	772.045	−16.204	0.056
0.321	0.841568	1235.62	778.289	−28.282	0.012	0.321	0.839167	1225.34	793.667	−28.249	0.023
0.399	0.837076	1225.90	794.923	−35.178	−0.009	0.399	0.834682	1215.77	810.543	−35.231	0.001
0.502	0.830657	1214.08	816.740	−44.468	−0.053	0.502	0.828274	1204.07	832.765	−44.550	−0.042
0.592	0.824277	1202.25	839.339	−48.980	−0.079	0.592	0.821914	1192.44	855.659	−49.146	−0.070
0.708	0.814876	1186.12	872.271	−50.974	−0.109	0.708	0.812545	1176.53	889.092	−51.126	−0.102
0.801	0.805945	1170.44	905.725	−45.406	−0.106	0.801	0.803655	1161.09	922.993	−45.500	−0.101
0.904	0.794219	1150.69	950.918	−31.361	−0.081	0.904	0.791985	1141.85	968.423	−31.654	−0.079
0.948	0.788501	1140.29	975.365	−20.292	−0.063	0.948	0.786296	1131.59	993.198	−20.442	−0.062
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.852838	1260.49	737.997	0.000	0.000	0.000	0.850494	1249.83	752.709	0.000	0.000
0.053	0.849995	1251.21	751.490	−2.813	0.072	0.053	0.847617	1241.04	766.000	−3.235	0.077
0.107	0.847465	1241.84	765.151	−5.910	0.081	0.107	0.845068	1231.72	779.982	−6.239	0.089
0.211	0.842465	1227.92	787.242	−16.230	0.067	0.211	0.840054	1217.74	802.756	−16.314	0.077
0.321	0.836759	1215.14	809.370	−28.240	0.034	0.321	0.834342	1205.00	825.433	−28.238	0.046
0.399	0.832280	1205.68	826.545	−35.256	0.013	0.399	0.829867	1195.71	842.830	−35.361	0.024
0.502	0.825881	1194.10	849.183	−44.599	−0.031	0.502	0.823479	1184.23	865.915	−44.690	−0.020
0.592	0.819540	1182.66	872.389	−49.267	−0.060	0.592	0.817154	1172.92	889.527	−49.329	−0.050
0.708	0.810204	1166.97	906.330	−51.234	−0.094	0.708	0.807853	1157.52	923.870	−51.382	−0.085
0.801	0.801355	1151.85	940.553	−45.681	−0.095	0.801	0.799042	1142.65	958.526	−45.784	−0.089
0.904	0.789739	1132.95	986.495	−31.764	−0.076	0.904	0.787485	1124.07	1005.011	−31.758	−0.073
0.948	0.784079	1122.90	1011.482	−20.530	−0.061	0.948	0.781853	1114.26	1030.153	−20.556	−0.059
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.848146	1239.22	767.773	0.000	0.000	0.000	0.845794	1228.62	783.250	0.000	0.000
0.053	0.845234	1230.96	780.792	−3.741	0.083	0.053	0.842845	1220.95	795.896	−4.346	0.088
0.107	0.842665	1221.62	795.193	−6.564	0.098	0.107	0.840256	1211.59	810.731	−6.974	0.106
0.211	0.837633	1207.58	818.680	−16.392	0.089	0.211	0.835206	1197.48	834.968	−16.513	0.100
0.321	0.831915	1194.87	841.937	−28.224	0.058	0.321	0.829479	1184.74	858.912	−28.145	0.071
0.399	0.827441	1185.69	859.648	−35.379	0.037	0.399	0.825006	1175.72	876.870	−35.397	0.050
0.502	0.821064	1174.28	883.242	−44.658	−0.008	0.502	0.818635	1164.33	901.068	−44.528	0.005
0.592	0.814755	1163.18	907.150	−49.400	−0.039	0.592	0.812346	1153.57	925.062	−49.580	−0.027
0.708	0.805486	1147.94	942.114	−51.345	−0.076	0.708	0.803109	1138.45	960.722	−51.341	−0.067
0.801	0.796716	1133.51	976.890	−46.039	−0.083	0.801	0.794378	1124.36	995.777	−46.164	−0.076
0.904	0.785216	1115.23	1023.958	−31.888	−0.070	0.904	0.782937	1106.46	1043.282	−32.032	−0.066
0.948	0.779614	1105.66	1049.246	−20.737	−0.057	0.948	0.777368	1097.03	1068.898	−20.749	−0.055
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.843437	1218.01	799.182	0.000	0.000	0.000	0.841075	1207.31	815.695	0.000	0.000
0.053	0.840453	1210.95	811.398	−5.005	0.094	0.053	0.838061	1200.93	827.349	−5.792	0.099
0.107	0.837841	1201.52	826.754	−7.348	0.115	0.107	0.835421	1191.52	843.125	−7.947	0.124
0.211	0.832770	1187.47	851.588	−16.745	0.112	0.211	0.830327	1177.50	868.618	−17.132	0.124
0.321	0.827032	1174.90	875.943	−28.445	0.085	0.321	0.824576	1164.82	893.823	−28.454	0.099
0.399	0.822561	1165.87	894.400	−35.539	0.064	0.399	0.820105	1156.05	912.383	−35.778	0.079
0.502	0.816194	1154.42	919.346	−44.370	0.019	0.502	0.813744	1144.64	937.939	−44.442	0.033
0.592	0.809924	1143.91	943.565	−49.589	−0.015	0.592	0.807494	1134.41	962.322	−49.882	−0.003
0.708	0.800714	1129.04	979.724	−51.355	−0.057	0.708	0.798311	1119.62	999.279	−51.347	−0.046
0.801	0.792031	1115.31	1015.001	−46.359	−0.069	0.801	0.789673	1106.31	1034.663	−46.639	−0.061
0.904	0.780645	1097.63	1063.248	−31.935	−0.063	0.904	0.778339	1088.88	1083.605	−31.962	−0.058
0.948	0.775105	1088.45	1088.986	−20.722	−0.053	0.948	0.772831	1079.90	1109.554	−20.729	−0.051
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.838706	1196.60	832.707	0.000	0.000						
0.053	0.835650	1190.98	843.658	−6.666	0.105						
0.107	0.833006	1181.66	859.739	−8.690	0.132						
0.211	0.827892	1167.75	885.781	−17.666	0.135						
0.321	0.822121	1154.87	912.007	−28.324	0.114						
0.399	0.817655	1146.46	930.491	−35.976	0.093						
0.502	0.811321	1135.41	956.097	−44.924	0.045						
0.592	0.805072	1125.16	981.153	−49.983	0.010						
0.708	0.795937	1110.80	1018.239	−51.693	−0.037						
0.801	0.787316	1097.49	1054.508	−46.400	−0.053						
0.904	0.776032	1080.20	1104.363	−31.145	−0.052						
0.948	0.770553	1071.41	1130.540	−19.827	−0.046						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + Ethylbenzene											
			288.15 K						290.65 K		
0.000	0.871245	1360.73	619.892	0.000	0.000	0.000	0.869052	1349.91	631.458	0.000	0.000
0.050	0.869062	1348.00	633.242	−1.044	0.040	0.050	0.866847	1337.18	645.175	−0.904	0.043
0.112	0.866236	1339.32	643.569	−8.588	0.083	0.112	0.864009	1328.82	655.465	−8.766	0.089
0.198	0.862318	1329.48	656.098	−21.007	0.097	0.198	0.860077	1319.03	668.272	−21.300	0.105
0.333	0.855973	1313.13	677.524	−38.614	0.044	0.333	0.853725	1302.80	690.123	−39.097	0.052
0.417	0.851492	1301.36	693.465	−47.048	0.003	0.417	0.849249	1291.38	706.085	−47.895	0.010
0.509	0.845887	1288.68	711.865	−55.297	−0.033	0.509	0.843644	1278.73	724.908	−56.139	−0.026
0.601	0.839953	1275.72	731.534	−62.202	−0.113	0.601	0.837716	1265.61	745.252	−62.787	−0.107
0.713	0.830892	1259.44	758.753	−67.218	−0.154	0.713	0.828675	1249.99	772.330	−68.453	−0.150
0.803	0.821619	1239.71	791.935	−60.161	−0.137	0.803	0.819413	1230.77	805.644	−61.674	−0.133
0.897	0.809910	1216.44	834.415	−45.008	−0.100	0.897	0.807745	1207.65	848.875	−46.201	−0.099
0.952	0.801860	1197.61	869.502	−25.816	−0.065	0.952	0.799709	1189.00	884.513	−26.709	−0.064
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.866856	1339.40	643.032	0.000	0.000	0.000	0.864660	1328.86	654.932	0.000	0.000
0.050	0.864627	1326.62	657.171	−0.724	0.047	0.050	0.862406	1316.06	669.479	−0.573	0.051
0.112	0.861769	1318.41	667.587	−8.759	0.095	0.112	0.859524	1307.90	680.132	−8.691	0.103
0.198	0.857828	1308.65	680.695	−21.411	0.113	0.198	0.855573	1298.21	693.510	−21.518	0.121
0.333	0.851469	1292.50	703.024	−39.384	0.060	0.333	0.849204	1282.12	716.359	−39.670	0.070
0.417	0.846993	1281.26	719.193	−48.383	0.018	0.417	0.844728	1271.03	732.776	−48.857	0.027
0.509	0.841393	1268.78	738.293	−56.799	−0.019	0.509	0.839136	1258.73	752.147	−57.478	−0.011
0.601	0.835470	1255.63	759.182	−63.348	−0.101	0.601	0.833220	1245.63	773.503	−64.034	−0.094
0.713	0.826441	1240.44	786.388	−69.426	−0.144	0.713	0.824201	1230.87	800.834	−70.564	−0.138
0.803	0.817204	1221.70	819.861	−62.927	−0.130	0.803	0.814988	1212.58	834.503	−64.336	−0.126
0.897	0.805563	1198.69	863.946	−47.058	−0.097	0.897	0.803378	1189.68	879.467	−48.077	−0.095
0.952	0.797551	1180.35	899.953	−27.463	−0.064	0.952	0.795390	1171.57	915.975	−28.266	−0.063
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.862459	1318.36	667.104	0.000	0.000	0.000	0.860256	1307.90	679.553	0.000	0.000
0.050	0.860180	1305.64	681.968	−0.512	0.055	0.050	0.857953	1295.30	694.698	−0.479	0.059
0.112	0.857275	1296.98	693.447	−8.121	0.110	0.112	0.855021	1286.63	706.506	−8.069	0.118
0.198	0.853315	1287.86	706.567	−21.650	0.130	0.198	0.851049	1277.56	719.918	−21.737	0.139
0.333	0.846937	1271.85	729.923	−39.987	0.079	0.333	0.844660	1261.65	743.773	−40.250	0.089
0.417	0.842457	1260.89	746.617	−49.330	0.037	0.417	0.840179	1250.86	760.695	−49.787	0.046
0.509	0.836870	1248.78	766.249	−58.162	−0.002	0.509	0.834601	1238.86	780.686	−58.721	0.006
0.601	0.830960	1235.69	788.135	−64.661	−0.086	0.601	0.828691	1225.81	803.084	−65.167	−0.079
0.713	0.821952	1221.34	815.606	−71.622	−0.132	0.713	0.819694	1211.73	830.877	−72.365	−0.126
0.803	0.812764	1203.42	849.574	−65.560	−0.122	0.803	0.810530	1194.15	865.193	−66.406	−0.117
0.897	0.801185	1180.69	895.355	−48.968	−0.093	0.897	0.798983	1171.73	911.606	−49.655	−0.091
0.952	0.793222	1162.79	932.401	−28.902	−0.062	0.952	0.791045	1154.05	949.182	−29.333	−0.062
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.858047	1297.48	692.289	0.000	0.000	0.000	0.855837	1287.09	705.328	0.000	0.000
0.050	0.855719	1285.03	707.689	−0.476	0.063	0.050	0.853481	1274.77	721.012	−0.448	0.067
0.112	0.852760	1276.64	719.509	−8.365	0.126	0.112	0.850496	1266.67	732.826	−8.663	0.134
0.198	0.848776	1267.31	733.569	−21.821	0.149	0.198	0.846496	1257.13	747.506	−21.945	0.159
0.333	0.842373	1251.49	757.950	−40.490	0.100	0.333	0.840081	1241.36	772.473	−40.724	0.111
0.417	0.837896	1240.84	775.137	−50.188	0.056	0.417	0.835600	1230.85	789.935	−50.581	0.067
0.509	0.832320	1228.96	795.489	−59.226	0.015	0.509	0.830028	1219.12	810.614	−59.768	0.026
0.601	0.826417	1215.95	818.407	−65.616	−0.071	0.601	0.824130	1206.14	834.082	−66.083	−0.062
0.713	0.817428	1202.13	846.540	−73.036	−0.119	0.713	0.815153	1192.57	862.568	−73.726	−0.112
0.803	0.808289	1184.88	881.221	−67.170	−0.113	0.803	0.806036	1175.63	897.644	−67.930	−0.107
0.897	0.796776	1162.79	928.242	−50.287	−0.089	0.897	0.794558	1153.89	945.248	−50.953	−0.086
0.952	0.788861	1145.34	966.342	−29.719	−0.061	0.952	0.786668	1136.66	983.892	−30.124	−0.060
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.853622	1276.75	718.659	0.000	0.000	0.000	0.851407	1266.54	732.192	0.000	0.000
0.050	0.851238	1264.63	734.551	−0.502	0.071	0.050	0.848994	1254.54	748.387	−0.467	0.076
0.112	0.848224	1256.74	746.446	−8.961	0.143	0.112	0.845947	1246.90	760.315	−9.226	0.152
0.198	0.844209	1247.01	761.746	−22.076	0.170	0.198	0.841915	1236.96	776.284	−22.136	0.181
0.333	0.837779	1231.36	787.228	−41.051	0.123	0.333	0.835470	1221.37	802.370	−41.233	0.135
0.417	0.833294	1220.88	805.111	−50.931	0.079	0.417	0.830981	1210.95	820.647	−51.172	0.092
0.509	0.827727	1209.29	826.137	−60.257	0.036	0.509	0.825416	1199.51	842.014	−60.653	0.048
0.601	0.821833	1196.39	850.102	−66.558	−0.053	0.601	0.819526	1186.70	866.474	−66.954	−0.042
0.713	0.812865	1183.03	879.002	−74.372	−0.104	0.713	0.810568	1173.53	895.823	−74.919	−0.096
0.803	0.803773	1166.39	914.490	−68.640	−0.102	0.803	0.801496	1157.18	931.744	−69.239	−0.095
0.897	0.792331	1144.94	962.782	−51.472	−0.083	0.897	0.790091	1135.98	980.802	−51.814	−0.080
0.952	0.784464	1128.01	1001.846	−30.512	−0.058	0.952	0.782249	1119.38	1020.234	−30.782	−0.057
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.849186	1256.29	746.135	0.000	0.000	0.000	0.846964	1246.12	760.353	0.000	0.000
0.050	0.846743	1244.52	762.508	−0.565	0.081	0.050	0.844491	1234.54	776.953	−0.622	0.085
0.112	0.843665	1237.17	774.410	−9.693	0.162	0.112	0.841373	1227.50	788.803	−10.152	0.172
0.198	0.839613	1226.94	791.178	−22.285	0.193	0.198	0.837300	1216.94	806.456	−22.348	0.206
0.333	0.833150	1211.42	817.876	−41.521	0.149	0.333	0.830825	1201.50	833.764	−41.740	0.162
0.417	0.828657	1201.06	836.557	−51.524	0.105	0.417	0.826324	1191.20	852.865	−51.802	0.118
0.509	0.823096	1189.77	858.269	−61.172	0.059	0.509	0.820763	1180.04	874.961	−61.588	0.072
0.601	0.817207	1177.04	883.254	−67.459	−0.032	0.601	0.814876	1167.50	900.315	−68.026	−0.020
0.713	0.808258	1164.05	913.076	−75.572	−0.087	0.713	0.805937	1154.60	930.756	−76.153	−0.077
0.803	0.799209	1147.99	949.431	−69.960	−0.089	0.803	0.796909	1138.83	967.550	−70.615	−0.082
0.897	0.787840	1127.04	999.271	−52.278	−0.076	0.897	0.785579	1118.15	1018.146	−52.714	−0.073
0.952	0.780023	1110.76	1039.088	−31.168	−0.055	0.952	0.777786	1102.14	1058.440	−31.437	−0.053
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.844741	1236.06	774.814	0.000	0.000	0.000	0.842518	1226.09	789.544	0.000	0.000
0.050	0.842234	1224.60	791.733	−0.592	0.091	0.050	0.839991	1214.70	806.840	−0.517	0.094
0.112	0.839075	1217.88	803.508	−10.558	0.184	0.112	0.836768	1208.32	818.523	−10.949	0.196
0.198	0.834988	1206.96	822.118	−22.299	0.219	0.198	0.832667	1196.99	838.200	−22.147	0.234
0.333	0.828490	1191.61	850.050	−41.853	0.177	0.333	0.826147	1181.75	866.745	−41.906	0.192
0.417	0.823977	1181.34	869.631	−51.926	0.133	0.417	0.82162	1171.47	886.884	−51.934	0.150
0.509	0.818420	1170.35	892.056	−61.920	0.086	0.509	0.816065	1160.65	909.647	−62.149	0.101
0.601	0.812533	1157.96	917.850	−68.454	−0.008	0.601	0.810178	1148.51	935.729	−68.952	0.005
0.713	0.803602	1145.16	948.914	−76.608	−0.067	0.713	0.801257	1135.76	967.509	−77.064	−0.056
0.803	0.794598	1129.66	986.182	−71.122	−0.074	0.803	0.792272	1120.53	1005.261	−71.644	−0.066
0.897	0.783309	1109.32	1037.417	−53.132	−0.069	0.897	0.781024	1100.48	1057.234	−53.488	−0.065
0.952	0.775540	1093.56	1078.228	−31.659	−0.051	0.952	0.773285	1084.98	1098.543	−31.851	−0.049
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.840306	1216.34	804.364	0.000	0.000						
0.050	0.837722	1205.79	821.026	−1.422	0.103						
0.112	0.834455	1198.81	833.866	−11.033	0.212						
0.198	0.830348	1188.00	853.310	−22.932	0.249						
0.333	0.823811	1171.93	883.831	−41.449	0.209						
0.417	0.819248	1161.56	904.693	−51.210	0.170						
0.509	0.813708	1150.96	927.707	−61.675	0.118						
0.601	0.807819	1139.23	953.813	−68.954	0.021						
0.713	0.798891	1126.31	986.726	−76.538	−0.041						
0.803	0.789946	1112.00	1023.748	−72.338	−0.056						
0.897	0.778718	1092.00	1076.898	−53.520	−0.057						
0.952	0.771030	1076.90	1118.351	−32.037	−0.046						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + Isooctane											
			288.15 K						290.65 K		
0.000	0.695948	1124.31	1136.714	0.000	0.000	0.000	0.693910	1113.83	1161.606	0.000	0.000
0.053	0.697898	1123.96	1134.244	9.646	−0.010	0.053	0.695811	1113.09	1159.974	10.950	0.000
0.108	0.699527	1120.89	1137.809	25.764	0.098	0.108	0.697433	1110.01	1163.707	27.720	0.109
0.191	0.702166	1118.02	1139.360	46.120	0.268	0.191	0.700071	1107.58	1164.415	47.957	0.280
0.296	0.706921	1118.00	1131.737	62.347	0.312	0.296	0.704817	1107.49	1156.762	65.074	0.323
0.398	0.712526	1119.12	1120.588	74.577	0.336	0.398	0.710401	1108.47	1145.641	78.232	0.349
0.504	0.720288	1121.13	1104.541	82.481	0.225	0.504	0.718157	1110.65	1128.824	86.289	0.236
0.623	0.730923	1125.53	1079.976	85.025	0.139	0.623	0.728796	1115.31	1103.069	88.688	0.146
0.701	0.739308	1129.78	1059.710	82.633	0.116	0.701	0.737177	1119.75	1081.897	86.080	0.122
0.805	0.753138	1138.93	1023.603	70.194	0.087	0.805	0.751001	1129.28	1044.134	72.897	0.091
0.907	0.771213	1154.51	972.815	42.605	0.044	0.907	0.769081	1145.34	991.195	44.050	0.046
0.950	0.780803	1163.26	946.466	26.027	0.017	0.950	0.778673	1154.28	963.879	26.882	0.017
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.691861	1103.30	1187.391	0.000	0.000	0.000	0.689809	1092.66	1214.230	0.000	0.000
0.053	0.693717	1102.40	1186.149	11.839	0.010	0.053	0.691617	1091.53	1213.565	12.936	0.021
0.108	0.695334	1099.29	1190.096	29.338	0.120	0.108	0.693231	1088.60	1217.266	30.727	0.131
0.191	0.697960	1096.91	1190.769	50.314	0.293	0.191	0.695845	1086.25	1217.946	52.517	0.306
0.296	0.702694	1096.97	1182.617	67.913	0.337	0.296	0.700562	1086.38	1209.456	70.801	0.351
0.398	0.708247	1097.93	1171.294	81.830	0.366	0.398	0.706102	1087.40	1197.716	85.305	0.381
0.504	0.716018	1100.34	1153.512	89.907	0.247	0.504	0.713873	1090.00	1179.033	93.509	0.258
0.623	0.726640	1105.21	1126.655	92.318	0.157	0.623	0.724476	1095.08	1151.024	95.931	0.168
0.701	0.735034	1109.87	1104.456	89.417	0.129	0.701	0.732876	1099.96	1127.757	92.731	0.137
0.805	0.748854	1119.77	1064.989	75.504	0.096	0.805	0.746695	1110.19	1086.581	78.123	0.101
0.907	0.766942	1136.22	1009.980	45.540	0.048	0.907	0.764793	1127.08	1029.311	46.895	0.050
0.950	0.776537	1145.47	981.455	27.565	0.018	0.950	0.774392	1136.57	999.647	28.200	0.019
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.687749	1082.20	1241.524	0.000	0.000	0.000	0.685687	1071.72	1269.730	0.000	0.000
0.053	0.689510	1080.69	1241.816	14.425	0.031	0.053	0.687381	1069.76	1271.246	16.222	0.047
0.108	0.691113	1077.77	1245.658	32.908	0.144	0.108	0.688988	1067.08	1274.660	34.870	0.158
0.191	0.693721	1075.66	1245.848	55.034	0.319	0.191	0.691588	1065.14	1274.498	57.531	0.334
0.296	0.698423	1075.85	1237.024	74.029	0.366	0.296	0.696276	1065.39	1265.323	77.303	0.381
0.398	0.703952	1076.95	1224.802	89.077	0.395	0.398	0.701794	1066.55	1252.645	92.999	0.410
0.504	0.711707	1079.71	1205.270	97.483	0.272	0.504	0.709538	1069.22	1232.793	102.217	0.286
0.623	0.722326	1084.86	1176.303	100.137	0.176	0.623	0.720181	1074.61	1202.421	104.746	0.182
0.701	0.730712	1090.07	1151.715	96.399	0.145	0.701	0.728554	1080.07	1176.615	100.635	0.151
0.805	0.744534	1100.61	1108.788	81.079	0.106	0.805	0.742373	1090.90	1131.900	84.646	0.111
0.907	0.762645	1118.02	1049.007	48.357	0.052	0.907	0.760486	1108.97	1069.225	50.126	0.054
0.950	0.772241	1127.63	1018.389	29.137	0.020	0.950	0.770082	1118.78	1037.465	30.226	0.021
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.683618	1061.30	1298.704	0.000	0.000	0.000	0.681542	1050.89	1328.596	0.000	0.000
0.053	0.685240	1058.87	1301.583	18.180	0.063	0.053	0.683080	1047.94	1333.078	20.405	0.083
0.108	0.686858	1056.50	1304.350	36.798	0.171	0.108	0.684719	1045.99	1334.850	38.674	0.186
0.191	0.689444	1054.66	1303.995	60.191	0.350	0.191	0.687292	1044.19	1334.442	62.979	0.367
0.296	0.694118	1054.97	1294.454	80.769	0.398	0.296	0.691948	1044.53	1324.600	84.481	0.416
0.398	0.699623	1056.17	1281.351	97.190	0.427	0.398	0.697441	1045.83	1310.902	101.507	0.445
0.504	0.707338	1058.66	1261.421	107.506	0.304	0.504	0.705144	1048.42	1290.184	112.265	0.320
0.623	0.717970	1064.63	1228.843	109.161	0.198	0.623	0.715748	1054.68	1256.025	113.733	0.214
0.701	0.726343	1070.29	1201.864	104.756	0.164	0.701	0.724117	1060.53	1227.850	109.049	0.178
0.805	0.740183	1081.43	1155.218	88.000	0.118	0.805	0.737980	1072.03	1179.075	91.379	0.126
0.907	0.758295	1099.66	1090.548	52.625	0.058	0.907	0.756111	1090.66	1111.823	54.613	0.061
0.950	0.767918	1109.99	1056.932	31.348	0.022	0.950	0.765731	1101.09	1077.155	32.786	0.024
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.679459	1040.53	1359.338	0.000	0.000	0.000	0.677373	1030.22	1390.952	0.000	0.000
0.053	0.680920	1037.23	1365.066	22.298	0.101	0.053	0.678759	1026.76	1397.483	23.777	0.119
0.108	0.682570	1035.53	1366.241	40.639	0.201	0.108	0.680413	1025.14	1398.495	42.655	0.217
0.191	0.685130	1033.78	1365.749	65.863	0.384	0.191	0.682957	1023.39	1398.055	68.982	0.403
0.296	0.689769	1034.18	1355.514	88.246	0.435	0.296	0.687576	1023.83	1387.470	92.344	0.455
0.398	0.695247	1035.54	1341.304	106.007	0.464	0.398	0.693042	1025.33	1372.502	110.652	0.484
0.504	0.702937	1038.22	1319.790	117.248	0.337	0.504	0.700717	1028.12	1350.112	122.353	0.356
0.623	0.713512	1044.74	1284.051	118.582	0.231	0.623	0.711264	1034.91	1312.696	123.522	0.249
0.701	0.721881	1050.84	1254.473	113.449	0.192	0.701	0.719632	1041.23	1281.729	117.998	0.208
0.805	0.735764	1062.67	1203.551	94.896	0.134	0.805	0.733536	1053.40	1228.547	98.505	0.143
0.907	0.753917	1081.70	1133.608	56.677	0.065	0.907	0.751713	1072.82	1155.831	58.807	0.068
0.950	0.763520	1091.99	1098.354	34.786	0.028	0.950	0.761324	1083.35	1119.162	36.046	0.030
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.675278	1019.94	1423.535	0.000	0.000	0.000	0.673177	1009.71	1457.060	0.000	0.000
0.053	0.676567	1016.16	1431.413	25.820	0.143	0.053	0.674376	1005.71	1466.062	27.670	0.165
0.108	0.678243	1014.72	1431.931	44.926	0.235	0.108	0.676064	1004.35	1466.365	47.312	0.253
0.191	0.680772	1013.04	1431.348	72.189	0.423	0.191	0.678575	1002.74	1465.634	75.554	0.445
0.296	0.685386	1013.71	1419.833	95.993	0.474	0.296	0.683162	1003.36	1453.994	100.661	0.498
0.398	0.690819	1015.05	1404.950	115.728	0.506	0.398	0.688587	1004.84	1438.293	120.979	0.529
0.504	0.698482	1017.93	1381.685	127.931	0.376	0.504	0.696229	1007.77	1414.246	133.834	0.397
0.623	0.708999	1025.02	1342.424	128.813	0.269	0.623	0.706723	1015.19	1372.954	134.308	0.289
0.701	0.717357	1031.56	1310.013	122.872	0.225	0.701	0.715077	1021.96	1338.996	127.891	0.243
0.805	0.731293	1044.07	1254.438	102.345	0.153	0.805	0.729041	1034.80	1280.959	106.319	0.163
0.907	0.749493	1063.87	1178.841	61.100	0.073	0.907	0.747259	1054.97	1202.399	63.500	0.077
0.950	0.759112	1074.66	1140.649	37.377	0.032	0.950	0.756888	1066.02	1162.620	38.775	0.035
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.671069	999.53	1491.561	0.000	0.000	0.000	0.668954	989.37	1527.166	0.000	0.000
0.053	0.672202	995.61	1500.796	28.659	0.182	0.053	0.670039	985.77	1535.850	28.896	0.194
0.108	0.673873	994.14	1501.505	49.491	0.273	0.108	0.671639	983.53	1539.178	53.164	0.302
0.191	0.676362	992.42	1501.170	79.303	0.469	0.191	0.674136	982.12	1537.883	83.240	0.494
0.296	0.680922	993.01	1489.345	105.714	0.525	0.296	0.678665	982.66	1525.942	111.086	0.554
0.398	0.686344	994.77	1472.356	126.204	0.552	0.398	0.684089	984.74	1507.455	131.599	0.577
0.504	0.693968	997.76	1447.466	139.711	0.420	0.504	0.691714	988.03	1480.925	145.025	0.440
0.623	0.704438	1005.49	1404.112	139.816	0.310	0.623	0.702129	995.84	1436.164	145.486	0.333
0.701	0.712789	1012.49	1368.540	132.901	0.260	0.701	0.710464	1003.10	1398.845	137.986	0.282
0.805	0.726775	1025.59	1308.135	110.439	0.174	0.805	0.724492	1016.43	1336.015	114.640	0.186
0.907	0.745014	1046.14	1226.467	65.962	0.082	0.907	0.742777	1037.58	1250.542	67.866	0.086
0.950	0.754658	1057.50	1184.920	40.079	0.037	0.950	0.752445	1049.39	1206.845	40.469	0.037
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.666832	979.25	1563.855	0.000	0.000						
0.053	0.667911	976.40	1570.456	27.689	0.196						
0.108	0.669485	974.21	1573.816	52.894	0.310						
0.191	0.671898	971.82	1575.887	87.694	0.521						
0.296	0.676397	972.35	1563.699	117.015	0.584						
0.398	0.681832	974.90	1543.130	137.134	0.603						
0.504	0.689486	978.83	1513.770	149.460	0.456						
0.623	0.699782	986.42	1468.634	151.503	0.363						
0.701	0.708091	993.96	1429.464	143.443	0.312						
0.805	0.722207	1007.46	1364.215	119.387	0.200						
0.907	0.740572	1029.56	1273.883	69.429	0.088						
0.950	0.750233	1041.43	1228.977	41.529	0.039						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + *p*-Xylene											
			288.15 K						290.65 K		
0.000	0.865354	1347.94	636.015	0.000	0.000	0.000	0.863184	1336.86	648.224	0.000	0.000
0.058	0.862991	1338.54	646.742	−5.011	0.048	0.058	0.860798	1328.25	658.475	−5.712	0.051
0.117	0.860771	1328.95	657.802	−10.179	0.047	0.117	0.858564	1318.59	669.897	−10.751	0.052
0.200	0.857501	1319.16	670.148	−20.417	0.036	0.200	0.855279	1308.68	682.693	−20.862	0.043
0.305	0.853017	1313.31	679.685	−39.685	−0.001	0.305	0.850785	1302.49	692.837	−39.936	0.007
0.419	0.847618	1297.87	700.386	−49.920	−0.054	0.419	0.845384	1287.68	713.395	−50.757	−0.047
0.503	0.842985	1287.00	716.181	−57.283	−0.093	0.503	0.840748	1276.46	729.995	−57.647	−0.086
0.601	0.836737	1277.36	732.461	−67.692	−0.123	0.601	0.834503	1267.31	746.116	−68.596	−0.116
0.710	0.829000	1259.39	760.545	−69.389	−0.199	0.710	0.826776	1249.54	774.661	−70.259	−0.193
0.804	0.819837	1239.92	793.387	−62.092	−0.154	0.804	0.817632	1230.26	808.069	−62.762	−0.149
0.902	0.808190	1219.00	832.682	−49.665	−0.093	0.902	0.806017	1209.40	848.234	−49.850	−0.091
0.951	0.801450	1204.50	860.023	−35.568	−0.054	0.951	0.799297	1195.28	875.694	−35.823	−0.053
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.861015	1326.13	660.413	0.000	0.000	0.000	0.858846	1315.60	672.726	0.000	0.000
0.058	0.858601	1318.04	670.427	−6.194	0.055	0.058	0.856402	1307.83	682.684	−6.524	0.060
0.117	0.856354	1308.34	682.190	−11.143	0.058	0.117	0.854136	1298.14	694.752	−11.450	0.065
0.200	0.853052	1298.37	695.389	−21.202	0.051	0.200	0.850819	1288.17	708.299	−21.554	0.060
0.305	0.848549	1291.92	706.077	−40.179	0.016	0.305	0.846305	1281.32	719.711	−40.310	0.026
0.419	0.843144	1277.53	726.701	−51.413	−0.038	0.419	0.840895	1267.26	740.503	−51.915	−0.029
0.503	0.838506	1266.27	743.774	−58.189	−0.077	0.503	0.836259	1256.05	757.958	−58.712	−0.069
0.601	0.832264	1257.26	760.131	−69.317	−0.109	0.601	0.830016	1247.02	774.759	−69.861	−0.100
0.710	0.824548	1239.74	789.083	−71.035	−0.187	0.710	0.822310	1229.77	804.112	−71.697	−0.181
0.804	0.815422	1220.65	823.067	−63.358	−0.145	0.804	0.813205	1210.87	838.697	−63.865	−0.140
0.902	0.803839	1199.78	864.227	−49.868	−0.089	0.902	0.801651	1190.01	880.873	−49.826	−0.086
0.951	0.797137	1186.02	891.832	−35.901	−0.052	0.951	0.794974	1176.56	908.697	−35.872	−0.051
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.856675	1305.39	685.024	0.000	0.000	0.000	0.854501	1295.34	697.463	0.000	0.000
0.058	0.854197	1297.64	695.238	−6.556	0.065	0.058	0.851990	1287.61	707.941	−6.582	0.070
0.117	0.851916	1287.93	707.650	−11.436	0.072	0.117	0.849692	1277.82	720.774	−11.338	0.080
0.200	0.848583	1278.04	721.468	−21.684	0.068	0.200	0.846340	1267.99	734.892	−21.700	0.078
0.305	0.844055	1270.83	733.592	−40.256	0.036	0.305	0.841799	1260.36	747.829	−39.987	0.046
0.419	0.838642	1256.98	754.687	−52.126	−0.019	0.419	0.836380	1246.74	769.209	−52.140	−0.009
0.503	0.834001	1245.87	772.481	−59.008	−0.059	0.503	0.831739	1235.73	787.346	−59.105	−0.050
0.601	0.827764	1236.78	789.784	−70.144	−0.092	0.601	0.825501	1226.51	805.268	−70.113	−0.083
0.710	0.820065	1219.80	819.548	−72.116	−0.174	0.710	0.817813	1209.85	835.378	−72.285	−0.167
0.804	0.810978	1201.02	854.851	−64.034	−0.135	0.804	0.808747	1191.20	871.401	−63.951	−0.130
0.902	0.799459	1180.26	897.942	−49.573	−0.084	0.902	0.797259	1170.51	915.483	−48.992	−0.081
0.951	0.792804	1167.13	925.967	−35.660	−0.050	0.951	0.790624	1157.75	943.627	−35.203	−0.049
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.852326	1285.42	710.079	0.000	0.000	0.000	0.850148	1275.64	722.854	0.000	0.000
0.058	0.849778	1277.43	721.141	−6.295	0.076	0.058	0.847566	1267.48	734.420	−6.105	0.081
0.117	0.847464	1267.70	734.253	−11.081	0.087	0.117	0.845230	1257.64	748.019	−10.725	0.095
0.200	0.844091	1257.99	748.611	−21.630	0.088	0.200	0.841834	1248.04	762.635	−21.465	0.099
0.305	0.839536	1249.86	762.497	−39.514	0.057	0.305	0.837264	1239.91	776.886	−39.556	0.069
0.419	0.834109	1236.47	784.170	−51.959	0.002	0.419	0.831829	1226.23	799.507	−51.669	0.014
0.503	0.829465	1225.60	802.610	−59.060	−0.039	0.503	0.827182	1215.53	818.215	−58.961	−0.028
0.601	0.823230	1216.18	821.265	−69.839	−0.074	0.601	0.820949	1205.82	837.759	−69.382	−0.063
0.710	0.815549	1199.82	851.761	−72.189	−0.159	0.710	0.813276	1189.79	868.603	−71.975	−0.151
0.804	0.806504	1181.36	888.442	−63.681	−0.125	0.804	0.804250	1171.55	905.915	−63.344	−0.118
0.902	0.795050	1160.76	933.514	−48.241	−0.078	0.902	0.792831	1150.98	952.103	−47.322	−0.075
0.951	0.788439	1148.40	961.713	−34.648	−0.048	0.951	0.786243	1139.03	980.331	−33.963	−0.046
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.847969	1266.13	735.632	0.000	0.000	0.000	0.845784	1256.41	748.994	0.000	0.000
0.058	0.845346	1257.60	747.964	−5.674	0.087	0.058	0.843125	1247.82	761.735	−5.584	0.093
0.117	0.842992	1247.82	761.856	−10.347	0.104	0.117	0.840748	1238.29	775.692	−10.522	0.113
0.200	0.839572	1238.19	776.904	−21.135	0.110	0.200	0.837303	1228.36	791.528	−20.983	0.122
0.305	0.834983	1229.36	792.436	−38.559	0.082	0.305	0.832699	1219.29	807.789	−38.263	0.095
0.419	0.829541	1216.04	815.204	−51.183	0.027	0.419	0.827244	1205.83	831.370	−50.703	0.040
0.503	0.824890	1205.47	834.240	−58.641	−0.016	0.503	0.822588	1195.45	850.658	−58.380	−0.003
0.601	0.818657	1195.43	854.771	−68.643	−0.052	0.601	0.816356	1185.23	871.997	−68.116	−0.041
0.710	0.810994	1179.76	885.921	−71.565	−0.142	0.710	0.808698	1169.86	903.537	−71.254	−0.133
0.804	0.801987	1161.75	923.862	−62.848	−0.112	0.804	0.799712	1152.13	942.027	−62.507	−0.105
0.902	0.790603	1141.22	971.187	−46.262	−0.071	0.902	0.788364	1131.49	990.768	−45.051	−0.068
0.951	0.784036	1129.61	999.556	−33.044	−0.044	0.951	0.781823	1120.33	1019.060	−32.180	−0.042
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.843599	1246.85	762.490	0.000	0.000	0.000	0.841410	1237.60	775.945	0.000	0.000
0.058	0.840901	1238.08	775.814	−5.347	0.099	0.058	0.838671	1228.42	790.159	−4.828	0.105
0.117	0.838496	1228.86	789.758	−10.656	0.123	0.117	0.836238	1219.36	804.278	−10.344	0.133
0.200	0.835027	1218.58	806.476	−20.731	0.135	0.200	0.832743	1208.88	821.718	−20.229	0.148
0.305	0.830403	1209.24	823.543	−37.839	0.109	0.305	0.828100	1199.38	839.467	−37.334	0.123
0.419	0.824938	1195.71	847.866	−50.218	0.053	0.419	0.822619	1185.83	864.483	−49.749	0.068
0.503	0.820274	1185.48	867.466	−58.091	0.011	0.503	0.817951	1175.66	884.523	−57.729	0.025
0.601	0.814039	1174.72	890.197	−67.023	−0.028	0.601	0.811718	1164.37	908.684	−65.860	−0.016
0.710	0.806392	1159.73	922.019	−70.533	−0.123	0.710	0.804075	1149.77	940.766	−69.813	−0.112
0.804	0.797426	1142.29	961.074	−61.784	−0.097	0.804	0.795129	1132.66	980.310	−61.177	−0.089
0.902	0.786113	1121.78	1010.880	−43.854	−0.063	0.902	0.783851	1112.43	1030.911	−43.085	−0.059
0.951	0.779595	1110.78	1039.621	−30.825	−0.040	0.951	0.777360	1101.29	1060.656	−29.364	−0.038
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.839220	1228.14	790.002	0.000	0.000	0.000	0.837031	1220.47	802.052	0.000	0.000
0.058	0.836440	1218.82	804.796	−4.607	0.112	0.058	0.834203	1209.50	819.439	−2.519	0.119
0.117	0.833976	1209.94	819.066	−10.343	0.143	0.117	0.831707	1200.56	834.184	−8.298	0.155
0.200	0.830452	1199.28	837.229	−20.020	0.162	0.200	0.828152	1189.74	853.072	−17.974	0.177
0.305	0.825788	1189.47	855.903	−36.858	0.139	0.305	0.823469	1179.69	872.603	−34.876	0.155
0.419	0.820291	1175.75	881.865	−49.032	0.084	0.419	0.817954	1165.97	899.283	−47.324	0.101
0.503	0.815613	1165.79	902.143	−57.303	0.040	0.503	0.813268	1156.19	919.831	−56.067	0.056
0.601	0.809381	1154.46	927.020	−65.326	−0.002	0.601	0.807031	1144.55	945.889	−63.764	0.013
0.710	0.801743	1140.09	959.592	−69.468	−0.101	0.710	0.799401	1130.54	978.731	−68.590	−0.089
0.804	0.792818	1123.29	999.638	−60.913	−0.081	0.804	0.790494	1113.93	1019.496	−60.133	−0.071
0.902	0.781576	1102.94	1051.780	−41.893	−0.055	0.902	0.779289	1093.99	1072.197	−41.415	−0.049
0.951	0.775111	1092.12	1081.671	−28.328	−0.036	0.951	0.772852	1083.02	1103.140	−27.222	−0.033
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.834849	1211.00	816.780	0.000	0.000						
0.058	0.831972	1200.00	834.697	−2.307	0.127						
0.117	0.829441	1191.24	849.603	−8.254	0.168						
0.200	0.825856	1180.46	868.947	−17.931	0.193						
0.305	0.821149	1170.88	888.287	−35.608	0.173						
0.419	0.815619	1156.54	916.624	−47.023	0.119						
0.503	0.810930	1146.88	937.520	−55.886	0.074						
0.601	0.804680	1135.14	964.446	−63.255	0.030						
0.710	0.797054	1121.36	997.751	−68.221	−0.074						
0.804	0.788169	1105.01	1039.078	−59.719	−0.060						
0.902	0.777009	1085.55	1092.130	−41.194	−0.043						
0.951	0.770590	1074.47	1124.056	−26.286	−0.028						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + *m*-Xylene											
			288.15 K						290.65 K		
0.000	0.868459	1362.66	620.120	0.000	0.000	0.000	0.866318	1352.14	631.363	0.000	0.000
0.055	0.866066	1350.48	633.101	−2.790	0.054	0.055	0.863897	1340.19	644.474	−2.926	0.059
0.127	0.863188	1339.27	645.890	−11.054	0.055	0.127	0.861002	1328.83	657.744	−11.065	0.062
0.196	0.860286	1330.23	656.907	−19.730	0.055	0.196	0.858089	1319.91	668.927	−19.906	0.062
0.312	0.854889	1315.10	676.352	−33.852	0.039	0.312	0.852680	1304.83	688.820	−34.147	0.047
0.396	0.850583	1304.31	691.069	−43.453	0.014	0.396	0.848369	1294.10	703.849	−43.848	0.022
0.506	0.844162	1288.67	713.330	−52.891	−0.017	0.506	0.841946	1278.64	726.473	−53.458	−0.009
0.607	0.837189	1272.63	737.517	−58.028	−0.039	0.607	0.834977	1262.75	751.088	−58.662	−0.032
0.700	0.829788	1256.23	763.650	−58.626	−0.058	0.700	0.827579	1246.43	777.776	−59.156	−0.051
0.805	0.819701	1234.11	801.008	−51.649	−0.065	0.805	0.817511	1224.70	815.543	−52.282	−0.061
0.899	0.808607	1209.90	844.819	−35.015	−0.050	0.899	0.806438	1200.80	859.979	−35.482	−0.047
0.950	0.801518	1194.38	874.584	−20.047	−0.031	0.950	0.799366	1185.47	890.170	−20.337	−0.030
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.864177	1341.72	642.797	0.000	0.000	0.000	0.862035	1331.31	654.511	0.000	0.000
0.055	0.861724	1330.01	656.027	−3.079	0.063	0.055	0.859549	1319.85	667.852	−3.260	0.068
0.127	0.858811	1318.59	669.704	−11.174	0.068	0.127	0.856615	1308.35	681.972	−11.303	0.076
0.196	0.855885	1309.73	681.116	−20.127	0.070	0.196	0.853677	1299.55	693.618	−20.387	0.079
0.312	0.850463	1294.69	701.476	−34.481	0.057	0.312	0.848241	1284.55	714.461	−34.880	0.066
0.396	0.846148	1284.03	716.809	−44.298	0.031	0.396	0.843918	1273.95	730.121	−44.820	0.041
0.506	0.839721	1268.71	739.844	−54.044	0.000	0.506	0.837491	1258.80	753.540	−54.770	0.009
0.607	0.832754	1253.01	764.846	−59.367	−0.024	0.607	0.830526	1243.25	778.986	−60.193	−0.016
0.700	0.825366	1236.85	791.989	−59.868	−0.045	0.700	0.823145	1227.30	806.533	−60.786	−0.038
0.805	0.815313	1215.40	830.304	−52.972	−0.057	0.805	0.813109	1206.10	845.444	−53.857	−0.052
0.899	0.804266	1191.79	875.388	−35.992	−0.045	0.899	0.802085	1182.81	891.148	−36.761	−0.042
0.950	0.797209	1176.66	905.995	−20.688	−0.029	0.950	0.795047	1167.87	922.185	−21.301	−0.028
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.859890	1320.92	666.506	0.000	0.000	0.000	0.857742	1310.57	678.770	0.000	0.000
0.055	0.857369	1309.70	679.968	−3.430	0.073	0.055	0.855187	1299.63	692.308	−3.637	0.078
0.127	0.854415	1298.18	694.483	−11.465	0.084	0.127	0.852211	1288.08	707.241	−11.632	0.091
0.196	0.851462	1289.40	706.414	−20.625	0.088	0.196	0.849243	1279.31	719.476	−20.842	0.098
0.312	0.846012	1274.46	727.731	−35.261	0.076	0.312	0.843776	1264.38	741.340	−35.533	0.087
0.396	0.841682	1263.89	743.761	−45.278	0.051	0.396	0.839437	1253.89	757.693	−45.665	0.062
0.506	0.835253	1248.92	767.561	−55.430	0.018	0.506	0.833007	1239.09	781.890	−55.988	0.028
0.607	0.828290	1233.54	793.435	−60.964	−0.008	0.607	0.826045	1223.86	808.226	−61.586	0.001
0.700	0.820916	1217.76	821.444	−61.586	−0.031	0.700	0.818679	1208.27	836.678	−62.245	−0.024
0.805	0.810897	1196.86	860.890	−54.679	−0.047	0.805	0.808676	1187.63	876.724	−55.283	−0.042
0.899	0.799898	1173.85	907.278	−37.400	−0.040	0.899	0.797704	1164.92	923.775	−37.828	−0.037
0.950	0.792881	1159.11	938.734	−21.792	−0.027	0.950	0.790706	1150.40	955.624	−22.094	−0.025
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.855593	1300.27	691.299	0.000	0.000	0.000	0.853441	1290.00	704.121	0.000	0.000
0.055	0.853001	1289.58	704.943	−3.817	0.084	0.055	0.850810	1279.59	717.837	−4.039	0.090
0.127	0.849999	1278.03	720.277	−11.794	0.100	0.127	0.847785	1268.05	733.570	−12.008	0.109
0.196	0.847015	1269.23	732.872	−21.002	0.108	0.196	0.844783	1259.22	746.537	−21.211	0.119
0.312	0.841531	1254.37	755.229	−35.812	0.099	0.312	0.839278	1244.38	769.464	−36.076	0.111
0.396	0.837186	1243.93	771.945	−46.022	0.074	0.396	0.834924	1234.02	786.518	−46.400	0.086
0.506	0.830750	1229.27	796.590	−56.474	0.039	0.506	0.828484	1219.52	811.592	−57.013	0.051
0.607	0.823790	1214.21	823.372	−62.160	0.011	0.607	0.821528	1204.58	838.893	−62.727	0.021
0.700	0.816432	1198.81	852.274	−62.855	−0.016	0.700	0.814174	1189.38	868.243	−63.471	−0.007
0.805	0.806446	1178.43	892.929	−55.837	−0.036	0.805	0.804207	1169.28	909.484	−56.433	−0.030
0.899	0.795499	1156.04	940.621	−38.236	−0.034	0.899	0.793286	1147.19	957.854	−38.659	−0.030
0.950	0.788521	1141.71	972.916	−22.325	−0.024	0.950	0.786331	1133.05	990.596	−22.577	−0.022
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.851282	1279.79	717.215	0.000	0.000	0.000	0.849122	1269.59	730.639	0.000	0.000
0.055	0.848616	1269.64	731.017	−4.253	0.095	0.055	0.846417	1259.74	744.481	−4.513	0.101
0.127	0.845561	1258.11	747.167	−12.206	0.118	0.127	0.843334	1248.21	761.071	−12.426	0.127
0.196	0.842542	1249.23	760.543	−21.375	0.130	0.196	0.840294	1239.36	774.772	−21.644	0.142
0.312	0.837019	1234.46	783.990	−36.357	0.123	0.312	0.834748	1224.61	798.820	−36.663	0.137
0.396	0.832654	1224.14	801.444	−46.745	0.099	0.396	0.830373	1214.35	816.656	−47.132	0.112
0.506	0.826209	1209.79	826.971	−57.509	0.063	0.506	0.823924	1200.16	842.625	−58.055	0.076
0.607	0.819252	1195.03	854.722	−63.329	0.032	0.607	0.816967	1185.53	870.904	−63.904	0.044
0.700	0.811906	1179.98	884.596	−64.059	0.002	0.700	0.809628	1170.63	901.312	−64.608	0.012
0.805	0.801959	1160.16	926.429	−57.008	−0.023	0.805	0.799697	1151.06	943.797	−57.481	−0.016
0.899	0.791062	1138.35	975.524	−39.026	−0.027	0.899	0.788830	1129.55	993.586	−39.322	−0.023
0.950	0.784127	1124.42	1008.687	−22.804	−0.021	0.950	0.781917	1115.83	1027.172	−22.958	−0.019
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.846958	1259.46	744.337	0.000	0.000	0.000	0.844792	1249.33	758.396	0.000	0.000
0.055	0.844212	1249.86	758.273	−4.735	0.107	0.055	0.842004	1240.08	772.301	−5.085	0.113
0.127	0.841099	1238.36	775.281	−12.653	0.137	0.127	0.838857	1228.59	789.765	−12.971	0.148
0.196	0.838038	1229.44	789.445	−21.805	0.154	0.196	0.835776	1219.59	804.419	−22.030	0.167
0.312	0.832471	1214.76	814.048	−36.943	0.151	0.312	0.830185	1204.96	829.621	−37.247	0.165
0.396	0.828081	1204.51	832.351	−47.433	0.127	0.396	0.825781	1194.74	848.376	−47.776	0.142
0.506	0.821626	1190.49	858.765	−58.548	0.089	0.506	0.819320	1180.89	875.241	−59.081	0.104
0.607	0.814671	1176.03	887.526	−64.505	0.056	0.607	0.812364	1166.57	904.540	−65.091	0.068
0.700	0.807337	1161.29	918.467	−65.212	0.022	0.700	0.805036	1152.03	935.960	−65.860	0.033
0.805	0.797425	1141.98	961.597	−58.051	−0.009	0.805	0.795142	1132.99	979.723	−58.679	−0.001
0.899	0.786586	1120.77	1012.094	−39.730	−0.019	0.899	0.784331	1112.07	1030.947	−40.178	−0.015
0.950	0.779694	1107.28	1046.070	−23.273	−0.017	0.950	0.777463	1098.75	1065.424	−23.520	−0.015
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.842622	1239.28	772.731	0.000	0.000	0.000	0.840452	1229.26	787.408	0.000	0.000
0.055	0.839794	1230.30	786.693	−5.353	0.120	0.055	0.837578	1220.60	801.361	−5.696	0.127
0.127	0.836612	1218.81	804.644	−13.186	0.159	0.127	0.834359	1209.11	819.814	−13.473	0.171
0.196	0.833506	1209.81	819.704	−22.245	0.180	0.196	0.831227	1200.07	835.348	−22.474	0.195
0.312	0.827891	1195.28	845.449	−37.610	0.180	0.312	0.825589	1185.66	861.620	−38.023	0.197
0.396	0.823468	1185.05	864.729	−48.115	0.158	0.396	0.821145	1175.38	881.503	−48.440	0.176
0.506	0.817003	1171.38	892.033	−59.633	0.118	0.506	0.814676	1161.87	909.285	−60.151	0.134
0.607	0.810046	1157.20	921.878	−65.701	0.082	0.607	0.807720	1147.86	939.640	−66.331	0.096
0.700	0.802723	1142.74	953.980	−66.338	0.044	0.700	0.800393	1133.54	972.351	−66.925	0.057
0.805	0.792847	1123.98	998.374	−59.152	0.007	0.805	0.790542	1115.09	1017.314	−59.812	0.015
0.899	0.782063	1103.37	1050.306	−40.504	−0.010	0.899	0.779788	1094.77	1069.985	−41.001	−0.005
0.950	0.775220	1090.30	1085.133	−23.800	−0.012	0.950	0.772968	1081.88	1105.300	−24.122	−0.010
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.838289	1219.51	802.113	0.000	0.000						
0.055	0.835372	1211.02	816.239	−5.825	0.133						
0.127	0.832112	1199.53	835.211	−13.488	0.183						
0.196	0.828953	1190.51	851.146	−22.466	0.211						
0.312	0.823292	1176.22	877.948	−38.130	0.214						
0.396	0.818820	1165.85	898.517	−48.327	0.195						
0.506	0.812347	1152.52	926.748	−60.199	0.152						
0.607	0.805390	1138.69	957.597	−66.447	0.112						
0.700	0.798065	1124.46	991.000	−66.861	0.071						
0.805	0.788234	1106.33	1036.515	−59.781	0.026						
0.899	0.777511	1086.30	1089.918	−40.759	0.002						
0.950	0.770714	1073.61	1125.677	−23.721	−0.006						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + *o*-Xylene											
			288.15 K						290.65 K		
0.000	0.883360	1381.29	593.325	0.000	0.000	0.000	0.881265	1371.75	603.036	0.000	0.000
0.058	0.880412	1377.32	598.748	−12.967	0.046	0.058	0.878285	1367.65	608.716	−13.084	0.050
0.117	0.877668	1368.04	608.796	−21.335	0.041	0.117	0.875527	1357.90	619.434	−21.157	0.046
0.201	0.873395	1355.76	622.908	−33.847	0.031	0.201	0.871235	1345.55	633.965	−33.789	0.038
0.307	0.867577	1340.04	641.884	−48.392	−0.004	0.307	0.865399	1329.87	653.379	−48.576	0.005
0.447	0.858671	1318.98	669.417	−64.983	−0.052	0.447	0.856485	1308.98	681.419	−65.556	−0.045
0.506	0.854358	1309.26	682.823	−70.289	−0.072	0.506	0.852169	1299.32	695.092	−70.975	−0.065
0.600	0.846633	1292.05	707.532	−75.401	−0.099	0.600	0.844443	1282.24	720.263	−76.230	−0.092
0.697	0.837357	1271.58	738.588	−74.755	−0.110	0.697	0.835166	1261.96	751.858	−75.661	−0.104
0.804	0.825112	1245.11	781.757	−65.414	−0.116	0.804	0.822932	1235.74	795.760	−66.275	−0.112
0.899	0.811792	1216.83	831.947	−45.084	−0.091	0.899	0.809628	1207.72	846.802	−45.698	−0.088
0.952	0.803003	1197.48	868.453	−25.347	−0.062	0.952	0.800855	1188.59	883.857	−25.753	−0.061
1.000	0.793644	1177.30	909.076	0.000	0.000	1.000	0.791511	1168.57	925.196	0.000	0.000
			293.15 K						295.65 K		
0.000	0.879168	1362.16	613.016	0.000	0.000	0.000	0.877069	1351.83	623.910	0.000	0.000
0.058	0.876155	1357.60	619.263	−12.892	0.054	0.058	0.874020	1347.53	630.089	−13.320	0.059
0.117	0.873379	1347.87	630.233	−21.088	0.053	0.117	0.871227	1337.81	641.327	−21.608	0.059
0.201	0.869070	1335.47	645.174	−33.853	0.046	0.201	0.866900	1325.39	656.665	−34.498	0.054
0.307	0.863217	1319.90	664.964	−48.950	0.013	0.307	0.861030	1309.96	676.808	−49.896	0.022
0.447	0.854290	1299.08	693.622	−66.213	−0.036	0.447	0.852090	1289.17	706.145	−67.343	−0.027
0.506	0.849973	1289.46	707.586	−71.722	−0.057	0.506	0.847770	1279.64	720.355	−72.973	−0.048
0.600	0.842242	1272.57	733.162	−77.181	−0.085	0.600	0.840036	1262.85	746.446	−78.500	−0.077
0.697	0.832971	1252.48	765.294	−76.696	−0.098	0.697	0.830768	1242.97	779.110	−78.077	−0.091
0.804	0.820744	1226.50	809.948	−67.248	−0.108	0.804	0.818551	1217.25	824.508	−68.547	−0.103
0.899	0.807459	1198.74	861.846	−46.425	−0.086	0.899	0.805282	1189.73	877.314	−47.400	−0.083
0.952	0.798703	1179.80	899.493	−26.230	−0.060	0.952	0.796542	1171.02	915.509	−26.986	−0.059
1.000	0.789374	1159.90	941.621	0.000	0.000	1.000	0.787232	1151.09	958.691	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			298.15 K						300.65 K		
0.000	0.874968	1341.51	635.068	0.000	0.000	0.000	0.872865	1331.21	646.487	0.000	0.000
0.058	0.871883	1337.44	641.199	−13.725	0.064	0.058	0.869740	1327.33	652.609	−14.087	0.069
0.117	0.869072	1327.82	652.628	−22.182	0.066	0.117	0.866912	1317.87	664.171	−22.761	0.073
0.201	0.864723	1315.27	668.487	−35.068	0.063	0.201	0.862539	1305.18	680.582	−35.604	0.073
0.307	0.858835	1299.99	688.986	−50.764	0.032	0.307	0.856634	1290.07	701.420	−51.601	0.042
0.447	0.849881	1279.30	718.947	−68.446	−0.018	0.447	0.847667	1269.45	732.055	−69.452	−0.008
0.506	0.845558	1269.84	733.430	−74.167	−0.039	0.506	0.843338	1260.08	746.796	−75.272	−0.030
0.600	0.837823	1253.19	760.001	−79.795	−0.069	0.600	0.835601	1243.53	773.907	−80.930	−0.060
0.697	0.828555	1233.52	793.207	−79.423	−0.085	0.697	0.826336	1224.09	807.638	−80.614	−0.077
0.804	0.816351	1208.02	839.411	−69.744	−0.099	0.804	0.814142	1198.85	854.614	−70.810	−0.094
0.899	0.803099	1180.78	893.085	−48.311	−0.081	0.899	0.800909	1171.83	909.259	−48.976	−0.078
0.952	0.794379	1162.27	931.876	−27.627	−0.058	0.952	0.792205	1153.58	948.565	−28.098	−0.057
1.000	0.785082	1142.40	975.997	0.000	0.000	1.000	0.782926	1133.88	993.448	0.000	0.000
			303.15 K						305.65 K		
0.000	0.870759	1320.96	658.147	0.000	0.000	0.000	0.868650	1310.79	670.022	0.000	0.000
0.058	0.867592	1317.25	664.275	−14.436	0.075	0.058	0.865441	1307.41	675.988	−14.967	0.081
0.117	0.864747	1307.97	675.951	−23.355	0.081	0.117	0.862575	1298.10	687.997	−23.921	0.089
0.201	0.860345	1294.95	693.141	−35.936	0.083	0.201	0.858148	1285.05	705.664	−36.558	0.093
0.307	0.854425	1280.15	714.174	−52.387	0.053	0.307	0.852209	1270.34	727.133	−53.246	0.065
0.447	0.845442	1259.64	745.458	−70.446	0.003	0.447	0.843207	1249.85	759.189	−71.416	0.014
0.506	0.841108	1250.31	760.524	−76.304	−0.019	0.506	0.838872	1240.61	774.522	−77.382	−0.009
0.600	0.833367	1233.91	788.128	−82.047	−0.051	0.600	0.831128	1224.32	802.680	−83.169	−0.042
0.697	0.824107	1214.70	822.391	−81.789	−0.070	0.697	0.821868	1205.33	837.502	−82.961	−0.062
0.804	0.811924	1189.68	870.210	−71.798	−0.088	0.804	0.809697	1180.56	886.138	−72.831	−0.083
0.899	0.798710	1162.92	925.787	−49.612	−0.075	0.899	0.796501	1154.03	942.713	−50.245	−0.072
0.952	0.790024	1144.88	965.695	−28.457	−0.055	0.952	0.787834	1136.24	983.162	−28.884	−0.054
1.000	0.780763	1125.42	1011.234	0.000	0.000	1.000	0.778593	1116.98	1029.434	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			308.15 K						310.65 K		
0.000	0.866538	1300.66	682.158	0.000	0.000	0.000	0.864422	1290.59	694.541	0.000	0.000
0.058	0.863288	1297.58	687.980	−15.487	0.087	0.058	0.861129	1287.81	700.210	−16.021	0.093
0.117	0.860398	1288.31	700.261	−24.546	0.097	0.117	0.858217	1278.56	712.788	−25.163	0.106
0.201	0.855944	1275.19	718.464	−37.191	0.104	0.201	0.853733	1265.43	731.479	−37.871	0.116
0.307	0.849984	1260.55	740.405	−54.093	0.077	0.307	0.847754	1250.80	753.971	−54.915	0.089
0.447	0.840964	1240.10	773.231	−72.395	0.026	0.447	0.838712	1230.44	787.528	−73.398	0.039
0.506	0.836622	1230.94	788.855	−78.453	0.003	0.506	0.834365	1221.29	803.538	−79.458	0.015
0.600	0.828875	1214.82	817.499	−84.363	−0.031	0.600	0.826613	1205.34	832.681	−85.486	−0.020
0.697	0.819620	1195.98	852.982	−84.117	−0.053	0.697	0.817361	1186.69	868.783	−85.248	−0.044
0.804	0.807458	1171.47	902.439	−73.857	−0.076	0.804	0.805210	1162.46	919.041	−74.889	−0.070
0.899	0.794282	1145.18	960.014	−50.881	−0.068	0.899	0.792054	1136.34	977.752	−51.395	−0.064
0.952	0.785635	1127.62	1001.045	−29.282	−0.052	0.952	0.783427	1119.04	1019.319	−29.606	−0.051
1.000	0.776414	1108.58	1048.027	0.000	0.000	1.000	0.774228	1100.26	1066.941	0.000	0.000
			313.15 K						315.65 K		
0.000	0.862302	1280.61	707.142	0.000	0.000	0.000	0.860179	1270.55	720.158	0.000	0.000
0.058	0.858965	1278.04	712.747	−16.487	0.099	0.058	0.856797	1268.30	725.568	−17.082	0.105
0.117	0.856028	1268.79	725.659	−25.699	0.115	0.117	0.853836	1259.09	738.775	−26.400	0.124
0.201	0.851514	1255.66	744.842	−38.496	0.128	0.201	0.849288	1245.91	758.528	−39.207	0.140
0.307	0.845511	1241.03	767.920	−55.686	0.102	0.307	0.843259	1231.39	782.074	−56.659	0.116
0.447	0.836447	1220.70	802.313	−74.299	0.052	0.447	0.834151	1210.76	817.785	−74.915	0.069
0.506	0.832097	1211.71	818.519	−80.571	0.028	0.506	0.829817	1202.17	833.846	−81.739	0.041
0.600	0.824338	1195.78	848.383	−86.530	−0.008	0.600	0.822054	1186.31	864.377	−87.680	0.004
0.697	0.815090	1177.46	884.916	−86.526	−0.034	0.697	0.812810	1168.23	901.476	−87.773	−0.025
0.804	0.802950	1153.40	936.163	−75.916	−0.063	0.804	0.800679	1144.39	953.660	−76.964	−0.056
0.899	0.789815	1127.57	995.835	−52.114	−0.060	0.899	0.787561	1118.85	1014.313	−52.830	−0.056
0.952	0.781207	1110.49	1038.017	−30.077	−0.049	0.952	0.778978	1101.94	1057.204	−30.449	−0.047
1.000	0.772031	1091.89	1086.444	0.000	0.000	1.000	0.769823	1083.58	1106.336	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			318.15 K						320.65 K		
0.000	0.858054	1260.62	733.360	0.000	0.000	0.000	0.855927	1250.66	746.938	0.000	0.000
0.058	0.854626	1258.64	738.620	−17.645	0.111	0.058	0.852466	1249.26	751.653	−18.611	0.116
0.117	0.851636	1249.47	752.132	−27.070	0.133	0.117	0.849433	1239.87	765.806	−27.817	0.143
0.201	0.847061	1236.36	772.317	−40.043	0.152	0.201	0.844841	1227.12	786.051	−41.337	0.163
0.307	0.840999	1221.66	796.717	−57.394	0.131	0.307	0.838736	1212.23	811.343	−58.562	0.145
0.447	0.831888	1201.58	832.587	−76.480	0.081	0.447	0.829613	1192.42	847.746	−78.124	0.094
0.506	0.827526	1192.61	849.614	−82.759	0.055	0.506	0.825232	1183.29	865.449	−84.154	0.070
0.600	0.819756	1176.94	880.657	−88.857	0.017	0.600	0.817449	1167.62	897.297	−90.129	0.030
0.697	0.810519	1159.09	918.338	−89.050	−0.014	0.697	0.808215	1149.97	935.621	−90.375	−0.003
0.804	0.798397	1135.47	971.471	−78.050	−0.048	0.804	0.796103	1126.56	989.742	−79.160	−0.040
0.899	0.785297	1110.09	1033.355	−53.356	−0.051	0.899	0.783020	1101.31	1052.951	−53.824	−0.046
0.952	0.776738	1093.50	1076.683	−30.915	−0.045	0.952	0.774487	1085.08	1096.636	−31.408	−0.043
1.000	0.767605	1075.33	1126.623	0.000	0.000	1.000	0.765378	1067.09	1147.419	0.000	0.000
			323.15 K								
0.000	0.853803	1240.87	760.659	0.000	0.000						
0.058	0.850316	1240.09	764.739	−19.625	0.120						
0.117	0.847237	1230.44	779.604	−28.500	0.153						
0.201	0.842627	1217.98	799.990	−42.431	0.175						
0.307	0.836490	1203.08	825.943	−59.688	0.159						
0.447	0.827343	1183.39	863.095	−79.414	0.108						
0.506	0.822955	1174.32	881.152	−85.477	0.083						
0.600	0.815144	1158.49	914.073	−90.996	0.045						
0.697	0.805911	1141.01	953.090	−91.177	0.010						
0.804	0.793807	1117.82	1008.188	−79.686	−0.030						
0.899	0.780755	1092.94	1072.241	−54.122	−0.040						
0.952	0.772237	1076.82	1116.769	−31.212	−0.039						
1.000	0.763177	1059.32	1167.671	0.000	0.000						

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
Ethanol + tert-Butylalcohol											
			300.65 K						303.15 K		
0.000	0.777762	1108.98	1045.456	0.000	0.000	0.000	0.775212	1099.02	1067.993	0.000	0.000
0.053	0.778529	1116.12	1031.106	−11.598	−0.071	0.053	0.775922	1104.24	1056.951	−8.039	−0.063
0.137	0.779356	1121.81	1019.590	−18.742	−0.131	0.137	0.776939	1111.54	1041.749	−18.469	−0.144
0.201	0.779873	1125.06	1013.036	−21.948	−0.160	0.201	0.777518	1115.15	1034.244	−22.320	−0.177
0.294	0.780435	1127.69	1007.590	−22.593	−0.175	0.294	0.778150	1118.18	1027.811	−23.513	−0.197
0.395	0.780863	1128.86	1004.951	−19.979	−0.168	0.395	0.778641	1119.47	1024.797	−20.795	−0.191
0.505	0.781046	1129.17	1004.164	−15.019	−0.127	0.505	0.778872	1120.32	1022.939	−16.380	−0.150
0.602	0.781387	1129.65	1002.873	−11.281	−0.106	0.602	0.779240	1120.96	1021.289	−12.543	−0.127
0.702	0.781674	1130.04	1001.813	−7.154	−0.076	0.702	0.779540	1121.38	1020.131	−8.040	−0.093
0.794	0.782073	1130.99	999.621	−4.547	−0.057	0.794	0.779940	1122.46	1017.647	−5.285	−0.070
0.897	0.782583	1132.44	996.413	−2.400	−0.037	0.897	0.780439	1123.94	1014.320	−2.769	−0.044
0.943	0.782826	1133.33	994.539	−1.848	−0.028	0.943	0.780676	1124.84	1012.390	−2.052	−0.032
1.000	0.782926	1133.88	993.448	0.000	0.000	1.000	0.780763	1125.42	1011.234	0.000	0.000
			305.65 K						308.15 K		
0.000	0.772623	1088.33	1092.726	0.000	0.000	0.000	0.770015	1077.71	1118.142	0.000	0.000
0.053	0.773387	1093.58	1081.190	−8.187	−0.069	0.053	0.770827	1082.99	1106.099	−8.333	−0.073
0.137	0.774492	1101.22	1064.719	−19.337	−0.157	0.137	0.772010	1090.74	1088.766	−19.772	−0.168
0.201	0.775132	1105.22	1056.153	−23.828	−0.195	0.201	0.772709	1095.11	1079.117	−24.906	−0.211
0.294	0.775834	1108.54	1048.886	−25.252	−0.219	0.294	0.773496	1098.92	1070.557	−26.994	−0.240
0.395	0.776397	1110.31	1044.787	−22.960	−0.216	0.395	0.774127	1101.12	1065.414	−25.056	−0.240
0.505	0.776668	1111.29	1042.581	−18.171	−0.173	0.505	0.774455	1102.36	1062.568	−20.153	−0.197
0.602	0.777071	1112.16	1040.411	−14.222	−0.149	0.602	0.774886	1103.41	1059.957	−15.985	−0.170
0.702	0.777385	1112.55	1039.261	−9.059	−0.111	0.702	0.775224	1103.98	1058.401	−10.548	−0.129
0.794	0.777795	1113.96	1036.086	−6.394	−0.083	0.794	0.775635	1105.47	1054.991	−7.488	−0.096
0.897	0.778290	1115.46	1032.644	−3.319	−0.051	0.897	0.776124	1107.00	1051.414	−3.845	−0.058
0.943	0.778517	1116.37	1030.660	−2.351	−0.036	0.943	0.776347	1107.93	1049.348	−2.642	−0.040
1.000	0.778593	1116.98	1029.434	0.000	0.000	1.000	0.776414	1108.58	1048.027	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			310.65 K						313.15 K		
0.000	0.767391	1067.22	1144.13	0.000	0.000	0.000	0.764739	1056.73	1171.005	0.000	0.000
0.053	0.768242	1072.40	1131.849	−8.198	−0.077	0.053	0.765631	1061.93	1158.214	−8.317	−0.081
0.137	0.769508	1080.52	1113.067	−20.490	−0.179	0.137	0.766978	1070.28	1138.210	−21.212	−0.190
0.201	0.770269	1085.10	1102.600	−25.987	−0.227	0.201	0.767797	1075.05	1126.928	−27.049	−0.242
0.294	0.771132	1089.30	1092.890	−28.572	−0.261	0.294	0.768738	1079.64	1115.999	−30.173	−0.281
0.395	0.771834	1091.90	1086.702	−26.964	−0.264	0.395	0.769513	1082.67	1108.643	−28.988	−0.287
0.505	0.772217	1093.42	1083.145	−21.991	−0.220	0.505	0.769957	1084.44	1104.390	−23.897	−0.244
0.602	0.772686	1094.72	1079.918	−17.755	−0.192	0.602	0.770462	1085.94	1100.619	−19.492	−0.214
0.702	0.773045	1095.43	1078.018	−11.957	−0.147	0.702	0.770850	1086.86	1098.204	−13.474	−0.165
0.794	0.773463	1096.98	1074.393	−8.458	−0.110	0.794	0.771275	1088.47	1094.354	−9.519	−0.123
0.897	0.773949	1098.56	1070.632	−4.271	−0.065	0.897	0.771760	1090.12	1090.358	−4.808	−0.072
0.943	0.774168	1099.50	1068.499	−2.804	−0.043	0.943	0.771977	1091.09	1088.114	−3.109	−0.047
1.000	0.774228	1100.26	1066.941	0.000	0.000	1.000	0.772031	1091.89	1086.444	0.000	0.000
			315.65 K						318.15 K		
0.000	0.762054	1046.12	1199.089	0.000	0.000	0.000	0.759355	1035.66	1227.781	0.000	0.000
0.053	0.762997	1051.45	1185.496	−8.686	−0.086	0.053	0.760341	1041.12	1213.361	−9.068	−0.090
0.137	0.764418	1060.06	1164.148	−22.235	−0.202	0.137	0.761832	1049.95	1190.703	−23.221	−0.212
0.201	0.765294	1065.10	1151.837	−28.575	−0.258	0.201	0.762730	1054.46	1179.150	−28.261	−0.268
0.294	0.766317	1070.05	1139.681	−32.168	−0.302	0.294	0.763868	1060.36	1164.327	−33.746	−0.321
0.395	0.767171	1073.51	1131.086	−31.396	−0.311	0.395	0.764798	1064.24	1154.447	−33.410	−0.334
0.505	0.767673	1075.51	1126.146	−26.086	−0.268	0.505	0.765362	1066.49	1148.734	−27.944	−0.290
0.602	0.768217	1077.19	1121.841	−21.423	−0.235	0.602	0.765952	1068.40	1143.749	−23.149	−0.257
0.702	0.768635	1078.37	1118.779	−15.235	−0.184	0.702	0.766360	1069.29	1141.238	−15.571	−0.198
0.794	0.769069	1079.99	1114.796	−10.658	−0.136	0.794	0.766851	1071.47	1135.871	−11.602	−0.150
0.897	0.769559	1081.78	1110.402	−5.501	−0.079	0.897	0.767343	1073.37	1131.127	−5.929	−0.086
0.943	0.769774	1082.77	1108.063	−3.516	−0.052	0.943	0.767557	1074.39	1128.666	−3.674	−0.055
1.000	0.769823	1083.58	1106.336	0.000	0.000	1.000	0.767605	1075.33	1126.623	0.000	0.000

(*Continued*)

Table A1. Continued.

x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})	x	ρ (g cm^{-3})	u (m s^{-1})	κ_S (TPa^{-1})	$\delta\kappa_S$ (TPa^{-1})	V^E (cm^3 mol^{-1})
			320.65 K						323.15 K		
0.000	0.756633	1025.17	1257.543	0.000	0.000	0.000	0.753891	1014.76	1288.145	0.000	0.000
0.053	0.757661	1030.82	1242.108	−9.609	−0.093	0.053	0.754973	1020.75	1271.247	−10.525	−0.099
0.137	0.759223	1039.84	1218.141	−24.317	−0.222	0.137	0.756621	1030.14	1245.458	−26.184	−0.235
0.201	0.760188	1044.73	1205.233	−30.135	−0.283	0.201	0.757676	1035.65	1230.525	−33.361	−0.304
0.294	0.761372	1050.38	1190.447	−34.755	−0.338	0.294	0.758923	1041.44	1214.881	−37.884	−0.361
0.395	0.762400	1055.04	1178.363	−35.717	−0.356	0.395	0.759988	1045.96	1202.716	−37.882	−0.378
0.505	0.763028	1057.44	1172.055	−29.856	−0.313	0.505	0.760711	1048.95	1194.733	−32.551	−0.337
0.602	0.763655	1059.44	1166.675	−24.588	−0.277	0.602	0.761398	1051.39	1188.121	−27.515	−0.301
0.702	0.764137	1061.19	1162.097	−18.183	−0.218	0.702	0.761917	1053.30	1183.009	−20.611	−0.239
0.794	0.764611	1062.92	1157.599	−12.517	−0.163	0.794	0.762386	1054.79	1178.944	−13.558	−0.176
0.897	0.765120	1065.11	1152.077	−6.700	−0.094	0.897	0.762907	1057.14	1172.906	−7.190	−0.101
0.943	0.765328	1066.10	1149.626	−4.017	−0.059	0.943	0.763108	1058.06	1170.559	−3.920	−0.062
1.000	0.765378	1067.09	1147.419	0.000	0.000	1.000	0.763177	1059.32	1167.671	0.000	0.000