

Supplementary Material on:

Vapor Liquid Equilibria of Binary Mixtures of

1-Butyl-3-methylimidazolium Triflate

(C₄mimTfO) and Molecular Solvents:

n-Alkyl Alcohols and Water

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Supporting Information

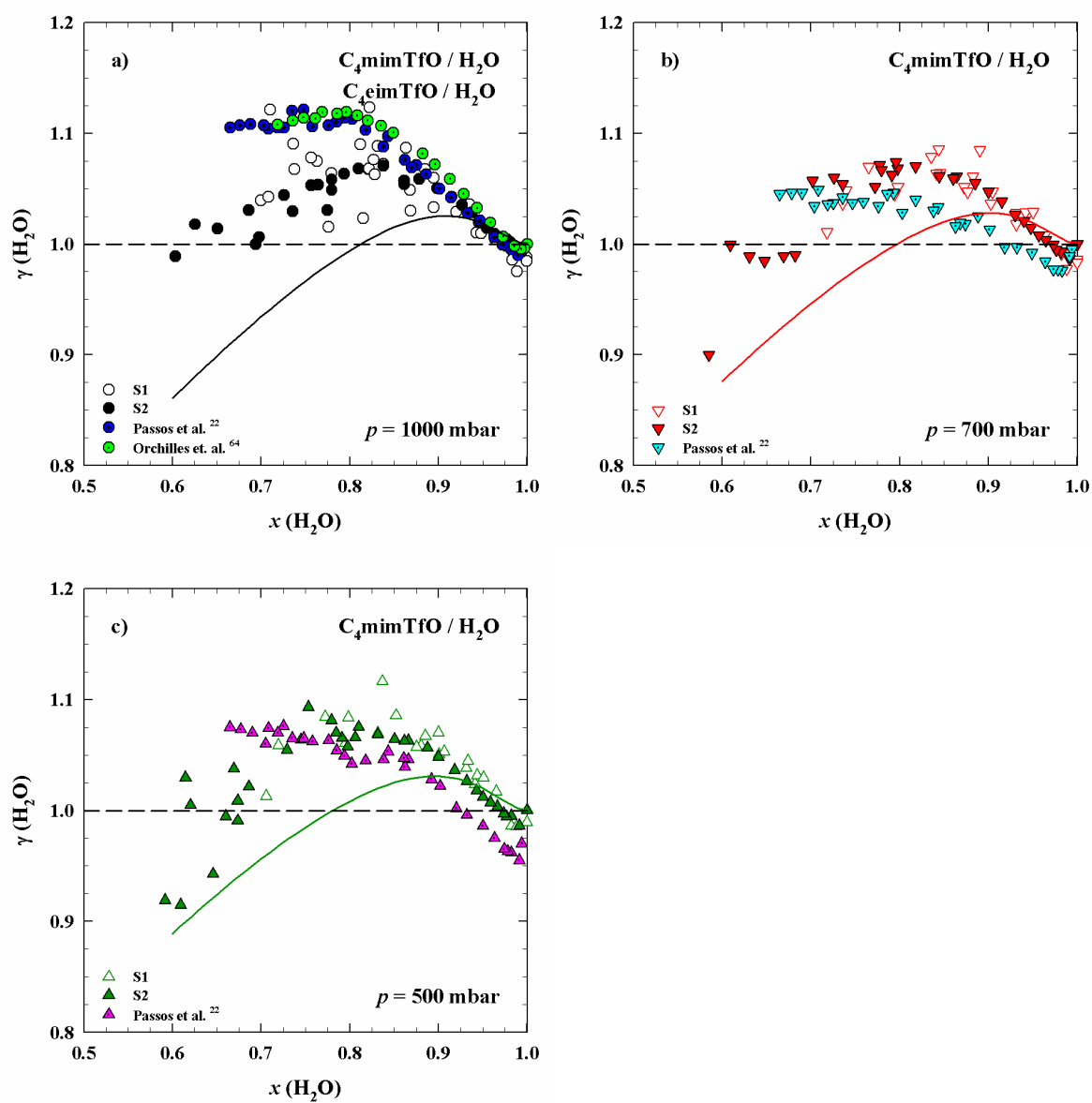


Fig. S1: Activity coefficients of the binary mixture $\text{C}_4\text{mimTfO} / \text{H}_2\text{O}$ with data from set-up S1 and S2, Passos et al. ²², and isobaric VLE data of the binary mixture $\text{C}_4\text{eimTfO} / \text{H}_2\text{O}$ from Orchilles et al. ⁶⁴. The solid lines represent the description by soft-SAFT EoS.

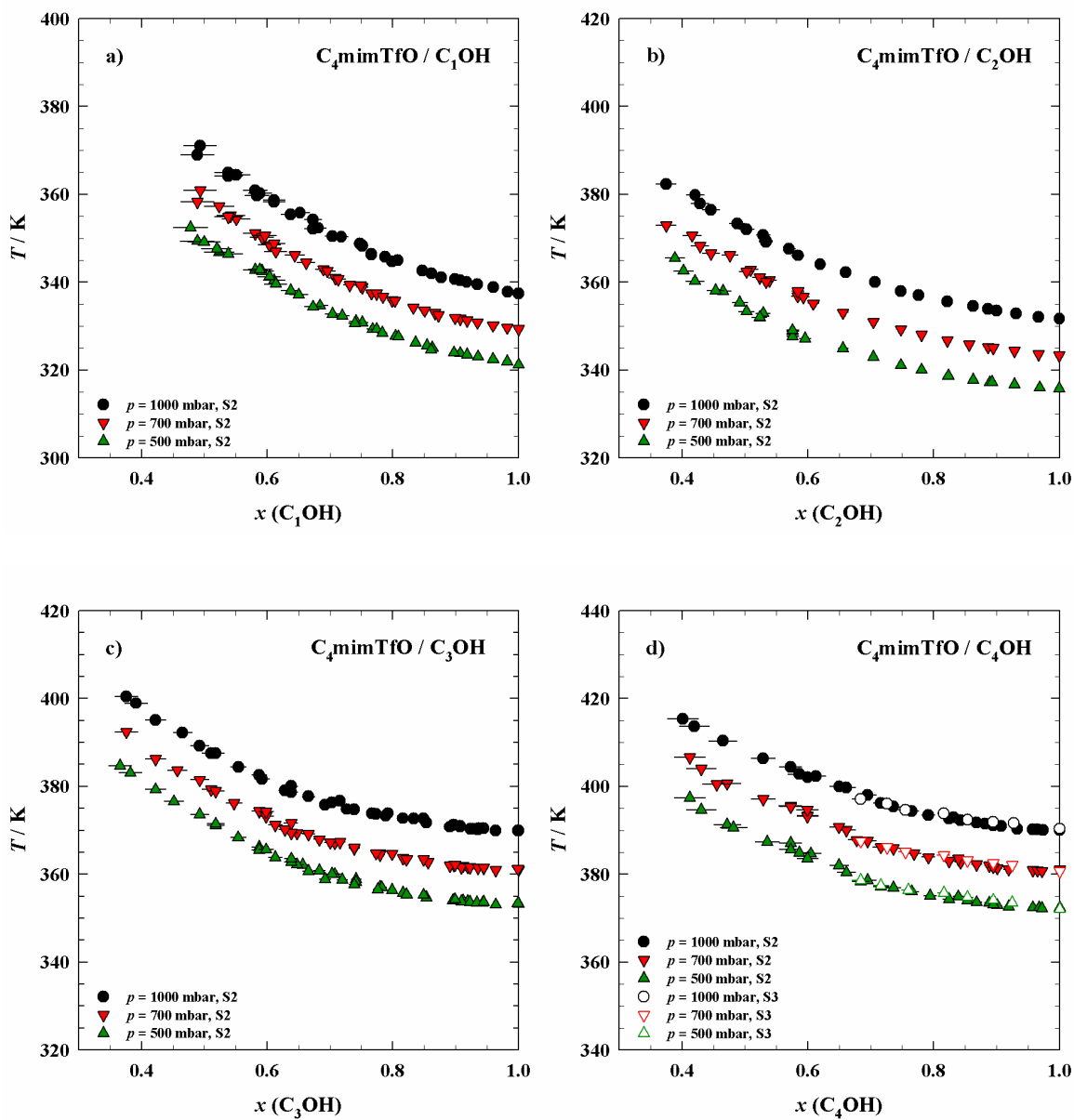


Fig. S2 Isobaric VLEs of binary mixtures of $C_4mimTfO / C_nOH$ ($n = 1-4$) obtained with the set-ups S2 and S3 with error bars.

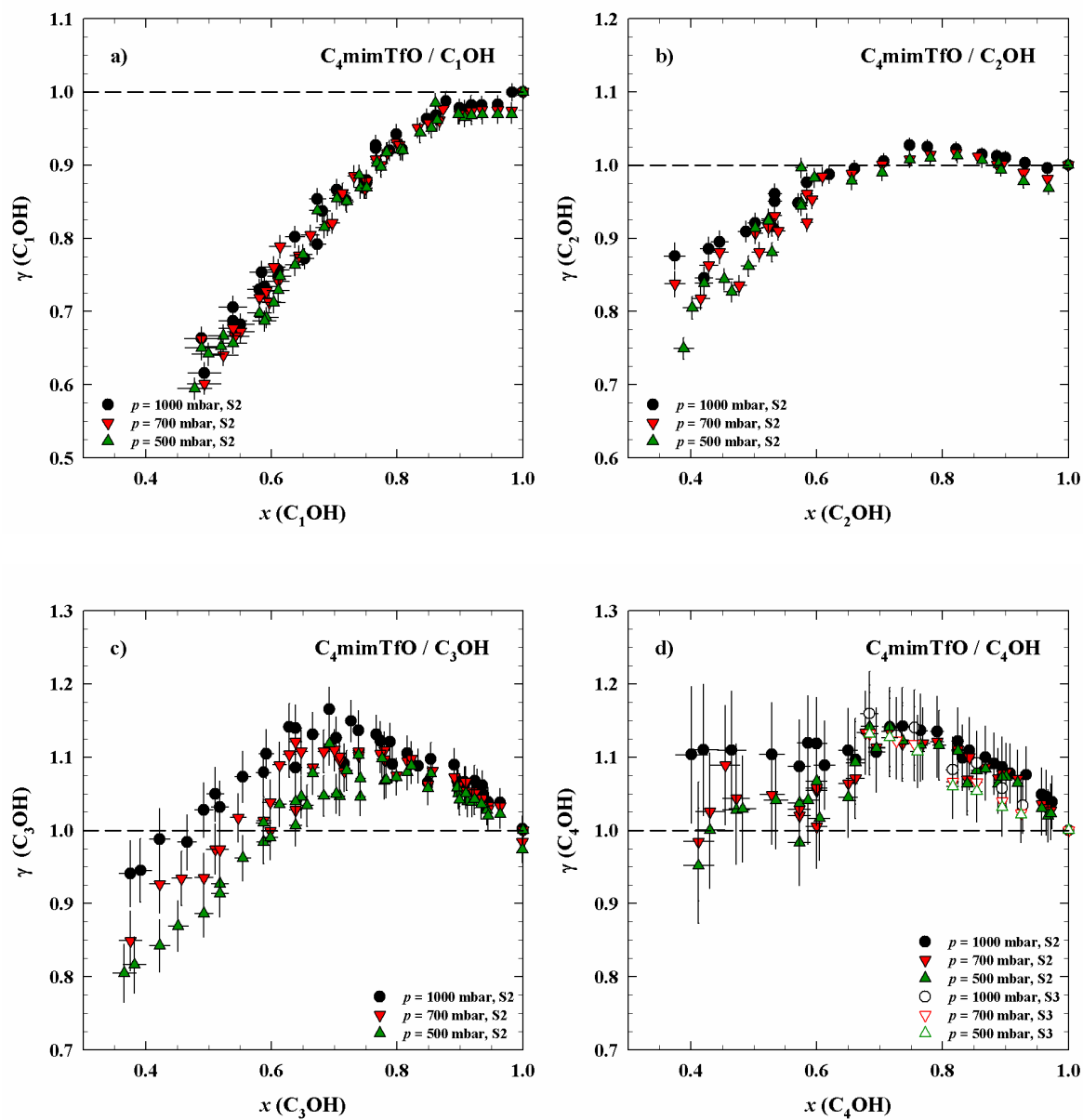


Fig. S3: Activity coefficients as obtained by eq. (7) of binary mixtures of $C_4mimTfO / C_nOH$ ($n = 1-4$) with error bars.

Table S1: Coefficients for vapor pressure calculation for equation (8); taken from DIPPR's data base.¹¹⁸ The correction coefficient u_c is estimated by the highest deviation in between the data from literature data^{78, 120-125} and the DIPPR correlation.

solvent	A / Pa	$B / \text{Pa} \cdot \text{K}$	$C /$ $\text{Pa} \cdot \ln \text{K} ^{-1}$	$D /$ $\text{Pa} \cdot \text{K}^{-E}$	$E / \text{a.u.}$	$u_c / \text{a.u.}$
water	73.649	-7258.2	-7.3037	$4.1653 \cdot 10^{-6}$	2	0.04
methanol	82.718	-6904.5	-8.8622	$7.4664 \cdot 10^{-6}$	2	0.012
ethanol	73.304	-7122.3	-7.1424	$2.8853 \cdot 10^{-6}$	2	0.0078
propan-1-ol	84.6642	-8307.2	8.5767	$7.5091 \cdot 10^{-18}$	6	0.018
butan-1-ol	106.295	-9866.4	-11.655	$1.0832 \cdot 10^{-18}$	6	0.034

Table S2: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / H₂O at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up described by Carvalho et al. ⁶¹; S1); $x(\text{H}_2\text{O})$: mole fraction of the solvent H₂O in the binary mixture; T : temperature of the boiling liquid; p : pressure of the system; $\gamma(\text{H}_2\text{O})$: calculated activity coefficient of the solvent H₂O with eq. (7); $u(\gamma)(\text{H}_2\text{O})$: estimated uncertainty of the activity coefficient of the solvent H₂O.

$p = 1000$ mbar				
$x(\text{H}_2\text{O})$	T / K	p / mbar	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$
1.0000	373.14	1000	1.000	0.040
0.9996	373.16	1000	0.988	0.040
0.9998	373.24	1000	0.985	0.039
0.9831	373.69	1000	0.985	0.040
0.9887	373.82	1000	0.975	0.040
0.9431	374.17	1000	1.010	0.043
0.8945	375.02	1000	1.033	0.046
0.9352	373.69	1000	1.036	0.044
0.8847	374.41	1000	1.067	0.048
0.8210	376.54	1000	1.067	0.052
0.9636	373.69	999	1.004	0.042
0.9203	374.34	1000	1.029	0.045
0.8680	375.45	1000	1.049	0.048
0.7759	379.61	1000	1.015	0.052
0.9480	374.03	1000	1.010	0.043
0.8632	374.57	999	1.087	0.050
0.8218	376.49	1000	1.068	0.052
0.7103	379.29	1000	1.121	0.063
0.6998	381.96	1000	1.039	0.059
0.8150	377.96	1000	1.023	0.050
0.7627	378.45	1000	1.075	0.056
0.7362	379.07	1000	1.090	0.059
0.9453	373.84	1000	1.019	0.043
0.8947	374.30	1000	1.060	0.047
0.8220	375.05	1000	1.123	0.055
0.8317	375.61	1000	1.088	0.052
0.8120	376.23	999	1.090	0.054
0.8285	376.37	999	1.063	0.051
0.7794	378.13	1000	1.064	0.055
0.8684	375.93	999	1.030	0.047
0.8383	375.79	999	1.072	0.051
0.8272	376.09	1000	1.076	0.052
0.7562	378.62	1000	1.078	0.057
0.7374	379.64	1000	1.067	0.058
0.7082	381.61	1003	1.042	0.059
$p = 700$ mbar				
$x(\text{H}_2\text{O})$	T / K	p / mbar	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$

1.0000	363.46	698	1.000	0.039
0.9996	363.51	700	0.986	0.039
0.9997	363.57	700	0.983	0.039
0.9821	363.82	700	0.992	0.040
0.9882	364.03	700	0.978	0.040
0.9443	363.94	700	1.026	0.044
0.9027	364.88	700	1.036	0.046
0.8900	364.05	700	1.085	0.049
0.8440	365.44	700	1.085	0.051
0.9312	364.27	700	1.028	0.044
0.9629	363.92	700	1.007	0.042
0.9312	364.53	700	1.018	0.044
0.8725	365.37	699	1.051	0.048
0.7942	368.10	700	1.045	0.053
0.9416	364.15	705	1.029	0.044
0.8822	364.91	701	1.061	0.048
0.8353	365.89	700	1.079	0.052
0.7651	368.49	700	1.070	0.056
0.7179	371.80	700	1.011	0.056
0.7359	370.41	700	1.037	0.056
0.7393	370.02	701	1.048	0.057
0.7979	367.89	702	1.051	0.053
0.8450	366.06	703	1.064	0.050
0.8412	366.15	702	1.064	0.051
0.8763	365.40	700	1.047	0.048
0.9047	364.62	702	1.047	0.046
0.9502	363.79	702	1.029	0.043

p = 500 mbar

$x(\text{H}_2\text{O})$	T / K	p / mbar	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$
1.0000	354.74	500	1.000	0.040
0.9995	354.77	500	0.989	0.040
0.9823	355.29	500	0.986	0.040
0.9880	355.16	500	0.986	0.040
0.9001	355.43	500	1.070	0.048
0.9413	355.42	500	1.024	0.044
0.9009	355.87	500	1.051	0.047
0.8369	356.20	500	1.116	0.053
0.9313	355.39	501	1.038	0.045
0.9649	355.01	501	1.017	0.042
0.9333	355.13	500	1.045	0.045
0.8807	356.26	500	1.058	0.048
0.7983	358.20	501	1.084	0.054
0.9438	355.16	500	1.032	0.044
0.8853	355.92	500	1.067	0.048

0.8520	356.45	500	1.086	0.051
0.7724	359.08	502	1.084	0.056
0.7193	361.49	501	1.059	0.059
0.7953	358.90	502	1.061	0.053
0.8313	357.55	502	1.070	0.052
0.8750	356.50	501	1.057	0.048
0.9065	355.66	500	1.053	0.047
0.9507	355.08	501	1.030	0.043
0.7056	363.21	502	1.013	0.057

Table S3: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / H₂O mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S2); $x(\text{H}_2\text{O})$: mole fraction of the solvent H₂O in the binary mixture; $u(x)(\text{H}_2\text{O})$: estimated uncertainty of the mole fraction of the solvent H₂O in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{H}_2\text{O})$: calculated activity coefficient of the solvent H₂O with eq. (7); $u(\gamma)(\text{H}_2\text{O})$: estimated uncertainty of the activity coefficient of the solvent H₂O.

$p = 1000$ mbar							
$x(\text{H}_2\text{O})$	$u(x)(\text{H}_2\text{O})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$
1.0000	0.0004	372.94	0.06	999.4	1.5	1.000	0.040
0.9914	0.0005	373.25	0.06	998.8	1.5	0.992	0.040
0.9817	0.0006	373.29	0.06	1000.4	1.5	1.001	0.041
0.9774	0.0007	373.35	0.06	1000.4	1.4	1.004	0.041
0.9708	0.0008	373.44	0.06	999.2	1.5	1.006	0.042
0.9632	0.0009	373.57	0.07	999.2	1.5	1.009	0.042
0.9545	0.0011	373.70	0.07	999.8	1.5	1.014	0.043
0.9470	0.0012	373.76	0.08	999.7	1.5	1.020	0.043
0.9374	0.0014	373.82	0.07	999.5	1.4	1.028	0.044
0.9264	0.0016	373.96	0.06	999.4	1.5	1.035	0.045
0.9151	0.0018	374.11	0.06	999.7	1.4	1.043	0.046
0.8984	0.0022	374.41	0.07	999.2	1.5	1.050	0.047
0.8782	0.0028	374.84	0.07	999.5	1.4	1.059	0.048
0.8612	0.0032	375.43	0.08	999.5	1.5	1.057	0.049
0.8612	0.0032	375.50	0.09	998.9	1.5	1.054	0.049
0.8382	0.0040	375.83	0.08	999.3	1.5	1.071	0.051
0.8100	0.0049	376.89	0.10	999.5	1.5	1.068	0.053
0.7934	0.0055	377.62	0.09	999.4	1.4	1.063	0.054
0.7796	0.0061	378.52	0.10	999.4	1.4	1.049	0.054
0.7564	0.0070	379.29	0.14	999.7	1.4	1.053	0.056
0.7358	0.0080	380.75	0.14	999.4	1.5	1.030	0.056
0.7747	0.0063	379.21	0.11	999.4	1.5	1.030	0.053
0.7796	0.0061	378.25	0.13	999.2	1.5	1.058	0.054
0.7645	0.0067	378.97	0.08	999.7	1.4	1.053	0.055
0.7261	0.0084	380.73	0.13	999.6	1.4	1.044	0.058
0.6939	0.0100	383.34	0.19	999.6	1.4	1.000	0.058
0.6508	0.0123	384.85	0.28	999.5	1.4	1.014	0.062
0.6257	0.0138	385.92	0.65	999.3	1.5	1.018	0.065
0.6978	0.0098	382.98	0.44	999.3	1.5	1.006	0.058
0.6860	0.0104	382.79	0.26	999.4	1.5	1.030	0.060
0.6033	0.0152	387.90	0.15	998.9	1.5	0.989	0.066

$p = 700$ mbar							
$x(\text{H}_2\text{O})$	$u(x)(\text{H}_2\text{O})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$
1.0000	0.0004	363.34	0.06	699.6	1.5	1.000	0.040
0.9914	0.0005	363.68	0.06	699.5	1.5	0.987	0.040

0.9817	0.0006	363.78	0.06	699.7	1.5	0.993	0.041
0.9765	0.0007	363.87	0.06	699.7	1.5	0.995	0.041
0.9727	0.0008	363.85	0.06	699.6	1.5	0.999	0.041
0.9644	0.0009	363.98	0.06	699.7	1.5	1.003	0.042
0.9567	0.0010	364.07	0.06	699.6	1.5	1.008	0.042
0.9475	0.0012	364.15	0.06	699.7	1.5	1.015	0.043
0.9397	0.0013	364.20	0.06	699.6	1.5	1.021	0.044
0.9302	0.0015	364.35	0.06	700.1	1.4	1.026	0.044
0.9150	0.0018	364.48	0.06	700.1	1.4	1.038	0.045
0.9002	0.0022	364.68	0.06	699.8	1.4	1.047	0.047
0.8847	0.0026	364.94	0.06	699.8	1.5	1.055	0.048
0.8638	0.0032	365.43	0.06	700.0	1.5	1.061	0.049
0.8599	0.0033	365.59	0.06	699.8	1.4	1.059	0.049
0.8444	0.0038	366.04	0.07	700.2	1.4	1.061	0.050
0.8176	0.0046	366.67	0.07	699.8	1.5	1.070	0.052
0.7977	0.0054	367.38	0.09	699.8	1.5	1.068	0.054
0.7912	0.0056	367.75	0.12	699.7	1.5	1.062	0.054
0.7772	0.0062	368.02	0.08	700.1	1.5	1.071	0.055
0.7261	0.0084	370.16	0.09	699.9	1.5	1.060	0.058
0.7722	0.0064	368.70	0.07	700.0	1.4	1.052	0.055
0.7956	0.0055	367.31	0.08	699.7	1.5	1.074	0.054
0.7796	0.0061	368.05	0.09	700.1	1.5	1.067	0.055
0.7358	0.0080	369.95	0.09	699.8	1.5	1.054	0.057
0.7016	0.0096	371.19	0.15	699.9	1.5	1.057	0.060
0.6691	0.0113	374.37	0.44	699.8	1.5	0.989	0.059
0.6480	0.0125	375.41	0.25	699.8	1.5	0.985	0.061
0.6819	0.0106	373.82	0.33	699.8	1.4	0.990	0.058
0.6309	0.0135	376.05	0.25	699.8	1.5	0.989	0.063
0.6091	0.0148	376.75	0.27	699.7	1.5	0.999	0.066
0.5852	0.0163	380.96	0.52	699.8	1.5	0.900	0.062

p = 500 mbar

$x(\text{H}_2\text{O})$	$u(x)(\text{H}_2\text{O})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{H}_2\text{O})$	$u(\gamma)(\text{H}_2\text{O})$
1.0000	0.0004	354.77	0.06	499.0	1.5	1.000	0.040
0.9914	0.0005	355.01	0.06	499.1	1.5	0.986	0.040
0.9822	0.0006	355.08	0.07	500.3	1.5	0.995	0.041
0.9771	0.0007	355.17	0.06	499.1	1.5	0.994	0.041
0.9737	0.0007	355.19	0.06	499.2	1.4	0.997	0.041
0.9666	0.0009	355.21	0.06	499.1	1.5	1.003	0.042
0.9588	0.0010	355.32	0.06	499.1	1.5	1.007	0.042
0.9499	0.0011	355.43	0.06	499.0	1.5	1.012	0.043
0.9429	0.0013	355.48	0.06	499.2	1.5	1.018	0.043
0.9321	0.0015	355.56	0.06	499.3	1.5	1.026	0.044
0.9180	0.0018	355.71	0.06	499.3	1.5	1.036	0.045
0.9002	0.0022	355.91	0.06	499.3	1.4	1.048	0.047

0.8878	0.0025	356.07	0.06	499.3	1.5	1.056	0.048
0.8663	0.0031	356.52	0.06	499.2	1.5	1.063	0.049
0.8612	0.0032	356.68	0.06	499.2	1.4	1.063	0.049
0.8503	0.0036	356.97	0.07	499.2	1.5	1.064	0.050
0.8317	0.0042	357.43	0.06	499.3	1.5	1.068	0.052
0.8060	0.0051	358.29	0.08	499.3	1.5	1.066	0.053
0.7912	0.0056	358.77	0.09	499.1	1.5	1.065	0.054
0.7843	0.0059	358.90	0.07	499.4	1.5	1.070	0.055
0.7449	0.0076	360.37	0.10	499.2	1.4	1.064	0.057
0.7977	0.0054	358.75	0.08	499.2	1.5	1.057	0.053
0.8100	0.0049	357.99	0.08	500.2	1.5	1.075	0.053
0.7796	0.0061	358.79	0.09	499.4	1.5	1.081	0.056
0.7536	0.0072	359.37	0.08	499.4	1.4	1.093	0.058
0.7294	0.0083	361.14	0.15	499.2	1.5	1.054	0.058
0.6691	0.0113	363.82	0.22	499.2	1.5	1.038	0.062
0.6735	0.0111	364.40	0.26	499.2	1.5	1.009	0.060
0.6860	0.0104	363.58	0.27	499.1	1.4	1.021	0.060
0.6735	0.0111	364.88	0.47	499.3	1.4	0.991	0.059
0.6460	0.0126	367.33	0.35	499.2	1.5	0.943	0.058
0.6203	0.0141	366.70	0.23	499.1	1.5	1.005	0.065
0.6602	0.0118	365.31	0.27	499.3	1.5	0.995	0.060
0.6091	0.0148	369.76	0.49	499.3	1.4	0.915	0.060
0.6148	0.0145	366.30	0.32	499.3	1.5	1.029	0.067
0.5914	0.0159	370.44	0.58	499.3	1.5	0.919	0.062

Table S4: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / C₁OH mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S2); $x(\text{C}_1\text{OH})$: mole fraction of the solvent C₁OH in the binary mixture; $u(x)(\text{C}_1\text{OH})$: estimated uncertainty of the mole fraction of the solvent C₁OH in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{C}_1\text{OH})$: calculated activity coefficient of the solvent C₁OH with eq. (7); $u(\gamma)(\text{C}_1\text{OH})$: estimated uncertainty of the activity coefficient of the solvent C₁OH.

$p = 1000$ mbar							
$x(\text{C}_1\text{OH})$	$u(x)(\text{C}_1\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_1\text{OH})$	$u(\gamma)(\text{C}_1\text{OH})$
1.0000	0.0012	337.46	0.04	999.9	1.4	1.000	0.012
0.9834	0.0014	337.79	0.03	999.8	1.5	0.999	0.012
0.9598	0.0019	338.83	0.03	999.7	1.5	0.983	0.012
0.9349	0.0025	339.54	0.03	999.8	1.4	0.982	0.013
0.9071	0.0032	340.46	0.03	999.5	1.4	0.976	0.013
0.9179	0.0029	340.00	0.03	999.6	1.5	0.982	0.013
0.8994	0.0035	340.64	0.03	999.8	1.4	0.978	0.013
0.8620	0.0046	342.01	0.03	999.6	1.5	0.968	0.014
0.7989	0.0071	344.73	0.05	999.7	1.4	0.942	0.014
0.7662	0.0085	346.28	0.06	999.5	1.5	0.927	0.015
0.8077	0.0067	345.03	0.04	999.6	1.5	0.921	0.014
0.7662	0.0085	346.39	0.04	999.8	1.5	0.923	0.015
0.7513	0.0092	348.36	0.05	999.7	1.4	0.876	0.014
0.7040	0.0117	350.43	0.05	999.6	1.5	0.866	0.015
0.6807	0.0130	352.33	0.05	999.8	1.5	0.837	0.015
0.7513	0.0092	348.23	0.04	999.7	1.5	0.880	0.014
0.7180	0.0109	350.35	0.04	999.5	1.4	0.852	0.014
0.6731	0.0135	352.10	0.05	999.5	1.5	0.853	0.015
0.6375	0.0156	355.40	0.07	999.9	1.5	0.802	0.015
0.6107	0.0174	358.30	0.07	999.9	1.5	0.757	0.015
0.5808	0.0195	360.85	0.07	999.9	1.5	0.730	0.015
0.5383	0.0226	364.94	0.09	1000.1	1.4	0.687	0.015
0.4887	0.0266	368.97	0.06	999.7	1.4	0.663	0.016
0.6107	0.0174	358.64	0.04	999.7	1.5	0.748	0.015
0.5839	0.0193	359.74	0.04	999.9	1.5	0.754	0.016
0.5508	0.0217	364.42	0.07	999.7	1.4	0.682	0.015
0.4930	0.0263	371.01	0.11	999.7	1.4	0.616	0.015
0.6524	0.0147	355.81	0.04	999.9	1.4	0.773	0.014
0.5886	0.0189	360.27	0.06	999.7	1.5	0.734	0.015
0.5383	0.0226	364.10	0.05	999.6	1.4	0.706	0.016
0.6731	0.0135	354.22	0.06	1000.1	1.5	0.792	0.014
0.7475	0.0094	348.73	0.04	999.9	1.4	0.868	0.014
0.7878	0.0075	345.73	0.04	999.8	1.5	0.920	0.014
0.8469	0.0052	342.60	0.03	999.6	1.5	0.963	0.014
0.8776	0.0041	341.02	0.04	999.7	1.4	0.987	0.014

<i>p = 700 mbar</i>							
$x(\text{C}_1\text{OH})$	$u(x)(\text{C}_1\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_1\text{OH})$	$u(\gamma)(\text{C}_1\text{OH})$
1.0000	0.0012	329.33	0.04	699.6	1.5	1.000	0.012
0.9823	0.0015	329.63	0.04	699.8	1.5	0.974	0.012
0.9598	0.0019	330.16	0.03	699.5	1.5	0.975	0.012
0.9349	0.0025	330.80	0.03	699.7	1.5	0.975	0.013
0.9071	0.0032	331.68	0.03	699.6	1.5	0.969	0.013
0.9187	0.0029	331.25	0.03	699.5	1.5	0.973	0.013
0.8994	0.0035	331.87	0.03	699.5	1.5	0.969	0.013
0.8673	0.0045	332.98	0.03	699.6	1.5	0.961	0.013
0.8327	0.0057	334.24	0.03	699.4	1.5	0.951	0.014
0.7989	0.0071	335.82	0.04	699.5	1.5	0.931	0.014
0.7662	0.0085	337.51	0.03	699.5	1.5	0.907	0.014
0.8031	0.0069	335.79	0.03	699.6	1.5	0.927	0.014
0.7746	0.0081	337.44	0.03	699.7	1.5	0.900	0.014
0.7311	0.0103	339.35	0.03	699.6	1.5	0.885	0.015
0.7088	0.0114	340.93	0.03	699.7	1.5	0.859	0.015
0.6891	0.0125	342.93	0.03	699.7	1.5	0.818	0.014
0.7513	0.0092	338.86	0.03	699.6	1.5	0.878	0.014
0.7134	0.0112	340.68	0.03	699.5	1.5	0.861	0.015
0.6962	0.0121	342.57	0.04	699.4	1.5	0.821	0.014
0.6438	0.0152	346.15	0.04	699.7	1.5	0.776	0.015
0.6035	0.0179	348.45	0.06	699.8	1.5	0.760	0.015
0.5808	0.0195	351.07	0.06	699.7	1.5	0.719	0.015
0.5508	0.0217	354.42	0.04	699.8	1.5	0.672	0.015
0.4887	0.0266	358.27	0.05	699.6	1.5	0.662	0.016
0.6107	0.0174	348.82	0.04	699.6	1.5	0.741	0.015
0.5916	0.0187	350.20	0.05	699.7	1.5	0.728	0.015
0.5419	0.0224	355.13	0.06	699.6	1.5	0.666	0.015
0.4930	0.0263	360.85	0.07	699.5	1.5	0.601	0.015
0.6135	0.0172	347.00	0.05	699.6	1.5	0.789	0.016
0.5961	0.0184	350.57	0.04	699.7	1.5	0.713	0.014
0.5383	0.0226	354.89	0.05	699.7	1.5	0.677	0.015
0.5233	0.0238	357.27	0.05	699.6	1.5	0.640	0.015
0.6618	0.0141	344.46	0.04	699.8	1.5	0.804	0.015
0.7490	0.0094	339.22	0.03	699.5	1.5	0.868	0.014
0.7846	0.0077	336.66	0.03	699.7	1.5	0.917	0.014
0.8505	0.0050	333.58	0.03	699.6	1.5	0.957	0.014
0.8731	0.0043	332.42	0.03	699.7	1.5	0.977	0.014

<i>p = 500 mbar</i>							
$x(\text{C}_1\text{OH})$	$u(x)(\text{C}_1\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_1\text{OH})$	$u(\gamma)(\text{C}_1\text{OH})$
1.0000	0.0012	321.21	0.03	500.4	1.5	1.000	0.012
0.9823	0.0015	321.89	0.03	500.4	1.5	0.969	0.012
0.9598	0.0019	322.43	0.03	500.3	1.4	0.969	0.012

0.9356	0.0025	323.01	0.03	500.4	1.5	0.969	0.013
0.9071	0.0032	323.81	0.03	500.3	1.4	0.965	0.013
0.9187	0.0029	323.45	0.03	500.3	1.5	0.968	0.013
0.8978	0.0035	323.95	0.03	500.4	1.4	0.970	0.013
0.8632	0.0046	325.06	0.03	500.4	1.5	0.961	0.014
0.8366	0.0056	326.22	0.03	500.4	1.5	0.944	0.014
0.8048	0.0068	327.71	0.03	500.4	1.5	0.921	0.014
0.7676	0.0085	329.31	0.04	500.3	1.4	0.903	0.014
0.8088	0.0066	327.63	0.03	500.4	1.5	0.920	0.014
0.7746	0.0081	329.25	0.04	500.5	1.4	0.897	0.014
0.7411	0.0097	331.09	0.04	500.4	1.4	0.869	0.014
0.7040	0.0117	332.76	0.04	500.4	1.4	0.854	0.015
0.6839	0.0128	334.65	0.04	500.4	1.5	0.815	0.015
0.7513	0.0092	330.76	0.03	500.4	1.4	0.869	0.014
0.7198	0.0108	332.33	0.04	500.2	1.5	0.850	0.014
0.6731	0.0135	334.35	0.04	500.3	1.4	0.838	0.015
0.6375	0.0156	338.06	0.04	500.6	1.4	0.764	0.015
0.6107	0.0174	340.36	0.05	500.5	1.4	0.729	0.015
0.5808	0.0195	342.80	0.04	500.5	1.4	0.698	0.015
0.5233	0.0238	346.79	0.04	500.5	1.4	0.667	0.015
0.4887	0.0266	349.34	0.05	500.4	1.5	0.650	0.016
0.6035	0.0179	341.26	0.06	500.4	1.4	0.712	0.014
0.5916	0.0187	342.55	0.05	500.4	1.4	0.692	0.014
0.5194	0.0241	347.58	0.09	500.3	1.4	0.652	0.015
0.4778	0.0275	352.43	0.09	500.3	1.4	0.595	0.015
0.6135	0.0172	339.57	0.05	500.4	1.4	0.748	0.015
0.5886	0.0189	342.86	0.05	500.5	1.5	0.687	0.014
0.5383	0.0226	346.43	0.07	500.4	1.4	0.657	0.015
0.4993	0.0257	349.10	0.09	500.4	1.4	0.642	0.016
0.6500	0.0149	337.11	0.05	500.5	1.4	0.777	0.015
0.7395	0.0098	330.66	0.04	500.3	1.4	0.886	0.015
0.7832	0.0077	328.46	0.03	500.4	1.5	0.917	0.014
0.8548	0.0049	325.54	0.03	500.3	1.5	0.951	0.014
0.8612	0.0047	324.60	0.03	501.3	1.4	0.985	0.014

Table S5: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / C₂OH mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S2); $x(\text{C}_2\text{OH})$: mole fraction of the solvent C₂OH in the binary mixture; $u(x)(\text{C}_2\text{OH})$: estimated uncertainty of the mole fraction of the solvent C₂OH in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{C}_2\text{OH})$: calculated activity coefficient of the solvent C₂OH with eq. (7); $u(\gamma)(\text{C}_2\text{OH})$: estimated uncertainty of the activity coefficient of the solvent C₂OH.

$p = 1000$ mbar							
$x(\text{C}_2\text{OH})$	$u(x)(\text{C}_2\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_2\text{OH})$	$u(\gamma)(\text{C}_2\text{OH})$
1.0000	0.0015	351.70	0.06	1000.0	1.4	1.000	0.008
0.9667	0.0019	352.09	0.06	999.7	1.5	0.996	0.008
0.9310	0.0023	352.86	0.06	999.6	1.4	1.003	0.009
0.8864	0.0030	353.89	0.06	999.8	1.5	1.012	0.009
0.8998	0.0028	353.56	0.06	999.9	1.5	1.010	0.009
0.8627	0.0033	354.53	0.06	999.7	1.5	1.015	0.009
0.8215	0.0040	355.63	0.07	999.7	1.5	1.022	0.010
0.7762	0.0049	357.04	0.06	999.5	1.5	1.025	0.010
0.7476	0.0055	357.99	0.06	1000.1	1.4	1.027	0.011
0.7064	0.0064	360.05	0.06	999.5	1.5	1.005	0.011
0.6600	0.0075	362.18	0.06	999.5	1.5	0.995	0.012
0.6196	0.0085	364.12	0.06	999.6	1.5	0.987	0.013
0.5330	0.0109	369.43	0.07	999.6	1.5	0.950	0.014
0.4873	0.0123	373.30	0.07	999.9	1.5	0.909	0.015
0.4206	0.0145	379.87	0.08	999.9	1.4	0.846	0.016
0.3744	0.0161	382.37	0.11	999.5	1.5	0.876	0.018
0.5290	0.0110	370.69	0.08	999.4	1.5	0.916	0.014
0.5840	0.0094	366.08	0.06	999.8	1.4	0.976	0.013
0.5702	0.0098	367.57	0.06	999.6	1.5	0.948	0.013
0.5330	0.0109	369.13	0.06	1000.0	1.5	0.961	0.014
0.5024	0.0118	372.05	0.07	999.7	1.5	0.921	0.014
0.4457	0.0136	376.41	0.07	999.6	1.5	0.895	0.016
0.4283	0.0142	377.92	0.08	999.6	1.5	0.886	0.016

$p = 700$ mbar							
$x(\text{C}_2\text{OH})$	$u(x)(\text{C}_2\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_2\text{OH})$	$u(\gamma)(\text{C}_2\text{OH})$
1.0000	0.0015	343.32	0.06	699.7	1.5	1.000	0.008
0.9667	0.0019	343.60	0.06	699.3	1.5	0.981	0.008
0.9288	0.0024	344.36	0.06	699.2	1.5	0.990	0.009
0.8864	0.0030	345.22	0.06	699.5	1.5	1.001	0.009
0.8946	0.0028	345.00	0.06	699.3	1.5	1.000	0.009
0.8563	0.0035	345.79	0.11	699.3	1.5	1.012	0.009
0.8215	0.0040	346.70	0.08	699.2	1.5	1.016	0.010
0.7807	0.0048	348.02	0.08	699.3	1.5	1.014	0.010
0.7476	0.0055	349.25	0.09	699.2	1.5	1.008	0.011
0.7041	0.0064	350.93	0.08	699.2	1.5	1.001	0.011

0.6559	0.0076	353.07	0.06	699.2	1.5	0.988	0.012
0.6087	0.0088	355.14	0.06	700.3	1.5	0.984	0.013
0.5840	0.0094	356.81	0.06	699.2	1.5	0.961	0.013
0.5388	0.0107	360.40	0.08	699.2	1.5	0.910	0.013
0.5087	0.0116	362.84	0.07	699.1	1.5	0.881	0.014
0.4762	0.0126	366.14	0.08	699.3	1.5	0.836	0.014
0.4154	0.0146	370.62	0.09	699.2	1.5	0.818	0.016
0.3744	0.0161	372.94	0.12	699.2	1.5	0.838	0.018
0.5230	0.0112	361.06	0.07	699.1	1.5	0.915	0.014
0.5924	0.0092	356.65	0.06	699.4	1.5	0.953	0.013
0.5840	0.0094	357.92	0.06	699.2	1.5	0.921	0.013
0.5330	0.0109	360.10	0.08	699.4	1.5	0.931	0.014
0.5024	0.0118	362.40	0.06	699.4	1.5	0.907	0.014
0.4457	0.0136	366.51	0.07	699.2	1.5	0.881	0.016
0.4283	0.0142	368.21	0.07	699.2	1.5	0.863	0.016

p = 500 mbar

$x(\text{C}_2\text{OH})$	$u(x)(\text{C}_2\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_2\text{OH})$	$u(\gamma)(\text{C}_2\text{OH})$
1.0000	0.0015	335.78	0.07	500.2	1.4	1.000	0.008
0.9684	0.0018	336.00	0.06	499.8	1.5	0.968	0.008
0.9288	0.0024	336.73	0.09	499.7	1.5	0.977	0.009
0.8891	0.0029	337.19	0.11	499.9	1.5	1.001	0.009
0.8929	0.0029	337.26	0.08	499.8	1.5	0.994	0.009
0.8627	0.0033	337.76	0.09	499.9	1.5	1.006	0.010
0.8230	0.0040	338.69	0.08	499.6	1.5	1.013	0.010
0.7807	0.0048	340.05	0.07	500.7	1.5	1.010	0.011
0.7476	0.0055	341.09	0.08	499.8	1.5	1.007	0.011
0.7041	0.0064	342.94	0.08	499.8	1.5	0.990	0.011
0.6559	0.0076	344.92	0.09	499.8	1.5	0.978	0.012
0.5957	0.0091	347.17	0.07	499.7	1.4	0.983	0.013
0.5754	0.0097	348.86	0.06	498.8	1.4	0.949	0.013
0.5290	0.0110	352.91	0.08	499.6	1.5	0.881	0.013
0.4917	0.0121	355.36	0.08	499.7	1.5	0.862	0.014
0.4647	0.0130	357.94	0.09	499.7	1.5	0.827	0.014
0.4022	0.0151	362.56	0.09	499.9	1.5	0.805	0.016
0.3885	0.0156	365.48	0.09	499.7	1.5	0.750	0.015
0.5230	0.0112	351.91	0.07	499.8	1.4	0.926	0.014
0.5754	0.0097	347.69	0.07	499.8	1.4	0.997	0.014
0.5754	0.0097	349.03	0.09	499.7	1.5	0.944	0.013
0.5230	0.0112	351.99	0.07	500.0	1.4	0.924	0.014
0.5024	0.0118	353.30	0.11	499.7	1.5	0.914	0.014
0.4529	0.0134	358.07	0.08	499.8	1.4	0.844	0.015
0.4206	0.0145	360.23	0.07	499.7	1.5	0.838	0.016

Table S6: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / C₃OH mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S2); $x(\text{C}_3\text{OH})$: mole fraction of the solvent C₃OH in the binary mixture; $u(x)(\text{C}_3\text{OH})$: estimated uncertainty of the mole fraction of the solvent C₃OH in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{C}_3\text{OH})$: calculated activity coefficient of the solvent C₃OH with eq. (7); $u(\gamma)(\text{C}_3\text{OH})$: estimated uncertainty of the activity coefficient of the solvent C₃OH.

$p = 1000$ mbar							
$x(\text{C}_3\text{OH})$	$u(x)(\text{C}_3\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_3\text{OH})$	$u(\gamma)(\text{C}_3\text{OH})$
1.0000	0.0026	369.91	0.04	1000.0	1.5	1.000	0.018
0.9642	0.0032	369.97	0.04	999.7	1.4	1.038	0.019
0.9379	0.0037	370.43	0.03	999.9	1.4	1.049	0.020
0.9078	0.0042	370.85	0.03	999.8	1.4	1.066	0.021
0.9233	0.0039	370.36	0.03	999.7	1.4	1.068	0.021
0.8954	0.0045	371.16	0.03	999.6	1.4	1.068	0.022
0.9078	0.0042	370.96	0.04	1000.1	1.5	1.062	0.021
0.9271	0.0039	370.37	0.03	999.7	1.5	1.063	0.021
0.9357	0.0037	370.16	0.03	999.7	1.5	1.062	0.021
0.8911	0.0046	370.77	0.03	999.8	1.5	1.090	0.022
0.8539	0.0053	371.72	0.03	999.5	1.4	1.097	0.023
0.8164	0.0061	372.73	0.03	999.8	1.5	1.105	0.024
0.7734	0.0071	373.77	0.04	999.7	1.5	1.123	0.026
0.5874	0.0118	382.57	0.06	999.6	1.5	1.079	0.033
0.6381	0.0104	378.66	0.05	999.6	1.5	1.139	0.032
0.7032	0.0087	376.28	0.04	999.6	1.4	1.127	0.029
0.7386	0.0079	374.69	0.04	999.7	1.5	1.136	0.028
0.7888	0.0067	373.28	0.04	999.7	1.4	1.121	0.026
0.8331	0.0057	372.60	0.03	999.6	1.4	1.088	0.024
0.7667	0.0072	373.79	0.03	999.5	1.4	1.131	0.027
0.7267	0.0082	374.82	0.04	999.6	1.5	1.149	0.029
0.6917	0.0090	375.80	0.04	999.6	1.5	1.165	0.030
0.6658	0.0097	377.68	0.05	999.5	1.5	1.131	0.031
0.6285	0.0107	379.07	0.05	1000.0	1.5	1.141	0.033
0.5917	0.0117	381.69	0.05	999.7	1.4	1.105	0.034
0.5539	0.0127	384.43	0.05	999.8	1.5	1.073	0.035
0.5103	0.0140	387.51	0.04	999.7	1.5	1.049	0.037
0.5179	0.0138	387.56	0.08	999.5	1.5	1.032	0.036
0.4653	0.0154	392.25	0.08	999.5	1.4	0.984	0.038
0.4221	0.0167	395.13	0.07	999.4	1.4	0.988	0.042
0.3914	0.0177	398.93	0.07	999.4	1.5	0.945	0.044
0.3753	0.0182	400.42	0.12	999.3	1.5	0.941	0.045
0.9991	0.0026	369.94	0.04	999.1	1.4	1.002	0.018
0.9448	0.0036	370.47	0.03	999.4	1.4	1.039	0.020
0.8975	0.0044	371.24	0.03	999.3	1.5	1.062	0.021
0.8488	0.0054	372.66	0.03	999.4	1.5	1.065	0.023
0.7926	0.0066	373.90	0.03	999.7	1.5	1.090	0.025

0.7160	0.0084	376.66	0.04	999.4	1.5	1.091	0.028
0.6381	0.0104	380.03	0.04	999.4	1.5	1.085	0.031
0.4922	0.0145	389.21	0.05	999.4	1.5	1.028	0.038

p = 700 mbar

$x(\text{C}_3\text{OH})$	$u(x)(\text{C}_3\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_3\text{OH})$	$u(\gamma)(\text{C}_3\text{OH})$
1.0000	0.0026	361.01	0.03	699.4	1.5	1.000	0.018
0.9642	0.0032	360.94	0.03	699.2	1.5	1.033	0.019
0.9448	0.0036	361.42	0.03	699.2	1.5	1.034	0.020
0.9118	0.0042	361.89	0.03	699.3	1.5	1.051	0.021
0.9195	0.0040	361.63	0.03	699.3	1.5	1.053	0.021
0.8971	0.0044	362.09	0.03	700.3	1.5	1.061	0.021
0.9094	0.0042	361.61	0.03	699.5	1.5	1.066	0.021
0.9233	0.0039	361.59	0.03	699.2	1.5	1.050	0.021
0.9357	0.0037	361.42	0.03	699.3	1.5	1.044	0.020
0.8911	0.0046	361.96	0.03	699.3	1.5	1.073	0.022
0.8559	0.0053	362.77	0.03	699.5	1.4	1.081	0.023
0.8164	0.0061	363.65	0.03	699.4	1.5	1.095	0.024
0.7799	0.0069	364.76	0.03	699.2	1.5	1.097	0.025
0.7386	0.0079	365.97	0.06	699.6	1.4	1.105	0.027
0.7081	0.0086	367.28	0.04	699.4	1.5	1.096	0.028
0.6833	0.0092	367.92	0.04	699.5	1.5	1.108	0.029
0.6476	0.0101	369.33	0.04	699.3	1.5	1.107	0.031
0.6125	0.0111	371.25	0.05	699.4	1.5	1.089	0.032
0.5874	0.0118	374.32	0.04	699.3	1.5	1.013	0.031
0.6381	0.0104	369.39	0.04	699.1	1.5	1.121	0.032
0.7081	0.0086	367.14	0.04	699.2	1.5	1.101	0.028
0.7386	0.0079	365.90	0.03	699.3	1.4	1.107	0.027
0.7799	0.0069	364.47	0.03	699.3	1.5	1.109	0.026
0.8221	0.0060	363.41	0.04	699.2	1.5	1.097	0.024
0.7734	0.0071	364.79	0.04	699.1	1.5	1.104	0.026
0.7386	0.0079	366.03	0.04	699.2	1.5	1.102	0.027
0.7000	0.0088	367.23	0.04	699.1	1.5	1.110	0.029
0.6658	0.0097	369.11	0.04	699.1	1.5	1.086	0.029
0.6285	0.0107	370.21	0.03	699.4	1.5	1.104	0.032
0.5980	0.0115	373.17	0.04	699.2	1.5	1.038	0.031
0.5469	0.0129	376.17	0.04	699.3	1.5	1.017	0.034
0.5103	0.0140	379.30	0.05	699.2	1.5	0.974	0.034
0.5179	0.0138	378.91	0.06	699.2	1.5	0.974	0.034
0.4569	0.0156	383.64	0.10	698.9	1.5	0.934	0.037
0.4221	0.0167	386.21	0.05	699.0	1.5	0.927	0.040
0.3753	0.0182	392.38	0.07	699.0	1.5	0.849	0.041
0.9991	0.0026	361.24	0.07	699.2	1.5	0.984	0.018
0.9448	0.0036	361.54	0.03	699.1	1.5	1.029	0.020
0.8996	0.0044	362.17	0.03	699.2	1.5	1.053	0.021

0.8488	0.0054	363.41	0.03	699.0	1.5	1.062	0.023
0.7987	0.0065	364.67	0.03	699.3	1.5	1.075	0.024
0.7160	0.0084	367.34	0.04	699.2	1.5	1.080	0.027
0.6381	0.0104	371.69	0.04	699.0	1.5	1.028	0.029
0.4922	0.0145	381.49	0.06	699.2	1.5	0.935	0.034
0.5980	0.0115	374.21	0.05	699.2	1.5	0.999	0.030

<i>p = 500 mbar</i>							
$x(\text{C}_3\text{OH})$	$u(x)(\text{C}_3\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_3\text{OH})$	$u(\gamma)(\text{C}_3\text{OH})$
1.0000	0.0026	353.29	0.03	499.9	1.4	1.000	0.018
0.9642	0.0032	353.09	0.03	500.0	1.4	1.022	0.019
0.9427	0.0036	353.48	0.04	499.6	1.5	1.027	0.020
0.9118	0.0042	354.00	0.03	499.8	1.5	1.039	0.021
0.9195	0.0040	353.82	0.03	499.8	1.5	1.039	0.021
0.8971	0.0044	354.13	0.03	499.7	1.5	1.051	0.021
0.9094	0.0042	353.82	0.04	499.8	1.5	1.050	0.021
0.9233	0.0039	353.63	0.04	499.6	1.5	1.042	0.021
0.9343	0.0037	353.52	0.04	499.9	1.5	1.036	0.020
0.8954	0.0045	354.00	0.03	499.8	1.5	1.059	0.022
0.8539	0.0053	354.70	0.03	499.9	1.4	1.078	0.023
0.8164	0.0061	355.73	0.05	499.8	1.5	1.080	0.024
0.7799	0.0069	357.09	0.05	499.8	1.5	1.068	0.025
0.7416	0.0078	358.83	0.04	500.0	1.5	1.046	0.026
0.7081	0.0086	360.00	0.05	500.9	1.5	1.047	0.027
0.6833	0.0092	360.82	0.04	500.0	1.5	1.047	0.028
0.6568	0.0099	362.10	0.05	499.8	1.5	1.034	0.029
0.6125	0.0111	363.83	0.04	499.8	1.5	1.035	0.031
0.5874	0.0118	366.19	0.04	499.8	1.5	0.984	0.030
0.6476	0.0101	362.17	0.04	499.8	1.5	1.046	0.029
0.7032	0.0087	360.03	0.03	499.7	1.5	1.050	0.027
0.7416	0.0078	358.24	0.05	499.7	1.5	1.071	0.026
0.7825	0.0068	356.97	0.05	499.7	1.5	1.069	0.025
0.8221	0.0060	355.36	0.03	499.6	1.5	1.088	0.024
0.7760	0.0070	356.54	0.04	499.8	1.5	1.098	0.026
0.7386	0.0079	357.62	0.05	499.7	1.5	1.103	0.027
0.6917	0.0090	358.88	0.04	499.7	1.5	1.118	0.029
0.6658	0.0097	360.71	0.06	499.6	1.5	1.078	0.029
0.6381	0.0104	362.70	0.06	499.8	1.5	1.039	0.030
0.5874	0.0118	365.52	0.04	499.7	1.5	1.010	0.031
0.5539	0.0127	368.31	0.04	499.8	1.5	0.962	0.031
0.5179	0.0138	371.06	0.04	499.8	1.5	0.927	0.032
0.5179	0.0138	371.45	0.04	499.8	1.5	0.914	0.032
0.4513	0.0158	376.53	0.05	499.5	1.5	0.869	0.035
0.4221	0.0167	379.28	0.05	499.6	1.5	0.842	0.036
0.3818	0.0180	383.03	0.04	499.6	1.5	0.816	0.039

0.3655	0.0185	384.71	0.07	499.7	1.5	0.805	0.040
0.9991	0.0026	353.38	0.04	499.7	1.5	0.974	0.018
0.9448	0.0036	353.61	0.03	499.8	1.4	1.020	0.020
0.8996	0.0044	354.26	0.03	499.6	1.5	1.041	0.021
0.8488	0.0054	355.27	0.04	499.6	1.5	1.058	0.023
0.7987	0.0065	356.41	0.04	499.7	1.5	1.073	0.024
0.7198	0.0083	358.71	0.03	499.7	1.5	1.082	0.027
0.6381	0.0104	363.49	0.04	499.7	1.5	1.007	0.029
0.4922	0.0145	373.63	0.07	499.8	1.4	0.887	0.033
0.5980	0.0115	365.58	0.05	499.8	1.4	0.990	0.030

Table S7: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / C₄OH mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S2); $x(\text{C}_4\text{OH})$: mole fraction of the solvent C₄OH in the binary mixture; $u(x)(\text{C}_4\text{OH})$: estimated uncertainty of the mole fraction of the solvent C₄OH in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{C}_4\text{OH})$: calculated activity coefficient of the solvent C₄OH with eq. (7); $u(\gamma)(\text{C}_4\text{OH})$: estimated uncertainty of the activity coefficient of the solvent C₄OH.

<i>p = 1000 mbar</i>							
$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	390.03	0.04	999.5	1.5	1.000	0.035
0.9574	0.0058	390.25	0.05	999.3	1.5	1.049	0.037
0.9071	0.0070	391.01	0.03	999.3	1.5	1.078	0.040
0.8423	0.0088	392.29	0.03	999.4	1.5	1.109	0.045
0.8816	0.0077	391.46	0.03	999.2	1.5	1.091	0.042
0.8318	0.0091	392.91	0.03	999.2	1.4	1.099	0.045
0.7362	0.0120	395.34	0.03	999.4	1.5	1.142	0.053
0.6614	0.0145	399.73	0.04	999.4	1.5	1.096	0.056
0.6125	0.0162	402.27	0.05	999.7	1.4	1.089	0.061
0.5860	0.0172	402.78	0.26	999.3	1.4	1.119	0.065
1.0000	0.0049	390.00	0.04	998.9	1.4	1.000	0.035
0.9644	0.0057	390.12	0.03	999.3	1.4	1.046	0.037
0.9742	0.0054	390.03	0.04	999.1	1.4	1.039	0.036
0.9328	0.0064	390.27	0.03	999.1	1.6	1.076	0.039
0.8946	0.0074	391.14	0.03	998.7	1.4	1.087	0.041
0.8681	0.0081	391.68	0.03	999.5	1.5	1.100	0.043
0.8240	0.0093	392.61	0.03	999.4	1.5	1.122	0.046
0.7913	0.0102	393.43	0.04	999.1	1.5	1.135	0.049
0.7647	0.0111	394.39	0.04	999.2	1.5	1.136	0.051
0.7161	0.0126	396.18	0.04	999.3	1.5	1.141	0.054
0.6950	0.0133	397.97	0.04	999.6	1.5	1.107	0.054
0.6496	0.0149	399.93	0.06	999.6	1.4	1.109	0.058
0.5994	0.0167	402.10	0.04	999.4	1.5	1.119	0.064
0.5723	0.0177	404.41	0.04	999.3	1.5	1.087	0.065
0.5288	0.0194	406.38	0.04	999.1	1.5	1.104	0.071
0.4651	0.0220	410.33	0.05	999.4	1.4	1.110	0.081
0.4196	0.0240	413.68	0.07	999.3	1.4	1.110	0.090
0.4012	0.0248	415.36	0.05	999.2	1.5	1.103	0.094

<i>p = 700 mbar</i>							
$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	380.94	0.04	699.1	1.5	1.000	0.034
0.9574	0.0058	380.90	0.04	700.2	1.5	1.036	0.037
0.9009	0.0072	381.39	0.03	699.2	1.5	1.079	0.041
0.8423	0.0088	382.71	0.03	700.2	1.5	1.100	0.044
0.8882	0.0075	382.00	0.03	700.1	1.4	1.071	0.041

0.8394	0.0089	383.54	0.03	700.1	1.4	1.070	0.043
0.7362	0.0120	385.89	0.03	700.2	1.5	1.118	0.052
0.6950	0.0133	387.60	0.04	700.3	1.4	1.113	0.055
0.6614	0.0145	390.06	0.04	700.2	1.5	1.071	0.055
0.5994	0.0167	393.32	0.04	700.3	1.5	1.054	0.060
0.5723	0.0177	395.61	0.04	700.1	1.5	1.020	0.061
1.0000	0.0049	381.15	0.03	700.2	1.4	1.000	0.034
0.9644	0.0057	380.85	0.03	700.1	1.4	1.030	0.036
0.9723	0.0055	380.70	0.03	700.1	1.4	1.027	0.036
0.9190	0.0067	381.11	0.03	700.2	1.4	1.070	0.040
0.8946	0.0074	381.65	0.03	700.1	1.4	1.077	0.041
0.8681	0.0081	382.25	0.03	700.3	1.4	1.086	0.043
0.8240	0.0093	383.04	0.03	700.1	1.5	1.110	0.046
0.7913	0.0102	383.87	0.03	700.0	1.5	1.121	0.048
0.7683	0.0109	384.72	0.03	700.1	1.4	1.119	0.050
0.7161	0.0126	386.23	0.04	700.0	1.5	1.135	0.054
0.6774	0.0139	387.81	0.03	700.1	1.5	1.134	0.057
0.6496	0.0149	390.75	0.03	700.0	1.5	1.064	0.056
0.5994	0.0167	393.21	0.04	699.9	1.5	1.058	0.060
0.5723	0.0177	395.36	0.04	700.0	1.4	1.028	0.061
0.5288	0.0194	397.11	0.04	700.0	1.5	1.049	0.068
0.4718	0.0218	400.67	0.06	700.1	1.5	1.044	0.075
0.4304	0.0235	404.02	0.04	700.0	1.5	1.025	0.081
0.4123	0.0243	406.62	0.06	699.9	1.5	0.985	0.081
0.4549	0.0225	400.48	0.04	700.1	1.5	1.089	0.081
0.5994	0.0167	394.68	0.05	700.1	1.5	1.005	0.057

p = 500 mbar

$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	372.29	0.04	499.7	1.4	1.000	0.034
0.9574	0.0058	372.42	0.03	499.7	1.5	1.030	0.037
0.9009	0.0072	372.91	0.04	499.7	1.5	1.073	0.041
0.8540	0.0084	374.05	0.03	499.8	1.4	1.082	0.043
0.8882	0.0075	373.48	0.03	499.7	1.4	1.064	0.041
0.8394	0.0089	374.90	0.03	499.5	1.5	1.064	0.043
0.7362	0.0120	376.88	0.03	499.9	1.5	1.122	0.052
0.6950	0.0133	378.60	0.03	499.7	1.5	1.112	0.055
0.6614	0.0145	380.35	0.03	499.6	1.5	1.092	0.056
0.6047	0.0165	384.67	0.05	499.7	1.5	1.016	0.057
0.5723	0.0177	387.08	0.04	499.6	1.5	0.983	0.059
1.0000	0.0049	372.39	0.03	499.8	1.4	1.000	0.034
0.9674	0.0056	372.39	0.03	499.6	1.4	1.020	0.036
0.9723	0.0055	372.19	0.04	499.5	1.5	1.023	0.036
0.9190	0.0067	372.61	0.04	499.6	1.4	1.064	0.040
0.8946	0.0074	373.09	0.03	499.6	1.4	1.073	0.041

0.8681	0.0081	373.59	0.03	499.8	1.4	1.084	0.043
0.8240	0.0093	374.32	0.03	499.6	1.4	1.109	0.046
0.7947	0.0101	375.07	0.03	499.6	1.4	1.116	0.048
0.7647	0.0111	376.03	0.03	499.6	1.4	1.117	0.050
0.7161	0.0126	377.15	0.03	499.5	1.5	1.141	0.054
0.6841	0.0137	378.33	0.04	499.7	1.5	1.142	0.057
0.6496	0.0149	382.00	0.04	499.6	1.4	1.045	0.055
0.5994	0.0167	383.59	0.04	499.6	1.5	1.067	0.061
0.5723	0.0177	385.59	0.05	499.4	1.5	1.037	0.062
0.5348	0.0192	387.36	0.05	499.6	1.4	1.041	0.066
0.4718	0.0218	391.23	0.06	499.7	1.5	1.028	0.074
0.4304	0.0235	394.65	0.08	499.6	1.5	1.000	0.079
0.4123	0.0243	397.37	0.05	499.6	1.5	0.952	0.079
0.4817	0.0213	390.61	0.05	499.6	1.4	1.029	0.073
0.5860	0.0172	384.86	0.04	499.5	1.4	1.041	0.061

Table S8: Isobaric vapor liquid equilibrium data and activity coefficients of binary mixtures of C₄mimTfO / C₄OH mixtures at $p = 1000$ mbar, 700 mbar, and 500 mbar (set-up; S3); $x(\text{C}_4\text{OH})$: mole fraction of the solvent C₄OH in the binary mixture; $u(x)(\text{C}_4\text{OH})$: estimated uncertainty of the mole fraction of the solvent C₄OH in the binary mixture; T : temperature of the boiling liquid; $u(T)$: estimated uncertainty of the temperature of the boiling liquid; p : pressure of the system; $u(p)$: estimated uncertainty of the systems pressure; $\gamma(\text{C}_4\text{OH})$: calculated activity coefficient of the solvent C₄OH with eq. (7); $u(\gamma)(\text{C}_4\text{OH})$: estimated uncertainty of the activity coefficient of the solvent C₄OH.

<i>p = 1000 mbar</i>							
$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	390.39	0.06	1000.0	1.0	1.000	0.034
0.9277	0.0065	391.57	0.04	1000.0	1.0	1.034	0.038
0.8946	0.0074	391.93	0.06	999.0	1.0	1.058	0.040
0.8540	0.0084	392.36	0.10	1000.0	1.0	1.092	0.044
0.8161	0.0095	393.89	0.12	999.0	1.0	1.083	0.045
0.7554	0.0113	394.65	0.13	1000.0	1.0	1.140	0.051
0.7263	0.0123	396.12	0.18	1001.0	1.0	1.129	0.053
0.6841	0.0137	397.07	0.16	1000.0	1.0	1.160	0.058
<i>p = 700 mbar</i>							
$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	380.66	0.03	700.0	1.0	1.000	0.034
0.9248	0.0066	382.12	0.04	700.0	1.0	1.024	0.038
0.8946	0.0074	382.56	0.04	699.0	1.0	1.039	0.040
0.8540	0.0084	383.14	0.07	699.0	1.0	1.065	0.042
0.8161	0.0095	384.38	0.05	700.0	1.0	1.066	0.044
0.7554	0.0113	385.11	0.18	698.0	1.0	1.118	0.050
0.7263	0.0123	386.15	0.16	700.0	1.0	1.122	0.053
0.6841	0.0137	387.53	0.09	699.0	1.0	1.132	0.056
<i>p = 500 mbar</i>							
$x(\text{C}_4\text{OH})$	$u(x)(\text{C}_4\text{OH})$	T / K	$u(T) / \text{K}$	p / mbar	$u(p) / \text{mbar}$	$\gamma(\text{C}_4\text{OH})$	$u(\gamma)(\text{C}_4\text{OH})$
1.0000	0.0049	372.10	0.04	500.0	1.0	1.000	0.034
0.9248	0.0066	373.51	0.04	500.0	1.0	1.021	0.038
0.8946	0.0074	374.09	0.04	500.0	1.0	1.031	0.039
0.8540	0.0084	374.73	0.07	500.0	1.0	1.053	0.042
0.8161	0.0095	375.72	0.06	500.0	1.0	1.060	0.044
0.7601	0.0112	376.41	0.12	500.0	1.0	1.108	0.050
0.7161	0.0126	377.45	0.11	499.0	1.0	1.127	0.054
0.6841	0.0137	378.57	0.10	500.0	1.0	1.132	0.056

Excerpt References - Supplementary Material:

22. Passos, H.; Khan, I.; Mutelet, F.; Oliveira, M. B.; Carvalho, P. J.; Santos, L. M. N. B. F.; Held, C.; Sadowski, G.; Freire, M. G.; Coutinho, J. A. P. Vapor-Liquid Equilibria of Water plus Alkylimidazolium-Based Ionic Liquids: Measurements and Perturbed-Chain Statistical Associating Fluid Theory Modeling. *Ind. Eng. Chem. Res.* **2014**, *53*, 3737-3748.
61. Carvalho, P. J.; Khan, I.; Morais, A.; Granjo, J. F. O.; Oliveira, N. M. C.; Santos, L. M. N. B. F.; Coutinho, J. A. P. A New Microebulliometer for the Measurement of the Vapor-Liquid Equilibrium of Ionic Liquid Systems. *Fluid Phase Equilib.* **2013**, *354*, 156-165.
64. Orchilles, A. V.; Miguel, P. J.; Gonzalez-Alfaro, V.; Vercher, E.; Martinez-Andreu, A. Isobaric Vapor-Liquid Equilibria of 1-Propanol + Water plus Trifluoromethanesulfonate-Based Ionic Liquid Ternary Systems at 100 kPa. *J. Chem. Eng. Data* **2011**, *56*, 4454-4460.
78. Ambrose, D.; Townsend, R. 681. Thermodynamic Properties of Organic Oxygen Compounds. Part IX. The Critical Properties and Vapour Pressures, Above Five Atmospheres, of Six Aliphatic Alcohols. *Journal of the Chemical Society (Resumed)* **1963**, (0), 3614-3625.
118. Rowley, R. L.; Wilding, W. V.; Oscarson, J. L.; Yang, Y.; Zundel, N. A.; Daubert, T. E.; Danner, R. P. DIPPR Data Compilation of Pure Chemical Properties. In Properties, D. I. f. P., Ed. AIChE: New York, 2007.
120. Stull, D. R. Vapor Pressure of Pure Substances - Inorganic Compounds. *Ind. Eng. Chem. Res.* **1947**, *39*, 540-550.
121. Liu, C.-T.; Lindsay, W. T., Vapor Pressure of Deuterated Water from 106 to 300.Deg. *J. Chem. Eng. Data* **1970**, *15*, 510-513.
122. Ambrose, D.; Sprake, C. H. S. Thermodynamic Properties of Organic Oxygen Compounds XXV. Vapour Pressures and Normal Boiling Temperatures of Aliphatic Alcohols. *J. Chem. Thermodyn.* **1970**, *2*, 631-645.
123. Ambrose, D.; Sprake, C. H. S.; Townsend, R. Thermodynamic Properties of Organic Oxygen Compounds XXXVII. Vapour Pressures of Methanol, Ethanol, Pentan-1-ol, and Octan-1-ol from the Normal Boiling Temperature to the Critical Temperature. *J. Chem. Thermodyn.* **1975**, *7*, 185-190.
124. Kemme, H. R.; Kreps, S. I. Vapor Pressure of Primary n-Alkyl Chlorides and Alcohols. *J. Chem. Eng. Data* **1969**, *14*, 98-102.
125. Hessel, D.; Geiseler, G. Über die Druckabhängigkeit des Heteroazeotropen Systems n-Butanol/Wasser. *Z. Phys. Chem.* **1965**, *229*, 199 - 209.