

Supplementary Information

# Viscosity Investigations on the Binary Systems of (1 ChCl:2 Ethylene Glycol) DES and Methanol or Ethanol

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**Table S1.** Reported values of experimental densities of pseudo-binary mixtures of (1-x) Ethaline + x methanol/ethanol at various temperatures and at a pressure of 100±5 kPa [References R1, R2].

Reference	$x$	Temperature (K)				
		283.15	293.15	303.15	313.15	323.15
		$\rho$ (g.cm <sup>-3</sup> )				
		(1- $x$ ) Ethaline + $x$ methanol				
[R1]	0.000	1.1252	1.1192	1.1133	1.1077	1.1021
[R1]	0.105	1.1118	1.1059	1.1001	1.0944	1.0888
[R1]	0.205	1.0950	1.0888	1.0828	1.0769	1.0711
[R1]	0.300	1.0780	1.0717	1.0656	1.0595	1.0534
[R1]	0.401	1.0564	1.0500	1.0437	1.0376	1.0313
[R1]	0.501	1.0318	1.0250	1.0185	1.0120	1.0056
[R1]	0.600	1.0035	0.9968	0.9898	0.9829	0.9762
[R1]	0.704	0.9663	0.9588	0.9516	0.9444	0.9373
[R1]	0.800	0.9237	0.9168	0.9092	0.9015	0.8937
[R1]	0.904	0.8692	0.8607	0.8523	0.8440	0.8355
[R1]	1.000	0.8007	0.7911	0.7817	0.7721	0.7626
		293.15	303.15	313.15	323.15	333.15
		(1- $x$ ) Ethaline + $x$ . ethanol				
[R2]	0.000	1.1192	1.1133	1.1077	1.1021	1.0965
[R2]	0.101	1.0984	1.0926	1.0868	1.0811	1.0753
[R2]	0.182	1.0806	1.0741	1.0682	1.0623	1.0566
[R2]	0.308	1.0487	1.0424	1.0363	1.0302	1.0242
[R2]	0.401	1.0231	1.0165	1.0102	1.0039	0.9979
[R2]	0.501	0.9932	0.9865	0.9799	0.9734	0.9668
[R2]	0.598	0.9622	0.9552	0.9483	0.9415	0.9347
[R2]	0.700	0.9250	0.9176	0.9104	0.9032	0.8961
[R2]	0.798	0.8848	0.8772	0.8696	0.8621	0.8543
[R2]	0.894	0.8433	0.8352	0.8271	0.8190	0.8106
[R2]	1.000	0.7915	0.7828	0.7741	0.7652	0.7559

**Table S2.** Calculated values of viscosity deviations from ideality for Ethaline + methanol/ethanol systems at various temperatures at a pressure of 100 kPa.

<b>T (K)</b>	<b>Viscosity deviation (mPa.s)</b>										
	<b><math>x_1</math> Ethaline (1 ChCl : 2 ethylene glycol) + <math>x_2</math> methanol</b>										
<b><math>x_2</math></b>	<b>0.000</b>	<b>0.105</b>	<b>0.205</b>	<b>0.300</b>	<b>0.401</b>	0.501	0.600	0.704	0.800	0.904	1.000
283.15	0.000	-17.986	-33.943	-39.233	-37.012	-34.072	-28.843	-22.519	-15.677	-7.684	0.000
293.15	0.000	-12.766	-21.904	-25.002	-23.551	-21.746	-18.433	-14.444	-10.086	-4.955	0.000
303.15	0.000	-7.667	-13.403	-15.468	-14.612	-13.599	-11.580	-9.141	-6.416	-3.166	0.000
313.15	0.000	-5.154	-8.902	-10.292	-9.736	-9.096	-7.773	-6.171	-4.352	-2.155	0.000
323.15	0.000	-3.545	-6.123	-7.088	-6.713	-6.302	-5.407	-4.320	-3.065	-1.531	0.000
	<b><math>x_1</math> Ethaline (1 ChCl : 2 ethylene glycol) + <math>x_2</math> ethanol</b>										
<b><math>x_2</math></b>	<b>0.000</b>	<b>0.108</b>	<b>0.203</b>	<b>0.301</b>	<b>0.401</b>	0.500	0.600	0.699	0.805	0.904	1.000
293.15	0.000	-11.048	-16.200	-21.226	-21.081	-19.617	-16.729	-13.449	-9.031	-4.520	0.000
303.15	0.000	-6.513	-9.671	-12.906	-12.929	-12.128	-10.387	-8.407	-5.659	-2.832	0.000
313.15	0.000	-4.375	-6.411	-8.546	-8.579	-8.080	-6.929	-5.634	-3.802	-1.903	0.000
323.15	0.000	-3.006	-4.381	-5.856	-5.896	-5.573	-4.787	-3.908	-2.643	-1.320	0.000
333.15	0.000	-2.402	-3.339	-4.368	-4.372	-4.125	-3.536	-2.888	-1.950	-0.967	0.000

## References:

- [R1] Haghbakhsh, R.; Raeissi, S. Experimental investigation on the volumetric properties of mixtures of the deep eutectic solvent of Ethaline and methanol in the temperature range of 283.15 to 323.15 K. *J. Chem. Thermodyn.* **2020**, *147*, 106124.
- [R2] Haghbakhsh, R.; Raeissi, S. A study of nonideal mixtures of ethanol and the 1 choline chloride + 2 ethylene glycol deep eutectic solvent for their volumetric behavior. *J. Chem. Thermodyn.* **2020**, *150*, 106219.