APPENDIX

Density data for binary system *i.e.* 1M0G, 4M0G, 0M1G and 0M4G.

T (K)	1M0G ($g\ cm^{-3}$)	4M0G ($g\ cm^{-3}$)	0M1G ($g\ cm^{-3}$)	0M4G ($g\ cm^{-3}$)
293	1.01182	1.04334	1.08483	1.10956
298	1.00889	1.04041	1.0819	1.1073
303	1.00576	1.03728	1.07877	1.10488
313	1.00175	1.03083	1.07387	1.09959
323	0.99709	1.02407	1.0684	1.09378
333	0.99175	1.0169	1.06234	1.08749
343	0.97788	1.0094	1.05089	1.08075
353	0.97014	1.00166	1.04315	1.07787
363	0.96194	0.99346	1.03495	1.0759

Density data for ternary system *i.e.* 4M2G, 4M1G, 3M1G, 2M2G and 1M3G.

T (K)	4M2G ($g\ cm^{-3}$)	4M1G ($g\ cm^{-3}$)	3M1G ($g\ cm^{-3}$)	2M2G ($g\ cm^{-3}$)	1M3G ($g\ cm^{-3}$)
293	1.18992	1.12074	1.05798	1.07508	1.09304
298	1.18699	1.11781	1.05531	1.07258	1.09068
303	1.18386	1.11468	1.05253	1.06996	1.08818
313	1.17615	1.10749	1.04665	1.06439	1.08269
323	1.16833	1.1001	1.04037	1.05836	1.07679
333	1.16028	1.09237	1.03367	1.05188	1.07045
343	1.15424	1.0868	1.02663	1.04506	1.06368
353	1.14653	1.07906	1.01922	1.0378	1.0563
293	1.18992	1.12074	1.05798	1.07508	1.09304

The comparison between calculated and measured density data for binary systems

System	Mole fraction			T	A	B	Correlation density data	Experimental density data	% of deviation
	x_{MDEA}	$x_{[gua][OTf]}$	x_{H_2O}						
4M2G	0.06622	0.03245	0.90133	293	1.4086	-0.000737	1.192659	1.18992	-0.23
	0.06622	0.03245	0.90133	298	1.4086	-0.000737	1.188974	1.18699	-0.167
	0.06622	0.03245	0.90133	303	1.4086	-0.000737	1.185289	1.18386	-0.121
	0.06622	0.03245	0.90133	313	1.4086	-0.000737	1.177919	1.17615	-0.15
	0.06622	0.03245	0.90133	323	1.4086	-0.000737	1.170549	1.16833	-0.19
	0.06622	0.03245	0.90133	333	1.4086	-0.000737	1.163179	1.16028	-0.249
	0.06622	0.03245	0.90133	343	1.4086	-0.000737	1.155809	1.15424	-0.136
	0.06622	0.03245	0.90133	353	1.4086	-0.000737	1.148439	1.14653	-0.166
	0.06622	0.03245	0.90133	363	1.4086	-0.000737	1.141069	1.13833	-0.24
4M1G	0.06731	0.01649	0.91620	293	1.3304	-0.000708	1.122956	1.12074	-0.197
	0.06731	0.01649	0.91620	298	1.3304	-0.000708	1.119416	1.11781	-0.143
	0.06731	0.01649	0.91620	303	1.3304	-0.000708	1.115876	1.11468	-0.107
	0.06731	0.01649	0.91620	313	1.3304	-0.000708	1.108796	1.10749	-0.118
	0.06731	0.01649	0.91620	323	1.3304	-0.000708	1.101716	1.1001	-0.147
	0.06731	0.01649	0.91620	333	1.3304	-0.000708	1.094636	1.09237	-0.207
	0.06731	0.01649	0.91620	343	1.3304	-0.000708	1.087556	1.0868	-0.07
	0.06731	0.01649	0.91620	353	1.3304	-0.000708	1.080476	1.07906	-0.131
	0.06731	0.01649	0.91620	363	1.3304	-0.000708	1.073396	1.07086	-0.236

System	Mole fraction			T	A	B	Correlation density data	Experimental density data	% of deviation
	x_{MDEA}	$x_{[gua][OTf]}$	x_{H_2O}						
4M0G	0.06844	0.00000	0.93156	293	1.2522	-0.000707	1.04505	1.04334	-0.164
	0.06844	0.00000	0.93156	298	1.2522	-0.000707	1.04151	1.04041	-0.106
	0.06844	0.00000	0.93156	303	1.2522	-0.000707	1.03798	1.03728	-0.067
	0.06844	0.00000	0.93156	313	1.2522	-0.000707	1.03091	1.03083	-0.008
	0.06844	0.00000	0.93156	323	1.2522	-0.000707	1.02384	1.02407	0.023
	0.06844	0.00000	0.93156	333	1.2522	-0.000707	1.01677	1.0169	0.013
	0.06844	0.00000	0.93156	343	1.2522	-0.000707	1.0097	1.0094	-0.03
	0.06844	0.00000	0.93156	353	1.2522	-0.000707	1.00263	1.00166	-0.097
	0.06844	0.00000	0.93156	363	1.2522	-0.000707	0.99556	0.99346	-0.211
3M1G	0.05133	0.01677	0.93190	293	1.261	-0.00070475	1.05450825	1.05798	0.329
	0.05133	0.01677	0.93190	298	1.261	-0.00070475	1.0509845	1.05531	0.412
	0.05133	0.01677	0.93190	303	1.261	-0.00070475	1.04746075	1.05253	0.484
	0.05133	0.01677	0.93190	313	1.261	-0.00070475	1.04041325	1.04665	0.599
	0.05133	0.01677	0.93190	323	1.261	-0.00070475	1.03336575	1.04037	0.678
	0.05133	0.01677	0.93190	333	1.261	-0.00070475	1.02631825	1.03367	0.716
	0.05133	0.01677	0.93190	343	1.261	-0.00070475	1.01927075	1.02663	0.722
	0.05133	0.01677	0.93190	353	1.261	-0.00070475	1.01222325	1.01922	0.691
	0.05133	0.01677	0.93190	363	1.261	-0.00070475	1.00517575	1.01143	0.622

System	Mole fraction			T	A	B	Correlation density data	Experimental density data	% of deviation
	x_{MDEA}	$x_{[gua][OTf]}$	x_{H_2O}						
2M2G	0.03423	0.03356	0.93221	293	1.2426	-0.000733	1.027831	1.07508	4.597
	0.03423	0.03356	0.93221	298	1.2426	-0.000733	1.024166	1.07258	4.727
	0.03423	0.03356	0.93221	303	1.2426	-0.000733	1.020501	1.06996	4.847
	0.03423	0.03356	0.93221	313	1.2426	-0.000733	1.013171	1.06439	5.055
	0.03423	0.03356	0.93221	323	1.2426	-0.000733	1.005841	1.05836	5.221
	0.03423	0.03356	0.93221	333	1.2426	-0.000733	0.998511	1.05188	5.345
	0.03423	0.03356	0.93221	343	1.2426	-0.000733	0.991181	1.04506	5.436
	0.03423	0.03356	0.93221	353	1.2426	-0.000733	0.983851	1.0378	5.483
	0.03423	0.03356	0.93221	363	1.2426	-0.000733	0.976521	1.03019	5.496
1M3G	0.01713	0.05036	0.93252	293	1.2312	-0.00075725	1.00932575	1.09304	8.294
	0.01713	0.05036	0.93252	298	1.2312	-0.00075725	1.0055395	1.09068	8.467
	0.01713	0.05036	0.93252	303	1.2312	-0.00075725	1.00175325	1.08818	8.628
	0.01713	0.05036	0.93252	313	1.2312	-0.00075725	0.99418075	1.08269	8.903
	0.01713	0.05036	0.93252	323	1.2312	-0.00075725	0.98660825	1.07679	9.141
	0.01713	0.05036	0.93252	333	1.2312	-0.00075725	0.97903575	1.07045	9.337
	0.01713	0.05036	0.93252	343	1.2312	-0.00075725	0.97146325	1.06368	9.493
	0.01713	0.05036	0.93252	353	1.2312	-0.00075725	0.96389075	1.0563	9.587
	0.01713	0.05036	0.93252	363	1.2312	-0.00075725	0.95631825	1.0469	9.472

System	Mole fraction			T	A	B	Correlation density data	Experimental density data	% of deviation
	x_{MDEA}	$x_{[gua][OTf]}$	x_{H_2O}						
1M0G	0.01804	0.00000	0.98196	293	1.2486	-0.000731	1.03442	1.01182	-2.185
	0.01804	0.00000	0.98196	298	1.2486	-0.000731	1.03076	1.00889	-2.122
	0.01804	0.00000	0.98196	303	1.2486	-0.000731	1.02711	1.00576	-2.078
	0.01804	0.00000	0.98196	313	1.2486	-0.000731	1.0198	1.00175	-1.77
	0.01804	0.00000	0.98196	323	1.2486	-0.000731	1.01249	0.99709	-1.521
	0.01804	0.00000	0.98196	333	1.2486	-0.000731	1.00518	0.99175	-1.336
	0.01804	0.00000	0.98196	343	1.2486	-0.000731	0.99787	0.97788	-2.003
	0.01804	0.00000	0.98196	353	1.2486	-0.000731	0.99056	0.97014	-2.061
	0.01804	0.00000	0.98196	363	1.2486	-0.000731	0.98325	0.96194	-2.167
0M4G	0.00000	0.06716	0.93284	293	1.261	-0.000743	1.0433	1.10956	6.351
	0.00000	0.06716	0.93284	298	1.261	-0.000743	1.03959	1.1073	6.514
	0.00000	0.06716	0.93284	303	1.261	-0.000743	1.03587	1.10488	6.662
	0.00000	0.06716	0.93284	313	1.261	-0.000743	1.02844	1.09959	6.918
	0.00000	0.06716	0.93284	323	1.261	-0.000743	1.02101	1.09378	7.127
	0.00000	0.06716	0.93284	333	1.261	-0.000743	1.01358	1.08749	7.292
	0.00000	0.06716	0.93284	343	1.261	-0.000743	1.00615	1.08075	7.414
	0.00000	0.06716	0.93284	353	1.261	-0.000743	0.99872	1.07787	7.925
	0.00000	0.06716	0.93284	363	1.261	-0.000743	0.99129	1.0759	8.535

System	Mole fraction			T	A	B	Correlation density data	Experimental density data	% of deviation
	x_{MDEA}	$x_{[gua][OTf]}$	x_{H_2O}						
0M1G	0.00000	0.01768	0.98232	293	1.294	-0.000722	1.08245	1.08483	0.22
	0.00000	0.01768	0.98232	298	1.294	-0.000722	1.07884	1.0819	0.283
	0.00000	0.01768	0.98232	303	1.294	-0.000722	1.07523	1.07877	0.329
	0.00000	0.01768	0.98232	313	1.294	-0.000722	1.06801	1.07387	0.548
	0.00000	0.01768	0.98232	323	1.294	-0.000722	1.06079	1.0684	0.717
	0.00000	0.01768	0.98232	333	1.294	-0.000722	1.05357	1.06234	0.832
	0.00000	0.01768	0.98232	343	1.294	-0.000722	1.04635	1.05089	0.434
	0.00000	0.01768	0.98232	353	1.294	-0.000722	1.03913	1.04315	0.386
	0.00000	0.01768	0.98232	363	1.294	-0.000722	1.03191	1.03495	0.294

Effect addition of [gua][OTf] to 4M MDEA on viscosity at different temperature

[gua][OTf] x 10^{-1} (mol dm^{-3})	Effect addition of [gua][OTf] to 4 M MDEA on viscosity at different temperature					
	303.2 K	313.2 K	323.2 K	333.2 K	343.2 K	353.2 K
4M0G	6.671	4.706	3.057	2.193	1.589	1.194
4M0.1G	7.1759	5.3001	3.4903	2.6002	1.8222	1.6865
4M0.3G	7.5206	5.6893	3.7005	2.9231	2.1332	1.8954
4M0.5G	7.9621	5.8997	4.1113	3.3466	2.5511	2.01378
4M0.7G	8.1444	6.3106	4.3381	3.6169	2.8009	2.2833
4M0.9G	8.4308	6.7792	4.6981	3.9083	3.0099	2.4041
4M1G	8.931	7.105	5.328	4.151	3.208	2.561
4M2G	11.059	8.745	6.590	5.270	4.352	3.599

Viscosities of aqueous [gua][OTf] at different temperature

[gua][OTf] x 10^{-1} (mol dm^{-3})	Viscosities of aqueous [gua][OTf] at different temperature			
	303.2	313.2	323.2	333.2
1	0.7366	0.6512	0.6047	0.5555
3	0.7996	0.6757	0.6289	0.5686
5	0.8208	0.6976	0.6517	0.5834
7	0.8616	0.7326	0.6872	0.6095
9	0.9134	0.8268	0.7268	0.6302
10	0.98552	0.83741	0.74377	0.65441
40	1.3611	1.098	0.9221	0.67002
1M0G	1.568	1.178	0.796	0.688

CO_2 solubility at high pressure for binary system

System type: Binary

Chemical Systems:

N-methyldiethanolamine

Water

Property: VLE (Solubility of CO_2)

Experimental Method: Pressure Change Measurement: thermocouple (Type J (iron-constantan)), pressure digital indicators with transducers

Equation for loading:

$$\alpha = \frac{\left[\frac{(P_{Ti} - P_{Vi}) * V_{gc}}{zRT}\right] - \left[\frac{(P_{Tf} - P_{vf}) * (V_{gc} + (V_{cell} - V_{sol}))}{zRT}\right]}{n_{total}}$$

P_T = total pressure; P_V = vapor pressure; V_{gc} = volume of gas container; V_{cell} = volume cell; V_{sol} = volume solution; $_i$ = initial condition; $_f$ = final condition; n_{total} = summation of moles of MDEA and/ or the other absorbents in the liquid phase.

Combined Expanded Uncertainty (k = 2) for the Property: $2\sigma(\alpha)$ = 0.001 mol CO_2/ mol total system

Variables and Constraints: temperature *T*, pressure *p*, Standard Uncertainty (k = 1) for each variable and constraint: σ(T) = 0.1 K; $\sigma(p)$ = 0.001 kg_f cm^{-2}.

CO_2 solubility at high pressure for binary and ternary systems

System type: Binary and ternary

Chemical Systems:

N-methyldiethanolamine

Guanidinium trifluoromethylsulfonate

Water

Property: VLE (Solubility of CO_2)

Experimental Method: Pressure Change Measurement: thermocouple (Type J (iron-constant)), pressure digital indicators with transducers

Equation for loading:

$$\alpha = \frac{\left[\frac{(P_{Ti} - P_{Vi}) * V_{gc}}{zRT}\right] - \left[\frac{(P_{Tf} - P_{vf}) * (V_{gc} + (V_{cell} - V_{sol}))}{zRT}\right]}{n_{total}}$$

P_T = total pressure; P_V = vapor pressure; V_{gc} = volume of gas container; V_{cell} = volume cell; V_{sol} = volume solution; $_i$ = initial condition; $_f$ = final condition; n_{total} = summation of moles of MDEA and/ or the other absorbents in the liquid phase.

Combined Expanded Uncertainty (k = 2) for the Property: $2\sigma(\alpha)$ = 0.001 mol CO_2/ mol total amine

Variables and Constraints: temperature *T*, pressure *p*, Standard Uncertainty (k = 1) for each Variable and Constraint: σ (T) = 0.1 K; σ (*p*) = 0.001 kg_f cm^{-2}.

Mole fraction of CO_2, H_2O, MDEA and [gua][OTf] for all systems at 303 K

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO_2}	x_{H_2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
4M0G	303	500	0.1020	0.0000	1.3889	0.8840	0.3722	0.5848	0.0000	0.0430	1.0000
		1000	0.1020	0.0000	1.3889	0.9810	0.3969	0.5619	0.0000	0.0413	1.0000
		1500	0.1020	0.0000	1.3889	1.1570	0.4369	0.5245	0.0000	0.0385	1.0000
		2000	0.1020	0.0000	1.3889	1.2090	0.4478	0.5144	0.0000	0.0378	1.0000
		2500	0.1020	0.0000	1.3889	1.3200	0.4696	0.4941	0.0000	0.0363	1.0000
		3000	0.1020	0.0000	1.3889	1.4240	0.4885	0.4765	0.0000	0.0350	1.0000
4M1G	303	500	0.1020	0.0250	1.3889	0.7650	0.3354	0.6089	0.0110	0.0447	1.0000
		1000	0.1020	0.0250	1.3889	0.8338	0.3548	0.5911	0.0106	0.0434	1.0000
		1500	0.1020	0.0250	1.3889	0.9300	0.3802	0.5678	0.0102	0.0417	1.0000
		2000	0.1020	0.0250	1.3889	1.2988	0.4614	0.4934	0.0089	0.0363	1.0000
		2500	0.1020	0.0250	1.3889	1.3488	0.4708	0.4848	0.0087	0.0356	1.0000
		3000	0.1020	0.0250	1.3889	1.5225	0.5011	0.4571	0.0082	0.0336	1.0000

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO_2}	x_{H_2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
1M0G	303	500	0.0255	0.0000	1.3889	0.3220	0.1854	0.7999	0.0000	0.0147	1.0000
		1000	0.0255	0.0000	1.3889	0.3760	0.2100	0.7757	0.0000	0.0142	1.0000
		1500	0.0255	0.0000	1.3889	0.4625	0.2464	0.7400	0.0000	0.0136	1.0000
		2000	0.0255	0.0000	1.3889	0.5130	0.2662	0.7206	0.0000	0.0132	1.0000
		2500	0.0255	0.0000	1.3889	0.5613	0.2841	0.7030	0.0000	0.0129	1.0000
		3000	0.0255	0.0000	1.3889	0.6028	0.2988	0.6885	0.0000	0.0126	1.0000
0M1G	303	500	0.0000	0.0250	1.3889	0.1553	0.0989	0.8851	0.0159	0.0000	1.0000
		1000	0.0000	0.0250	1.3889	0.2175	0.1333	0.8514	0.0153	0.0000	1.0000
		1500	0.0000	0.0250	1.3889	0.2953	0.1727	0.8126	0.0146	0.0000	1.0000
		2000	0.0000	0.0250	1.3889	0.3365	0.1922	0.7935	0.0143	0.0000	1.0000
		2500	0.0000	0.0250	1.3889	0.4065	0.2233	0.7630	0.0137	0.0000	1.0000
		3000	0.0000	0.0250	1.3889	0.4970	0.2601	0.7268	0.0131	0.0000	1.0000

Mole fraction of CO_2, H_2O, MDEA and [gua][OTf] for all systems at 323 K

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO2}	x_{H2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
4M0G	323	321	0.1020	0.0000	1.3889	0.7260	0.3275	0.6265	0.0000	0.0460	1.0000
		800	0.1020	0.0000	1.3889	0.8730	0.3693	0.5875	0.0000	0.0432	1.0000
		1366	0.1020	0.0000	1.3889	1.0410	0.4111	0.5485	0.0000	0.0403	1.0000
		1822	0.1020	0.0000	1.3889	1.1410	0.4335	0.5277	0.0000	0.0388	1.0000
		2399	0.1020	0.0000	1.3889	1.2360	0.4533	0.5093	0.0000	0.0374	1.0000
		2851	0.1020	0.0000	1.3889	1.3160	0.4688	0.4948	0.0000	0.0364	1.0000
4M1G	323	338	0.1020	0.0250	1.3889	0.6650	0.3049	0.6368	0.0115	0.0468	1.0000
		842	0.1020	0.0250	1.3889	0.7200	0.3220	0.6212	0.0112	0.0456	1.0000
		1372	0.1020	0.0250	1.3889	0.8513	0.3596	0.5867	0.0106	0.0431	1.0000
		1713	0.1020	0.0250	1.3889	0.9975	0.3969	0.5526	0.0099	0.0406	1.0000
		2395	0.1020	0.0250	1.3889	1.0800	0.4160	0.5350	0.0096	0.0393	1.0000
		2883	0.1020	0.0250	1.3889	1.4350	0.4863	0.4707	0.0085	0.0346	1.0000

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO_2}	x_{H_2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
1M0G	323	521	0.0255	0.0000	1.3889	0.2610	0.1558	0.8290	0.0000	0.0152	1.0000
		971	0.0255	0.0000	1.3889	0.3083	0.1789	0.8063	0.0000	0.0148	1.0000
		1504	0.0255	0.0000	1.3889	0.3785	0.2111	0.7747	0.0000	0.0142	1.0000
		1913	0.0255	0.0000	1.3889	0.4293	0.2328	0.7533	0.0000	0.0138	1.0000
		2504	0.0255	0.0000	1.3889	0.4820	0.2542	0.7324	0.0000	0.0135	1.0000
		2802	0.0255	0.0000	1.3889	0.5050	0.2631	0.7236	0.0000	0.0133	1.0000
0M1G	323	468	0.0000	0.0250	1.3889	0.1323	0.0855	0.8983	0.0162	0.0000	1.0000
		974	0.0000	0.0250	1.3889	0.2085	0.1285	0.8561	0.0154	0.0000	1.0000
		1394	0.0000	0.0250	1.3889	0.2540	0.1523	0.8327	0.0150	0.0000	1.0000
		2115	0.0000	0.0250	1.3889	0.3190	0.1841	0.8015	0.0144	0.0000	1.0000
		2335	0.0000	0.0250	1.3889	0.3890	0.2158	0.7704	0.0139	0.0000	1.0000
		2754	0.0000	0.0250	1.3889	0.4358	0.2356	0.7509	0.0135	0.0000	1.0000

Mole fraction of CO_2, H_2O, MDEA and [gua][OTf] for all systems at 333 K

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO_2}	x_{H_2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
4M0G	333	367	0.1020	0.0000	1.3889	0.1613	0.0976	0.8406	0.0000	0.0618	1.0000
		821	0.1020	0.0000	1.3889	0.2080	0.1224	0.8175	0.0000	0.0601	1.0000
		1389	0.1020	0.0000	1.3889	0.2355	0.1364	0.8045	0.0000	0.0591	1.0000
		1697	0.1020	0.0000	1.3889	0.2423	0.1398	0.8014	0.0000	0.0589	1.0000
		2416	0.1020	0.0000	1.3889	0.2755	0.1560	0.7863	0.0000	0.0578	1.0000
		2879	0.1020	0.0000	1.3889	0.2835	0.1598	0.7827	0.0000	0.0575	1.0000
4M1G	333	350	0.1020	0.0250	1.3889	0.102	0.0630	0.8584	0.0155	0.0631	1.0000
		810	0.1020	0.0250	1.3889	0.105	0.0648	0.8568	0.0154	0.0630	1.0000
		1355	0.1020	0.0250	1.3889	0.1490	0.0895	0.8342	0.0150	0.0613	1.0000
		1880	0.1020	0.0250	1.3889	0.1590	0.0949	0.8292	0.0149	0.0609	1.0000
		2362	0.1020	0.0250	1.3889	0.1858	0.1092	0.8162	0.0147	0.0600	1.0000
		2582	0.1020	0.0250	1.3889	0.2608	0.1468	0.7817	0.0141	0.0574	1.0000

Sample	T (K)	$P_{eq.}$	mole MDEA	mole [gua][OTf]	mole H_2O	mole CO_2	x_{CO_2}	x_{H_2O}	$x_{[gua][OTf]}$	x_{MDEA}	x_{total}
1M0G	333	543	0.0255	0.0000	1.3889	0.2308	0.1403	0.8442	0.0000	0.0155	1.0000
		964	0.0255	0.0000	1.3889	0.2845	0.1675	0.8175	0.0000	0.0150	1.0000
		1437	0.0255	0.0000	1.3889	0.3450	0.1961	0.7894	0.0000	0.0145	1.0000
		1910	0.0255	0.0000	1.3889	0.3893	0.2158	0.7700	0.0000	0.0141	1.0000
		2386	0.0255	0.0000	1.3889	0.4313	0.2337	0.7525	0.0000	0.0138	1.0000
		2725	0.0255	0.0000	1.3889	0.4590	0.2450	0.7414	0.0000	0.0136	1.0000
0M1G	333	470	0.0000	0.0250	1.3889	0.0810	0.0542	0.9291	0.0167	0.0000	1.0000
		959	0.0000	0.0250	1.3889	0.1455	0.0933	0.8907	0.0160	0.0000	1.0000
		1411	0.0000	0.0250	1.3889	0.2093	0.1289	0.8557	0.0154	0.0000	1.0000
		1927	0.0000	0.0250	1.3889	0.2485	0.1495	0.8355	0.0150	0.0000	1.0000
		2295	0.0000	0.0250	1.3889	0.3215	0.1853	0.8003	0.0144	0.0000	1.0000
		2801	0.0000	0.0250	1.3889	0.3688	0.2069	0.7791	0.0140	0.0000	1.0000

ACADEMIC JOURNAL AND PROCEEDING

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Solubilities of CO_2 in aqueous *N*-methyldiethanolamine and guanidinium trifluoromethanesulfonate ionic liquid systems at elevated pressures, *Fluid Phase Equilibria*, 300 (2011) 89 – 94 (ISI publication) (*ISI-Cited Publication*)

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua. Density of *N*-methyldiethanolamine and Guanidium trifluoromethanesulfonate ionic liquid, *Malaysian Journal of Science*, 2009, 28 (Special Edition), 159-164 (Scopus publication) (*SCOPUS-Cited Publication*)

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Solubilities of CO_2 in aqueous *N*-methyldiethanolamine and guanidinium trifluoromethanesulfonate ionic liquid systems at elevated pressures, Energy and Sustainability 2011, 11 - 13 April 2011, Alicante, Spain *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Physical properties of CO_2 absorption capability of amine-functionalized ionic liquid, Regional Conference on Ionic Liquids 2009, P15, pg 67, University of Malaya, Kuala Lumpur, Malaysia, 24-25 November 2009 *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Amine-functionalized ionic liquid: Properties and application in CO_2 removal system, 3rd Congress on Ionic Liquids, P159, Cairns, Australia, 31 May-4 June 2009 *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Solubility and density for binary mixture of guanidinium tris(pentafluoroethyl) trifluorophosphate ionic liquids and *N*-methyl-diethanolamine, Expo Penyelidikan Rekacipta dan Inovasi 2009, University of Malaya, Kuala Lumpur, Malaysia, 13 -15 January 2009, *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Physical Transport Properties of Amine Functionalized Ionic Liquid Systems, 2nd International Conference for Young Chemist, Abstract 5G-1, 306, Penang, Malaysia, 18-20 June, 2008 *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Thermal stability of Guanidinium Trifluoromethanesulfonate Ionic Liquids, 4th Mathematics and Physical Sciences Graduate Congress, Abstract, 126, Singapore, 17-19 December 2008 *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Temperature dependence study on density of guanidinium tris(pentafluoroethyl) trifluorophosphate ionic liquids, Symposium Kimia Analisis Malaysia ke-21, Abstract D3-5, 58, Kota Kinabalu, Sabah, Malaysia, 25-27 November 2008 *(proceeding)*

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Ionic liquids as an alternatives solvent for CO_2 removal, 2nd International Conference for Young Chemist, Abstract 5G-1, 306, Penang, Malaysia, 18-20 June 2008 *(proceeding)*

N. A. Sairi, Y.H. Taufiq-Yap and M.Z. Hussein, Promotional effect of Te-doped vanadium phosphate catalysts for partial oxidation of *n*-butane, International Symposium on Relations between Homogeneous and Heterogeneous Catalysis, Abstract 3C-2, 101, University of California, USA, 16-20 June 2007 *(proceeding)*

N. A. Sairi, Y.H. Taufiq-Yap and M.Z. Hussein, A study on the effects of tellurium dopant and ball milling treatment to vanadium phosphate catalysts, 19th Malaysian Analytical Chemistry Sysposium (SKAM 19) and 2nd Malaysian Conference on catalysis (MYCat 2), Riviera Bay Resort, Melaka, Malaysia, 21-24 August 2006 *(proceeding)*

N. A. Sairi, Y.H. Taufiq-Yap and M.Z. Hussein, The influence of Co- and Te- on mechanical treatment treated vanadium phosphate catalysts, 1st USM Penang International Postgraduate Convention (ICYC), University Sains Malaysia, Malaysia, 23-26 May 2006 *(proceeding)*

PRESENTATION

N. A. Sairi, Amine functionalized ionic liquid: Properties and application in CO_2 removal system, Mini symposium 2009 (received visit from Utrech University), University of Malaya, Kuala Lumpur, Malaysia. 14 April 2009.

N. A. Sairi, Y. Alias, R. Yusoff and M. K. Aroua, Physical transport properties of amine functionalized ionic liquids systems, Annual University of Malaya Centre for Ionic Liquid (UMCiL) Seminar, Chemical Engineering Department, Faculty of Engineering, University of Malaya, Kuala Lumpur, Malaysia, 3 November 2008.