SUPPORTING INFORMATION

Table 5: NRTL model parameters for the solubility of thiophene in DES12 – DES15

	τ_{12}^{0}	τ_{12}^{T}	τ_{21}^{0}	τ_{21}^{T}	α	R^2
DES12	-70.08	4.450	4.160	-0.005	0.200	**0.995**
DES13	2.730	-0.013	-3.100	0.050	0.470	**0.987**
DES14	5.410	1.950	4.450	-0.010	0.200	**0.988**
DES15	10.550	2.390	5.720	-0.028	0.200	**0.959**

Table 6: Experimental and predicted solubility data of thiophene in DES12 and DES13 as a function of temperature

Temp.	**DES12**			**DES13**		
(℃)	S^{exp}	S^{pre}	**ARE**	S^{exp}	S^{pre}	**ARE**
30	1.384	1.384	0.0000	1.082	1.120	0.0356
40	4.015	3.912	0.0256	5.293	4.607	0.1294
50	4.363	4.439	0.0172	6.577	6.709	0.0201
60	5.103	5.099	0.0006	6.349	6.656	0.0483
70	5.497	5.757	0.0469	7.516	7.799	0.0376
80	7.121	6.812	0.0430	7.353	6.993	0.0488

Table 7: Experimental and predicted solubility data of thiophene in DES14 and DES15 as a function of temperature

Temp.	**DES14**			**DES15**		
(℃)	S^{exp}	S^{pre}	**ARE**	S^{exp}	S^{pre}	**ARE**
30	1.977	1.977	0.0001	0.172	0.172	0.0000
40	3.858	3.893	0.0088	2.461	2.185	0.1124
50	4.517	4.701	0.0406	2.467	3.065	0.2431
60	6.172	5.847	0.0527	7.064	5.039	0.2873
70	7.752	7.225	0.0681	8.261	7.289	0.118
80	8.002	8.472	0.0587	9.611	10.531	0.0962

Table 8: NRTL model parameters for the solubility of DBT in DES1 – DES4

	τ_{12}^{0}	τ_{12}^{T}	τ_{21}^{0}	τ_{21}^{T}	α	R^2
DES1	93.932	-0.955	4.602	-0.062	0.209	0.998
DES2	-5.252	-0.192	-0.530	0.029	0.200	0.984
DES3	3.256	-0.271	1.157	0.013	0.200	0.999
DES4	15.725	-0.289	2.211	-0.003	0.339	0.998

Table 9: Experimental and predicted solubility data of DBT in DES1 and DES2 as a function of temperature

Temp.	**DES1**			**DES2**		
(℃)	$\mathbf{S^{exp}}$	$\mathbf{S^{pre}}$	**ARE**	$\mathbf{S^{exp}}$	$\mathbf{S^{pre}}$	**ARE**
65	17.459	17.445	0.001	48.430	48.484	0.001
70	34.705	34.839	0.003	53.425	53.208	0.003
75	45.123	44.836	0.005	62.333	62.585	0.003
80	41.659	41.862	0.004	78.629	79.011	0.004
85	58.113	57.672	0.006	90.752	88.987	0.014
90	55.340	55.364	0.000	97.992	87.927	0.073

Table 10: Experimental and predicted solubility data of DBT in DES3 and DES4 as a function of temperature

Temp.	**DES3**			**DES4**		
(℃)	$\mathbf{S^{exp}}$	$\mathbf{S^{pre}}$	**ARE**	$\mathbf{S^{exp}}$	$\mathbf{S^{pre}}$	**ARE**
65	50.160	50.134	0.0004	22.68	22.708	0.0011
70	65.110	65.176	0.0008	31.04	30.878	0.0046
75	76.790	76.708	0.0008	35.62	35.857	0.0058
80	50.650	50.726	0.0012	45.00	44.978	0.0004
85	48.970	48.887	0.0014	38.93	38.748	0.0041
90	47.580	47.604	0.0004	40.17	40.266	0.0021

Table 11: NRTL model parameters for the solubility of DBT in DES12 – DES15

	τ_{12}^{0}	τ_{12}^{T}	τ_{21}^{0}	τ_{21}^{T}	α	R^2
DES12	2.695	6.689	6.688	-0.011	0.200	0.985
DES13	9.069	6.354	5.139	0.002	0.200	0.985
DES14	116.067	-0.432	6.119	-0.018	0.200	0.993
DES15	1.179	5.673	6.084	-0.012	0.200	0.985

Table 12: Experimental and predicted solubility data of DBT in DES12 and DES13 as a function of temperature

Temp.	**DES12**			**DES13**		
(℃)	S^{exp}	S^{pre}	**ARE**	S^{exp}	S^{pre}	**ARE**
30	0.084	0.070	0.1650	0.268	0.241	0.0997
40	0.111	0.104	0.0695	0.313	0.313	0.0010
50	0.126	0.150	0.1899	0.381	0.400	0.0503
60	0.189	0.215	0.1364	0.465	0.502	0.0794
70	0.316	0.303	0.0417	0.578	0.623	0.0779
80	0.506	0.423	0.1649	0.864	0.764	0.1162
90	0.582	0.581	0.0006	0.954	0.924	0.0321

Table 13: Experimental and predicted solubility data of DBT in DES14 and DES15 as a function of temperature

Temp.	**DES14**			**DES15**		
(℃)	S^{exp}	S^{pre}	**ARE**	S^{exp}	S^{pre}	**ARE**
30	0.097	0.094	0.0288	0.168	0.154	0.079
40	0.132	0.130	0.0146	0.275	0.230	0.164
50	0.237	0.251	0.0562	0.306	0.337	0.100
60	0.437	0.454	0.0397	0.393	0.485	0.236
70	0.895	0.804	0.1023	0.710	0.692	0.025

80	0.919	0.973	0.0589	1.177	0.976	0.172
90	0.927	0.900	0.0297	1.389	1.355	0.025