Support Information

A Two-Binary-Interaction-Parameter Model for Molecular Solute + Ionic Liquid Solution

Lihang Bai[1], Tao Wang[1], Patricia B. Weisensee[2], Xiangyang Liu[1], Maogang He[1]*

[1]*Key Laboratory of Thermal Fluid Science and Engineering of MOE,*

School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an 710049, China

[2]*Department of Mechanical Engineering and Materials Science,*

Washington University in St. Louis, St. Louis, Missouri 63130, USA

**Corresponding author.* Tel:+86-29-8266-3863; Fax:+86-29-8266-3863

*E-mail address:*mghe@mail.xjtu.edu.cn

Table S1 Deviation comparison between TBIP model and NRTL model

Solute/ionic liquid	(AAD*1000)/(MAD*1000)[a]						Points	Ref.
	All points correlated		lower half correlated[b]		upper half correlated[b]			
	TBIP	NRTL	TBIP	NRTL	TBIP	NRTL		
R152a/[P(14)666][TMPP]	2.6/7.3	3.0/8.9	4.4/17.0	18.7/55.2	3.0/8.6	16.5/71.7	30	34,35
R245fa/[P(14)666][TMPP]	1.9/3.8	2.3/7.0	2.8/6.8	4.5/12.6	2.6/9.2	2.6/8.9	30	34,35
R227ea/[P(14)666][TMPP]	2.7/8.3	5.4/13.9	6.3/29.2	13.1/49.6	7.4/22.8	27.3/112.5	25	34,35
R1234ze(E)/[EMIM][BF_4]	0.9/2.8	1.3/22.6	1.8/15.4	354.0/432.2	0.9/4.4	1.0/4.1	42	36,37
R1234ze(E)/[HMIM][BF_4]	1.4/6.4	1.2/7.7	3.1/7.7	2.2/27.6	1.3/9.6	0.8/6.1	49	36,37
R1234ze(E)/[OMIM][BF_4]	1.5/6.5	2.7/20.0	4.0/19.3	2.7/16.2	1.5/8.4	1.0/5.2	49	36,37
R134a/[P(14)666][TMPP]	5.5/14.6	6.6/24.0	14.5/60.7	33.0/103.2	6.1/40.3	4.6/17.8	30	35,38
R143a/[P(14)666][TMPP]	3.5/10.1	3.6/11.2	4.9/24.1	5.3/33.2	4.2/16.1	18.2/60.0	30	35,38
R161/[P(14)666][TMPP]	2.7/7.2	3.1/8.9	5.8/33.8	5.2/18.2	6.1/23.6	5.69/42.2	30	35,38
R32/[dmpim][TMeM]	2.2/9.3	5.1/16.9	4.4/19.2	6.2/15.1	2.4/10.3	5.5/31.2	30	39
R32/[EMIM][BEI]	3.3/9.9	4.3/16.8	5.1/29.1	6.3/13.6	4.8/14.0	1.7/4.4	31	39,40
R32/[EMIM][BMeI]	1.9/5.4	7.6/29.2	2.5/9.0	7.3/30.0	2.0/5.9	2.1/6.7	31	39,41
R32/[pmpy][BMeI]	3.0/10.2	3.1/15.4	10.7/44.8	4.1/25.8	3.6/13.2	1.8/4.6	31	39,42
water/choline lactate	11.5/35.7	5.3/31.8	16.2/45.1	8.6/30.9	20.0/89.8	6.3/33.9	35	43,44
ethanol/[MMIM][$(CH_3)_2PO_4$]	13.7/39.4	5.9/13.2	13.4/40.4	1.2/13.8	13.5/47.6	81.6/999.0	33	44,45
SO_2/[HMIM][Tf_2N]	5.9/16.2	6.0/14.9	6.9/17.2	6.3/17.0	7.0/26.2	8.1/87.1	38	46,47
water/choline glycolate	6.5/26.0	5.1/17.4	8.8/29.2	46.4/121.0	23.1/99.1	17.4/76.2	35	43,48
acetone/[MMIM][$(CH_3)_2PO_4$]	4.2/12.2	5.3/23.7	7.5/35.2	8.5/23.7	4.4/12.1	10.5/28.8	10	44,45
Water/[EMIM][Tf_2N]	3.9/10.4	13.3/27.9	3.8/15.2	17.5/102.2	3.9/14.8	52.2/279.5	21	49,50

a: AAD (average absolute deviation) = $\sum|x_{cal}-x_{exp}|/n$ MAD (maximum absolute deviation) = $\max(|x_{cal}-x_{exp}|)$

b: only the lower or upper half of solubility points at every constant temperature are fitted with for adjustable parameters