

**Electronic Supplementary Information (ESI)**

**Concentration-dependent Apparent Partition Coefficients of Ionic  
Liquids Possessing Ethyl- and Bi-sulphate Anions**

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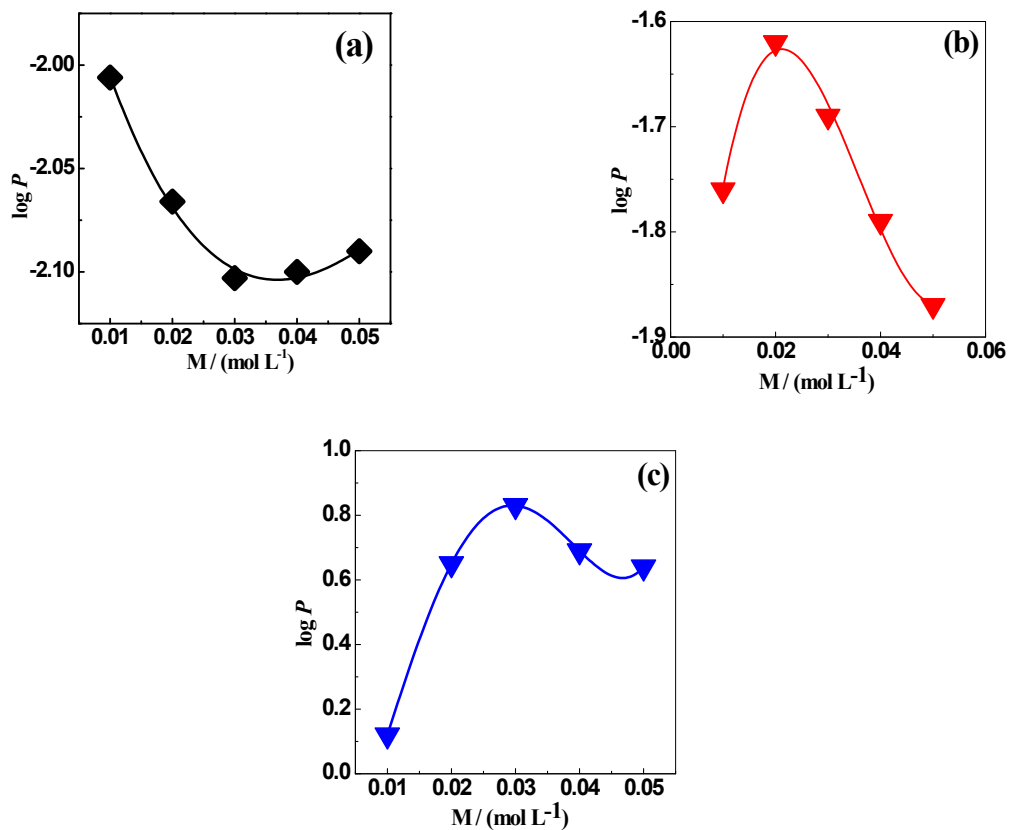


Fig. S1 Variation of  $\log P$  with concentration (a) for [BMIM][HSO<sub>4</sub>], (b) for [HMIM][EtSO<sub>4</sub>], and (c) for [OMIM][EtSO<sub>4</sub>].

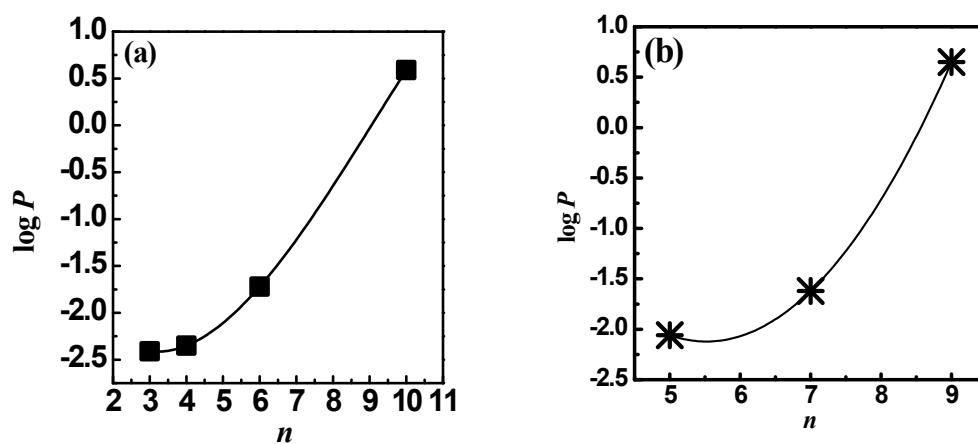


Fig. S2 Variation of  $\log P$  with the number of carbon atoms in alkyl groups attached to the cationic ring of ionic liquids (a) [EtSO<sub>4</sub>]-based ionic liquids, and (b) [HSO<sub>4</sub>]-based ionic liquids.

Table S1. Apparent Partition Coefficient ( $\log P$ ) Values of [EtSO<sub>4</sub>]<sup>-</sup>-based Ionic Liquids as a Function of Concentration at 298 K.

Conc (M)/ (mol L <sup>-1</sup> )	Log <i>P</i>			
	[EMIM] [EtSO <sub>4</sub> ]	[dEIM] [EtSO <sub>4</sub> ]	[EBIM] [EtSO <sub>4</sub> ]	[EOIM] [EtSO <sub>4</sub> ]
0.01	-2.04 ± 0.13	-2.12 ± 0.08	-1.64 ± 0.02	0.19 ± 0.02
0.02	-2.41 ± 0.02	-2.35 ± 0.05	-1.72 ± 0.02	0.59 ± 0.05
0.03	-2.55 ± 0.05	-2.45 ± 0.03	-1.76 ± 0.00	0.95 ± 0.07
0.04	-2.62 ± 0.06	-2.51 ± 0.02	-1.84 ± 0.00	1.32 ± 0.03
0.05	-2.82 ± 0.03	-2.63 ± 0.03	-1.92 ± 0.00	1.65 ± 0.01

Table S2. Apparent Partition Coefficient ( $\log P$ ) Values of [HSO<sub>4</sub>]<sup>-</sup>-based Ionic Liquids as a Function of Concentration at 298 K.

Conc (M) / (mol L <sup>-1</sup> )	Log <i>P</i>		
	[Bmim][HSO <sub>4</sub> ]	[HMIM][HSO <sub>4</sub> ]	[OMIM][HSO <sub>4</sub> ]
0.01	-2.01 ± 0.02	-1.76 ± 0.02	0.12 ± 0.02
0.02	-2.07 ± 0.03	-1.62 ± 0.02	0.66 ± 0.02
0.03	-2.11 ± 0.02	-1.69 ± 0.02	0.83 ± 0.04
0.04	-2.10 ± 0.00	-1.79 ± 0.01	0.69 ± 0.01
0.05	-2.09 ± 0.00	-1.87 ± 0.02	0.64 ± 0.02

Table S3. Apparent Partition Coefficient ( $\log P$ ) Values of Pyridinium-based Ionic Liquids as a Function of Concentration at 298 K.

Conc (M) / (mol L <sup>-1</sup> )	Log P	
	[BPy][HSO4]	[OPy][HSO4]
0.01	-2.45 ± 0.02	-0.39 ± 0.02
0.02	-2.63 ± 0.01	0.20 ± 0.01
0.03	-2.51 ± 0.01	0.40 ± 0.07
0.04	-2.44 ± 0.00	0.86 ± 0.03
0.05	-2.42 ± 0.00	1.22 ± 0.09

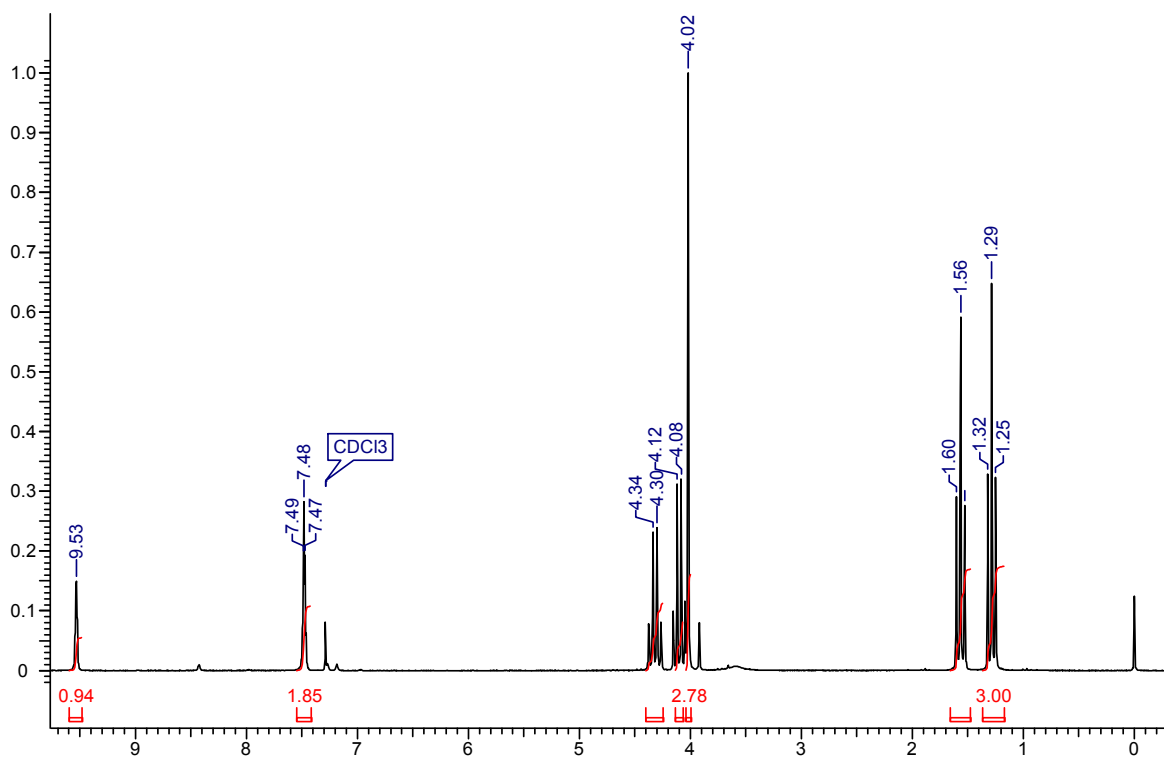
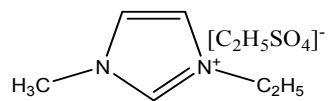
Table S4. Log  $P$  of Ionic Liquids having different Anion and Cationic Ring as a Function of Concentration at 298 K.

Conc (M)/ (mol L <sup>-1</sup> )	Log P			
	[Bmim] [HSO4]	[BMIM] [BuSO4]	[OMIM] [HSO4]	[OPy] [HSO4]
0.01	-2.01 ± 0.02	-0.59 ± 0.04	0.12 ± 0.02	-0.39 ± 0.02
0.02	-2.07 ± 0.03	-0.69 ± 0.05	0.66 ± 0.02	0.20 ± 0.01
0.03	-2.11 ± 0.02	-0.76 ± 0.03	0.83 ± 0.04	0.40 ± 0.07
0.04	-2.10 ± 0.00	-0.70 ± 0.03	0.69 ± 0.01	0.86 ± 0.03
0.05	-2.09 ± 0.00	-0.67 ± 0.02	0.64 ± 0.02	1.22 ± 0.09

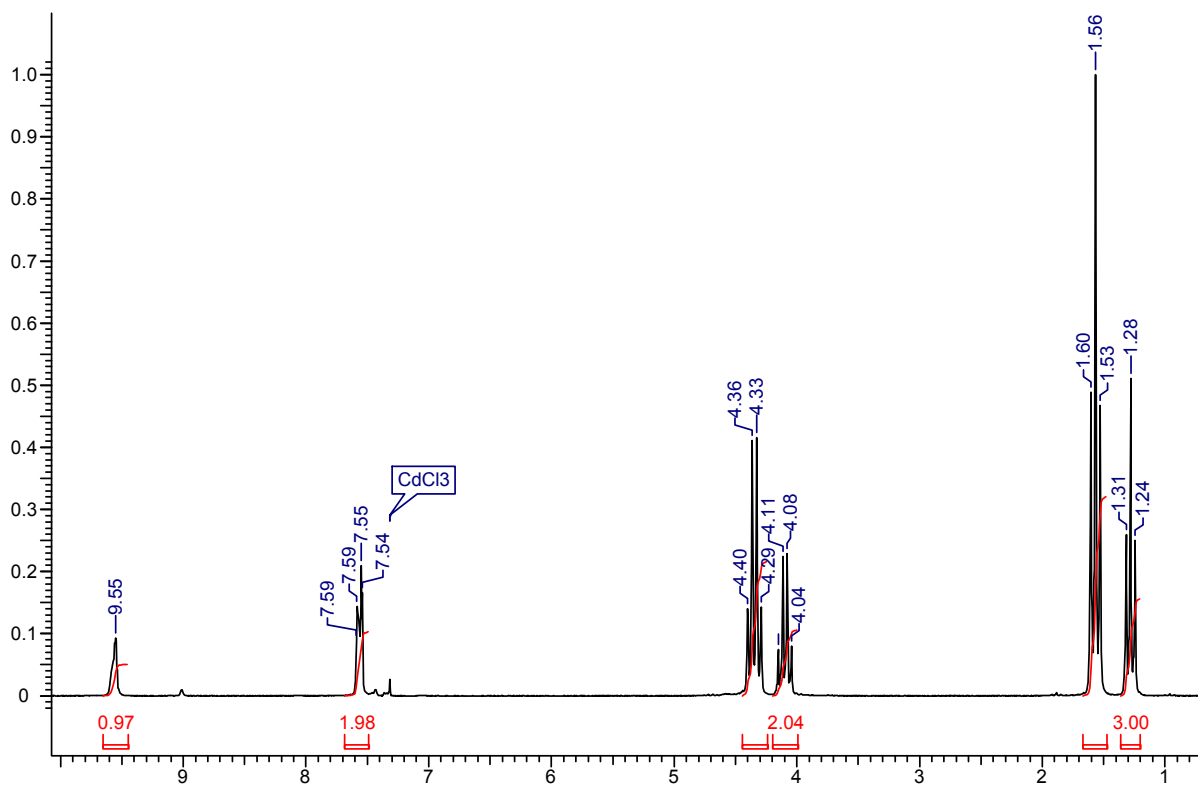
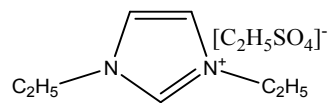
Table S5. Molar Absorption Coefficient Values of Ionic Liquids in Saturated *n*-Octanol and Saturated Water.

Name of ILs	$\epsilon$ in saturated <i>n</i> -octanol (mol <sup>-1</sup> L cm <sup>-1</sup> )	$\epsilon$ in saturated water (mol <sup>-1</sup> L cm <sup>-1</sup> )
[EMIM][EtSO <sub>4</sub> ]	1570.00 ± 27.84	4115.4 ± 72.119
[dEIM][EtSO <sub>4</sub> ]	2767.08 ± 139.46	4132.90 ± 113.92
[EBIM][EtSO <sub>4</sub> ]	3955.08 ± 78.01	4227.08 ± 156.87
[EOIM][EtSO <sub>4</sub> ]	3801.25 ± 74.19	3973.34 ± 91.18
[BMIM][HSO <sub>4</sub> ]	3096.67 ± 124.98	-
[HMIM][HSO <sub>4</sub> ]	4074.15 ± 212.87	-
[OMIM][HSO <sub>4</sub> ]	4704.15 ± 299.31	-
[BMIM][BuSO <sub>4</sub> ]	4280.42 ± 100.65	4151.25 ± 52.82
[BPy][HSO <sub>4</sub> ]	4995.00 ± 155.38	4934.16 ± 225.02
[OPy][HSO <sub>4</sub> ]	3455.00 ± 196.50	3287.08 ± 99.45

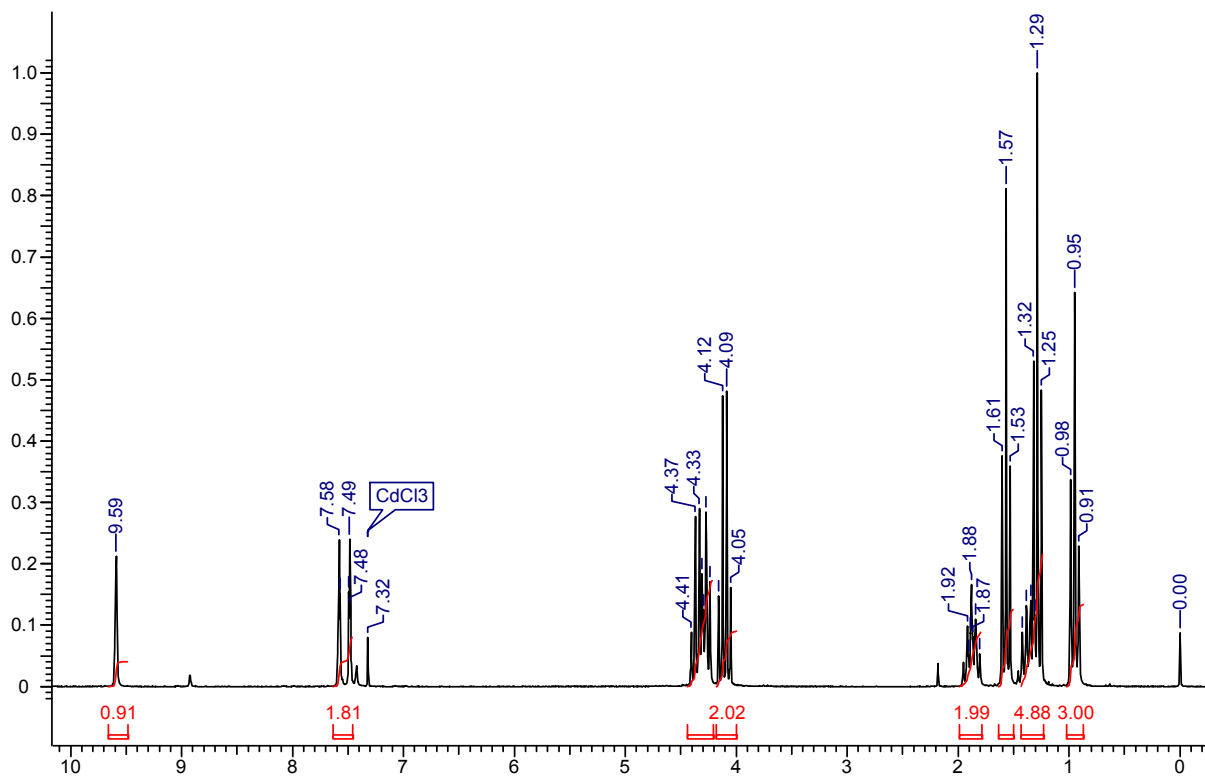
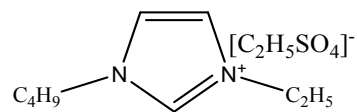
# 1. [EMIM][EtSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>



2. [dEIM][EtSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>

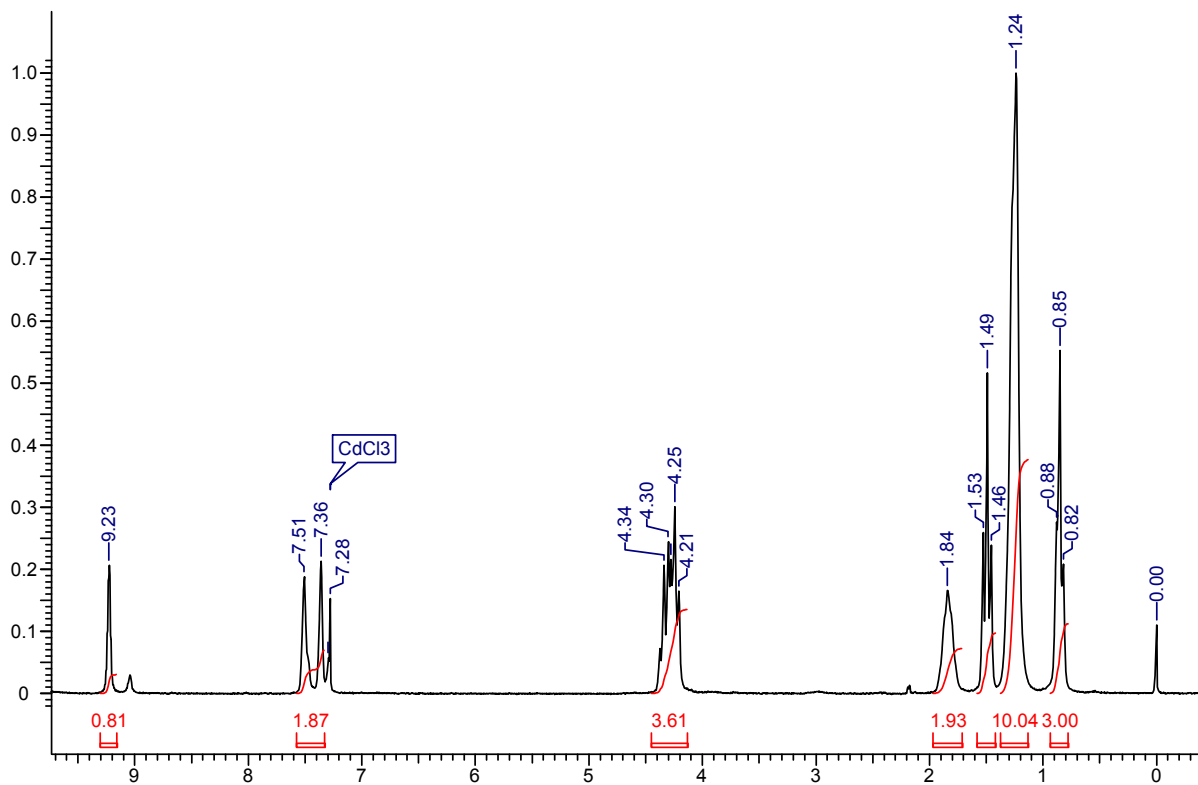
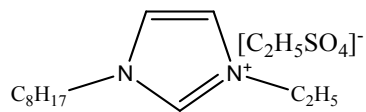


### 3. [EBIM][EtSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>

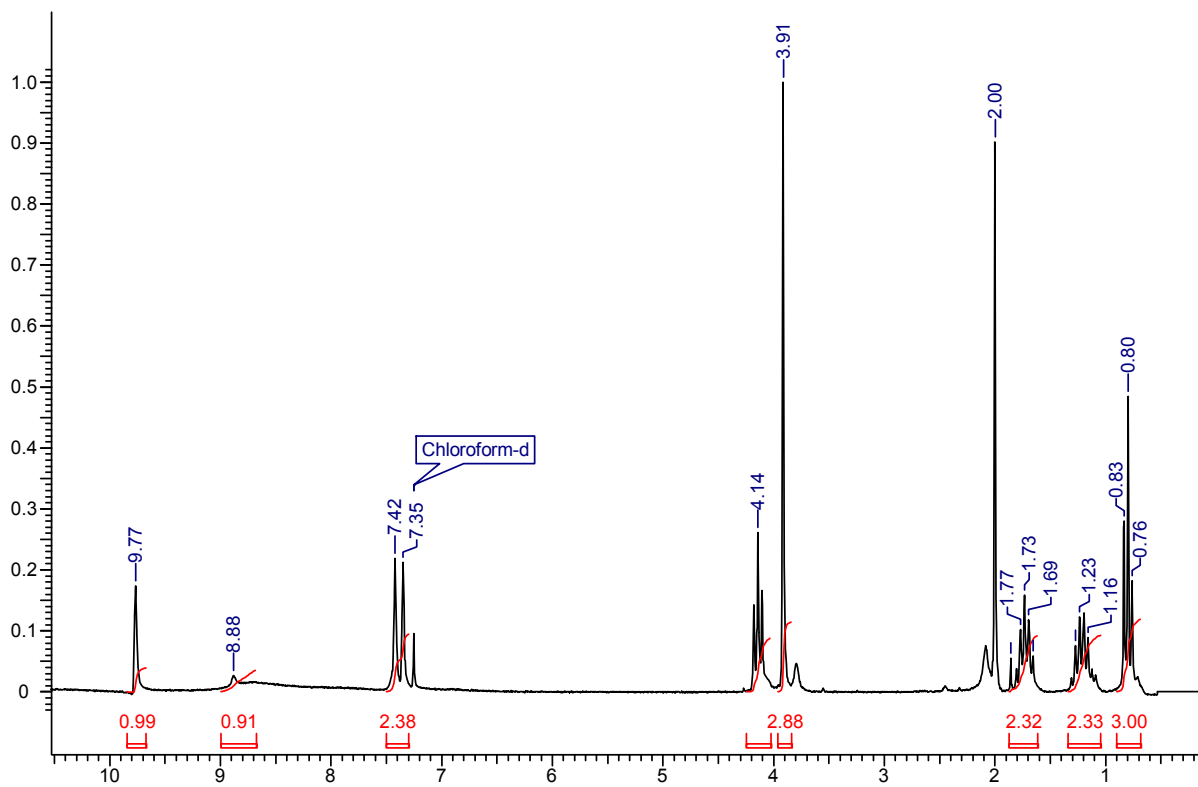
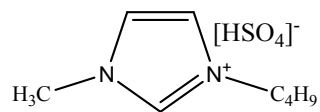




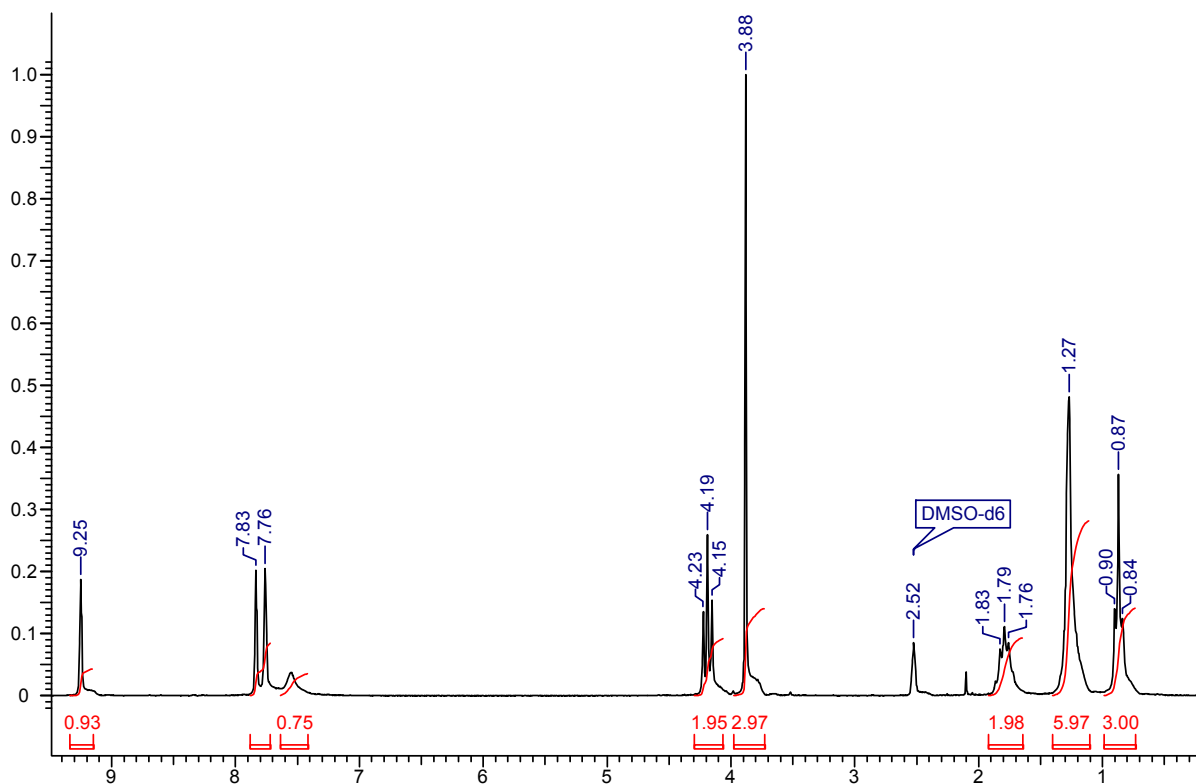
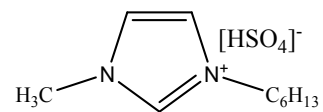
#### 4. [EOIM][EtSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>



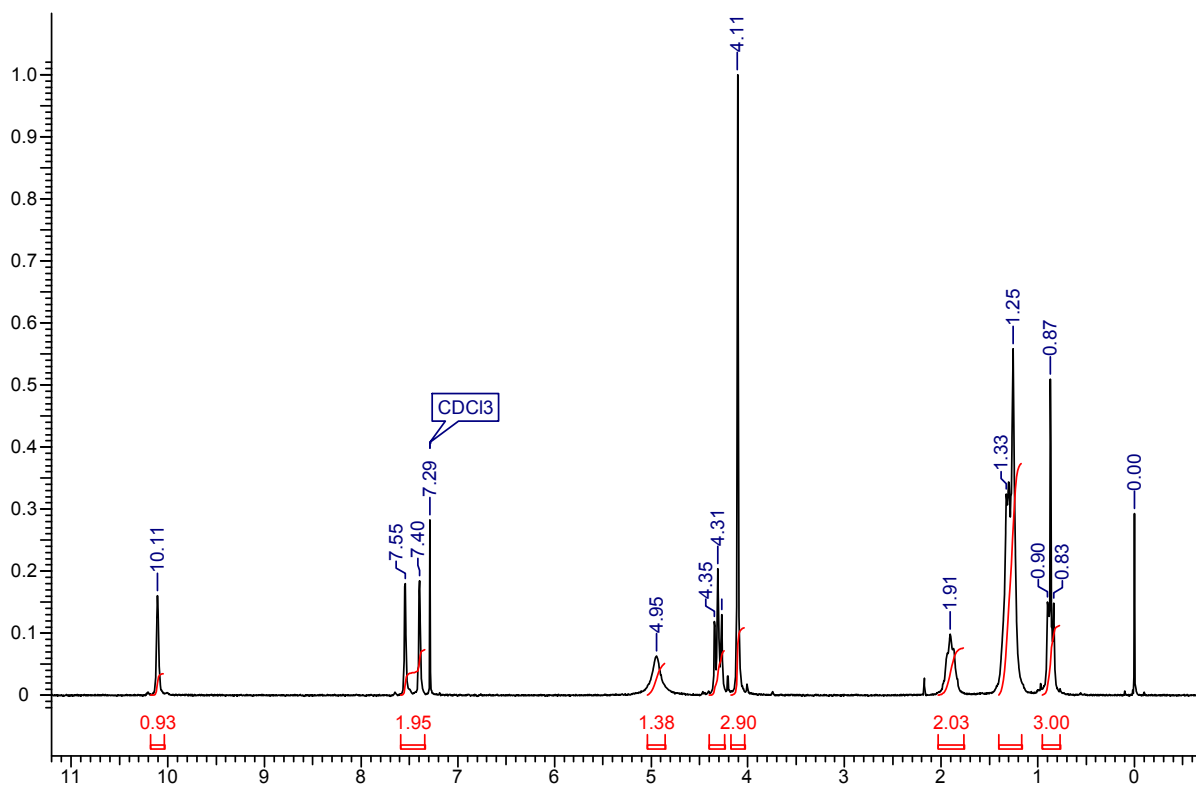
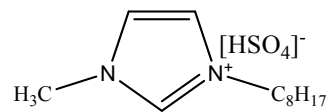
5. [BMIM][HSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub> +DMSO-d<sub>6</sub>



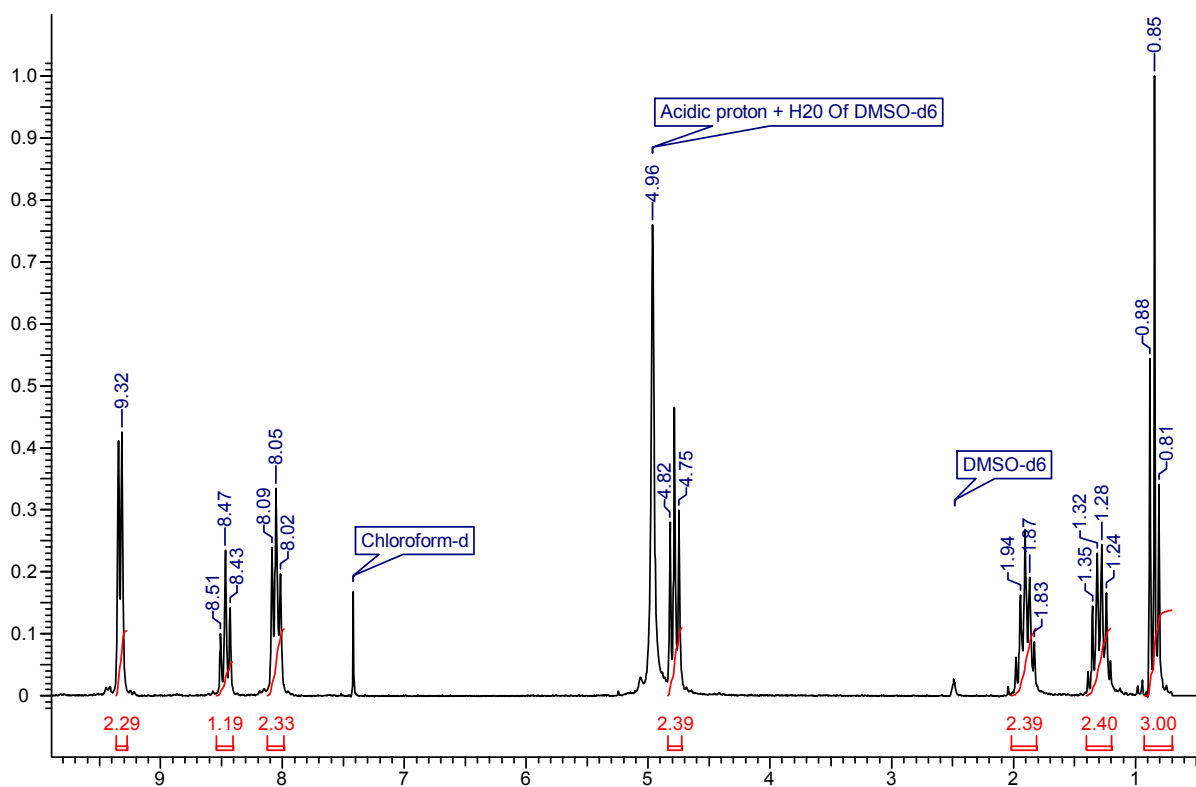
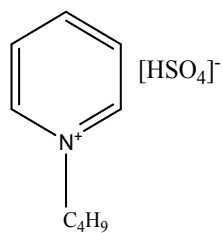
6. [HMIM][HSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub> +DMSO-d<sub>6</sub>



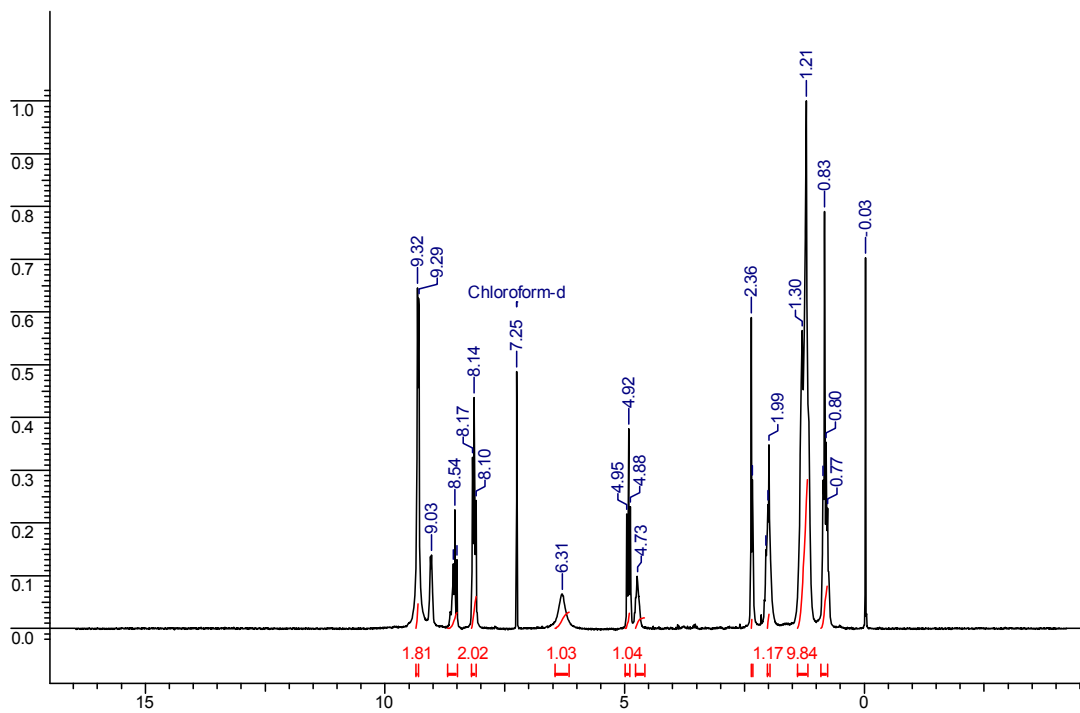
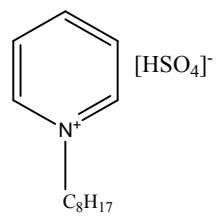
### 7. [OMIM][HSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>



8. [BPy][HSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub> +DMSO-d<sub>6</sub>



### 9. [OPy][HSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub>



10. [BMIM][BuSO<sub>4</sub>] - <sup>1</sup>H NMR, 200 MHz, CDCl<sub>3</sub> + DMSO-d<sub>6</sub>

