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Electronic Supplementary Information

Absorption and thermodynamic properties of CO_2 in amido-containing anion-functionalized ionic liquids

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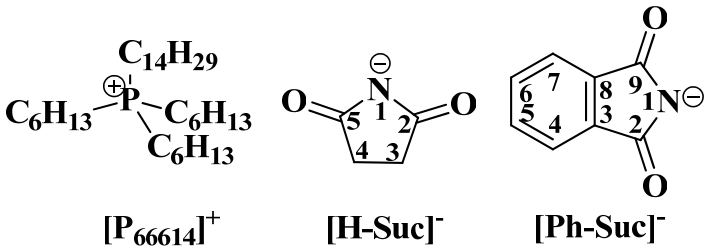
^{1}H NMR, ^{13}C NMR and FT-IR data of the amido-based ILs



Numbering scheme for the positions in the amido-based anion-functionalized ILs

$[P_{66614}][H\text{-}Suc]$:^{1}H NMR (DMSO-$d_6$): 0.86 (m, 12H, 4×$CH_3$), 1.236-1.469 (m, 48H, 24×CH_2), 2.05(s, 4H, C3 and C4), 2.19 (m, 8H, 4×PCH_2) ppm; ^{13}C NMR (DMSO-d_6): 13.8, 13.8, 17.3, 17.6, 20.5, 20.6, 21.2, 21.8, 21.9, 22.1, 28.1, 28.7, 28.7, 29.0, 29.0, 29.1, 29.7, 29.8, 30.0, 30.4, 30.8, 31.3, 32.5 (C3 and C4), 34.5, 35.5, 177.0, 174.4, 194.2 (C2 and C5) ppm; IR: 2955, 2923, 2854, 1764, 1696, 1672, 1572, 1465, 1416, 1377, 1315, 1273, 1240, 1211, 1163, 1112, 1003, 987, 891, 857, 821, 720 cm^{-1}.

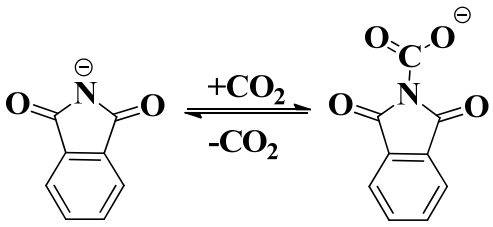
$[P_{66614}][Ph\text{-}Suc]$:^{1}H NMR(DMSO-$d_6$): 0.86 (m, 12H, 4×$CH_3$), 1.237-1.464 (m, 48H, 24×CH_2), 2.18 (m, 8H, 4×PCH_2), 7.30 - 7.36 (m, 4H, C4, C5, C6, and C7) ppm; ^{13}C NMR (DMSO-d_6): 13.7, 13.8, 17.3, 17.6, 20.5, 20.6, 21.2, 21.8, 21.9, 22.1, 28.1, 28.7, 28.7, 29.0, 29.0, 29.1, 29.7, 29.8, 30.0, 30.4, 30.8, 31.3, 119.0 (C4 and C7), 125.8, 128.6, 129.3 (C5 and C6), 129.5, 129.9, 130.9, 139.6 (C3 and C8), 145.0, 169.4, 172.9, 185.0 (C2 and C9) ppm; IR: 2955, 2924, 2854, 1698, 1662, 1619, 1588, 1571, 1465, 1460, 1409, 1378, 1364, 1343, 1273, 1202, 1178, 1158, 1125, 1004, 861, 831, 814, 721 cm^{-1}.

Table S1. Solubility (n_{CO2}) of CO_2 in $[P_{66614}][H\text{-}Suc]$ at different temperatures (T) and CO_2 partial pressures (P_{CO2}).

P_{CO2} (100 kPa)	n_{CO2} (mol CO_2 mol^{-1} IL)	P_{CO2} (100 kPa)	n_{CO2} (mol CO_2 mol^{-1} IL)
T = 308.15 K		T = 313.15 K	
0.025	0.36	0.025	0.16
0.05	0.50	0.05	0.26
0.075	0.57	0.075	0.35
0.10	0.61	0.10	0.43
0.15	0.70	0.15	0.52
0.20	0.76	0.20	0.57
0.25	0.82	0.25	0.64
0.30	0.86	0.30	0.68
0.50	0.92	0.50	0.73
0.70	0.94	0.70	0.74
1.00	0.95	1.00	0.76
T = 318.15 K		T = 323.15 K	
0.025	0.10	0.025	0.04
0.05	0.16	0.05	0.07
0.075	0.21	0.075	0.11
0.10	0.32	0.10	0.14
0.15	0.40	0.15	0.19
0.20	0.45	0.20	0.24
0.25	0.50	0.25	0.29
0.30	0.57	0.30	0.32
0.50	0.60	0.50	0.41
0.70	0.61	0.70	0.43
1.00	0.66	1.00	0.45

Table S2. Solubility (n_{CO2}) of CO_2 in [P_{66614}][Ph-Suc] at different temperatures (T) and CO_2 partial pressures (P_{CO2}).

P_{CO2} (100 kPa)	n_{CO2} (mol CO_2 mol^{-1} IL)	P_{CO2} (100 kPa)	n_{CO2} (mol CO_2 mol^{-1} IL)
T = 308.15 K		T = 313.15 K	
0.05	0.18	0.05	0.10
0.10	0.30	0.10	0.19
0.15	0.37	0.15	0.26
0.25	0.46	0.25	0.34
0.30	0.52	0.30	0.38
0.50	0.61	0.50	0.45
0.70	0.66	0.70	0.49
1.00	0.73	1.00	0.52
T = 318.15 K		T = 323.15 K	
0.05	0.06	0.05	0.04
0.10	0.13	0.10	0.09
0.15	0.19	0.15	0.13
0.25	0.25	0.25	0.19
0.30	0.28	0.30	0.22
0.50	0.35	0.50	0.27
0.70	0.41	0.70	0.31
1.00	0.47	1.00	0.38



Scheme S1. Possible mechanism of CO_2 absorption by [P_{66614}][Ph-Suc].

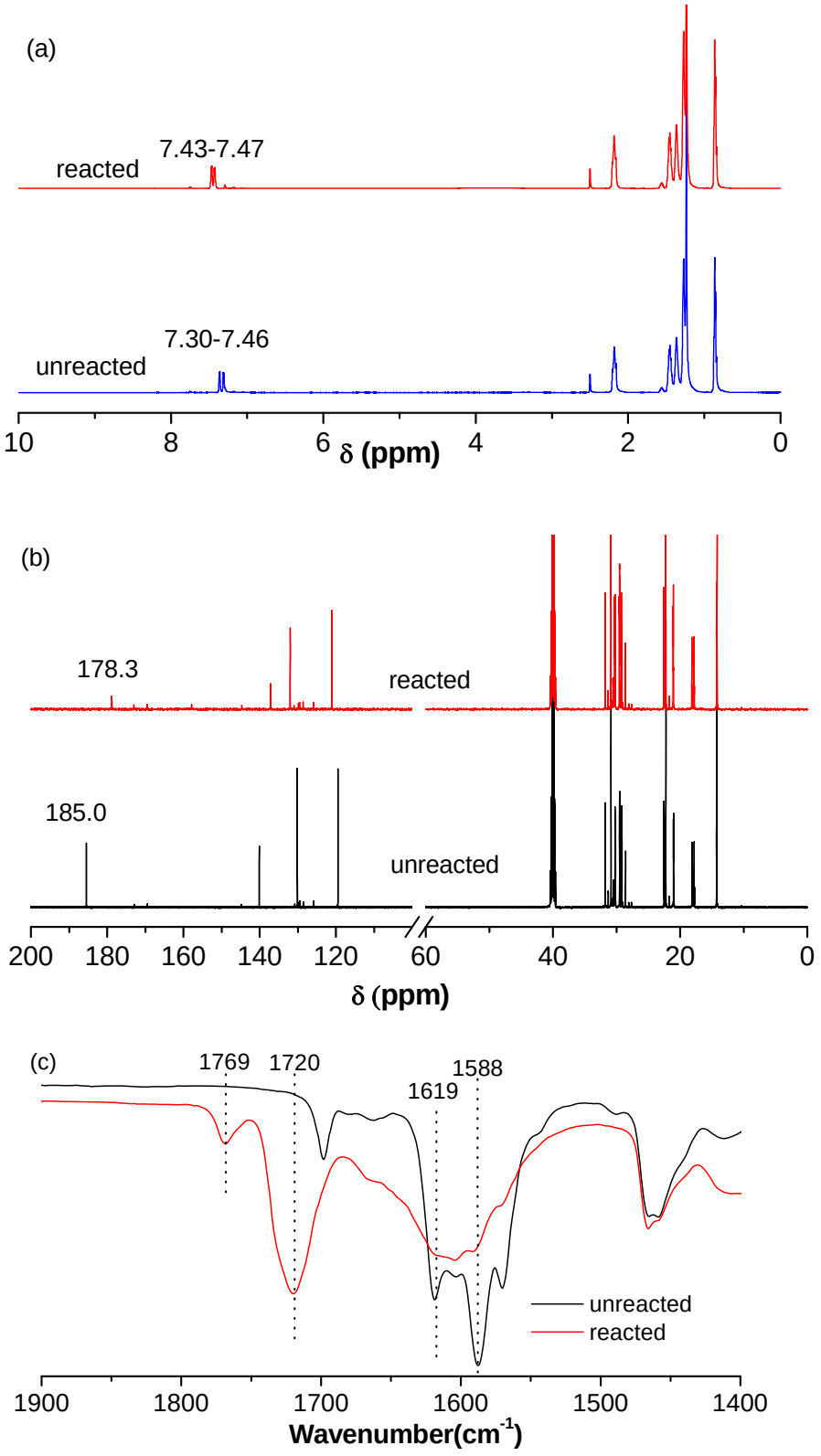


Figure S1. ^{1}H NMR (a), ^{13}C NMR (b) and FT-IR (c) spectra of $[P_{66614}][Ph\text{-}Suc]$ before and after absorption of CO_2.