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Supporting Information

Synthesis of High Molecular Weight Isosorbide-based Polycarbonates through Efficiently Activation of Endo-hydroxyl Groups by Ionic Liquid

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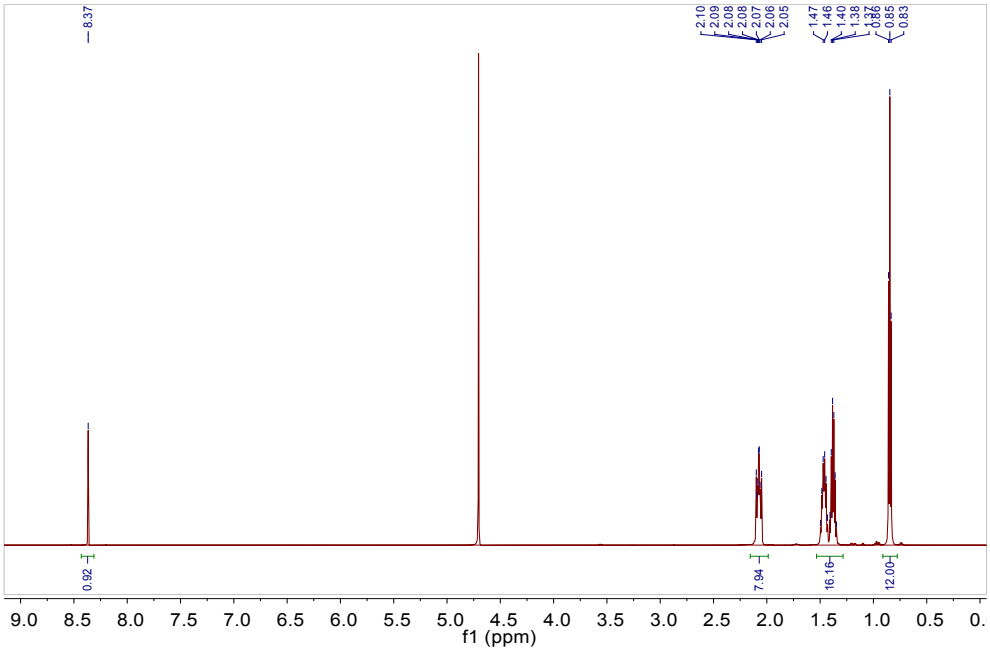


Fig. S1 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[HCOO]^{-}$ (D_2O).

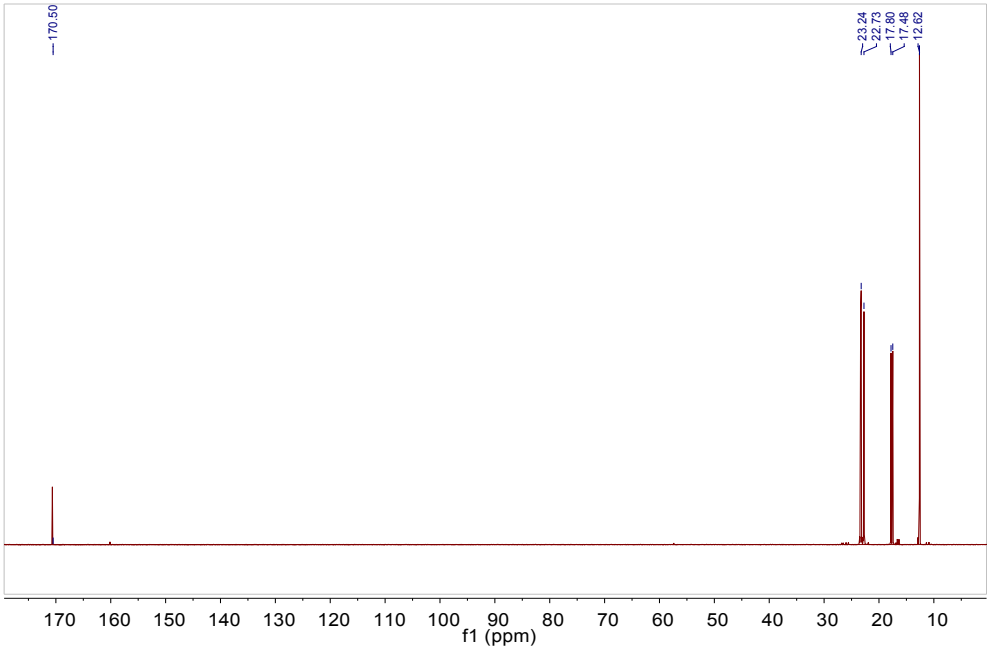


Fig. S2 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[HCOO]^{-}$ (D_2O).

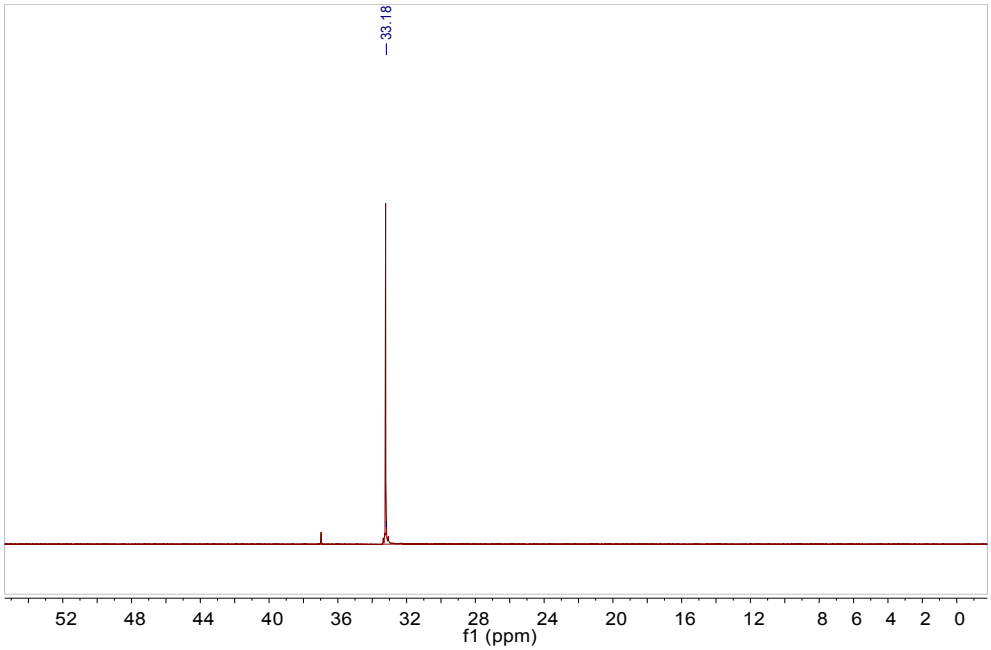


Fig. S3 The ^{31}P NMR spectrum of $[P_{4444}]^+[HCOO]^-$ (D_2O).

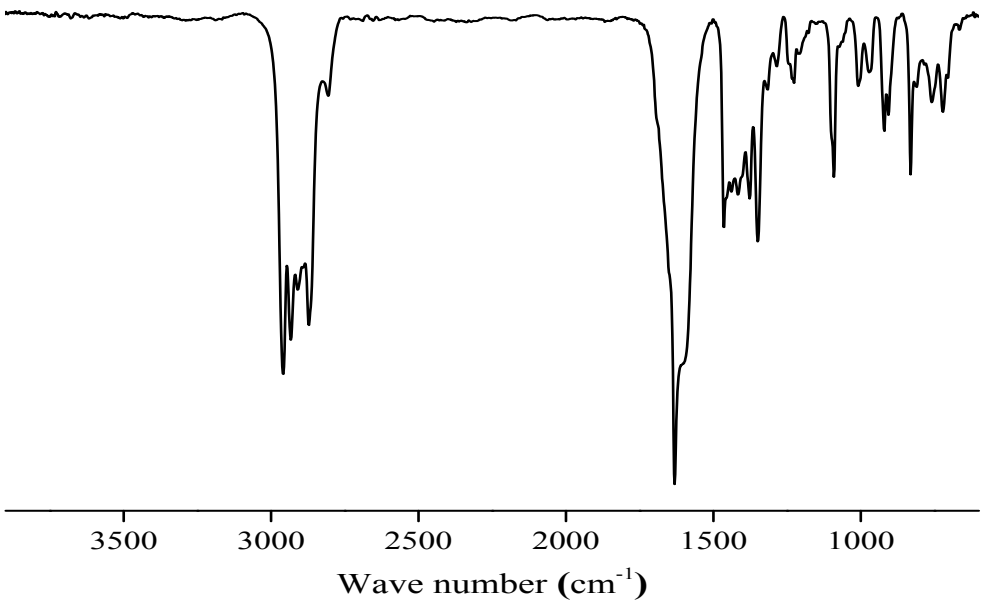


Fig. S4 FT-IR measurement of $[P_{4444}]^+[HCOO]^-$.

$[P_{4444}]^+[HCOO]^-$: Yield: 85%(light yellow liquid).^1H NMR (600 MHz, D_2O) δ: 0.85 (12H, t), 1.41-1.57 (8H, m), 1.27-1.43 (8H, m), 2.08 (8H, m), 8.37 (1H, s). ^{13}C NMR (150 MHz, D_2O) δ: 170.6, 23.2, 22.7, 17.8, 17.5, 12.6. ^{31}P NMR (400 MHz, D_2O) δ: 33.18. FT-IR (KBr, cm^{-1}):2959, 2933, 2872, 1631, 1465, 1349, 1091, 920, 830, 721.

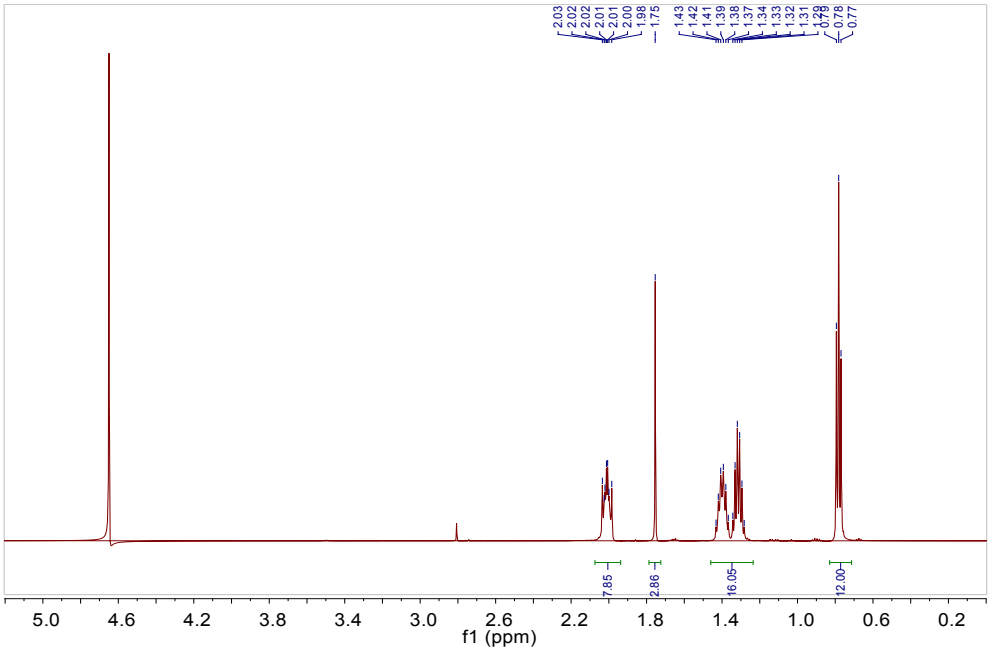


Fig. S5 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[CH_3COO]^{-}$ (D_2O).

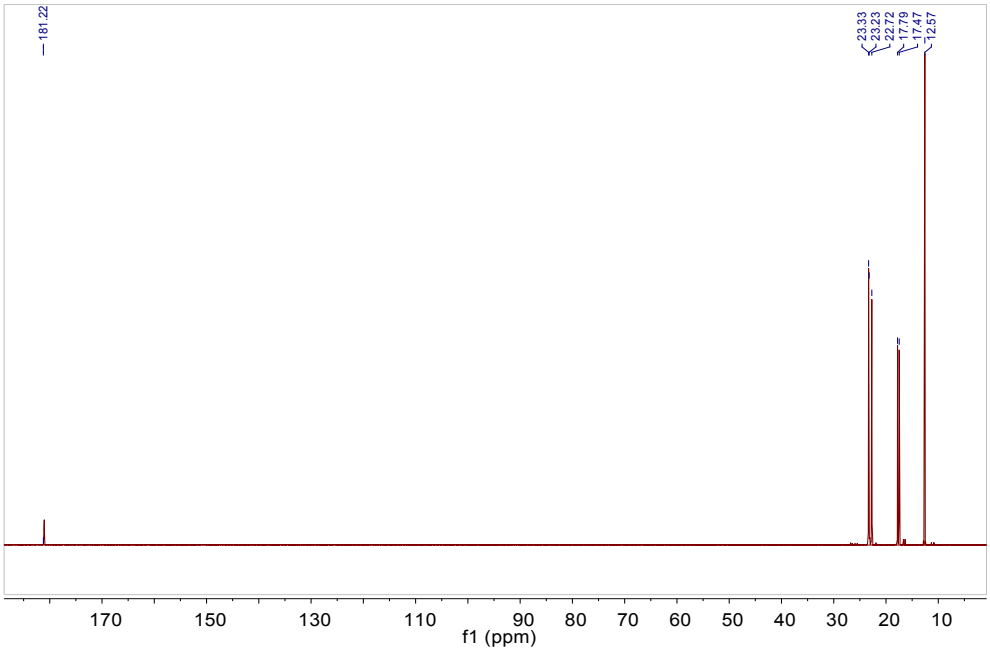


Fig. S6 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[CH_3COO]^{-}$ (D_2O).

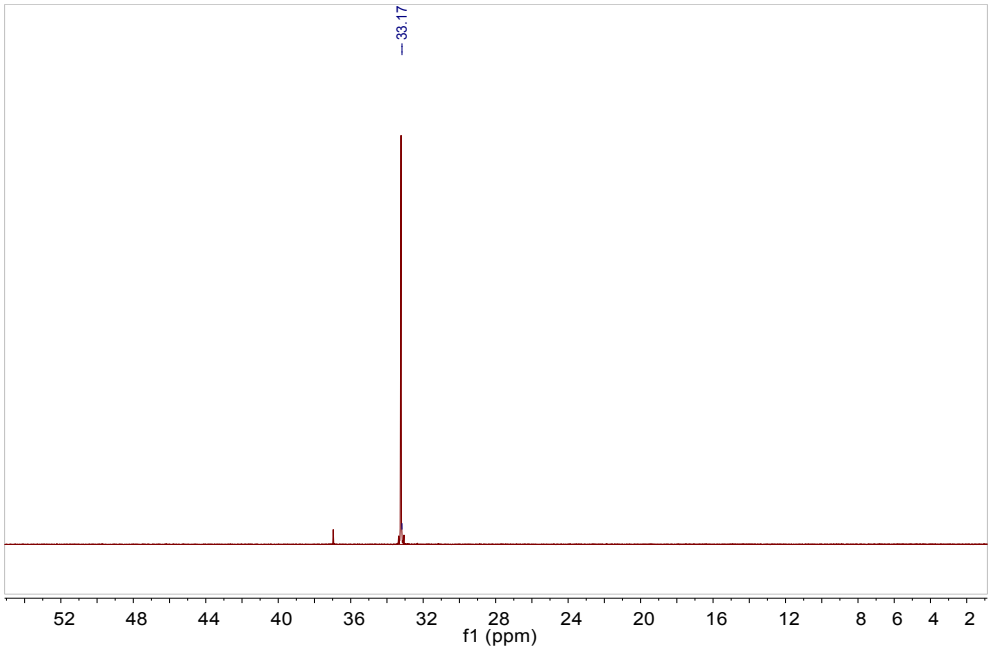


Fig. S7 The ^{31}P NMR spectrum of $[P_{4444}]^+[CH_3COO]^-$ (D_2O).

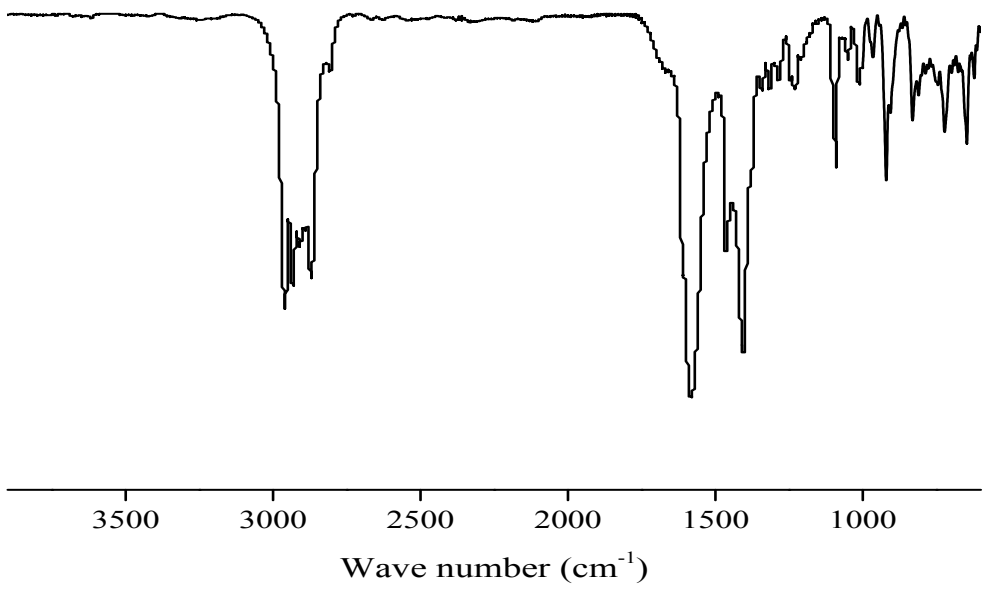


Fig. S8 The FT-IR spectrum of $[P_{4444}]^+[CH_3COO]^-$.

$[P_{4444}]^+[CH_3COO]^-$: Yield: 85% (light yellow liquid).^1H NMR (600 MHz, D_2O) δ: 0.78 (12H, t), 1.40 (8H, m), 1.31 (8H, m), 2.00 (8H,m), 1.75 (3H, s).^{13}C NMR (150MHz, D_2O) δ: 181.0, 23.7, 23.1, 22.7, 17.8, 17.5, 12.6. ^{31}P NMR (400 MHz, D_2O) δ: 33.17. FT-IR (KBr, cm^{-1}):2959, 2933, 2872, 1581, 1464, 1405, 1091, 920, 831, 722.

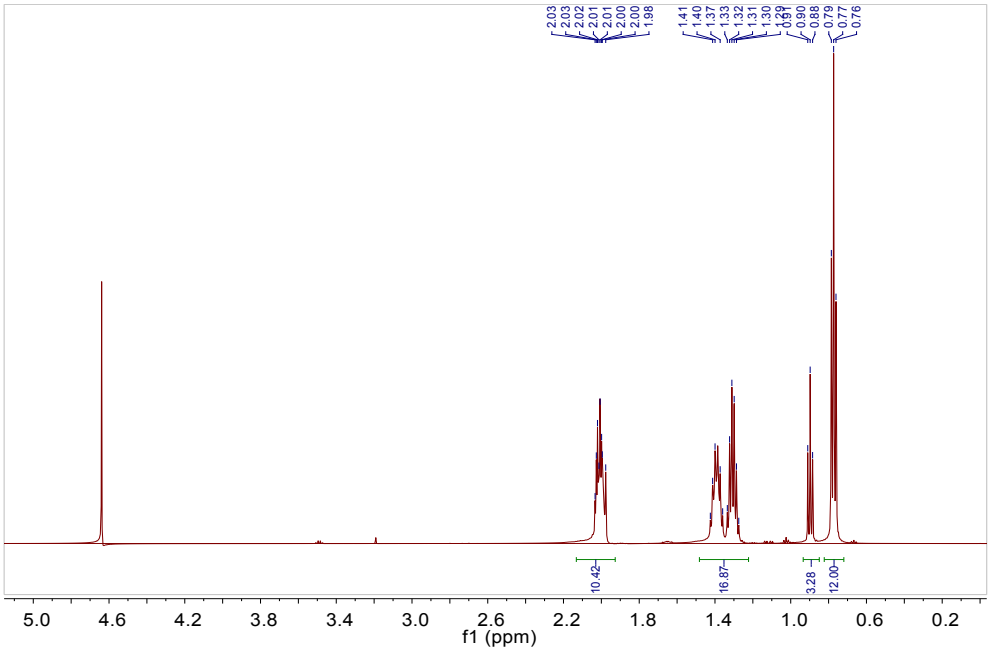


Fig. S9 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[CH_3CH_2COO]^{-}$ (D_2O).

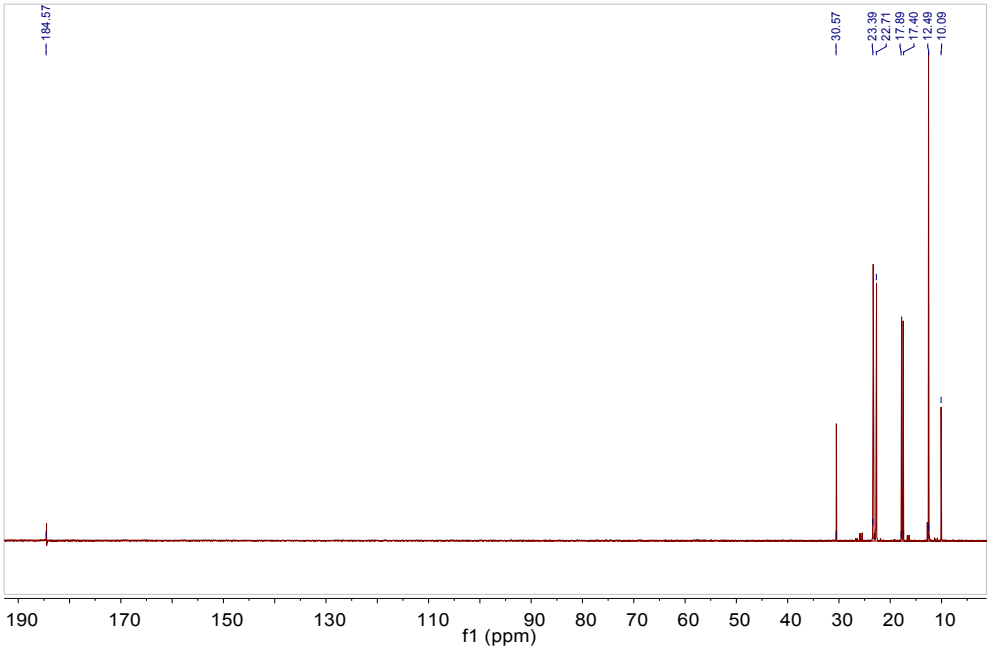


Fig. S10 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[CH_3CH_2COO]^{-}$ (D_2O).

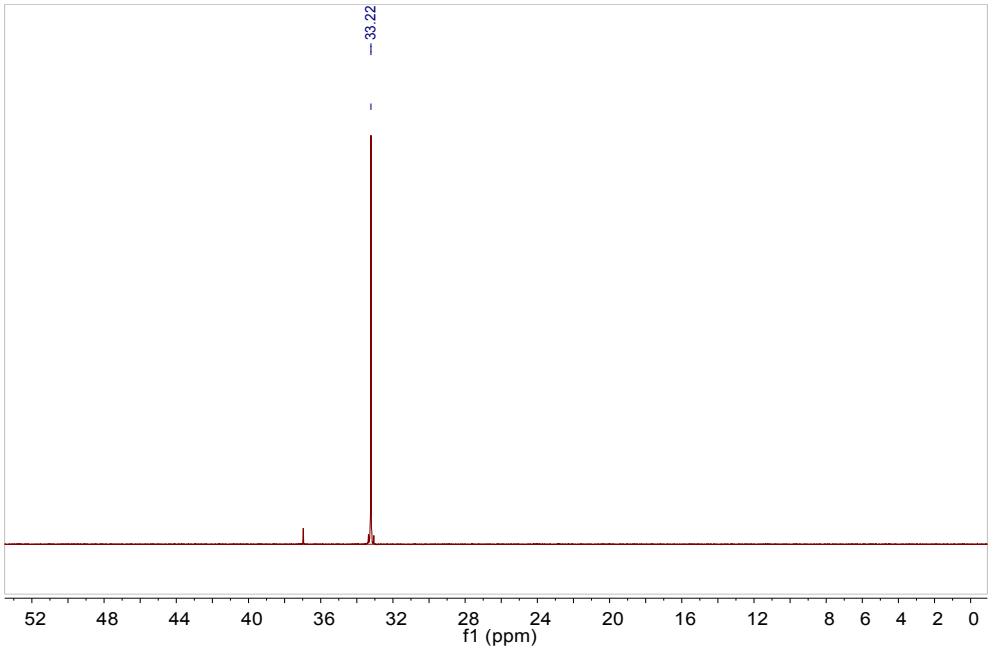


Fig. S11 The ^{31}P NMR spectrum of $[P_{4444}]^+[CH_3CH_2COO]^-$ (D_2O).

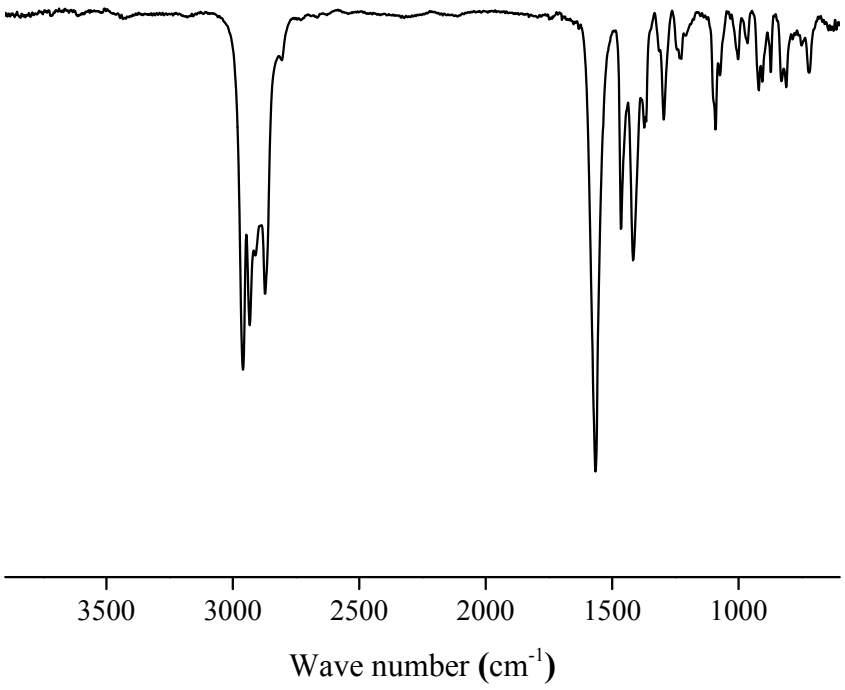


Fig.S12 The FT-IR spectrum of $[P_{4444}]^+[CH_3CH_2COO]^-$.

$[P_{4444}]^+[CH_3CH_2COO]^-$: Yield: 87% (light yellow liquid).^1H NMR (600 MHz, D_2O) δ: 0.77 (12H,t), 1.20-1.35 (8H, m),1.36-1.48 (8H,m), 1.90-2.11 (10H, m),0.97-0.84 (3H, t).^{13}C NMR (151 MHz, D_2O) δ 184.5, 30.5, 23.4, 22.8, 17.8, 17.5, 12.5, 10.1. ^{31}P NMR (400 MHz, D_2O) δ: 33.22. FT-IR (KBr, cm^{-1}):2959, 2933, 2872, 1581, 1464, 1405, 1315,1091, 920, 831, 722.

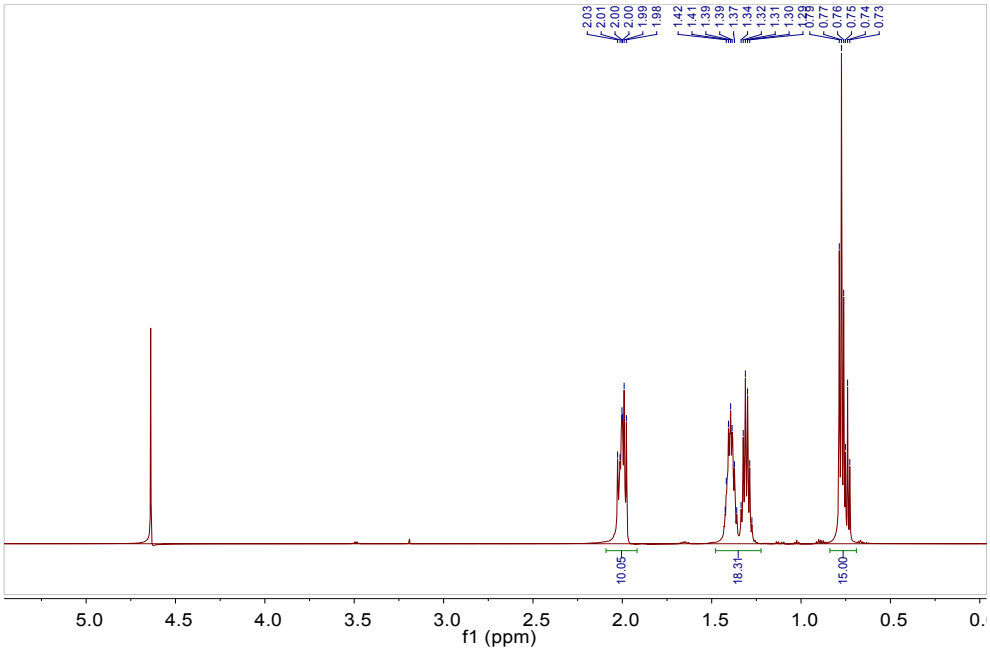


Fig. S13 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[CH_3CH_2CH_2COO]^{-}$ (D_2O).

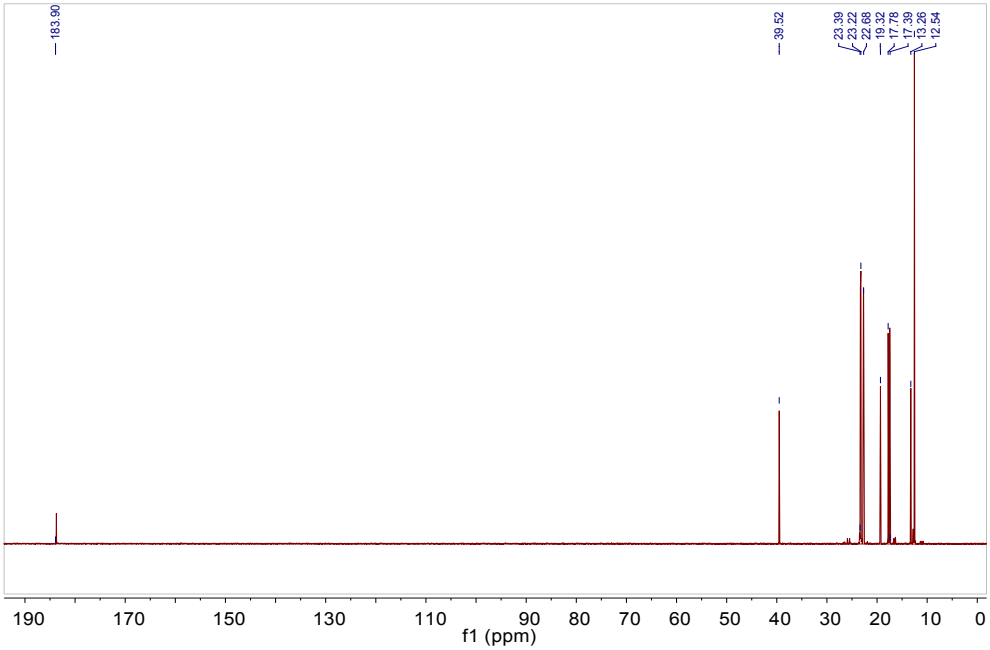


Fig. S14 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[CH_3CH_2CH_2COO]^{-}$ (D_2O).

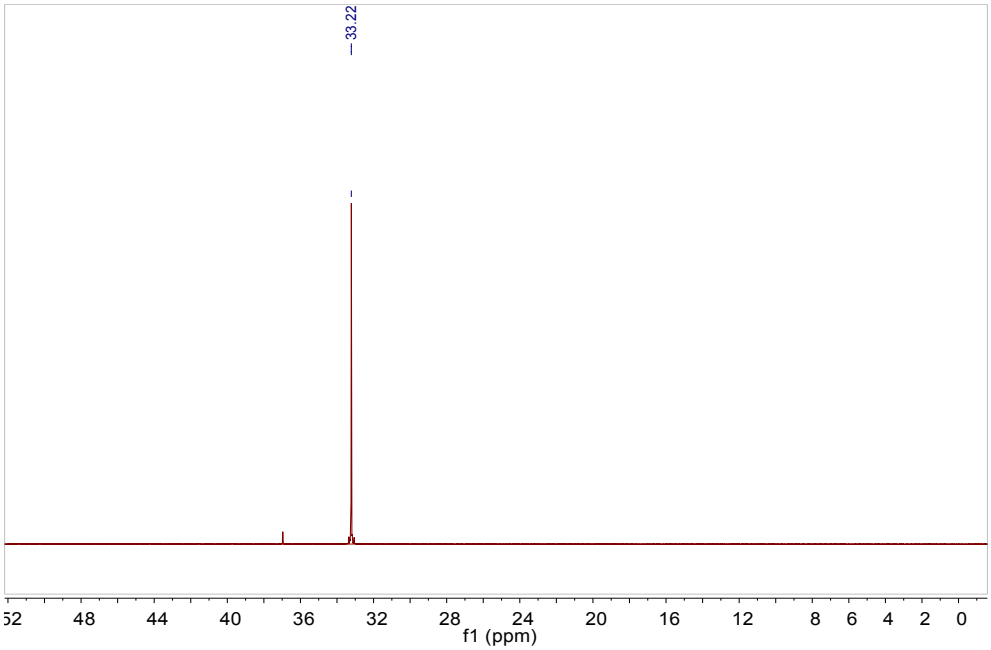


Fig. S15 The ^{31}P NMR spectrum of $[P_{4444}]^+[CH_3CH_2CH_2COO]^-$ (D_2O).

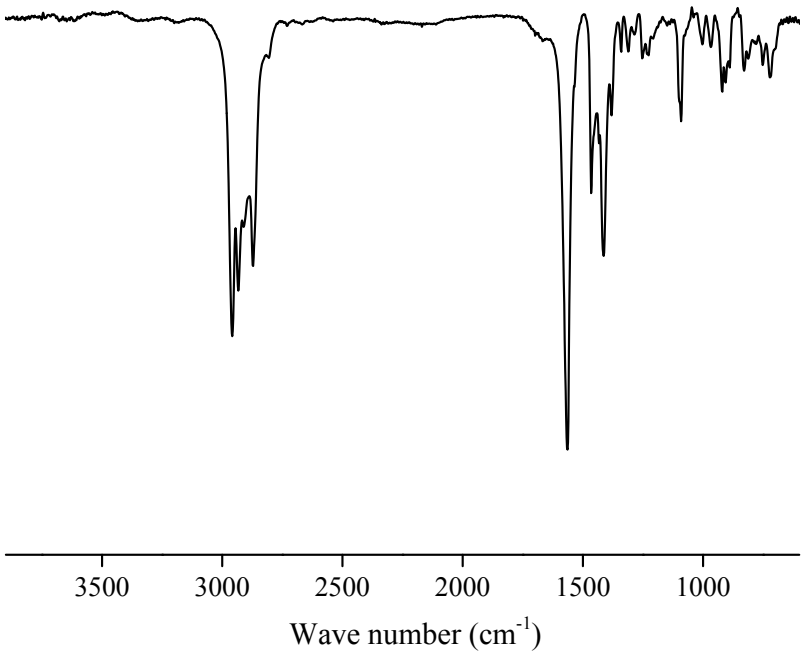


Fig. S16 The FT-IR spectrum of $[P_{4444}]^+[CH_3CH_2CH_2COO]^-$

$[P_{4444}]^+[CH_3CH_2CH_2COO]^-$:Yield: 86% (light yellow liquid).^1H NMR (600 MHz, D_2O) δ: 0.77 (12H,t), 1.24-1.47 (18H, m), 2.01 (10H,m), 0.74 (3H, t).^{13}C NMR (150 MHz, D_2O) δ 183.7, 39.5, 23.3, 22.8, 19.3, 17.8, 17.5, 13.3, 12.5. ^{31}P NMR (400 MHz, D_2O) δ: 33.22. FT-IR (KBr, cm^{-1}):2959, 2933, 2872, 1564, 1465, 1413, 1380, 1092, 921, 829, 722.

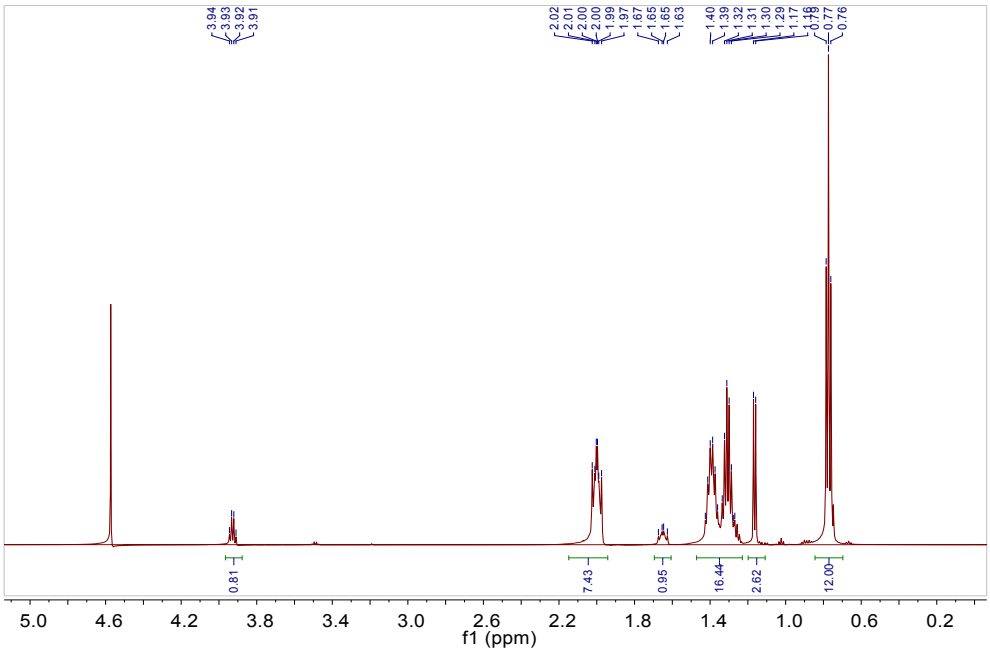


Fig. S17 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[CH_3CH(OH)COO]^{-}$ (D_2O).

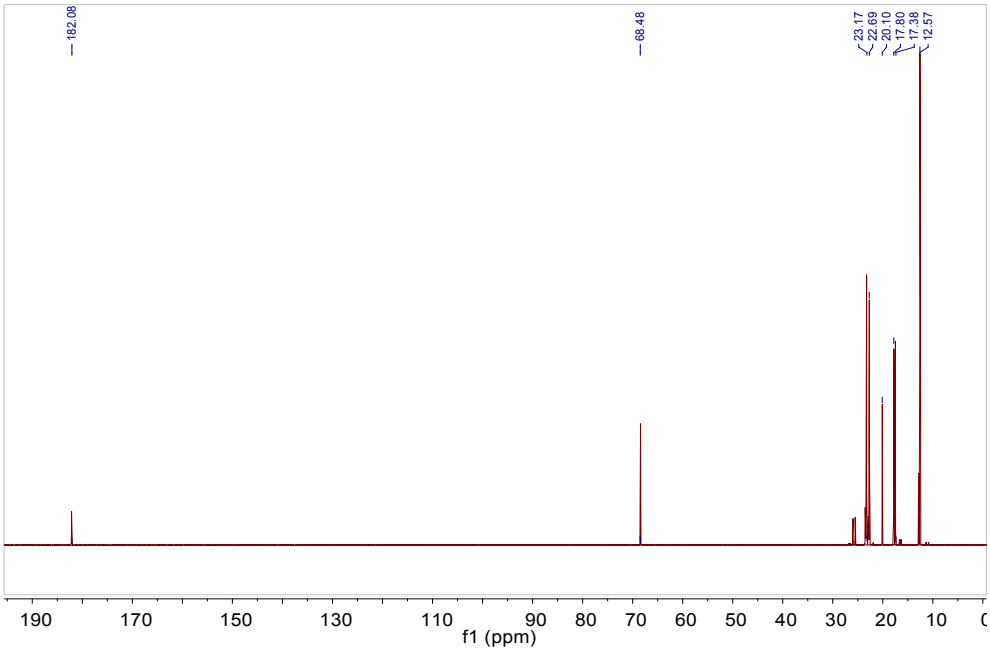


Fig. S18 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[CH_3CH(OH)COO]^{-}$ (D_2O).

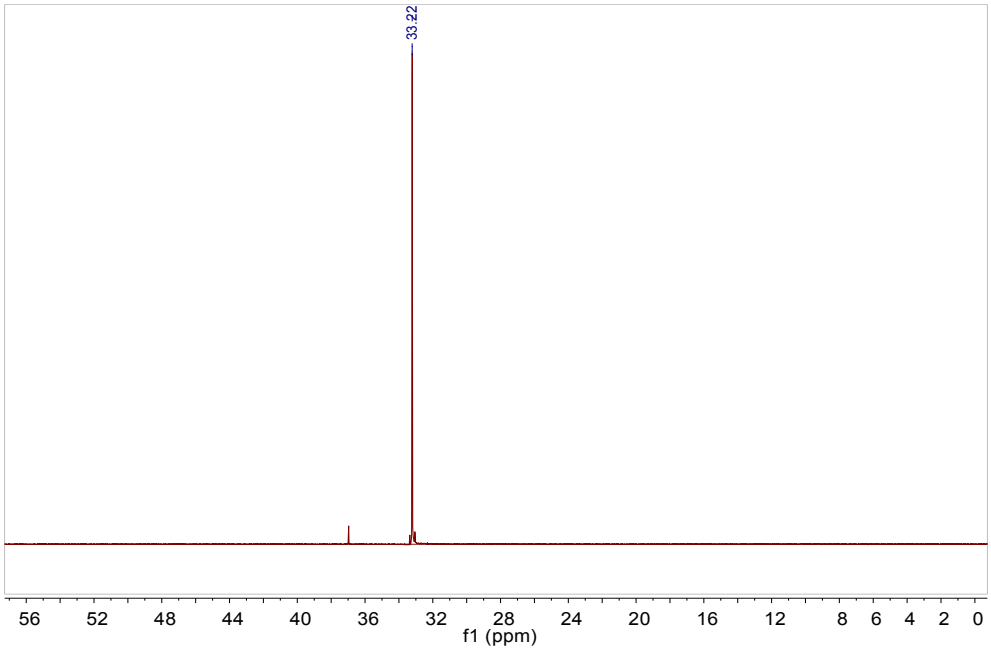


Fig. S19 The ^{31}P NMR spectrum of $[P_{4444}]^+[CH_3CH(OH)COO]^-$ (D_2O).

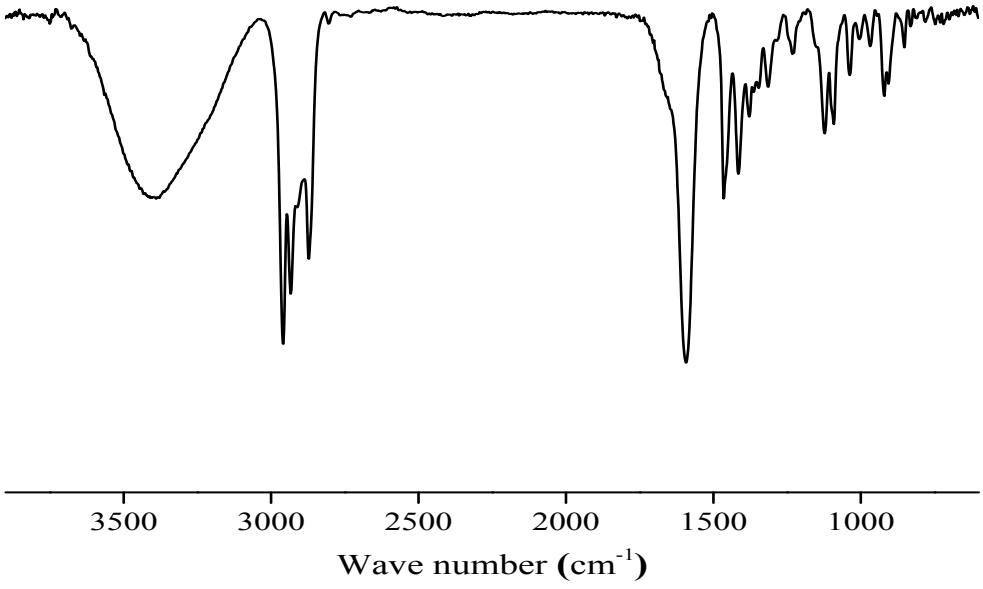


Fig.S20 The FT-IR spectrum of $[P_{4444}]^+[CH_3CH(OH)COO]^-$

$[P_{4444}]^+[CH_3CH(OH)COO]^-$: Yield: 81% (light yellow liquid).^1H NMR (600 MHz, D_2O) δ: 0.77 (12H, t), 1.22-1.35 (8H, m), 1.39 (8H, m), 1.94-2.24 (8H, m), 3.93 (q,1H), 1.20-1.10 (3H, d).^{13}C NMR (150 MHz, D_2O) δ: 182.2, 68.4, 23.6, 20.1, 17.8, 17.5, 12.7. ^{31}P NMR (400 MHz, D_2O) δ: 33.22. FT-IR (KBr, cm^{-1}): 3378, 2959, 2933, 2873, 1594, 1465, 1415, 1379, 1222, 1095, 1040, 919, 847, 721.

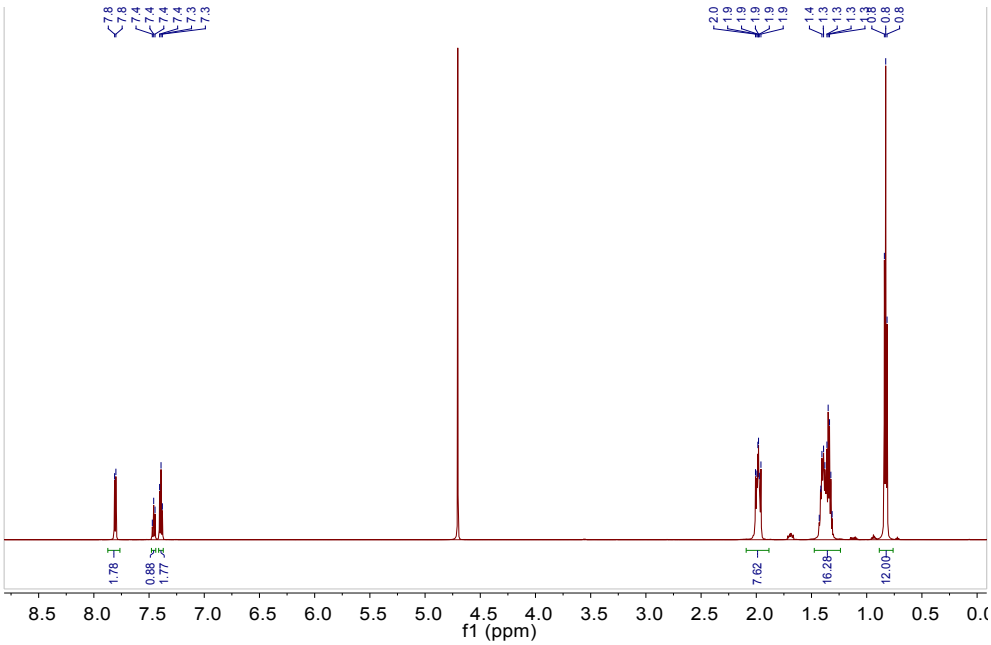


Fig. S21 The ^{1}H NMR spectrum of $[P_{4444}]^{+}[C_6H_5COO]^{-}$ (D_2O).

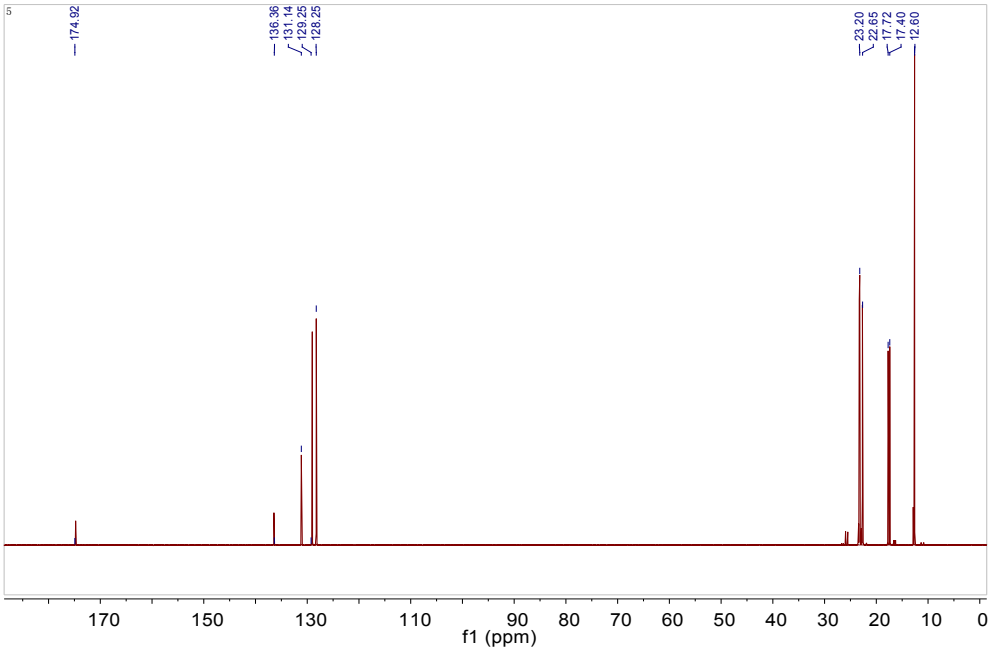


Fig. S22 The ^{13}C NMR spectrum of $[P_{4444}]^{+}[C_6H_5COO]^{-}$ (D_2O).

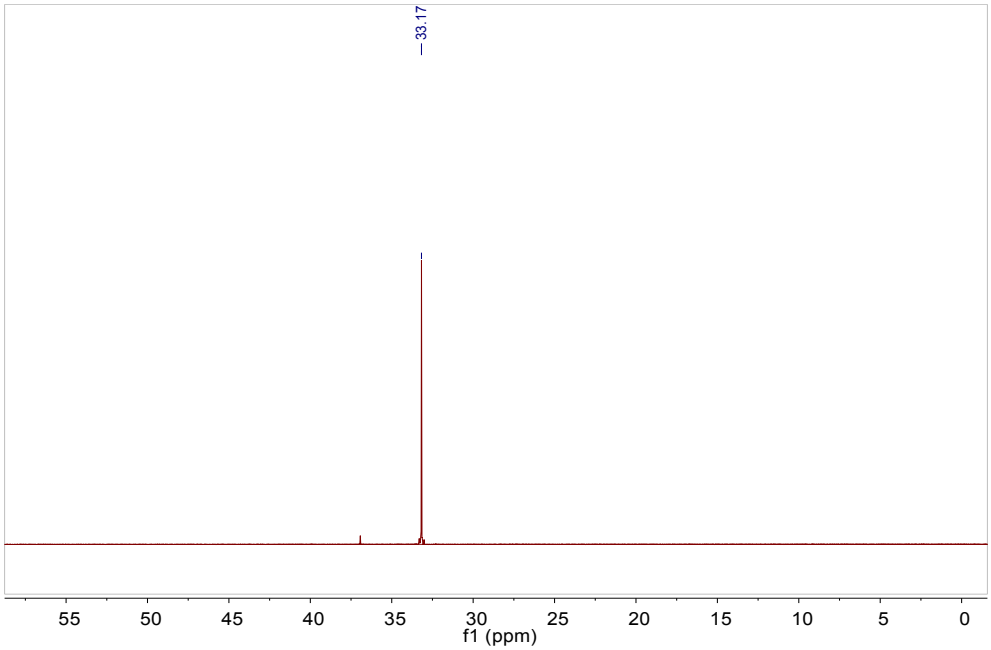


Fig. S23 The ^{31}P NMR spectrum of $[P_{4444}]^+[C_6H_5COO]^-$ (D_2O).

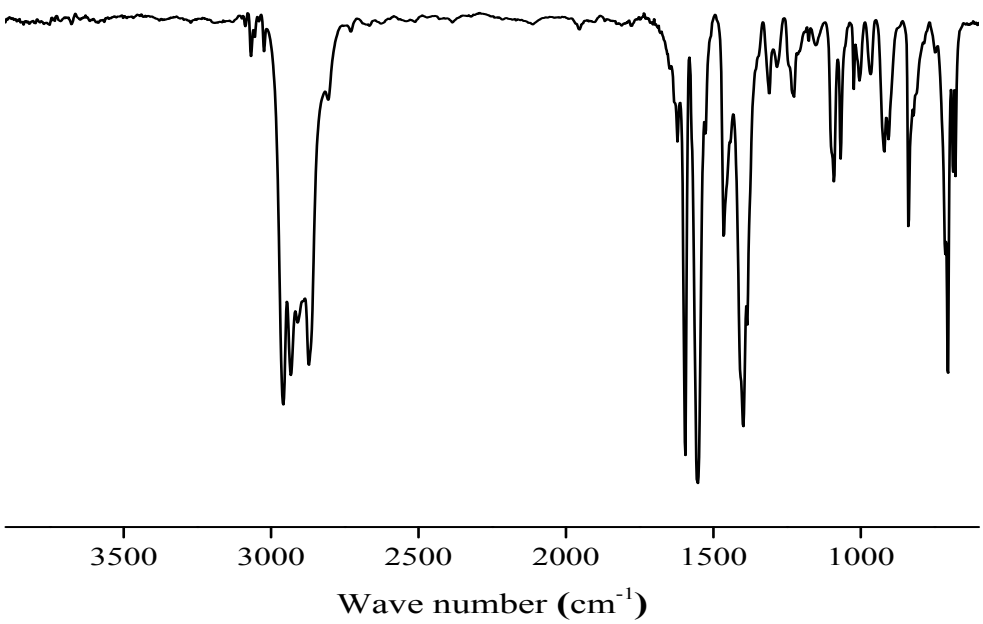


Fig.S24 The FT-IR spectrum of $[P_{4444}]^+[C_6H_5COO]^-$.

$[P_{4444}]^+[C_6H_5COO]^-$:Yield: 83% (light yellow liquid). ^1H NMR (600 MHz, D_2O) δ: 0.83 (12H,t), 1.33 (8H,m),1.44-1.37 (8H, m),2.16-1.84 (8H, m), 7.80 (2H, d), 7.46 (1H,t), 7.39 (2H, t).^{13}C NMR (150 MHz, D_2O) δ 174.8, 136.4, 131.1, 129.0, 128.3, 23.6, 22.7, 17.7, 17.4, 12.6. ^{31}P NMR (400 MHz, D_2O) δ: 33.17. FT-IR (KBr, cm^{-1}): 3068, 3023, 2959, 2933, 2872, 1595, 1552, 1464, 1398, 1091, 1068, 1023, 920, 838, 704, 678.

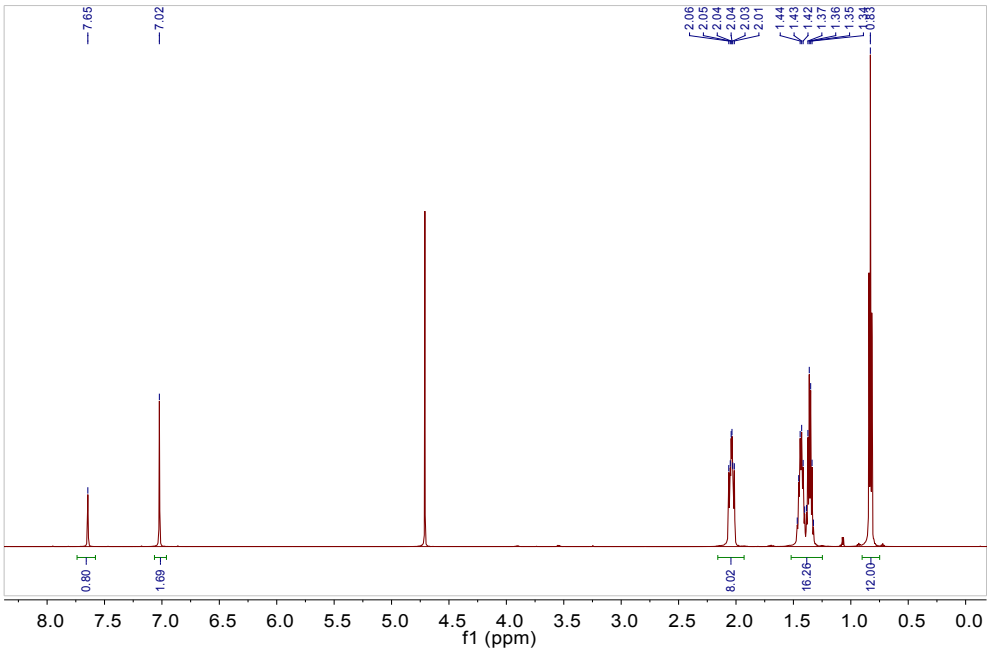


Fig. S25 The ^{13}C NMR spectrum of $[P_{4444}]^+[Im]^-$ (D_2O).

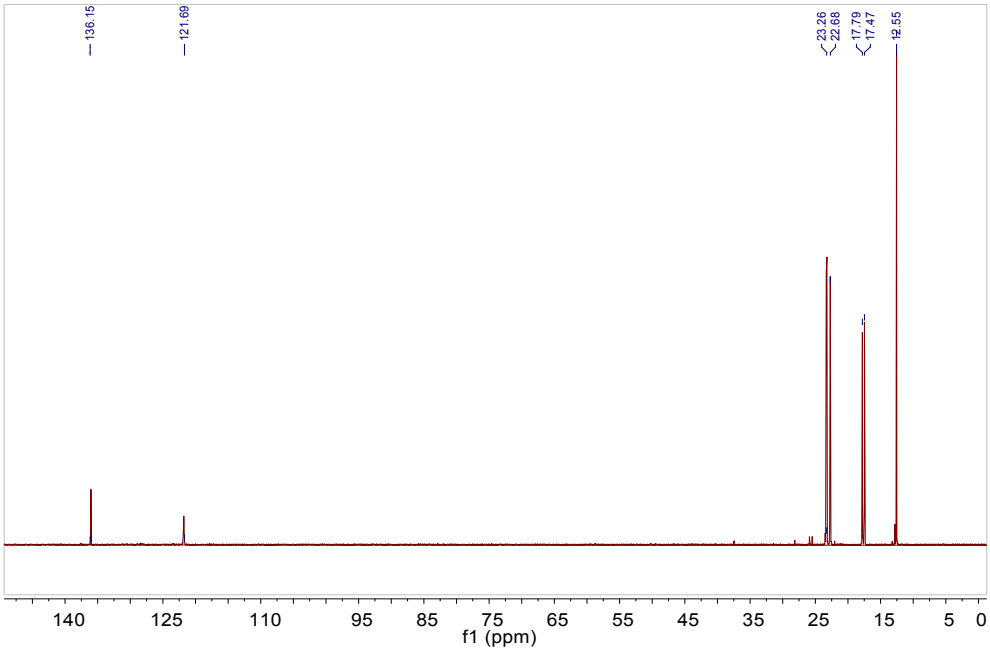


Fig. S26 The ^{13}C NMR spectrum of $[P_{4444}]^+[Im]^-$ (D_2O).

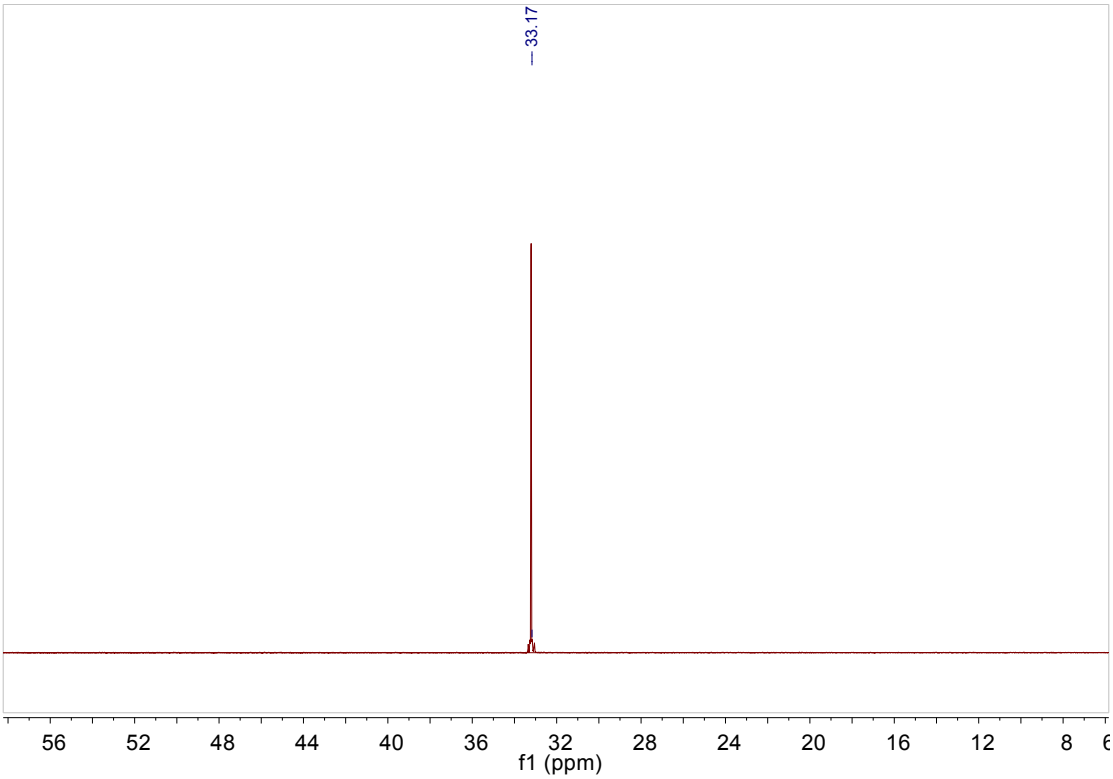


Fig. S27 The ^{31}P NMR spectrum of $[P_{4444}]^+[Im]^-$ measured by ^{31}P NMR (D_2O).

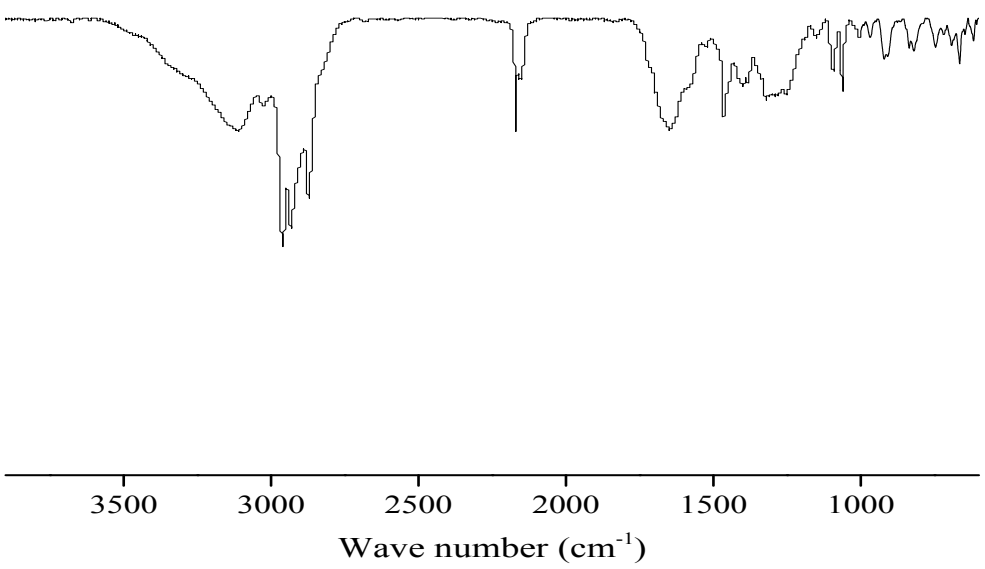


Fig.S28 The FT-IR spectrum of $[P_{4444}]^+[Im]^-$.

$[P_{4444}]^+[Im]^-$: Yield: 86% (light fuchsia liquid).^1H NMR (600 MHz, D_2O) 0.83 (12H, t), 1.29-1.50 (m, 16H), 1.99-2.09 (8H, m),δ 7.65 (1H, s), 7.02 (2H,s).^{13}C NMR (150 MHz, D_2O) δ 136.0, 121.8, 23.4, 22.7, 17.8, 17.5, 12.5. ^{31}P NMR (400 MHz, D_2O) δ:

33.17. FT-IR (KBr, cm^{-1}): 3112, 2960, 2932, 2873, 2170, 1646, 1465, 1399, 1322, 1093, 1062, 968, 919, 819, 744, 664.

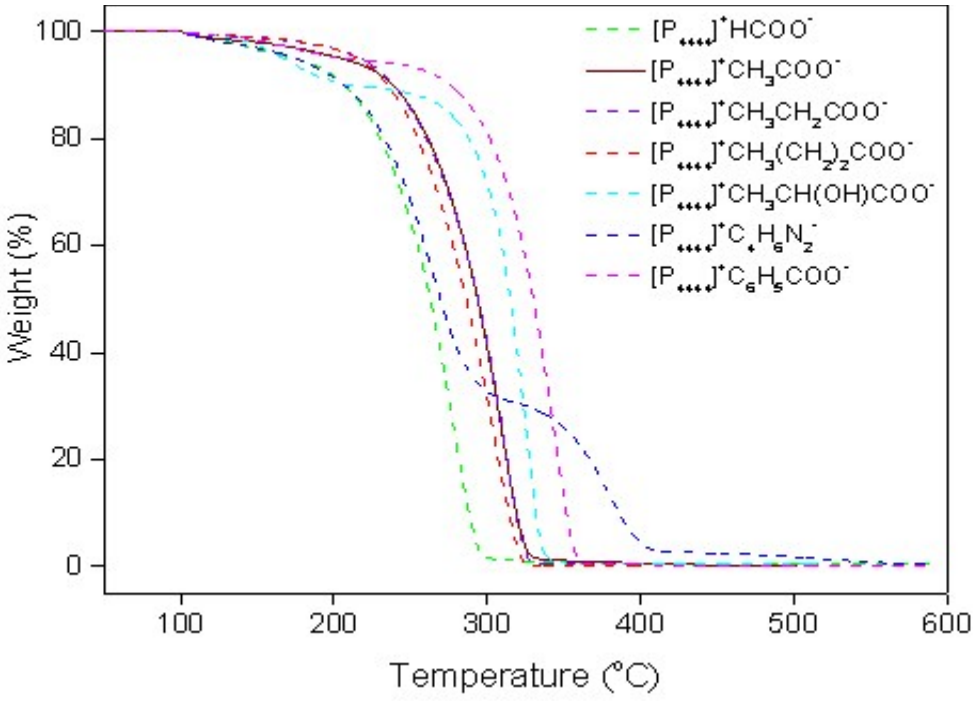


Fig. S29 TGA curves of ILs

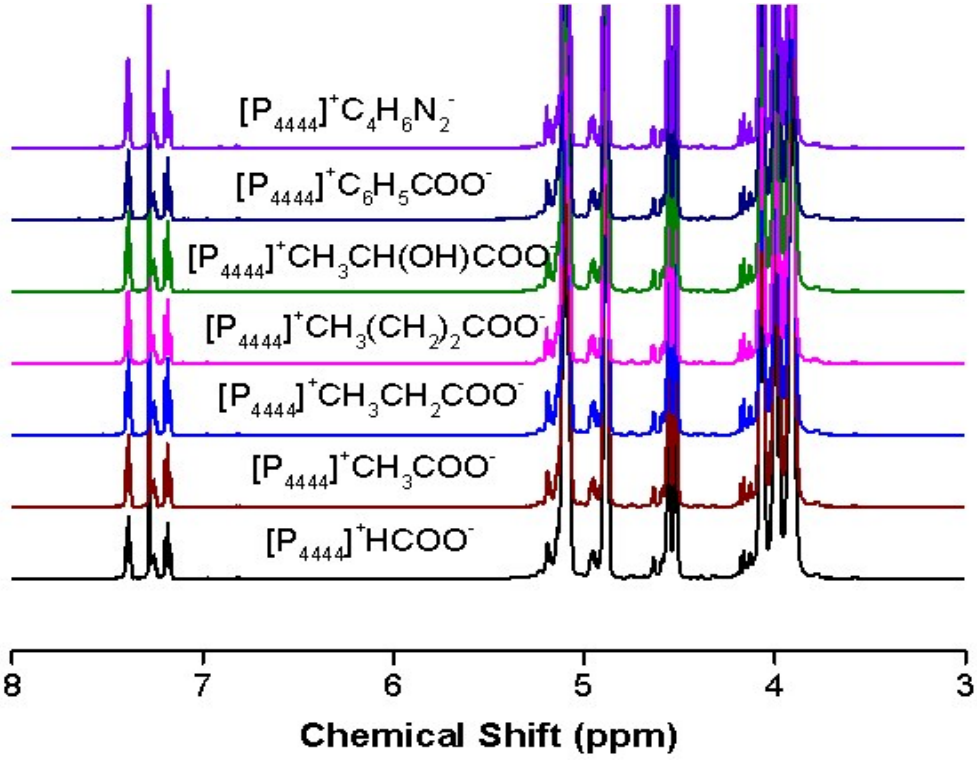


Fig. S30 Effects of different ILs on PIC terminal groups by measured by ^{1}H NMR

Table S1 The result of effects of different catalyst on PIC terminal groups

Catalyst	exo-OH	endo-OH	endo-OH/ exo-OH	PhO-	-OH
$[P_{4444}]^+[HCOO]^-$	0.012	0.003	0.250	0.053	0.015
$[P_{4444}]^+[CH_3COO]^-$	0.008	0.002	0.250	0.052	0.010
$[P_{4444}]^+[CH_3CH_2COO]^-$	0.008	0.002	0.250	0.061	0.010
$[P_{4444}]^+[CH_3CH_3CH_2COO]^-$	0.008	0.002	0.250	0.054	0.010
$[P_{4444}]^+[CH_3CH(OH)COO]^-$	0.008	0.002	0.250	0.059	0.010
$[P_{4444}]^+[C_6H_5COO]^-$	0.010	0.002	0.200	0.054	0.012
$[P_{4444}]^+[C_4H_3N_2]^-$	0.008	0.002	0.250	0.062	0.010
$[N_{2222}]^+[CH_3COO]^-$	0.010	0.002	0.200	0.072	0.012
$[Bmim]^+[CH_3COO]^-$	0.013	0.003	0.231	0.075	0.016
$[Emim]^+[CH_3COO]^-$	0.011	0.002	0.182	0.060	0.013
$[Ch]^+[CH_3COO]^-$	0.009	0.002	0.222	0.076	0.011
$CsCO_3$	0.020	0.009	0.450	0.050	0.029
LiAcac	0.017	0.011	0.647	0.008	0.028

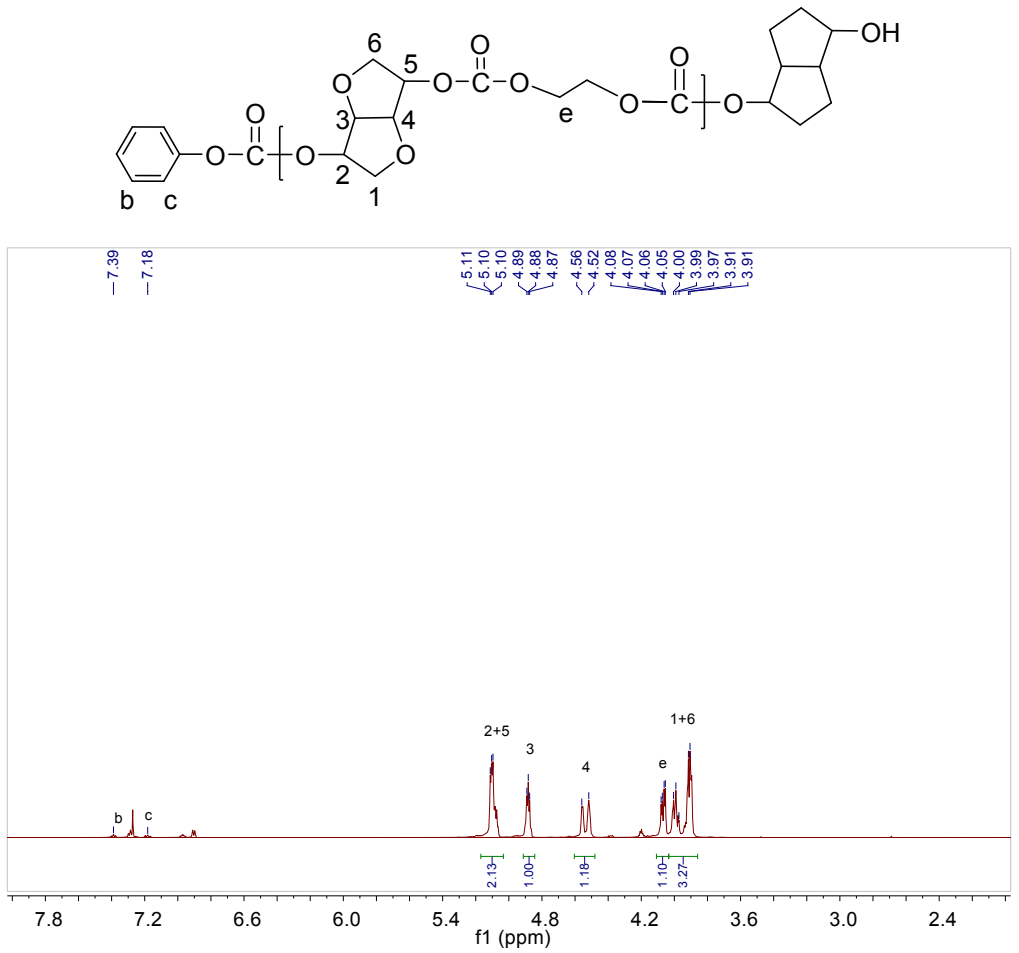
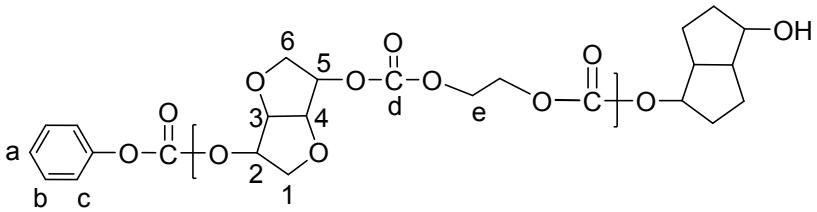


Fig. S31 The ^{1}H NMR spectrum of PEIC ($CDCl_3$).



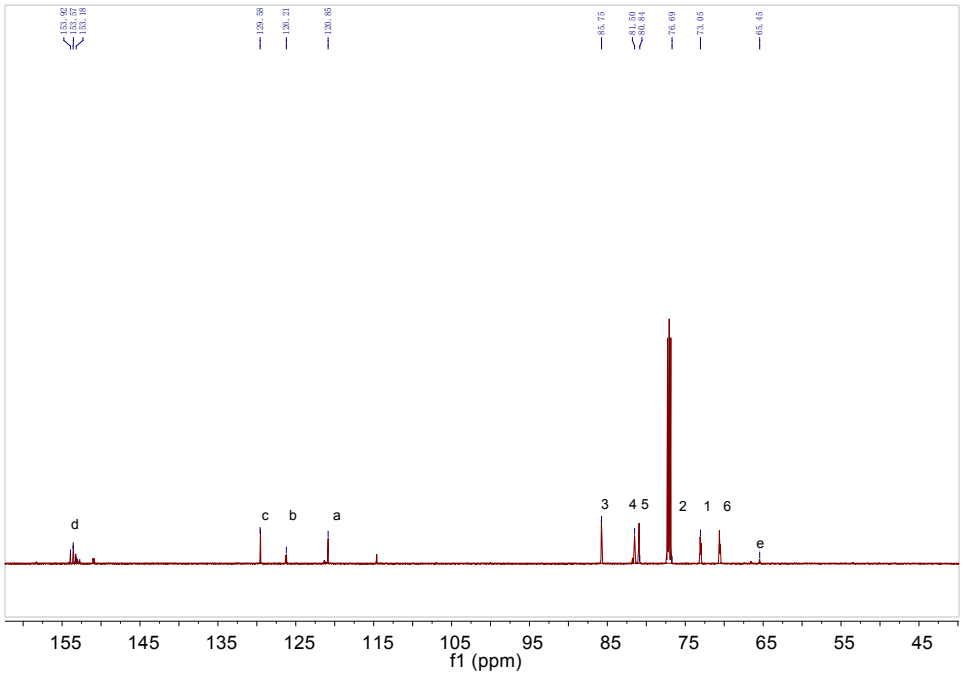


Fig. S32 The ^{13}C NMR spectrum of PEIC ($CDCl_3$).

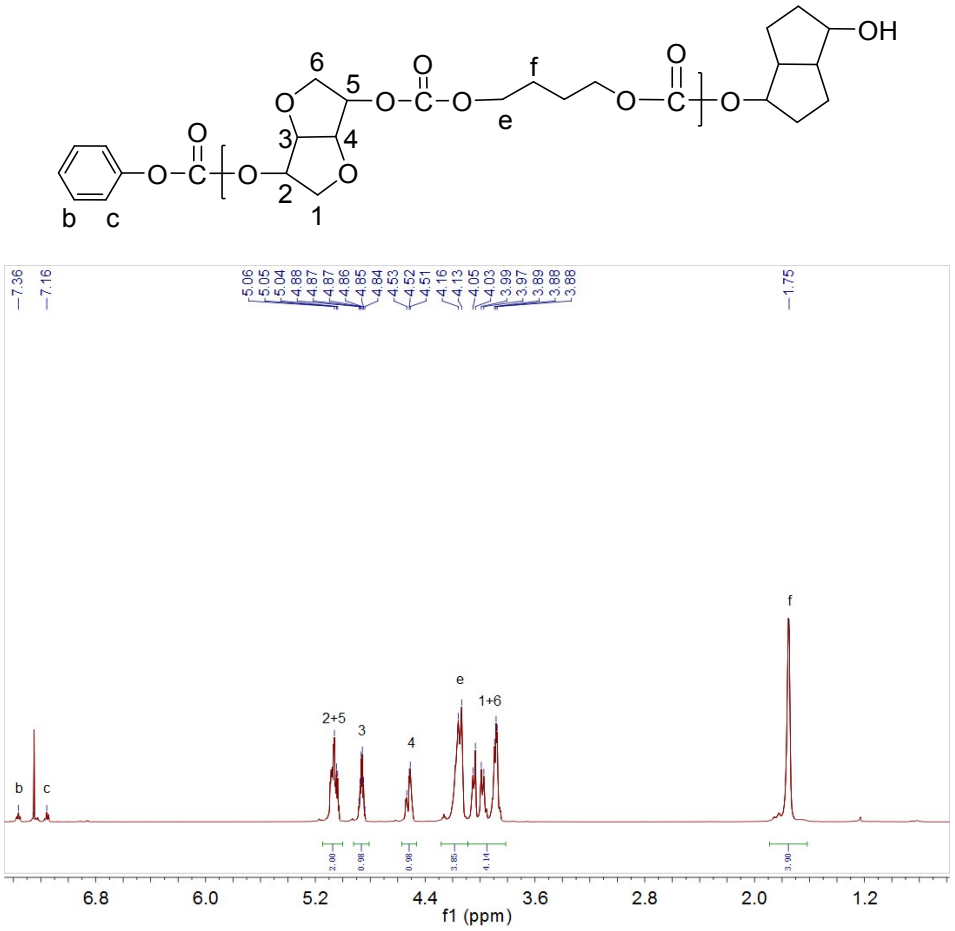
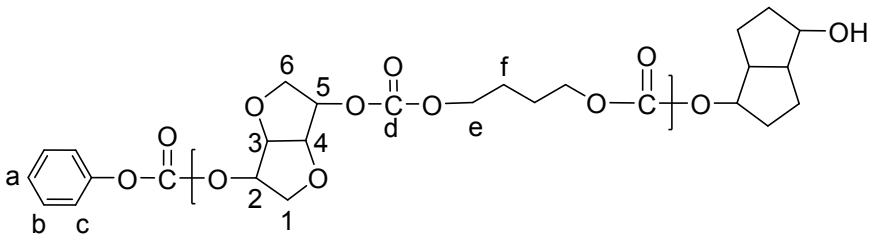


Fig. S33 The ^{1}H NMR spectrum of PBIC ($CDCl_3$).



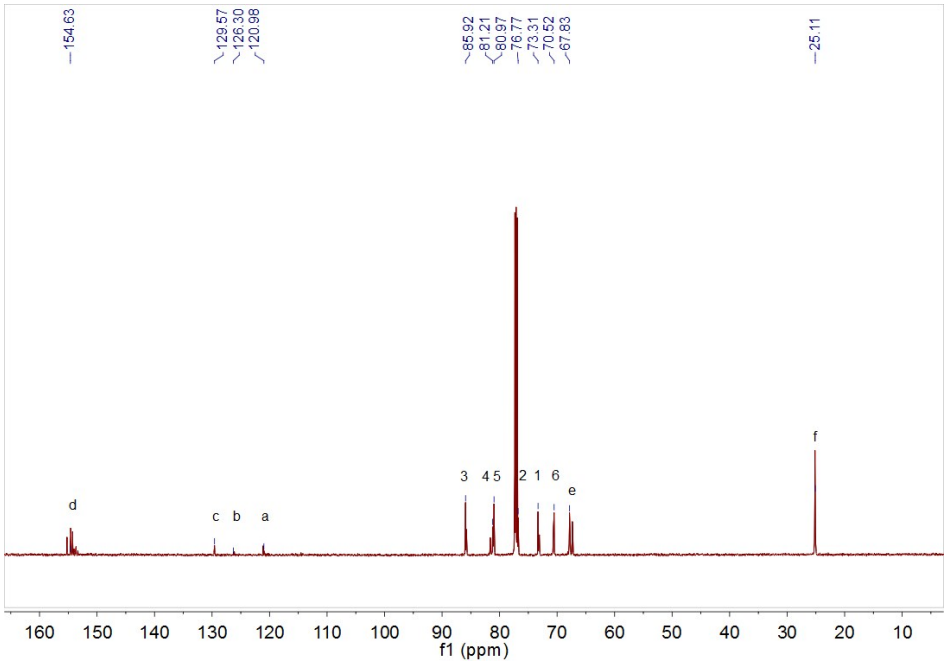


Fig. S34 The ^{13}C NMR spectrum of PBIC ($CDCl_3$).

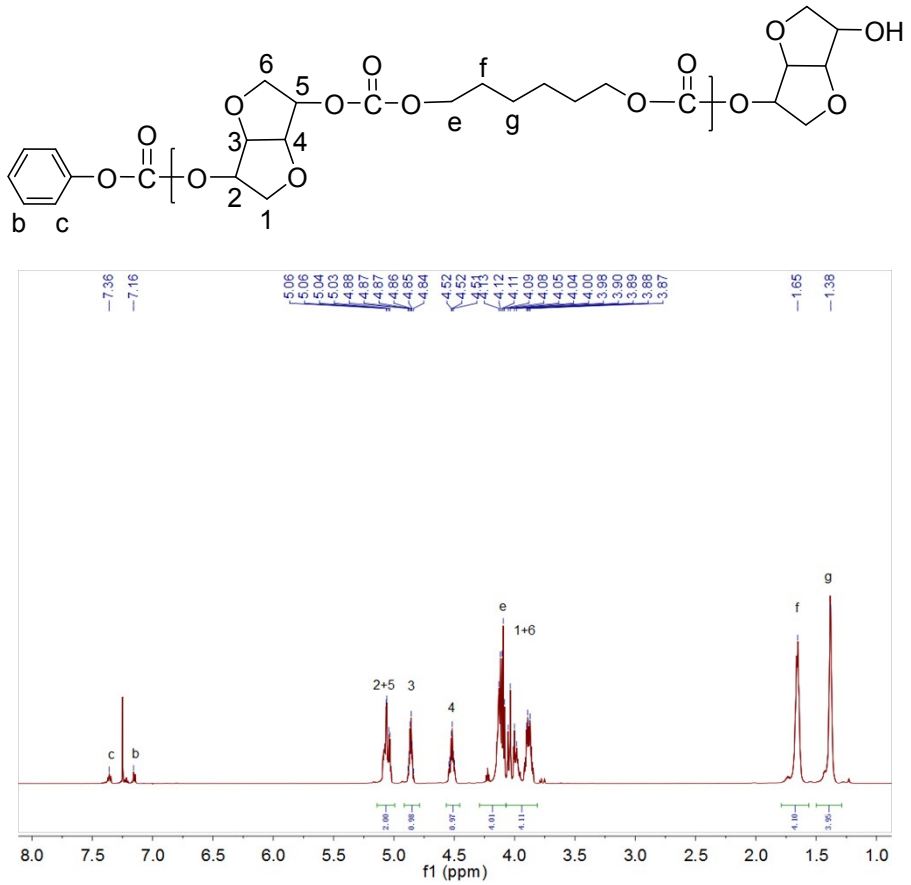


Fig. S35 The ^{1}H NMR spectrum of PHIC ($CDCl_3$).

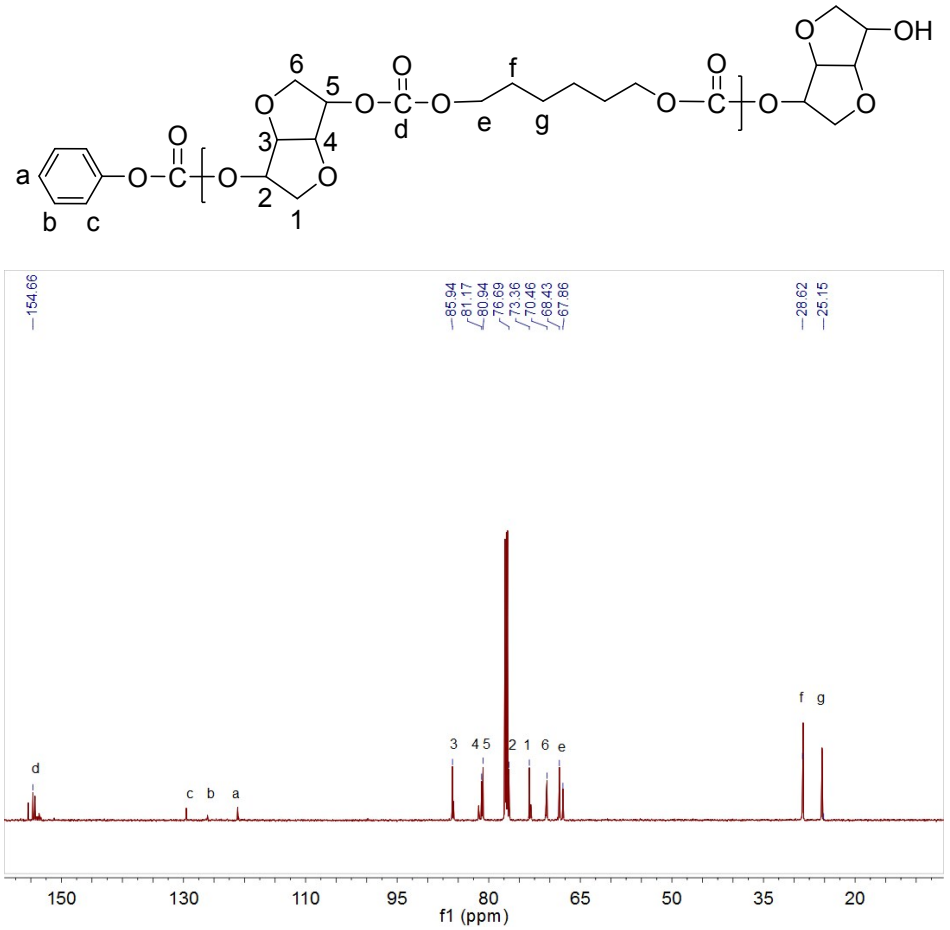
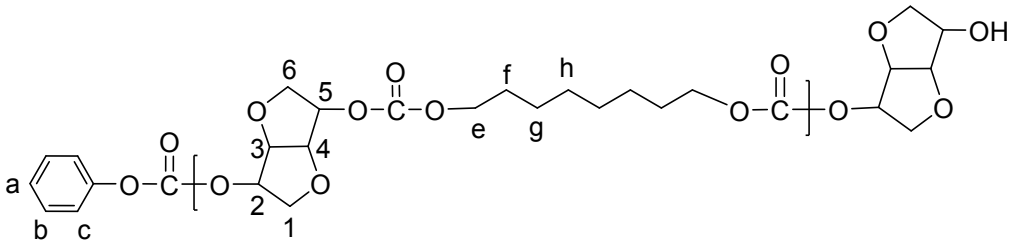


Fig. S36 The ^{13}C NMR spectrum of PHIC ($CDCl_3$).



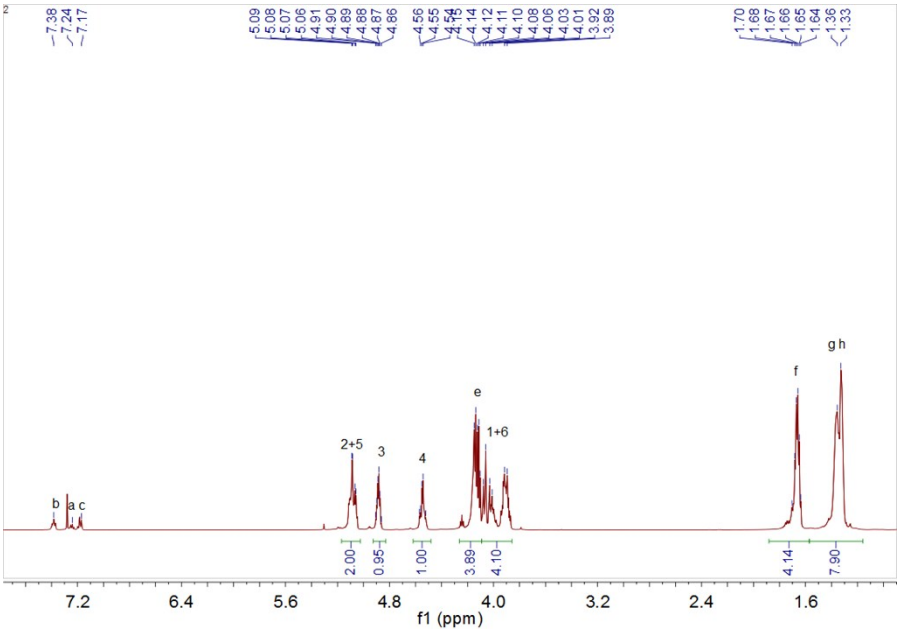
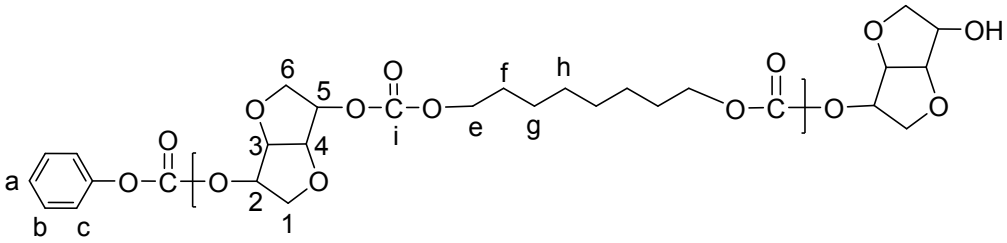


Fig. S37 The ^{1}H NMR spectrum of POIC ($CDCl_3$).



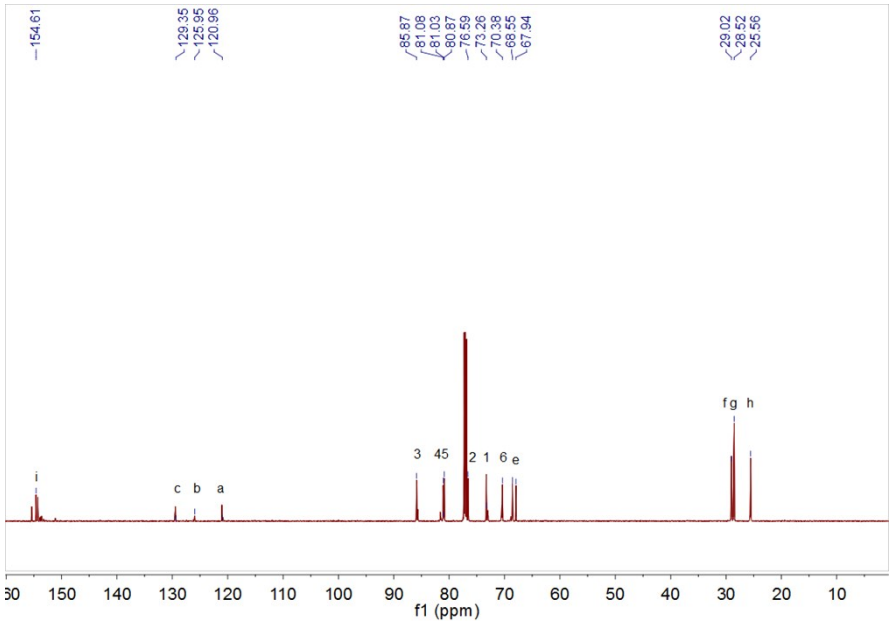


Fig. S38 The ^{13}C NMR spectrum of POIC ($CDCl_3$).

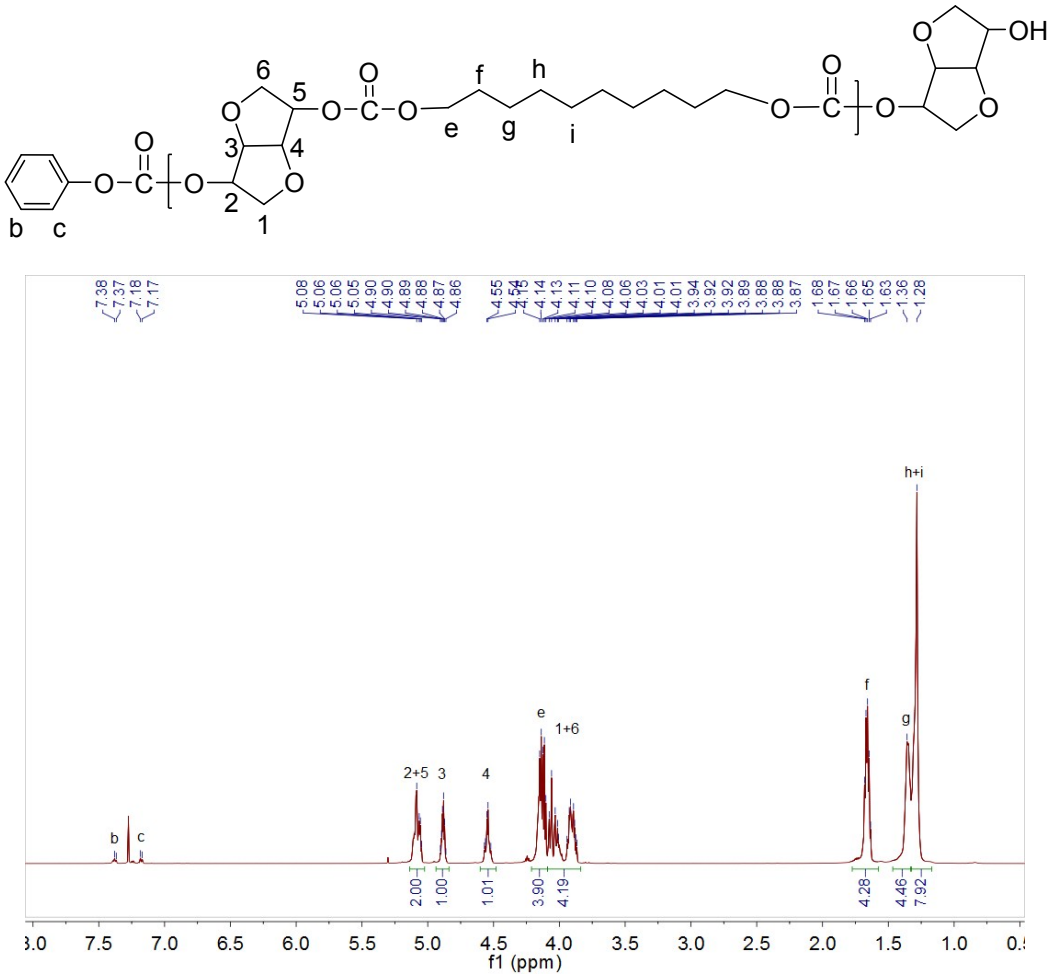


Fig. S39 The ^{1}H NMR spectrum of PAIC measured by ($CDCl_3$).

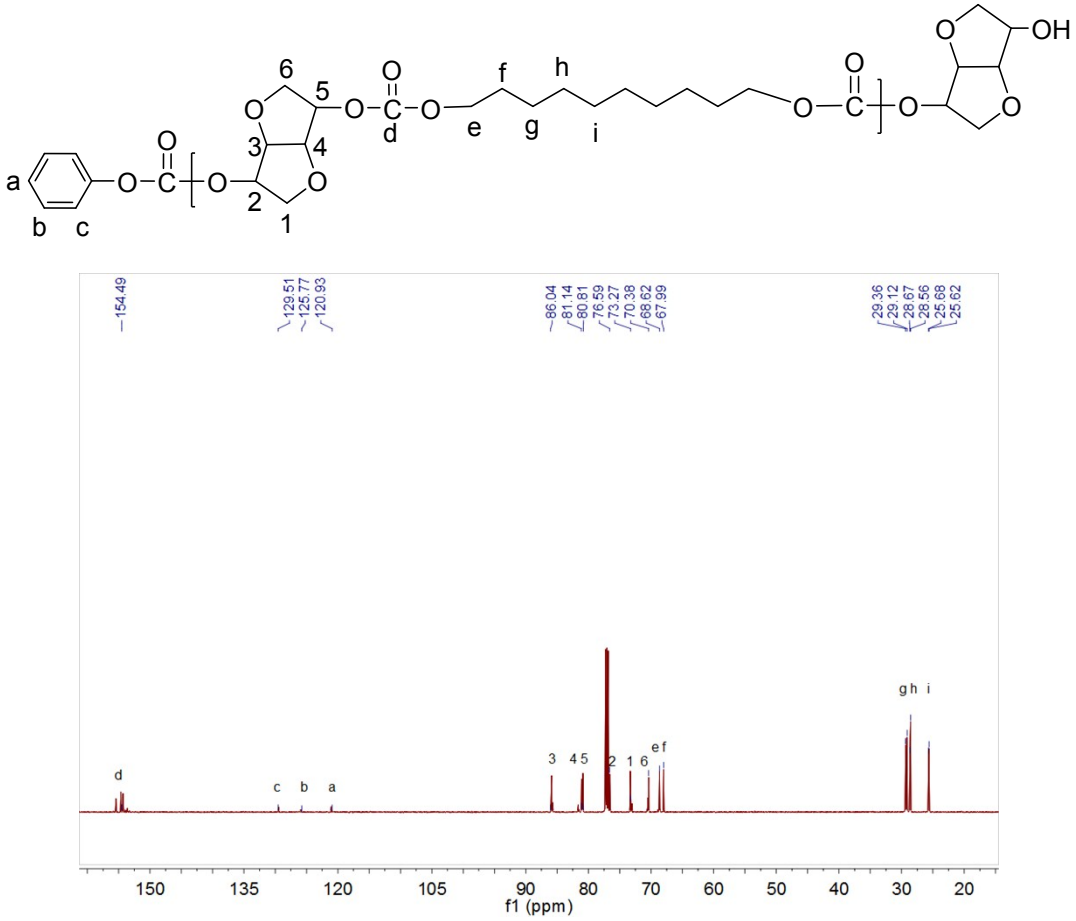
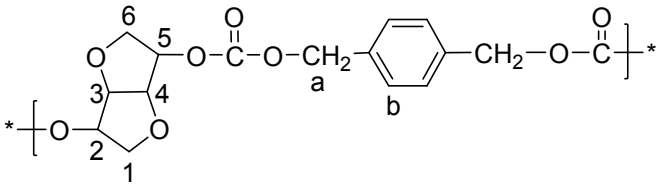


Fig. S40 The ^{13}C NMR spectrum of PAIC ($CDCl_3$).



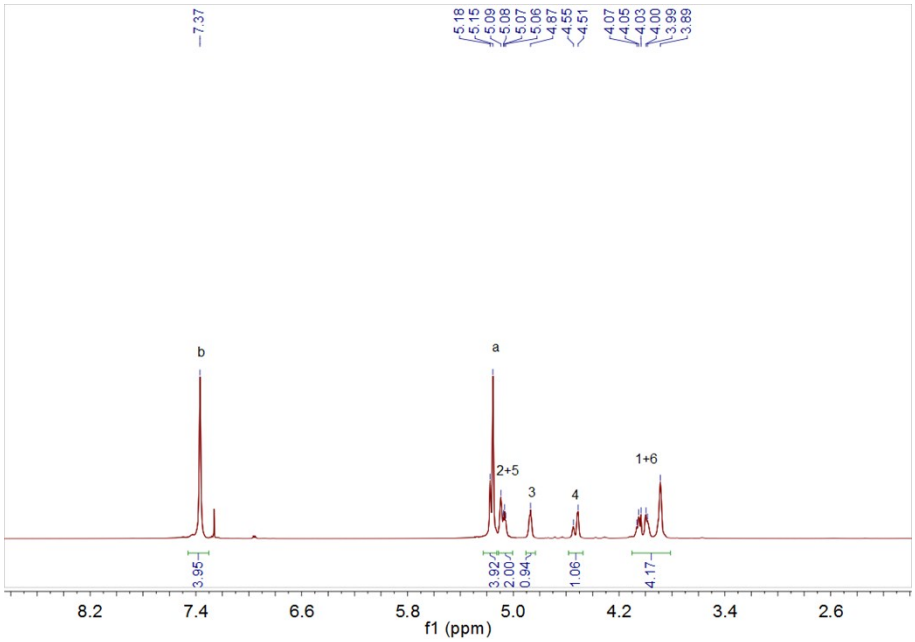


Fig. S41 The ^{1}H NMR spectrum of PDIC ($CDCl_3$).

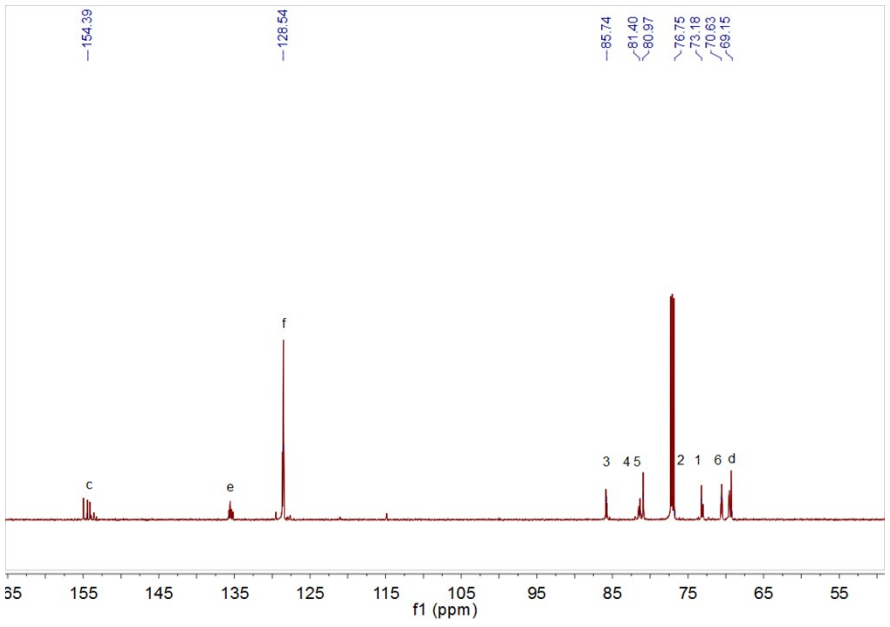


Fig. S42 The ^{13}C NMR spectrum of PDIC ($CDCl_3$).

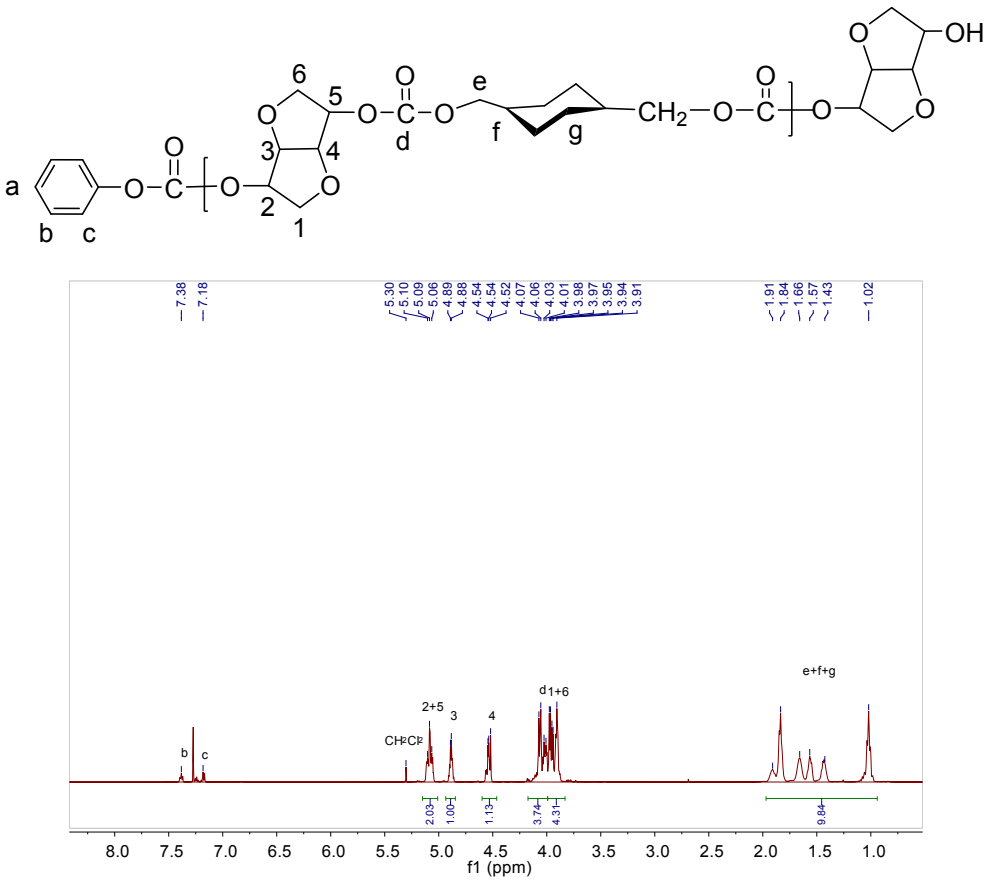


Fig. S43 The ^{1}H NMR spectrum of PCIC ($CDCl_3$).

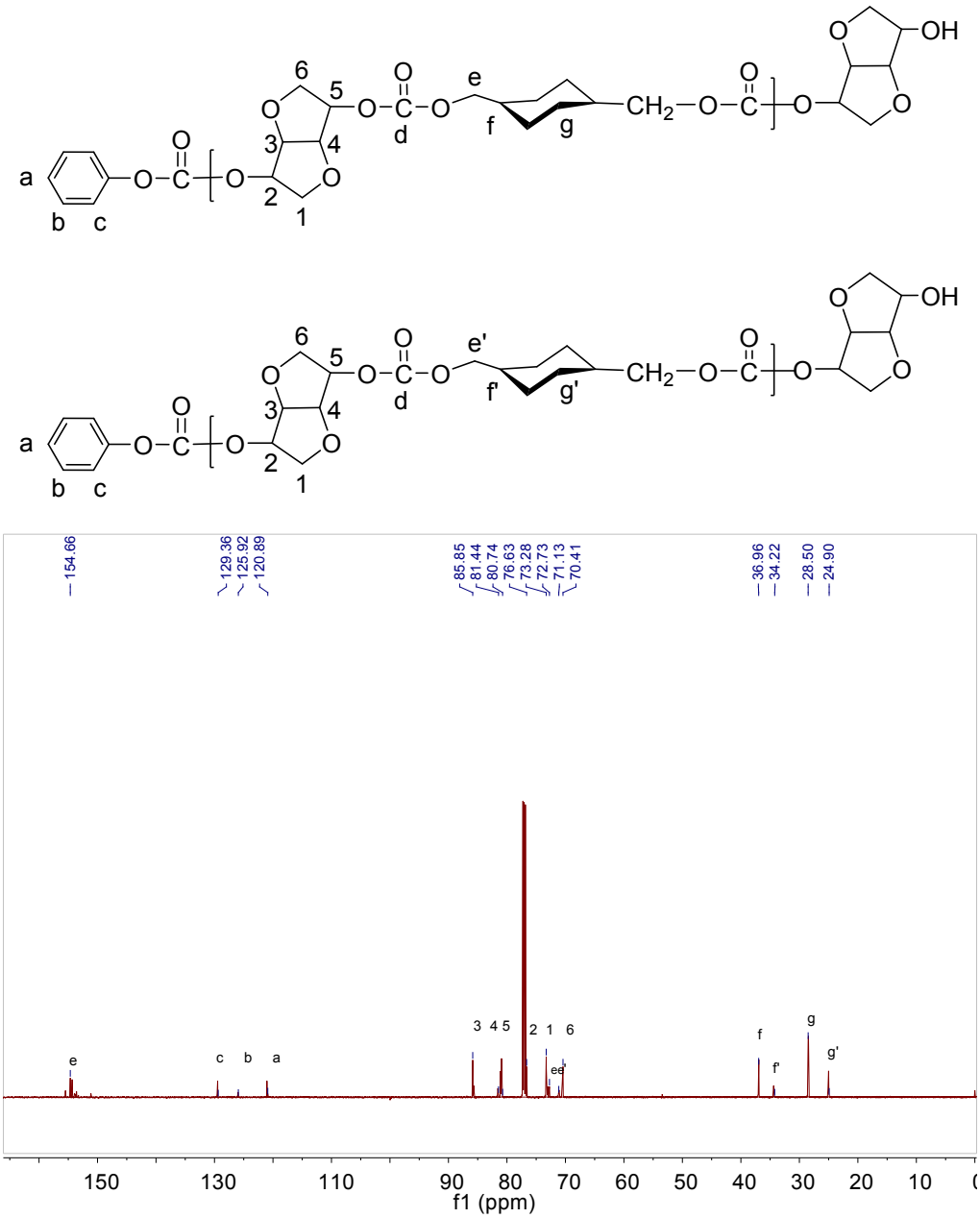


Fig. S44 The ^{13}C NMR spectrum of PCIC ($CDCl_3$).

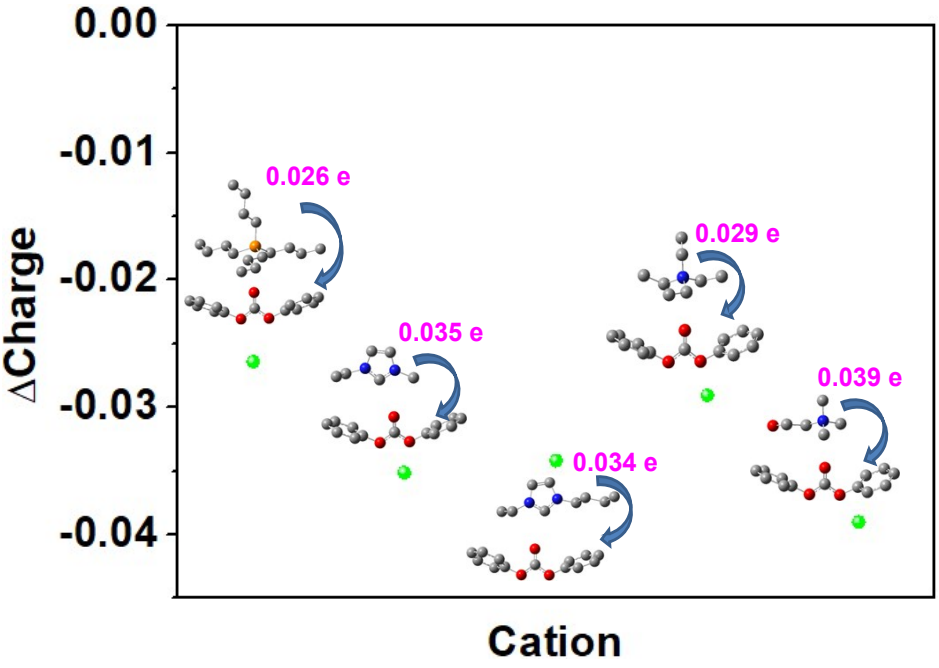


Fig. S45 Inductive effect of cations and DPC.