Supporting Information

Silica-immobilized ionic liquid Brönsted acids as highly effective heterogeneous catalysts for the isomerization of n-heptane and n-octane

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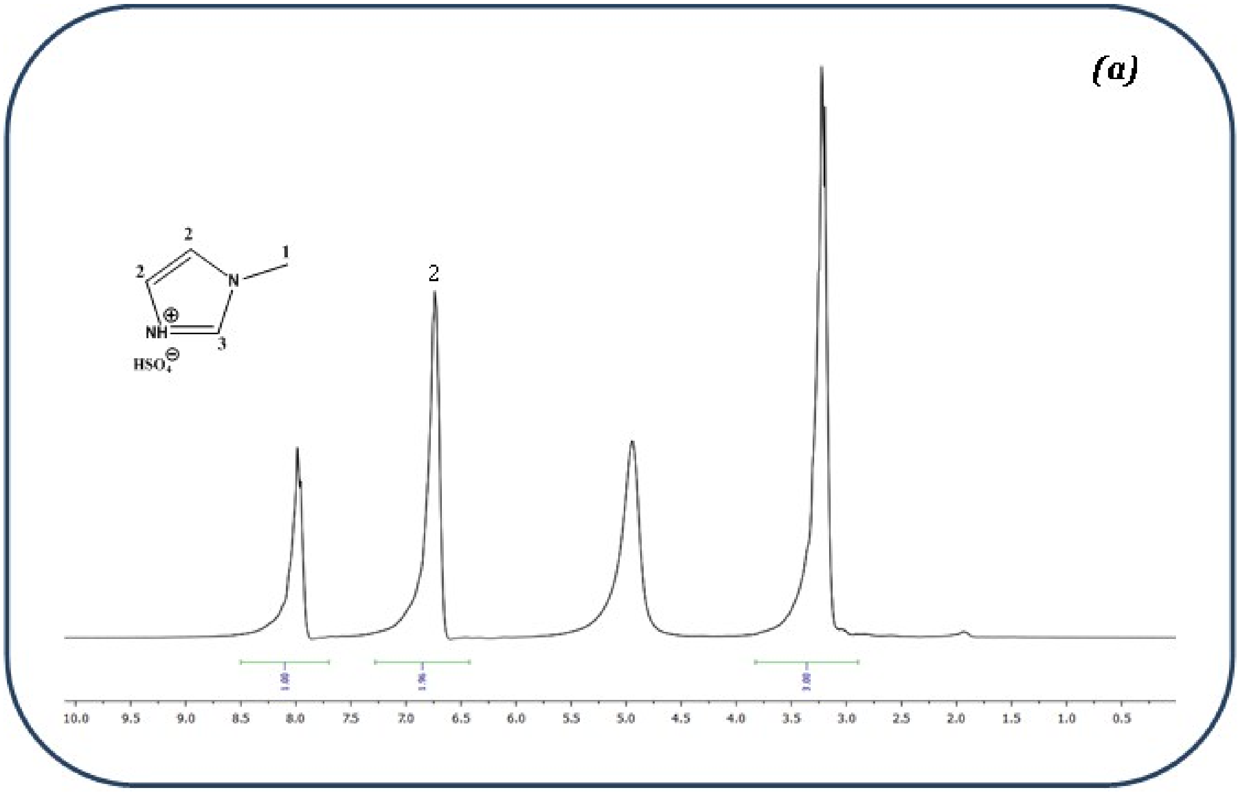
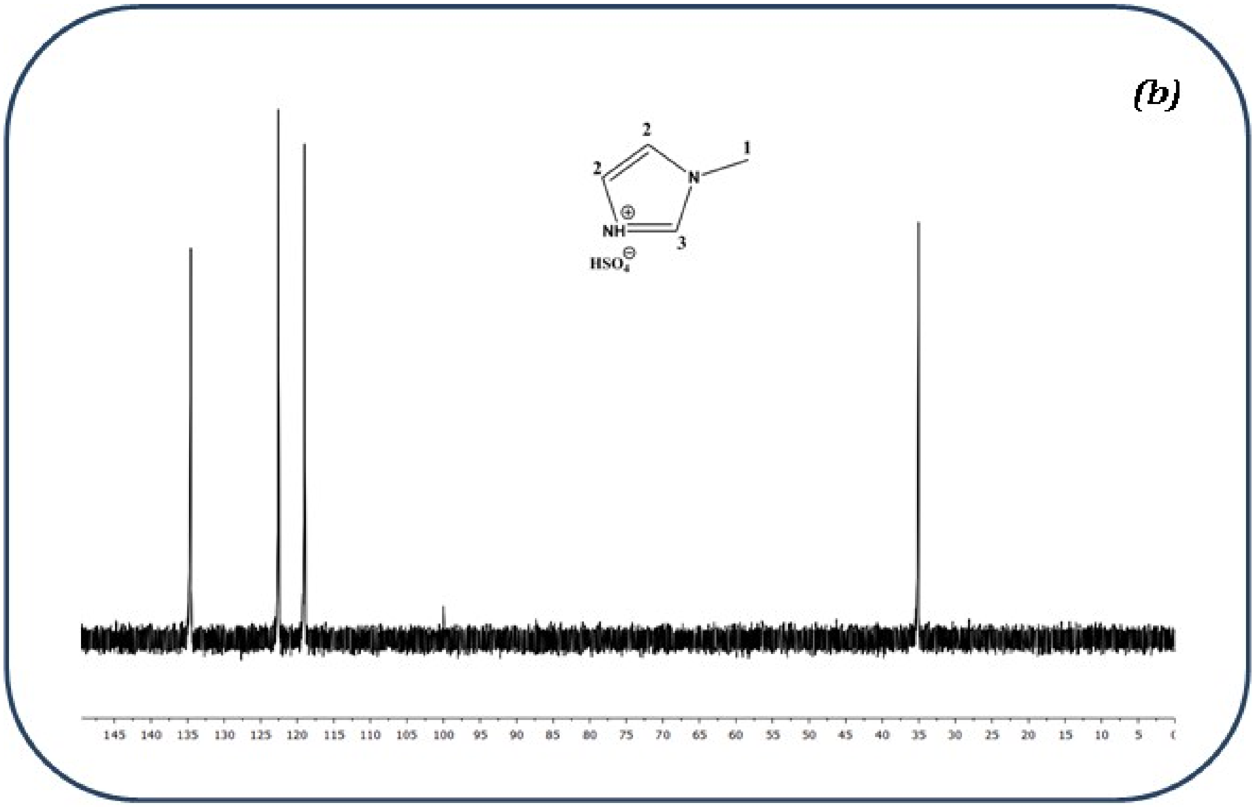
2.3. Spectral data of synthesized [HMIM]HSO_4 and [HMBIM]HSO_4

[HMIM]HSO_4: *^1H NMR* (D_2O, δ/ppm relative to TMS) = 3H (-NCH_3), 2H (-CH aromatic protons), 1H (-NCHN); *^{13}C NMR* (D_2O δ/ppm) = 35 (-NCH_3), 119 (-CH), 121 (-CH), 135 (-NCHN); *IR* (KBr) (ν cm^{-1}) = 750 (C-H stretching), 851 (aromatic C-H bending), 1042 (S=O stretching), 1177 (C-N stretching), 1466 (C-C aromatic multiple bond stretching), 3147 (aromatic stretching), 3450 (N-H stretching). M^+ observed at m/*z* = (+) 83.06.**(Fig. S1(a-d))**

[HMBIM]HSO_4: ^1H NMR (D_2O, δ/ppm relative to TMS) = 3H (-NCH_3-); 2H (-CH aromatic protons), 2H (-CH aromatic protons), 1H (-NCHN); ^{13}C NMR (D_2O δ/ppm) = 32.5 (-NCH_3), 112 (-CH), 114 (-CH), 126 (-CH), 126 (-CH), 130 (-CH), 131 (-CH), 140 (-NCHN); IR (KBr) (ν cm^{-1}) = 753 (C-H stretching), 861 (aromatic C-H bending), 1038 (S=O stretching), 1177 (C-N stretching), 1461 (C-C aromatic multiple bond stretching), 3135 (aromatic stretching); M^+ observed m/*z* = (+) 133.07. **(Fig. S2(a-d))**


(a)
2
2
1
N
NH
⊕
3
HSO$_4^{\ominus}$
2
1.00
1.96
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5


(b)
2
2
1
N
NH
⊕
3
HSO$_4^{\ominus}$
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5

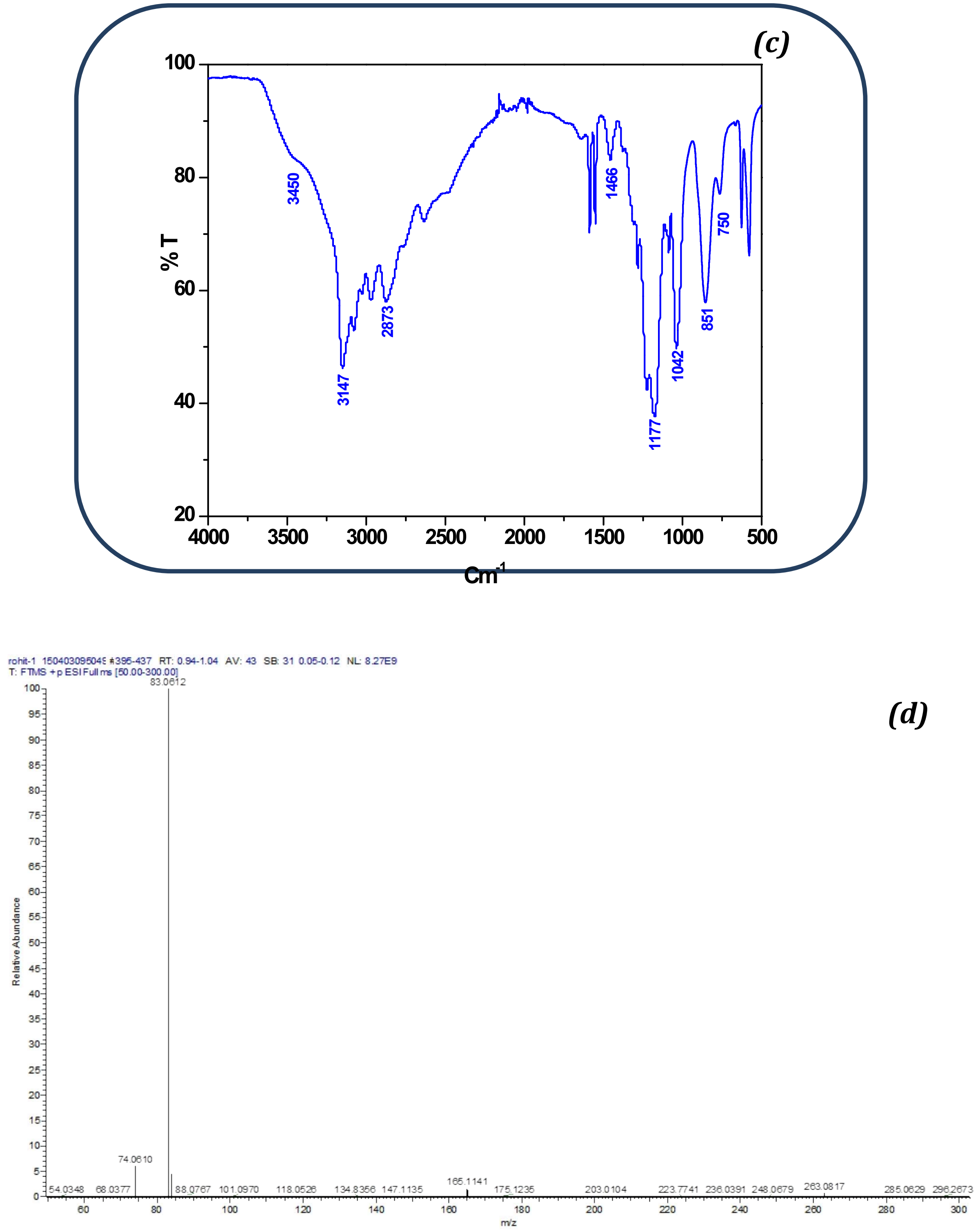
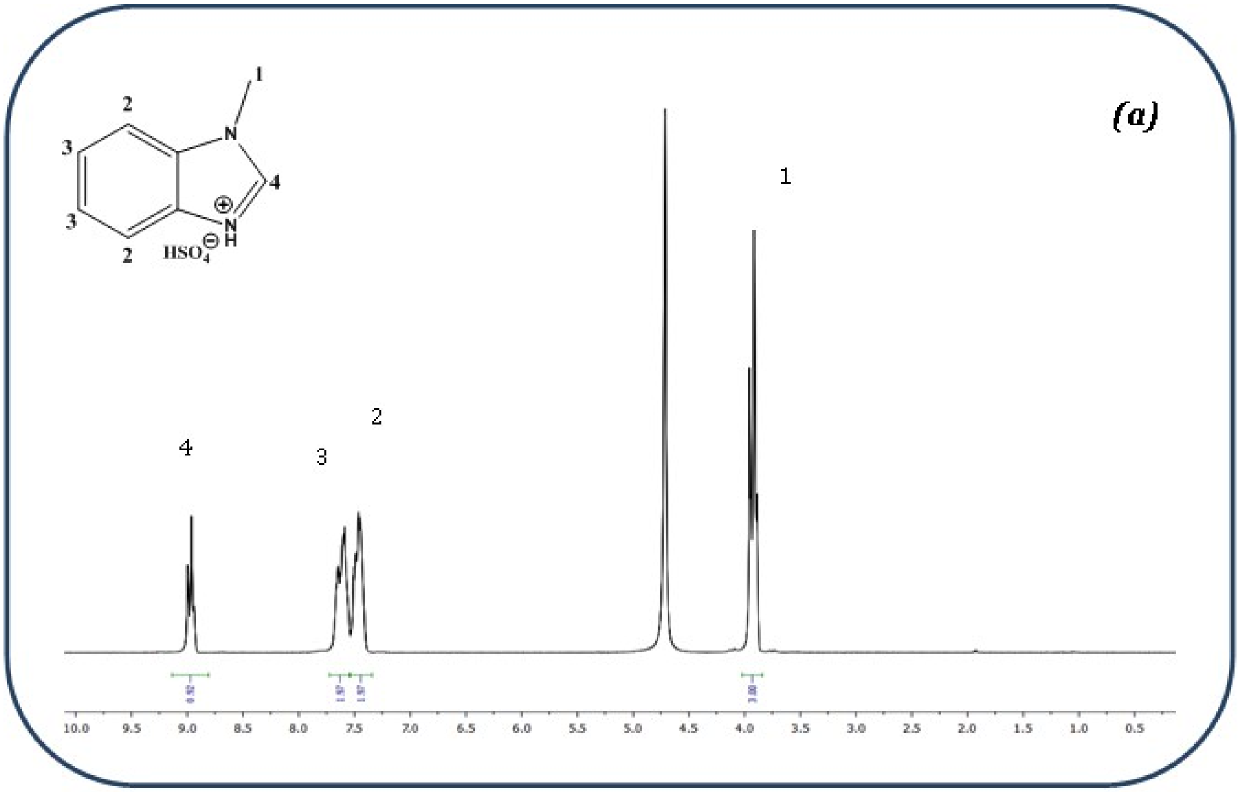
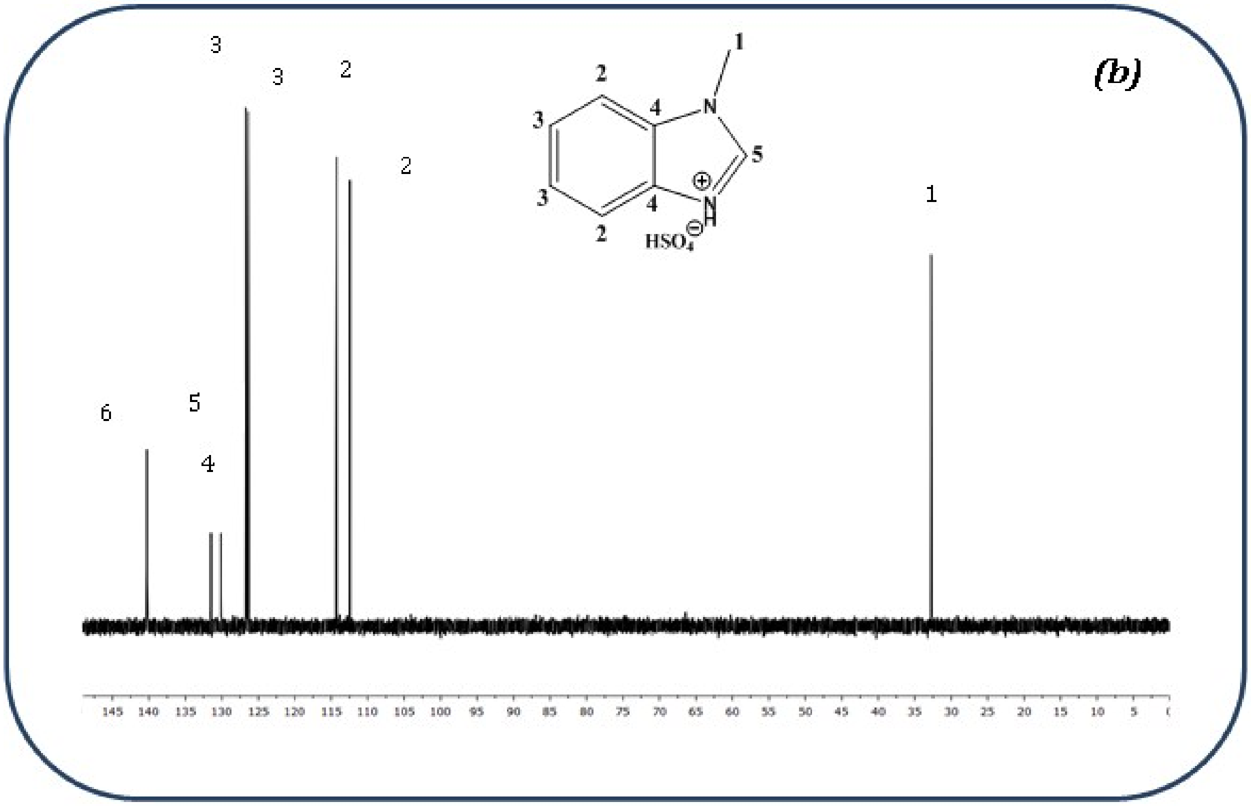
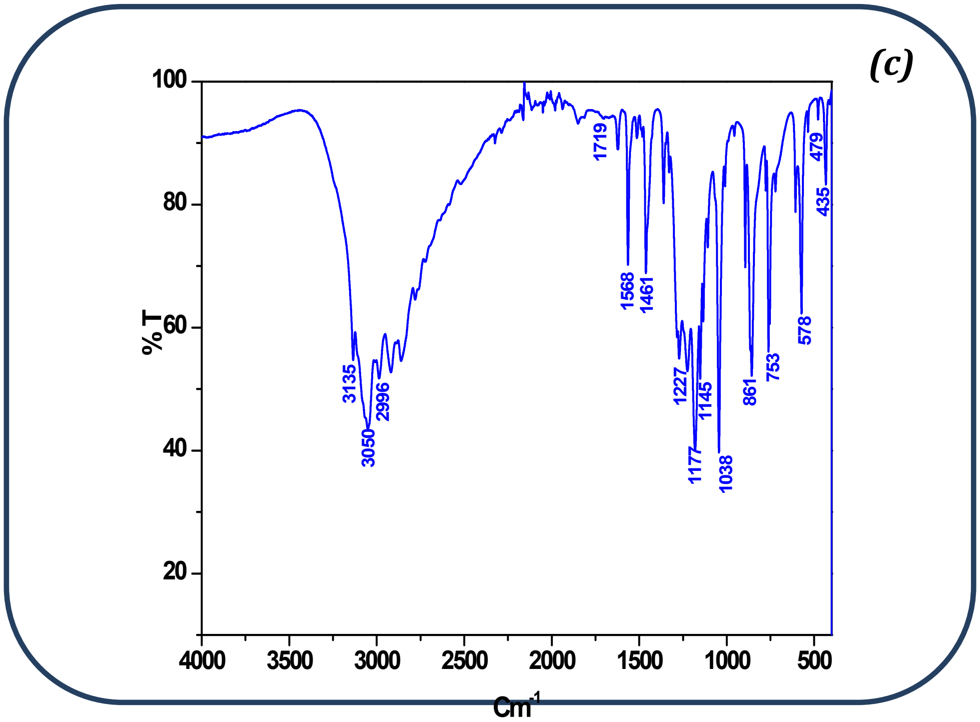


Fig.S1. (a) ^{1}H-NMR, (b) ^{13}C-NMR, (c) FT-IR and (d) Mass spectra of synthesized IL [HMIM]HSO$_4$.


(a)
1
2
3
3
2
N
4
N
H
HSO$_4^-$
4
3
2
1
0.92
1.97
1.97
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5


(b)
3
3
2
2
1
2
3
3
2
4
4
N
5
N
H
HSO$_4^-$
6
5
4
145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5



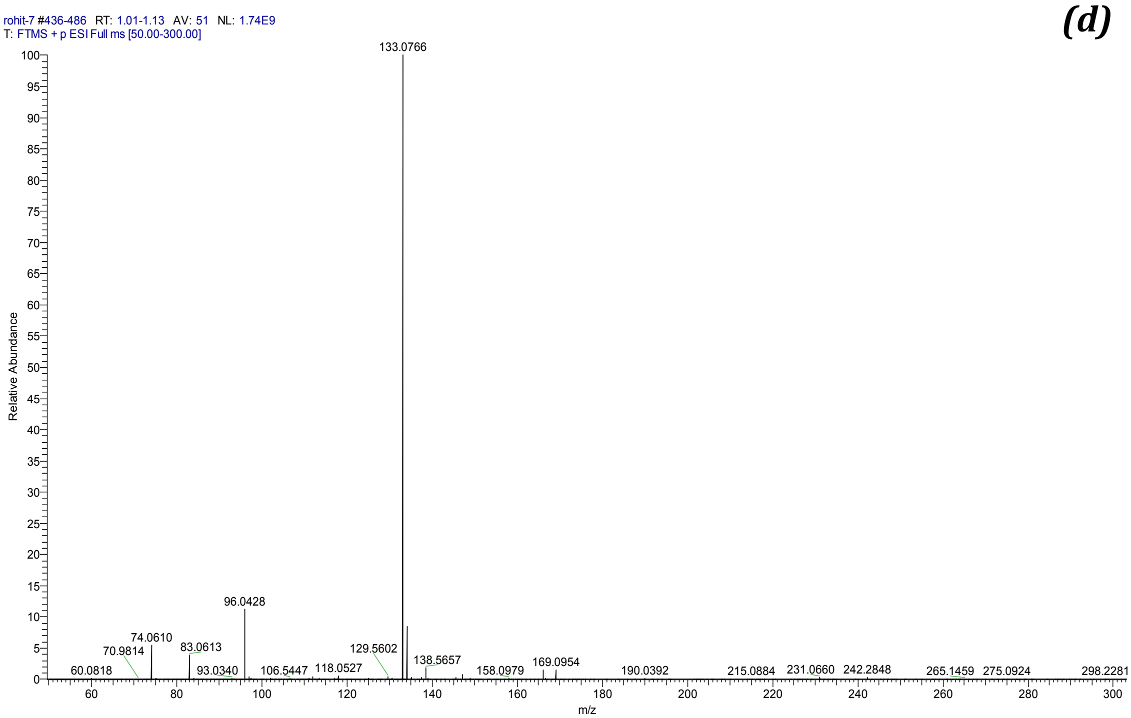


Fig. S2. (a) ^{1}H-NMR, (b) ^{13}C-NMR, (c) FT-IR and (d) Mass spectra of synthesized IL [HMBIM]HSO_4.