Electronic Supplementary Material (ESI) for RSC Advances.

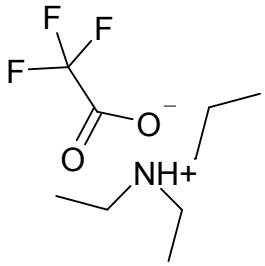

# Thermal behavior and electrochemistry of protic ionic liquids on the base of triethylamine with different acids

L. E. Shmukler, M. S. Gruzdev, N. O. Kudryakova, Yu. A. Fadeeva,
A. M. Kolker and L. P. Safonova

## *Supporting Information*

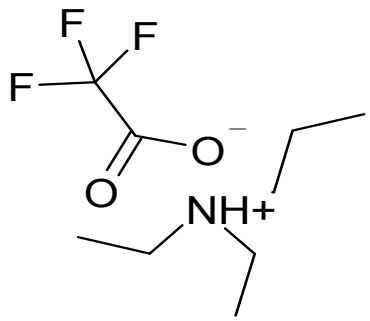
All PILs were prepared by a proton transfer reaction from a Bronsted acid and a Bronsted base without using any solvents, with 90°C as the melting temperature. An equimolar amount of acid and base will be reacted under argon conditions. The drop wise addition of acids to the amine was carried out slowly with continuous stirring with a magnetic bar, since these reactions are highly exothermic.

Triethylammonium trifluoroacetat




To a round-bottomed 100 mL flask in an ice bath equipped with a teflon coated stir bar, 7 g (0.069 mol) of triethylamine was load by syringe. Under the argon environment, the 7.9 g (0.069 mol) of trifluoroacetic acid was slowly added into the reactor through an addition funnel. After addition, the ice bath was removed. The reaction mixture was stirred at 90 $^{o}$C for 8 h, and then the yellow liquid was removed. The resulting product was dried in vacuo to yield as yellow liquid.

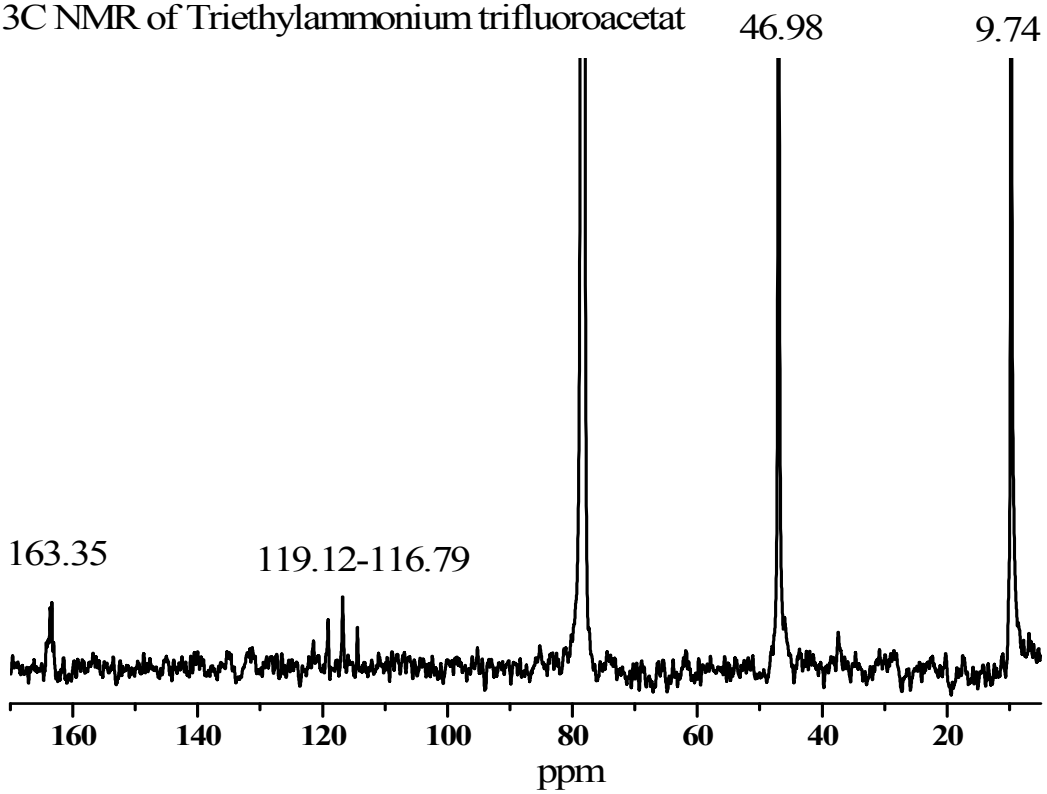
1H NMR of Triethylammonium trifluoroacetat



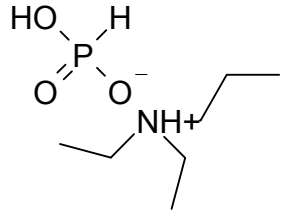




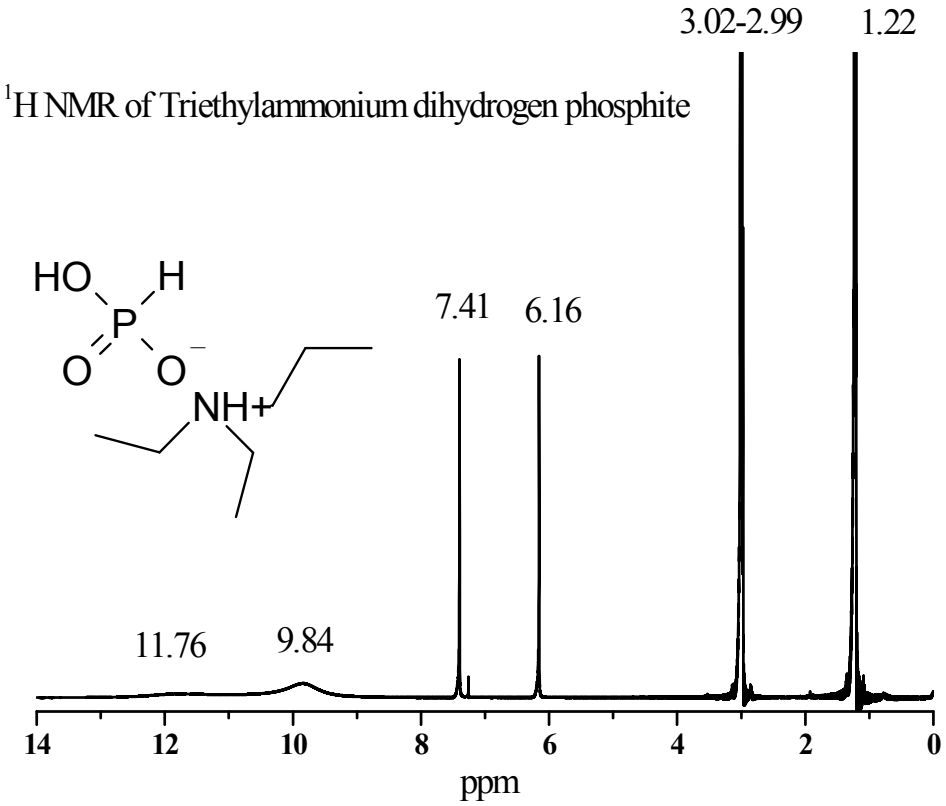
13C NMR of Triethylammonium trifluoroacetat



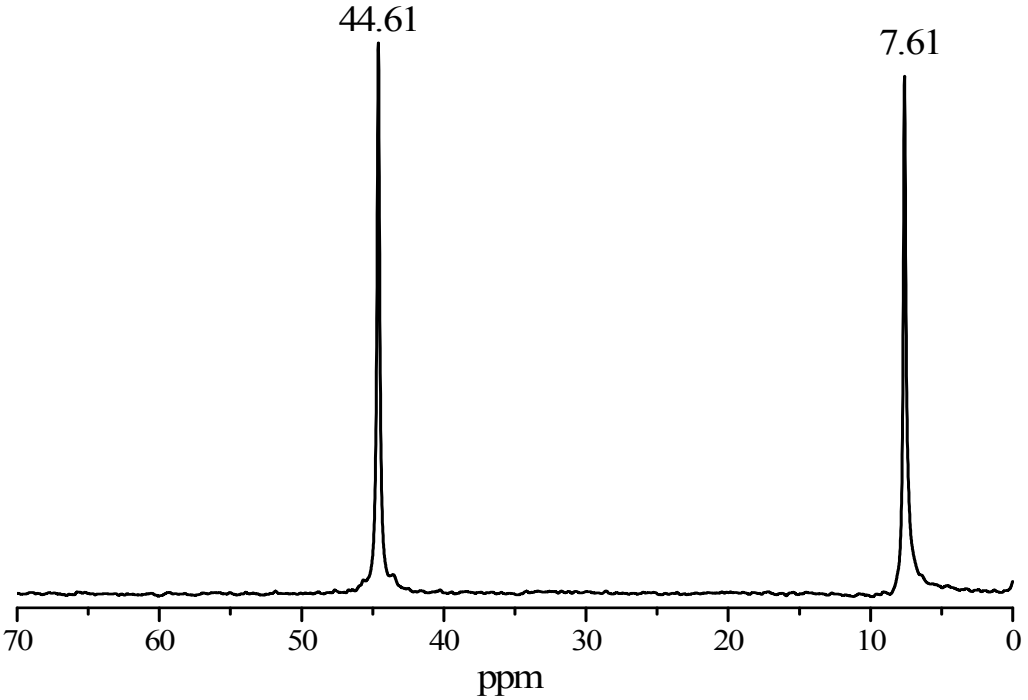
Triethylammonium dihydrogen phosphite



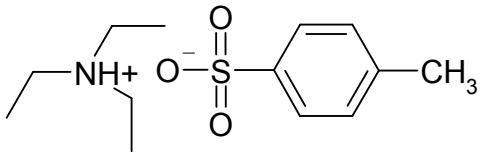

In a 100 mL round-bottom flask equipped with a teflon coated stir bar, $H_2PO_3$ 6.25 g, (0.076 mol) was load and triethylamine 7.71 g (0.076 mol) was added by syringe. The reaction mixture was stired under argon and then allowed to react at 90 °C for 8 h. The resulting product was dried in vacuo overnight to yield as white solid.



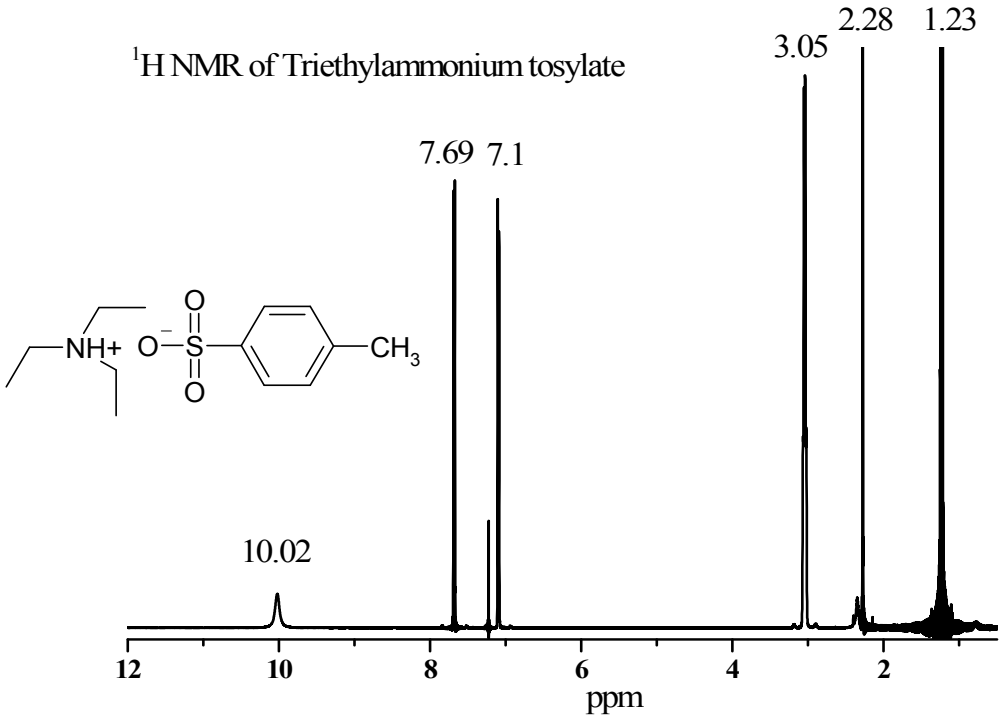
$^{13}$C NMR of Triethylammonium dihydrogen phosphite

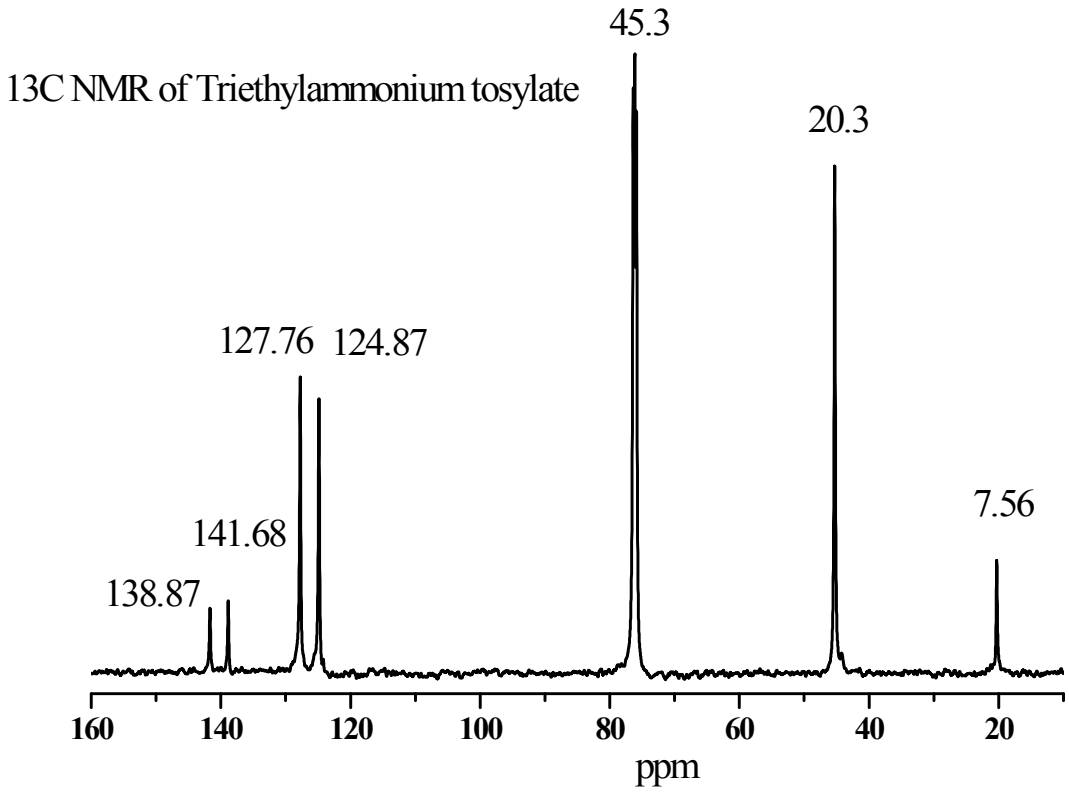



Triethylammonium tosylate

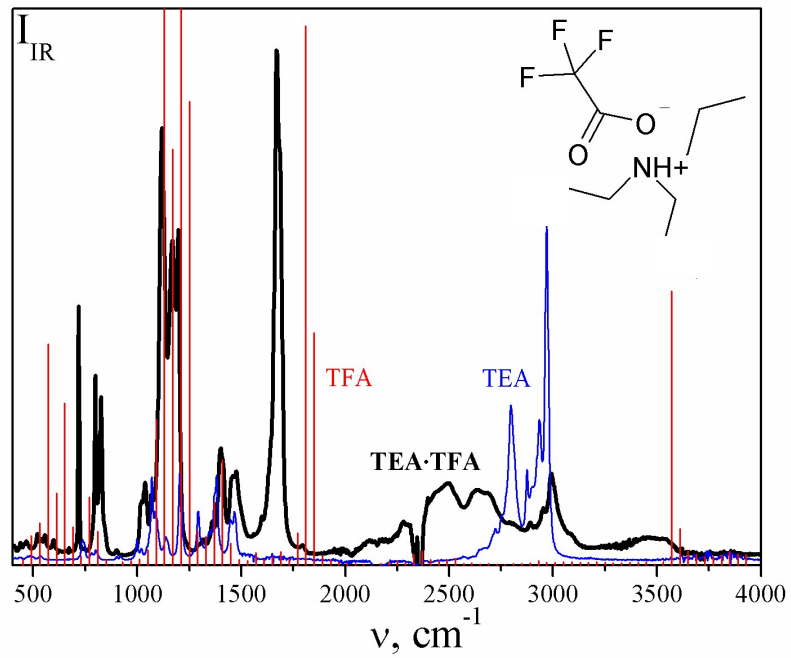


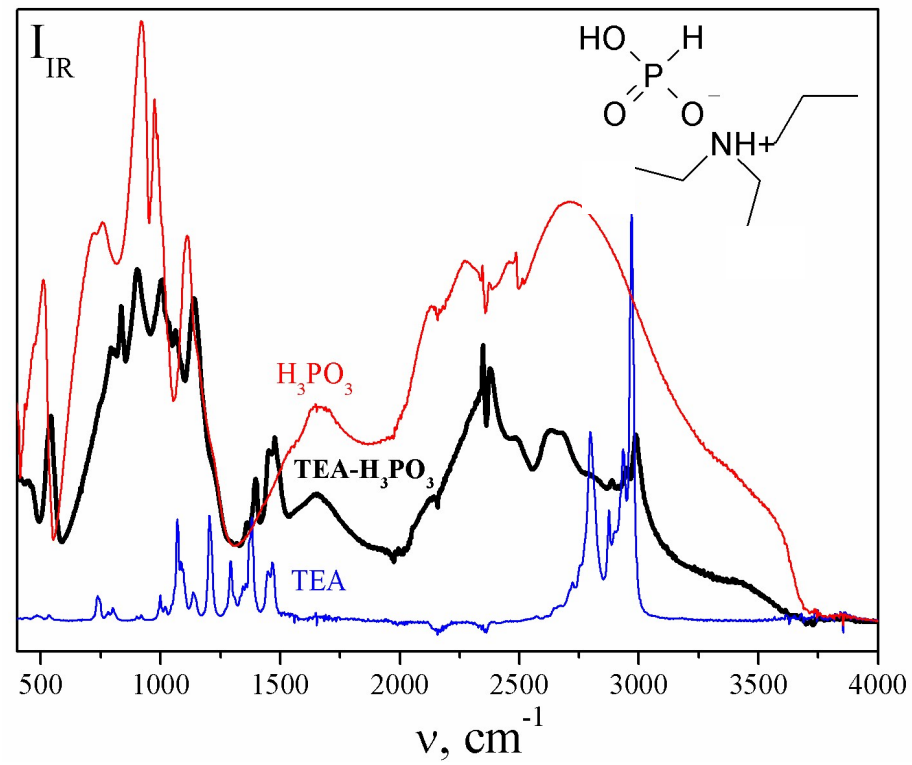

Compound was obtained from triethylamine 7 g (0.069 mol) and 13.17 g (0.069 mol) ρ-toluenesulfonic acid monohydrate similarly to Triethylammonium phosphonate.

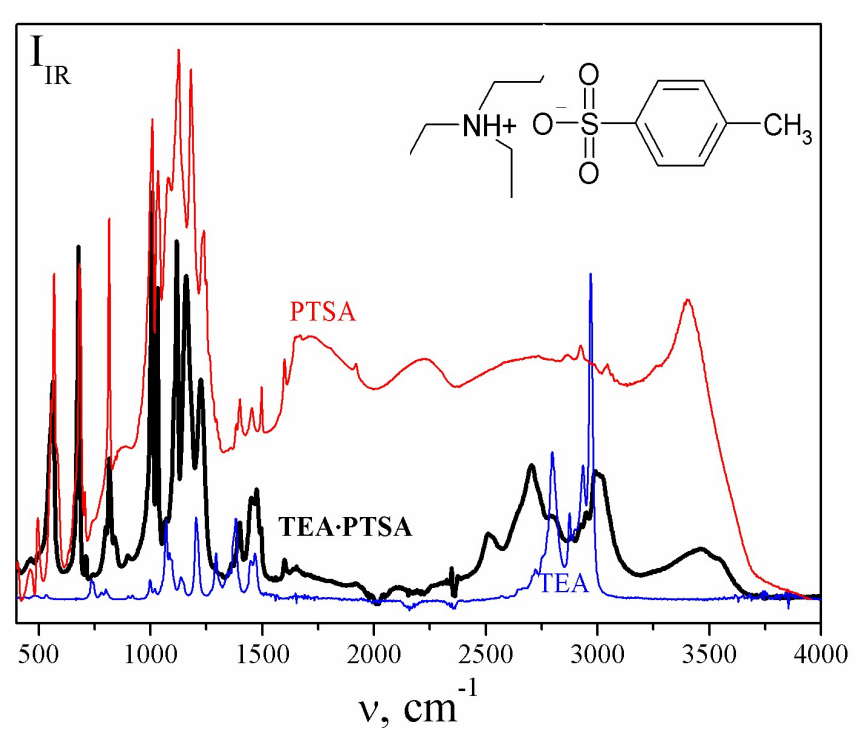

1H NMR of Triethylammonium tosylate
3.05
2.28
1.23
7.69
7.1
10.02
NH+
O
S
CH3
12
10
8
6
4
2
ppm


13C NMR of Triethylammonium tosylate
45.3
20.3
127.76
124.87
141.68
138.87
7.56
160
140
120
100
80
60
40
20
ppm

ATR spectra of PILs together with starting compounds




I IR
NH+
O
S
O
O
CH3
PTSA
TEA·PTSA
TEA
500
1000
1500
2000
2500
3000
3500
4000
ν, cm-1