1,2,3-Trimethoxypropane/Lithium and Sodium Bis(trifluoromethanesulfonyl)Imide Solvate Ionic Liquids

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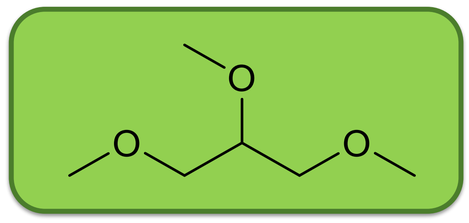
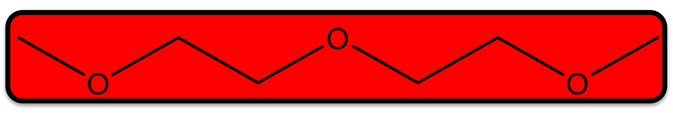
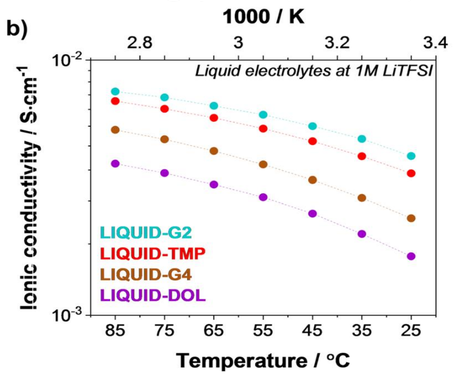
1,2,3-trimethoxypropane

- Bio-based triether
- Non-toxic
- Derived from biosources (glycerol)
- Potential alternative to diglyme for metal-ion battery electrolytes



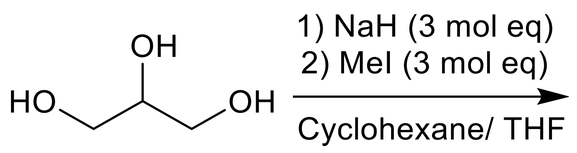


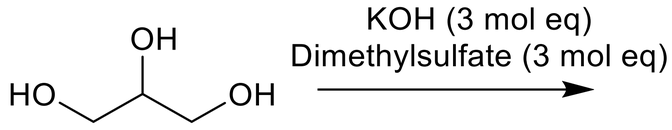
Diglyme (DGME)



Alvarez *et al*., *Green Chem*., 2022, **24**, 6016

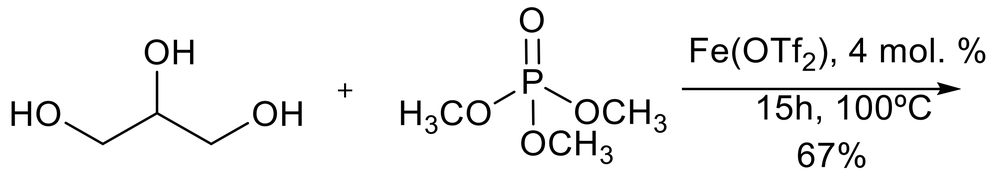
"Traditional" ether synthesis challenging with glycerol





Sutter *et al*., *ChemCatChem,* 2013, **5**, 2893B

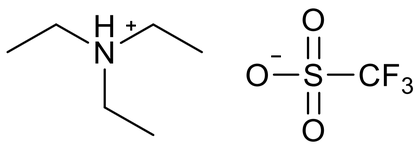
Lewis acid catalysed methylation with trimethylphosphate



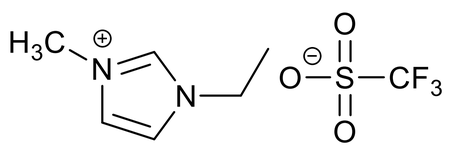
Duclos *et al*., *ChemSusChem,* 2018, **11**, 547

Introduction

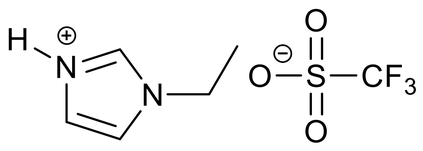
The ILs Investigated



$[HN(Et)_3][OTf]$ (triethylammonium triflate)

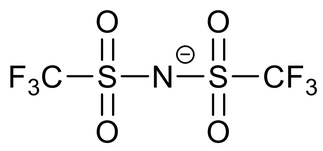


[emim][OTf] (1-ethyl-3-methylimidazolium trifluoromethanesulfonate)



[eim][OTf] (1-ethylimidazolium trifluoromethanesulfonate)

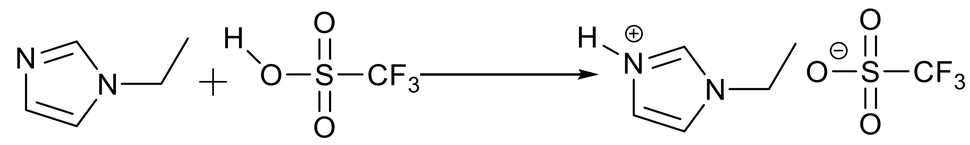
$TMP/M[NTf_2]$ (M = Li, Na, K) phase behaviour screened



*bis*trifluoromethanesulfonylimide anion

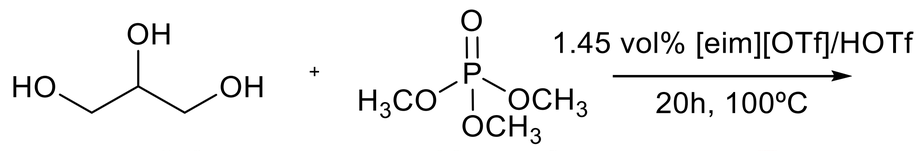
Synthesis of 1,2,3-TMP & Results

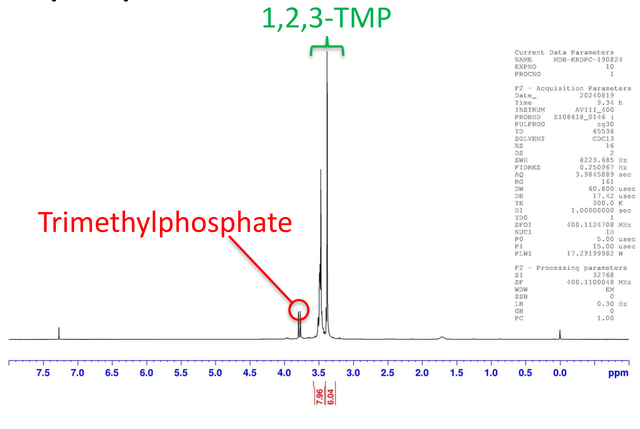
Synthesis of 1,2,3-TMP using an acidic IL catalyst (1:1, 1.5%)

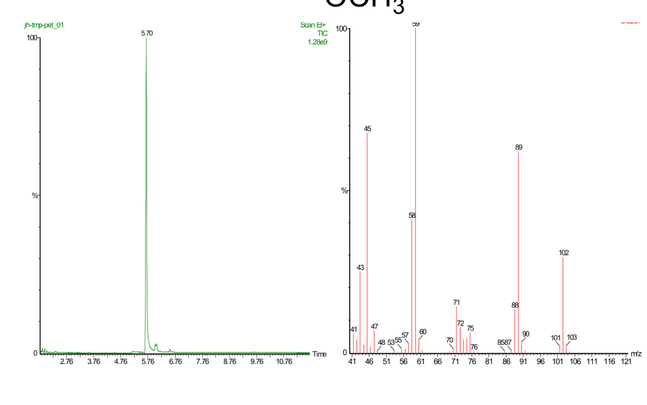


1,2,3-TMP Synthesis

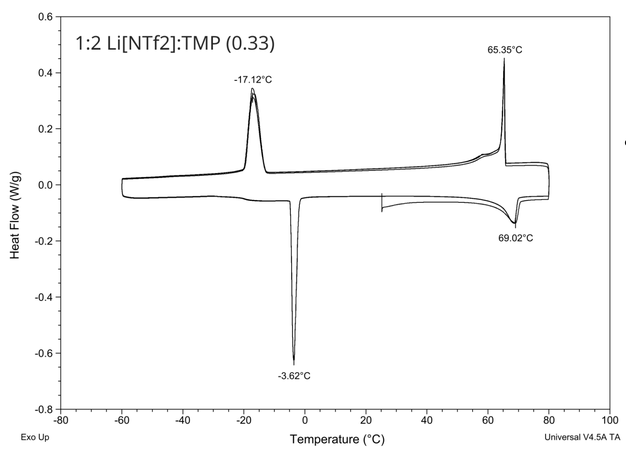
simple pet ether extraction

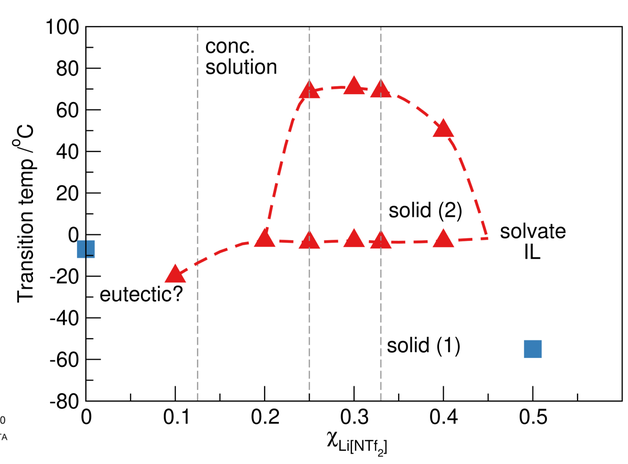




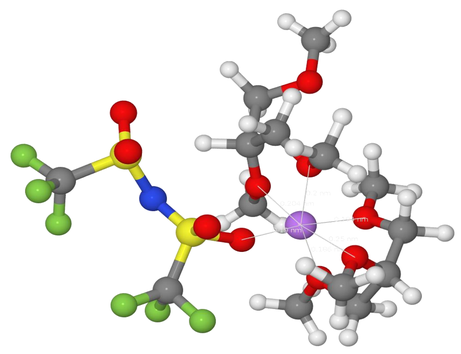


Phase behaviour of the $Li[NTf_2]$/1,2,3,-TMP





$Li[NTf_2]$/1,2,3-TMP phase diagram (from DSC)



Snapshot from model of neutron scattering data from 1:3 Li[NTf2]:TMP at 80 °C

Conclusions & future work

Future work

- Optimise catalyst (conversion-time)
- Catalyst stability wrt time
- Phase/coordination studies on $M[NTf_2]$ solvates

Acknowledgements

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