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QUEEN'S UNIVERSITY IONIC LIQUID LABORATORIES

QUILL

Manipulating cation Lewis acidity to create functional ionic liquid systems

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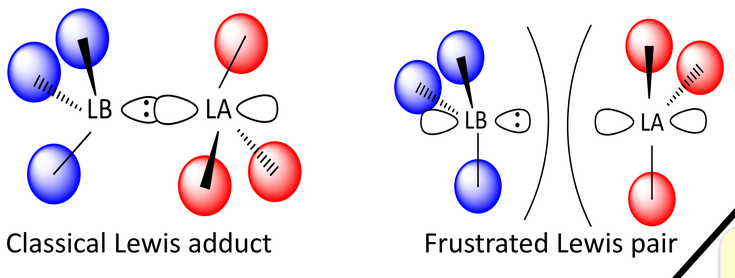
First application : IL FLP based systems

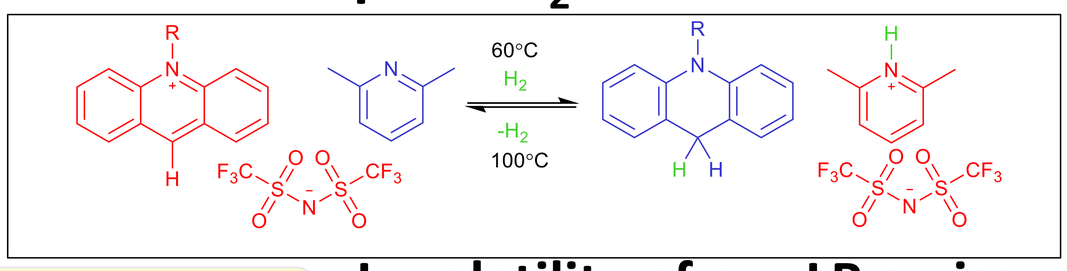


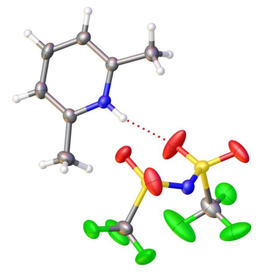
Classical Lewis adduct

Frustrated Lewis pair

Frustrated Lewis acid/base pairs (FLPs) are LA/LB that do not form classical adducts

Conceptual H_2 activation

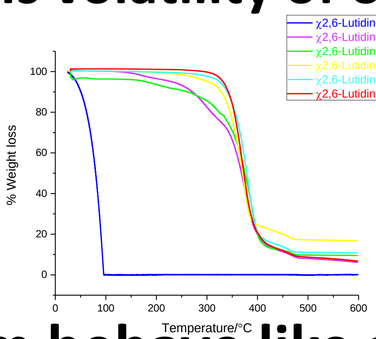


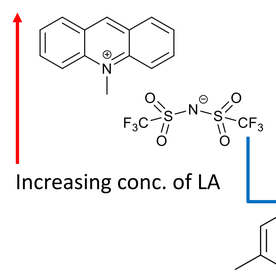


- *N*-methylacridinium salt/lutidine pairs are water/air tolerant FLPs that can activate H_2 in CH_2Cl_2 solution - activity is strongly anion dependent: $[BPh_4]^-$ best, but limited by solubility (Ingleson and co-workers, *Angew. Chem,* 2010, **49**, 46, 11309; 2014, **53**, 11306)

- **Our concept – when combined with appropriate anion, e.g. $[NTf_2]^-$ it should be possible to generate a wholly IL system before, during and after H_2 activation**
- **High intrinsic FLP concentrations are highly active for H_2 capture and/or activation**

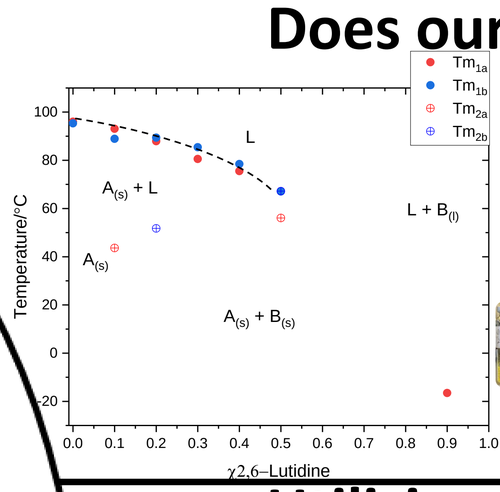
Is volatility of our LB an issue – No!

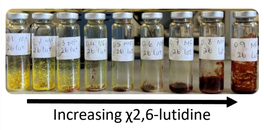


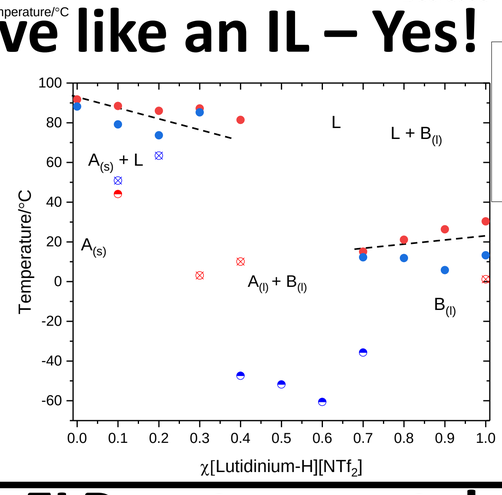


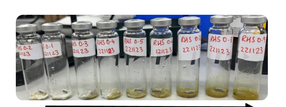
Decrease in % weight loss of 2,6-lutidine

Does our system behave like an IL – Yes!

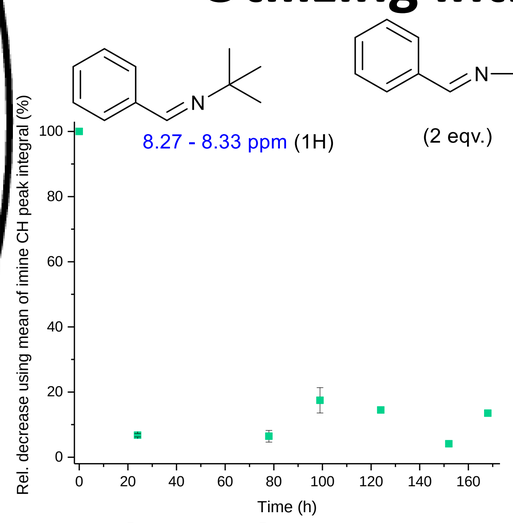


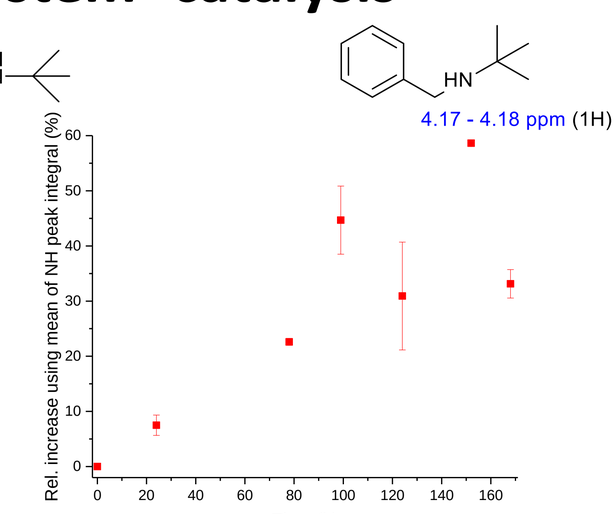






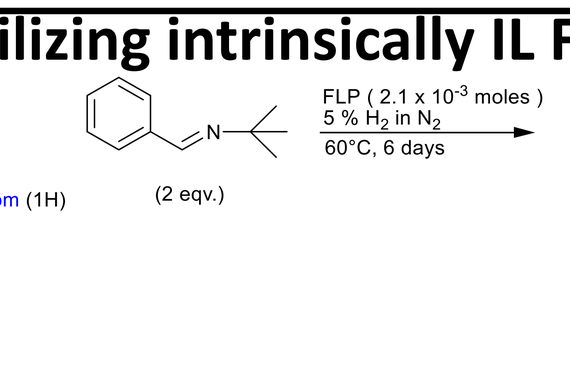
Utilizing intrinsically IL FLP system- catalysis





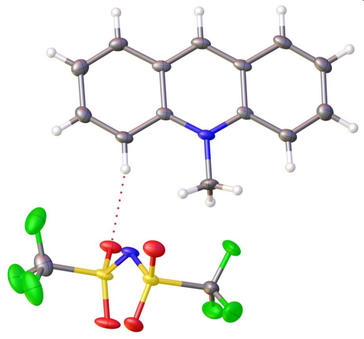
Second application: probing the other aspect of LA…

EIS Measurements

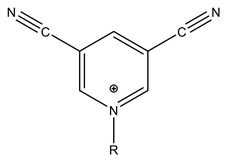


Introduction

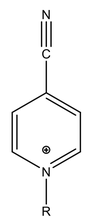
Intrinsically IL FLP system



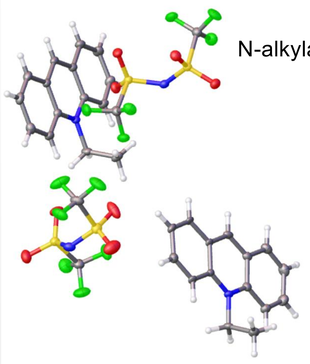
N-alkylated acridinium



N-alkylated 3,5-dicyanopyridinium



N-alkylated 4-cyanopyridinium



Results

Conclusions & future work

Conclusions

- 2,6-lutidine/ $[Me\text{-}Ac][NTf_2]$ can be transformed to an IL system
- First neat intrinsically IL FLP system that has demonstrated
- Conductivity of [4-CNPy] IL FLP system demonstrated- unexplained inversion in Conductivity

Future work

- Association behaviour (neutron scattering at ISIS, deuteration of "Poc" FLP system
- Fluorescent measurements (individual FLP components, hydrogenated and de-hydrogenated species)
- *N*-alkylated-acridinium/ *N*-alkylated-3,5-diCyPyr ILs and Me-naph CT complexes

Acknowledgements

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Scan me!

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