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IONIC LIQUID
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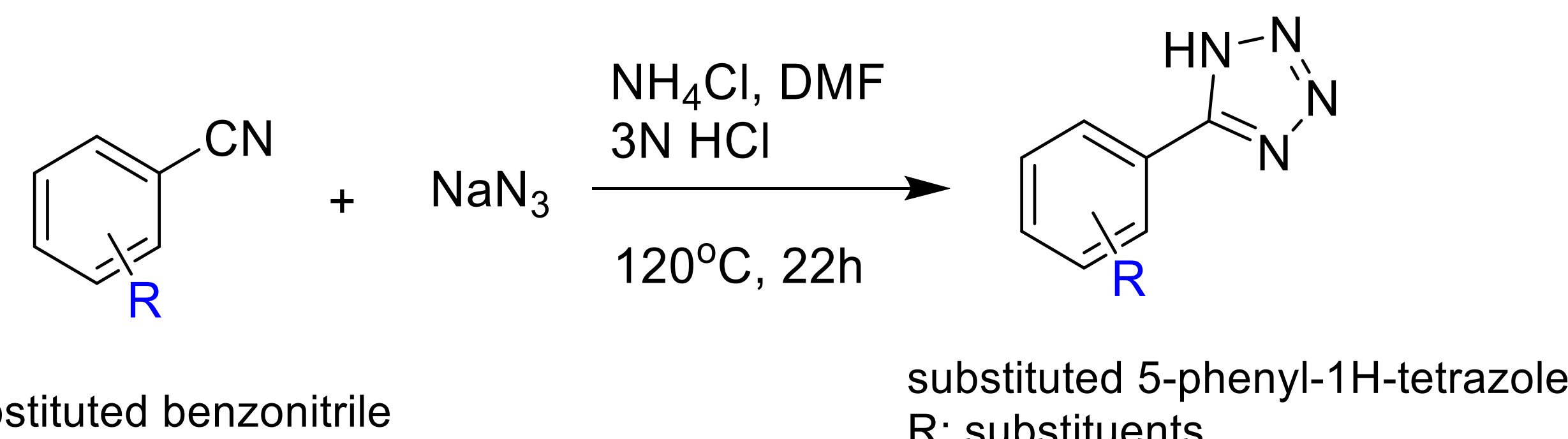
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Controlling LCST phase behaviour via structured design of ionic liquids

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Synthesis & Methodology

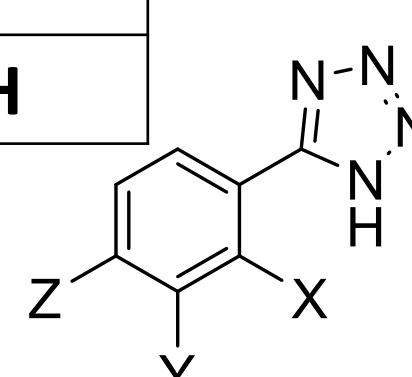
Cyclisation to tetrazoles



Anion modification

| X | Y | Z |
|---------------|----------------|------------------------|
| H | OCH_3 | H |
| H | H | OCH_3 |
| CH_3 | H | H |
| H | CH_3 | H |
| H | H | CH_3 |
| H | H | C_2H_5 |
| H | H | CF_3 |
| OH | H | H |
| H | H | OH |

| X | Y | Z |
|---------------|---|---------------|
| Br | H | H |
| H | H | Br |
| Cl | H | H |
| H | H | Cl |
| NH_2 | H | H |
| H | H | NH_2 |
| H | H | CF_3 |
| H | H | NO_2 |
| H | H | H |

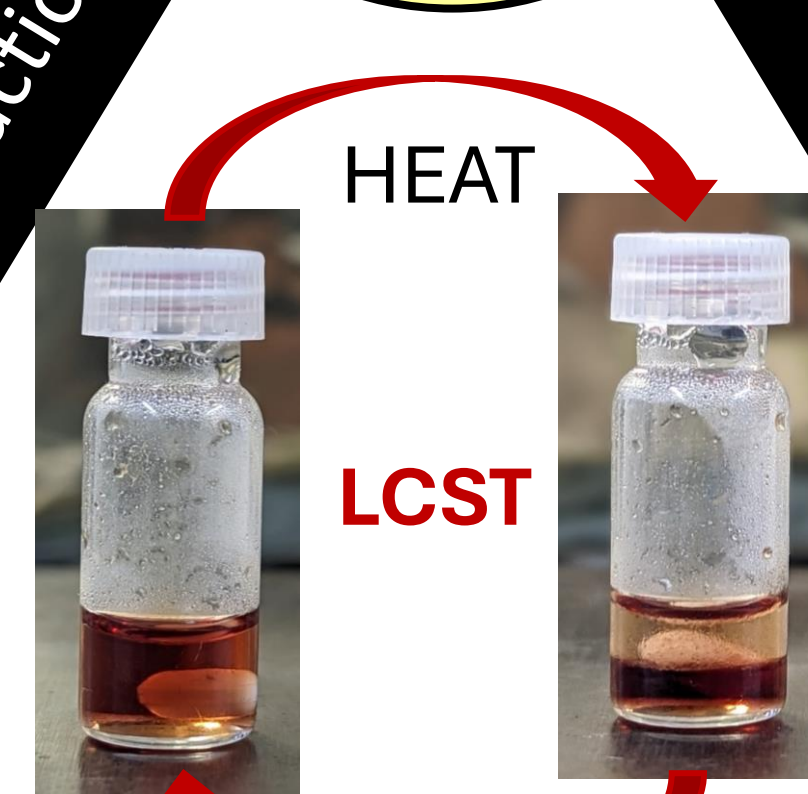


Organic Synthesis, Metal Extractions,

Deep-Eutectic Solvents

Battery Electrolytes, Conductance Materials

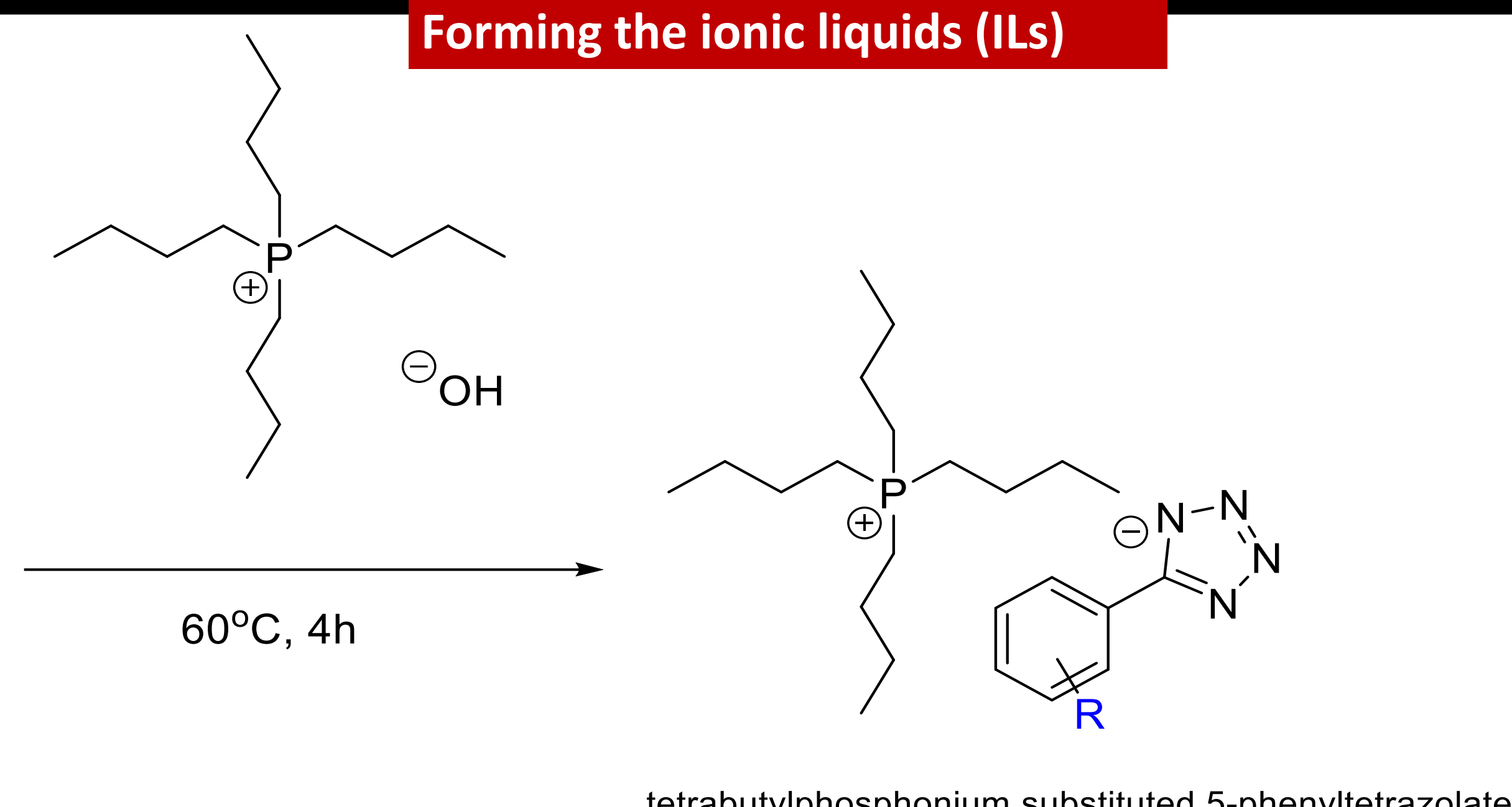
Ionic Liquids



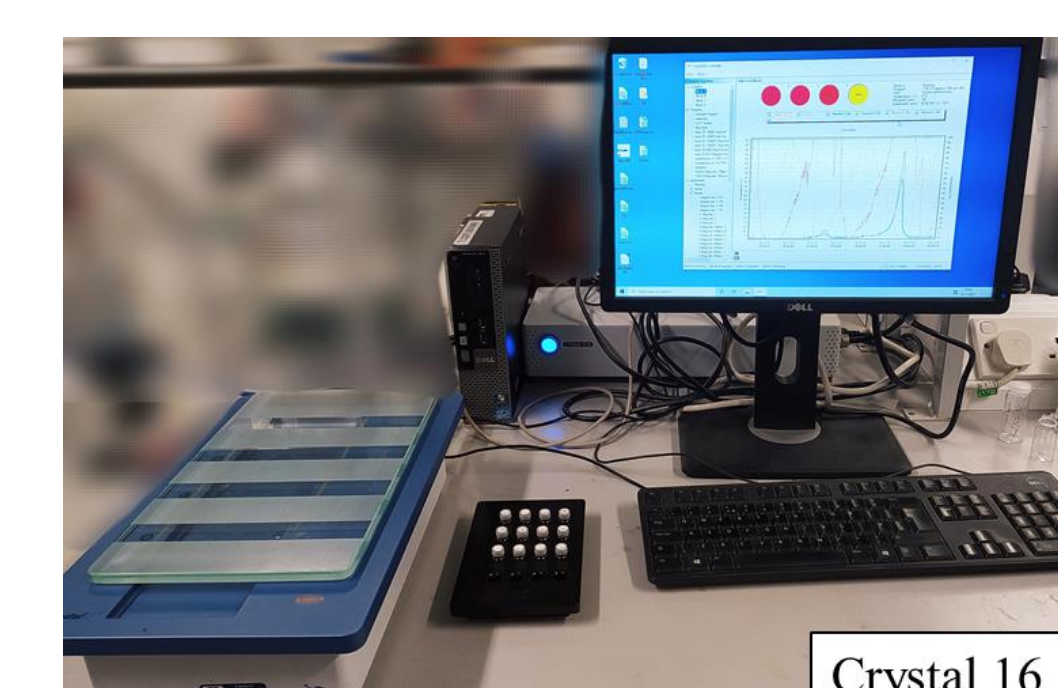
Desalination system, Sewage treatment,

Polymerised-Ionic Liquids

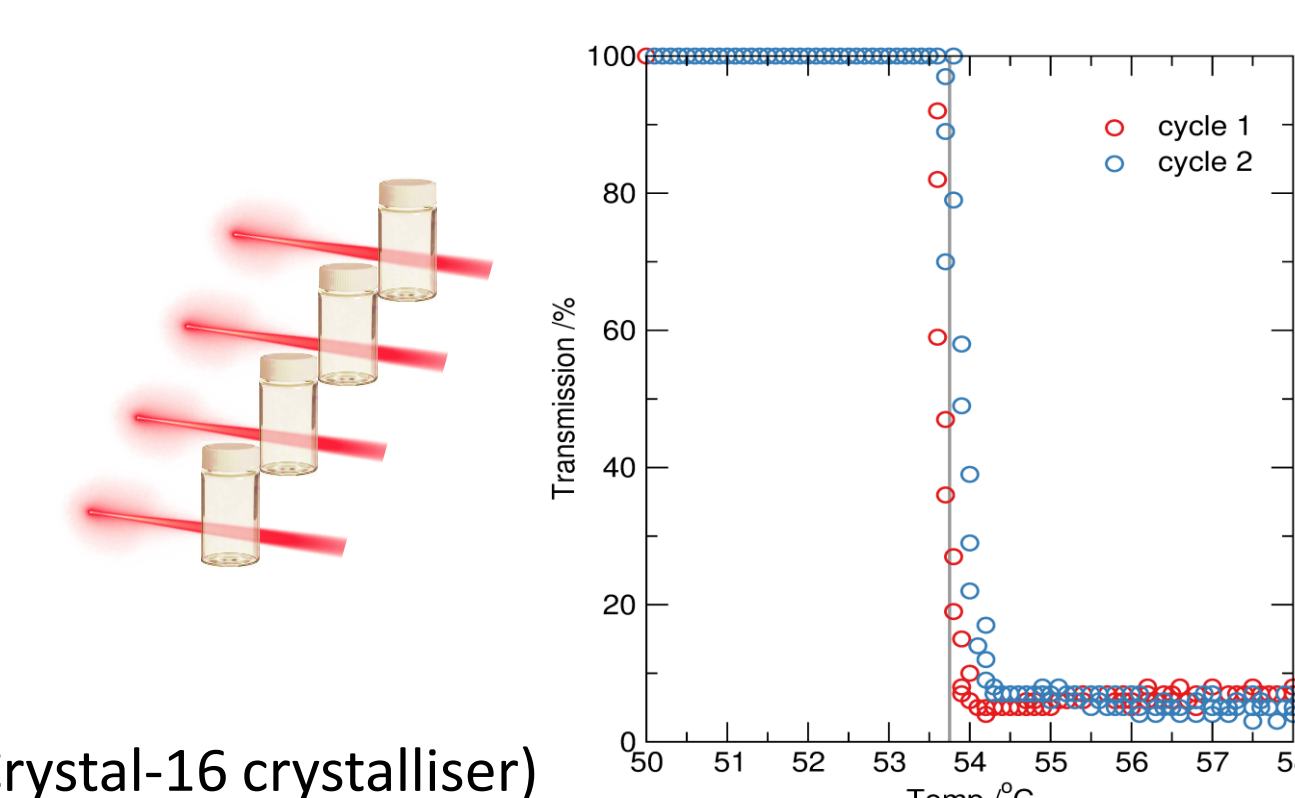
Forming the ionic liquids (ILs)



Testing the phase behaviour of IL/H₂O mixtures



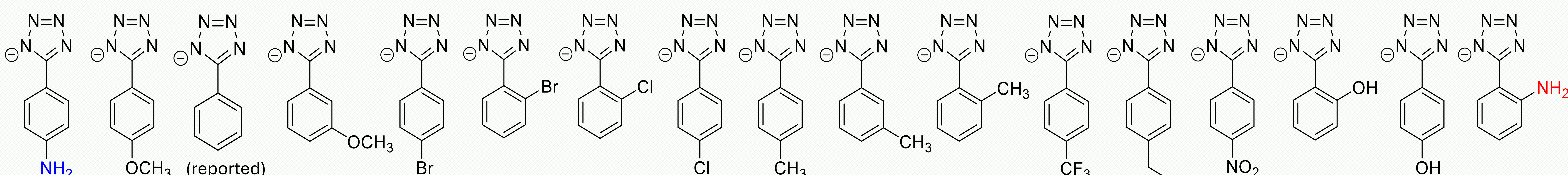
Rapid parallel screening of cloud point (Crystal-16 crystalliser) with consistency (0.5°C/min)



MISCIBLE

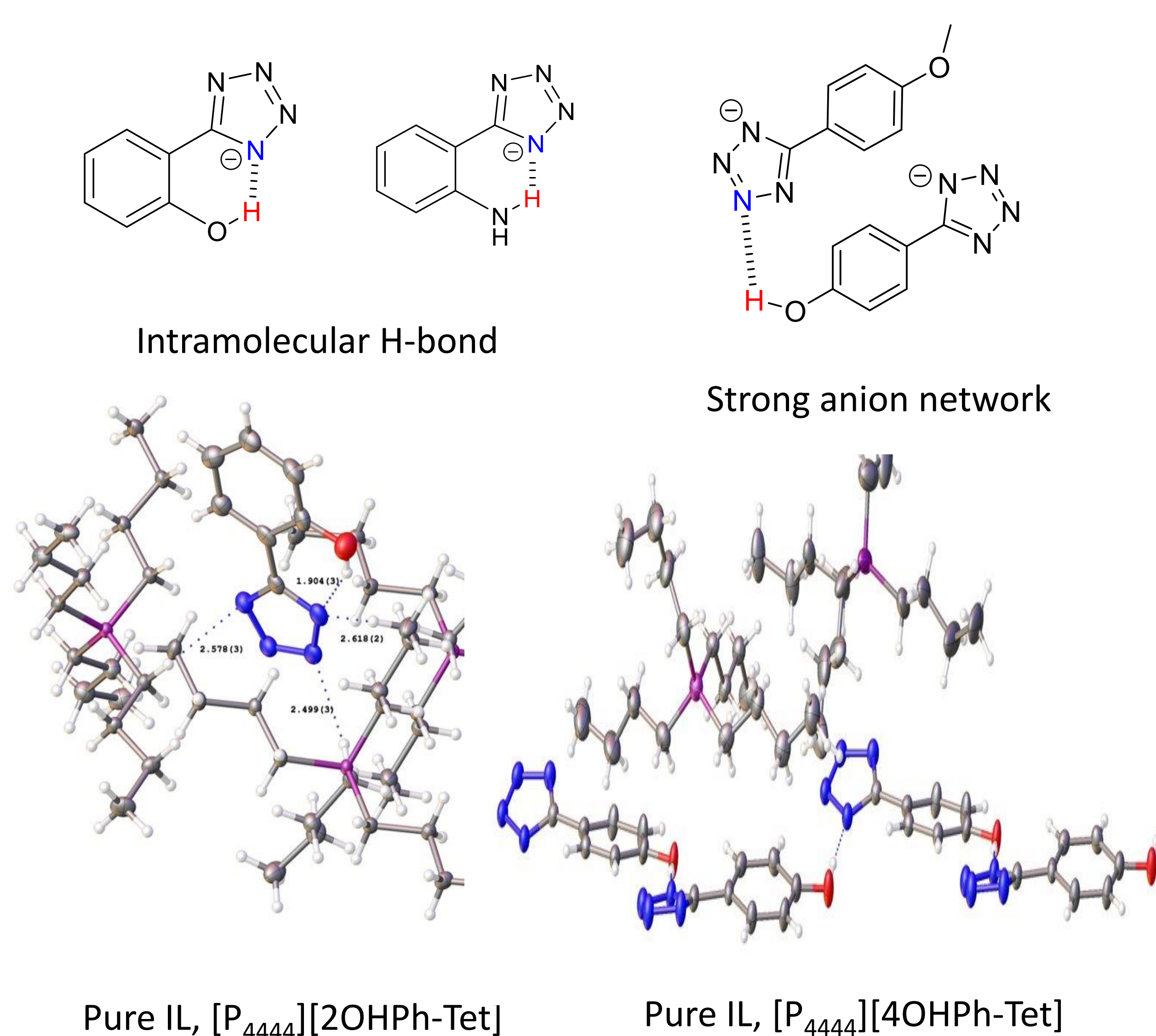
LCST

IMMISCIBLE

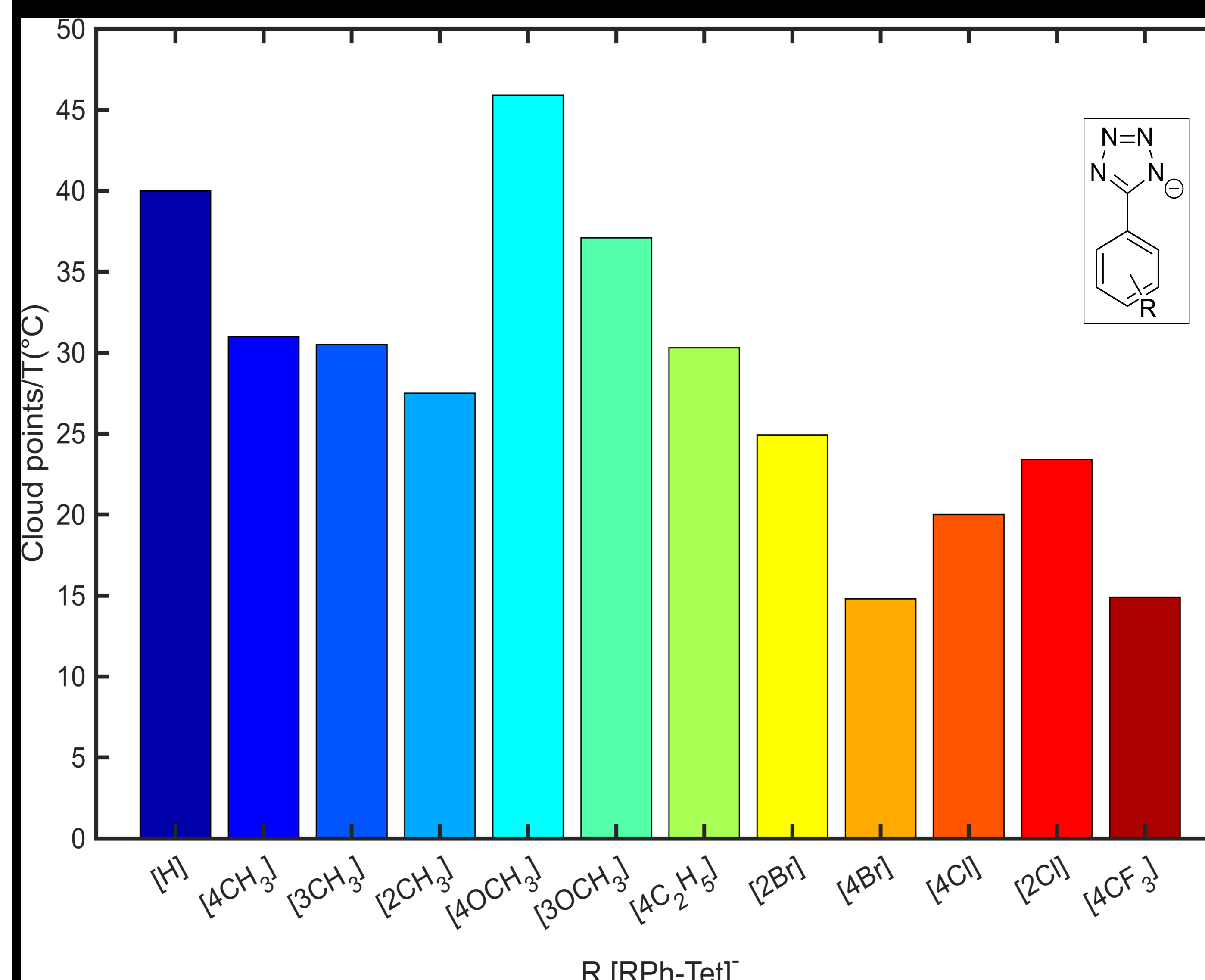


Observations & Conclusions

Non-LCST Systems

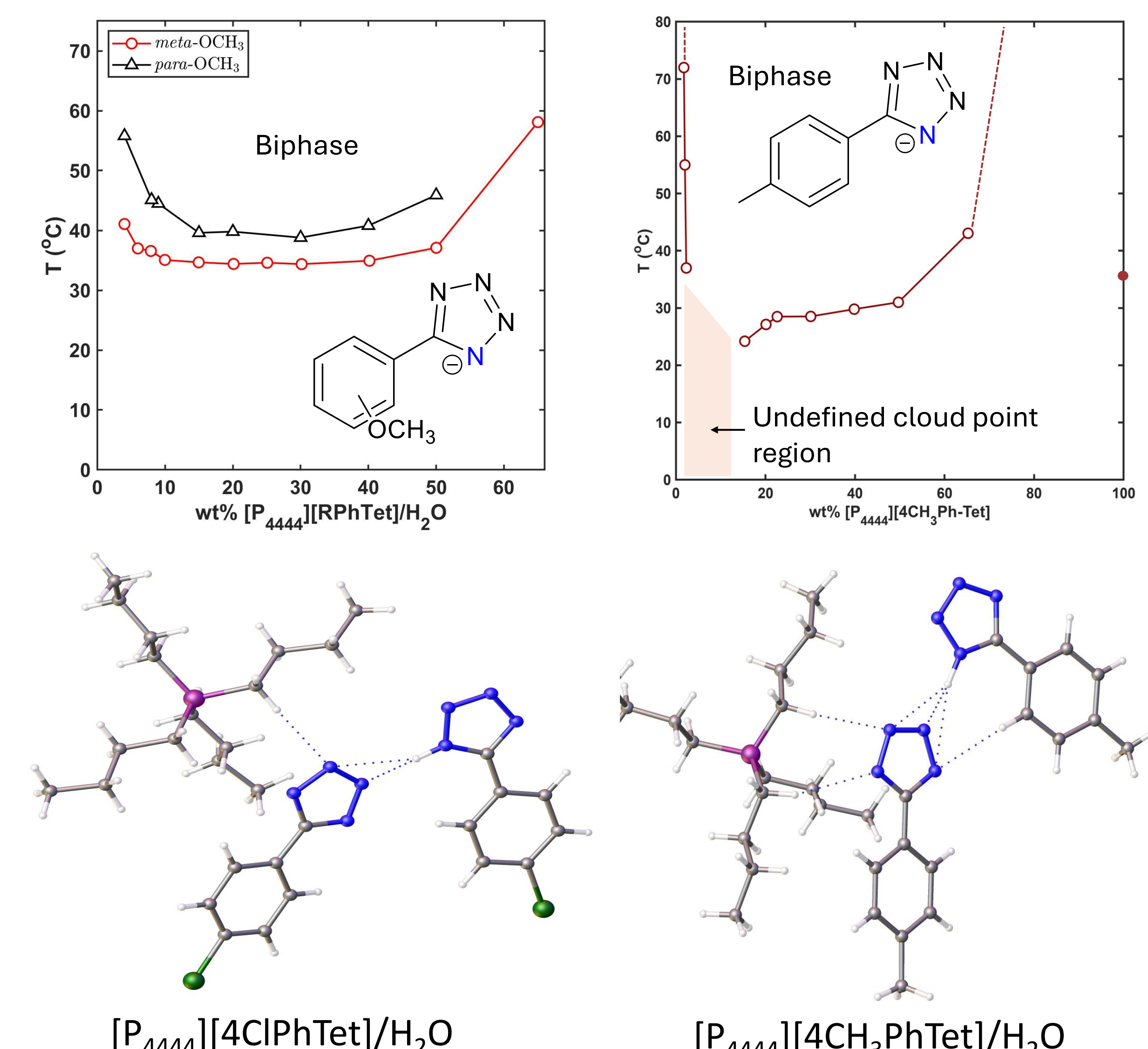


Inter-ionic interactions involving the ionic liquid's anion imparting hydrophobicity



Cloud point comparison at 50wt% $[\text{P}_{4444}][\text{RPh-Tet}]/\text{H}_2\text{O}$ mixtures

LCST Systems



Inter-ionic interactions within the ionic liquid's anion and the ion-pair : acid-base system

Future Works:

- Comparative study on cation modifications: Dicationic Ionic liquids
- Understand the liquid-structure of these IL-H₂O systems through scattering experiments
- Monitor spectral shifts to access IL-H₂O interactions w.r.t temperature, below and above T_c
- Capabilities of IL-H₂O systems as 'thermo-responsive polymer hydrogels' and their prospectives in FO processes

References:

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- Urban *et al.*, *Commun Chem*, 2019, **2**, 51.
- Cai, Y *et al.*, *Environ. Sci*, 2015, **1**(3), 341-347
- Wilson *et al.*, *Chem. Commun.*, 2017, **53**, 10934
- Yu *et al.*, *RSC Adv.*, 2014, **4**, 14055-14062

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