



Hydrophobic low melting mixtures for biogas upgrading

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The problem

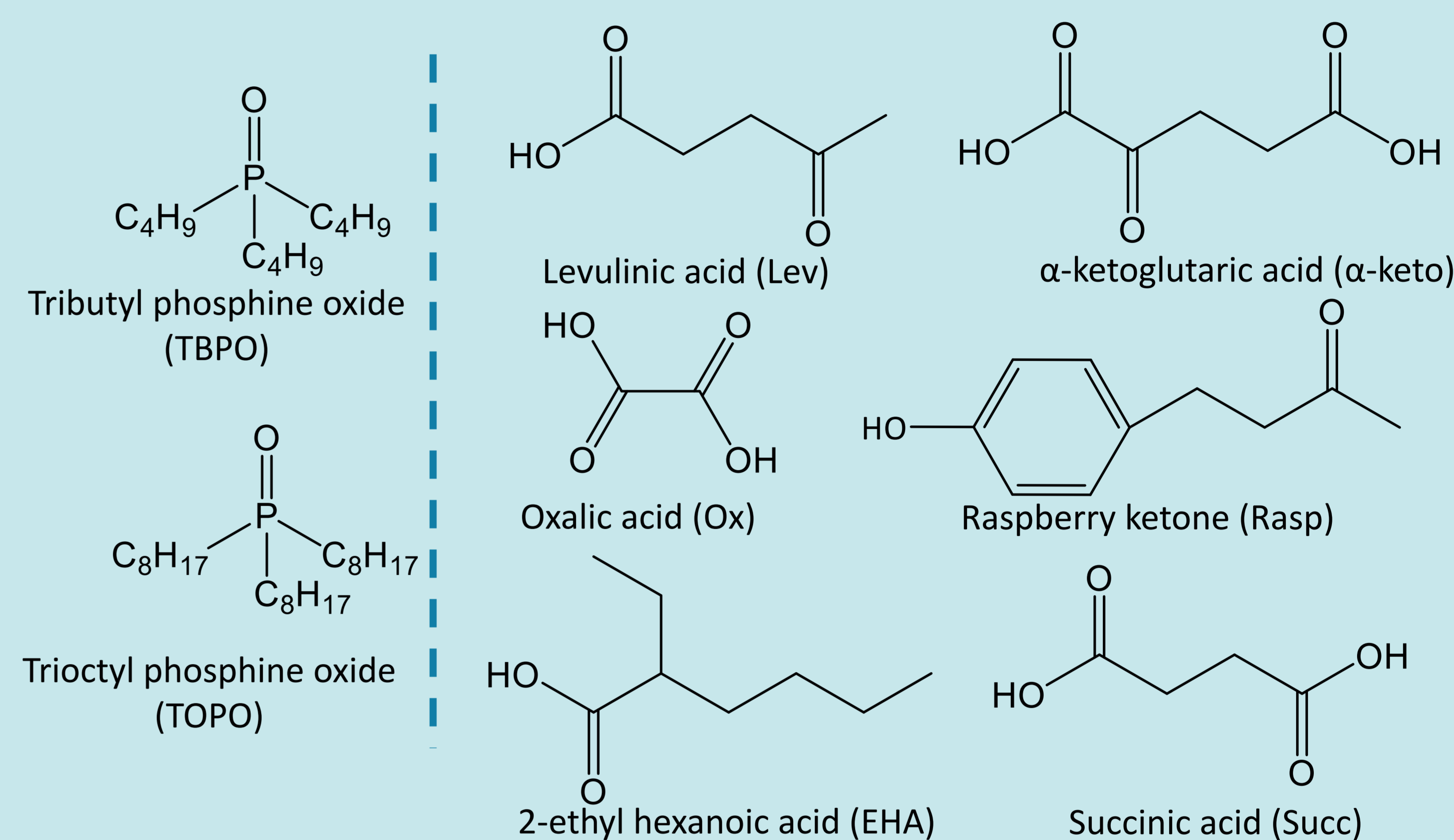
- Biogas is a natural product of anaerobic digestion of organic material
- Multi component mixture; predominantly CO_2/CH_4 with other impurities such as water, H_2S , VOCs and siloxanes
- Liquid amines are predominantly used for CO_2/CH_4 separation these have several main issues:
 - High regeneration cost of $85 \text{ kJ mol}^{-1}\text{CO}_2$
 - High volatility
 - Corrosivity
- We seek to find high capacity physisorbant materials with lower regeneration energies, low volatility and low corrosivity
- Phosphine oxide based low melting mixtures have the potential to have high CO_2 capacity, selectivity and desirable physico-chemical properties

Phys. Chem. Chem. Phys., 2020, **22**, 24744–24763.

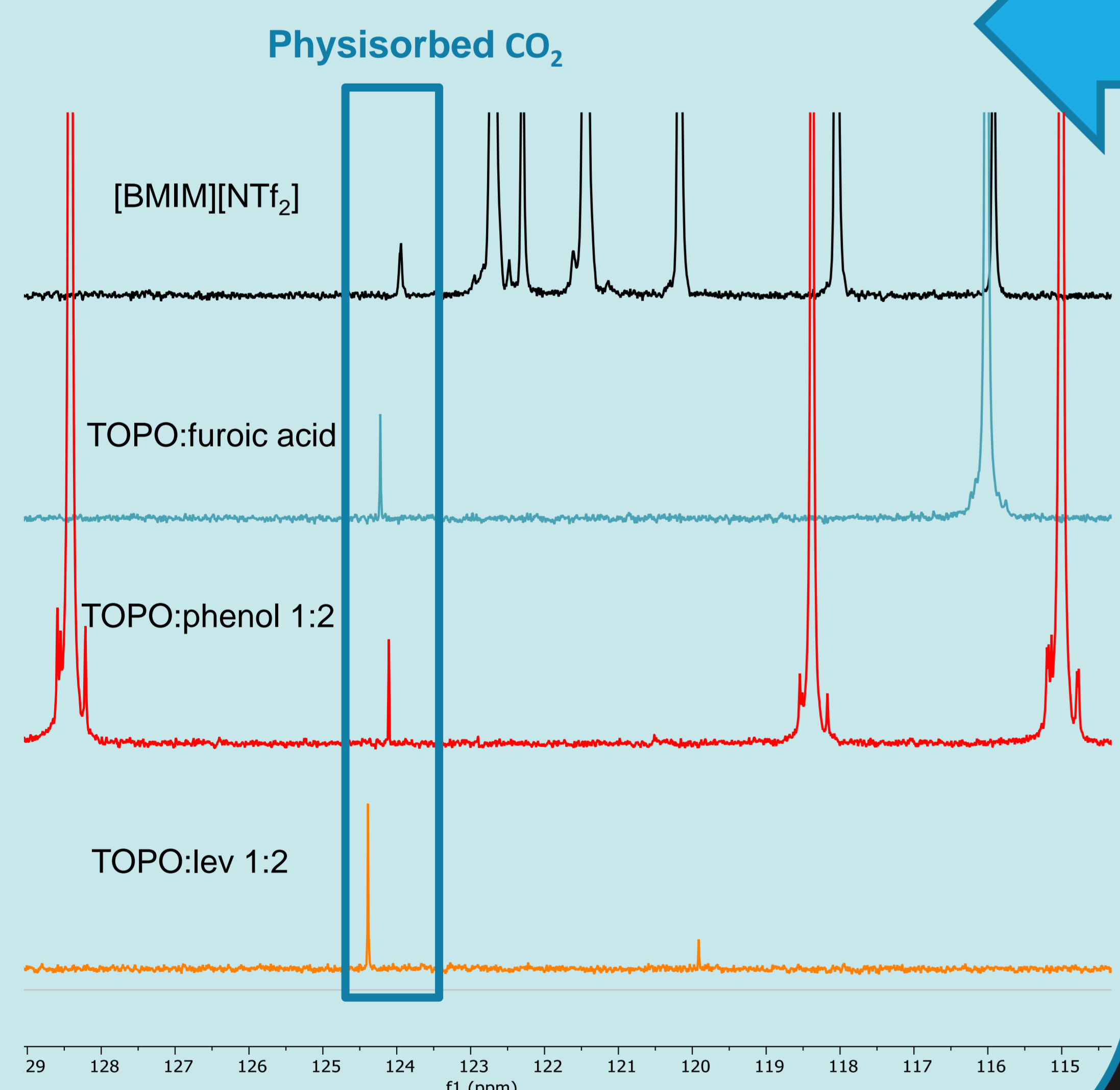
Can. J. Chem. Eng., 1995, **73**, 140–147

ACS Sustain. Chem. Eng., 2018, **6**, 17323–17332.

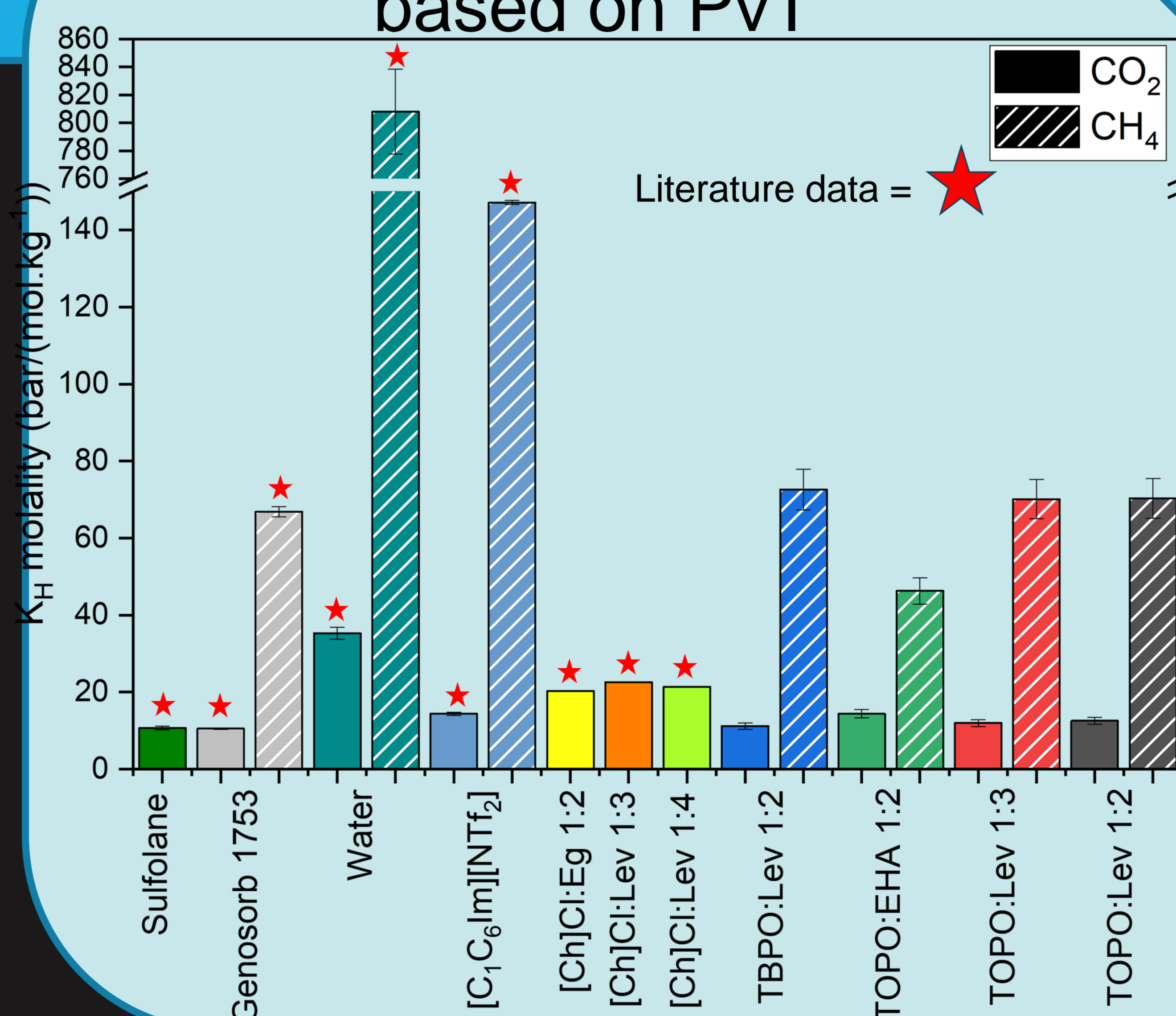
Components of LMMs



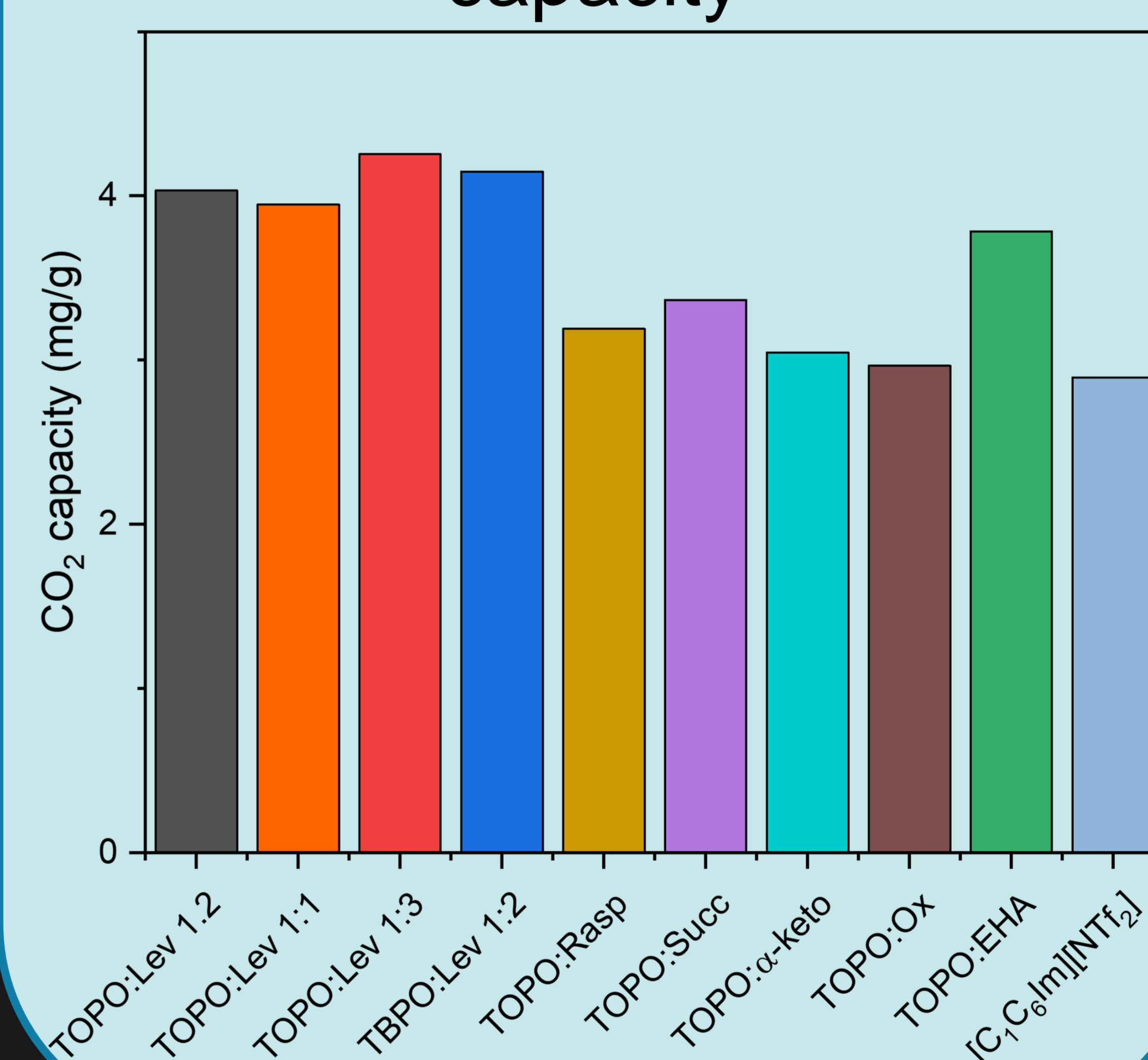
Absorption mechanism



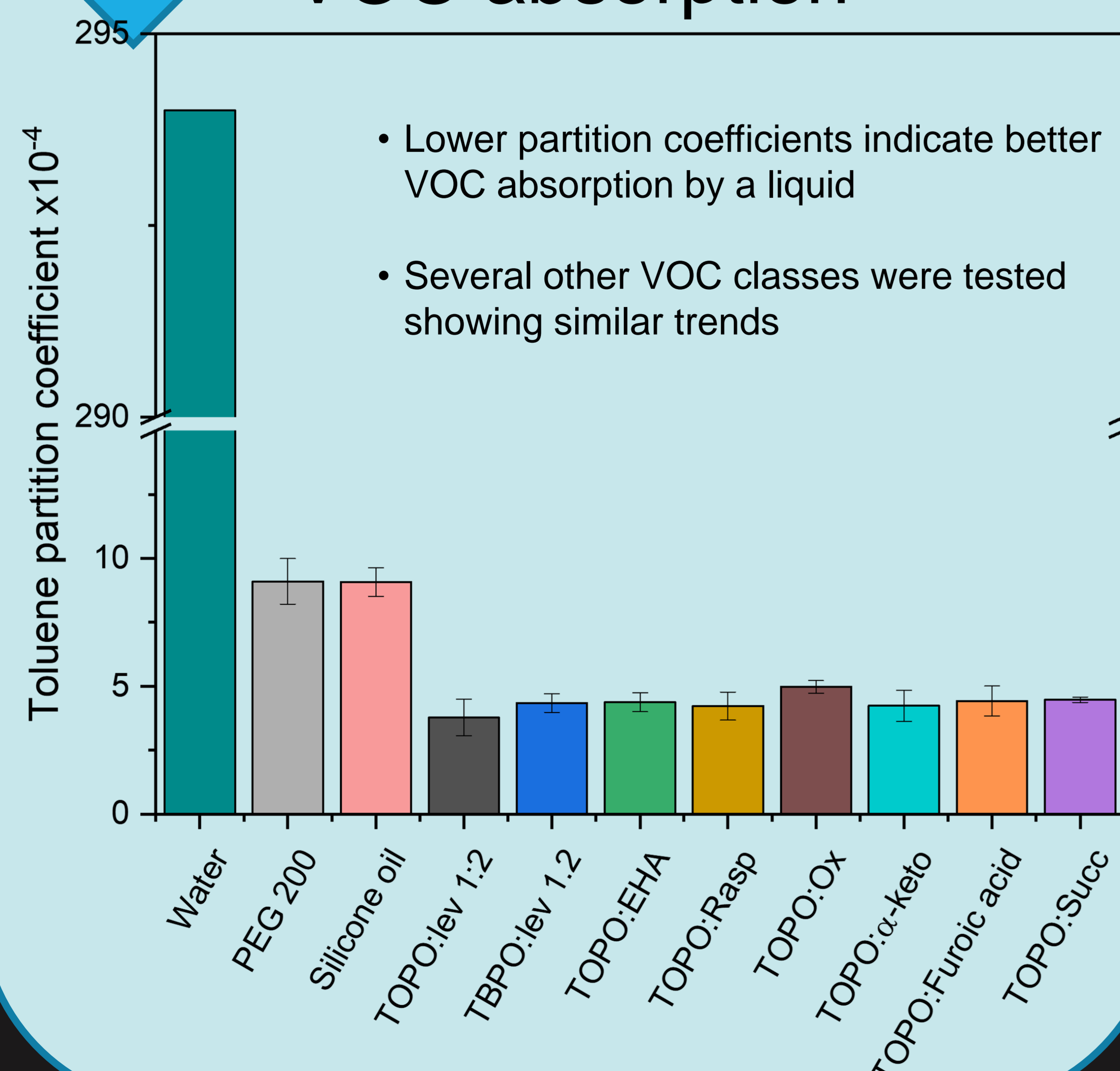
Isochoric saturation method based on PvT



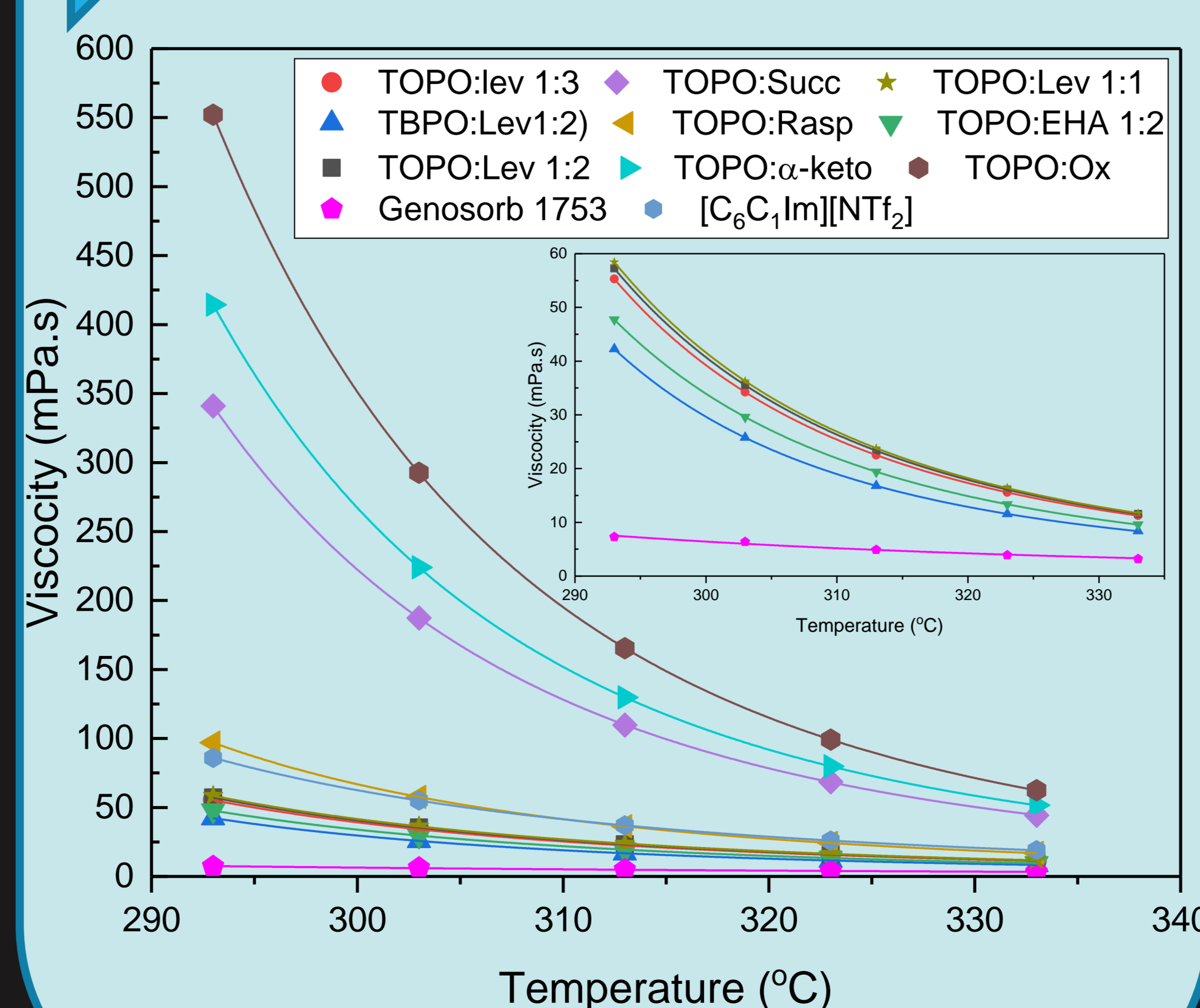
Screening CO_2 uptake capacity



VOC absorption



Viscosity



Our solution

- By first screening materials we can narrow down the overall experimental time
- TOPO based LMMs have CO_2 uptake capacities comparable to that of the best physisorbant ILs
- TOPO based materials show good potential VOC removal from gas streams
- These materials have potential to be a “one pot” biogas purification technology

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