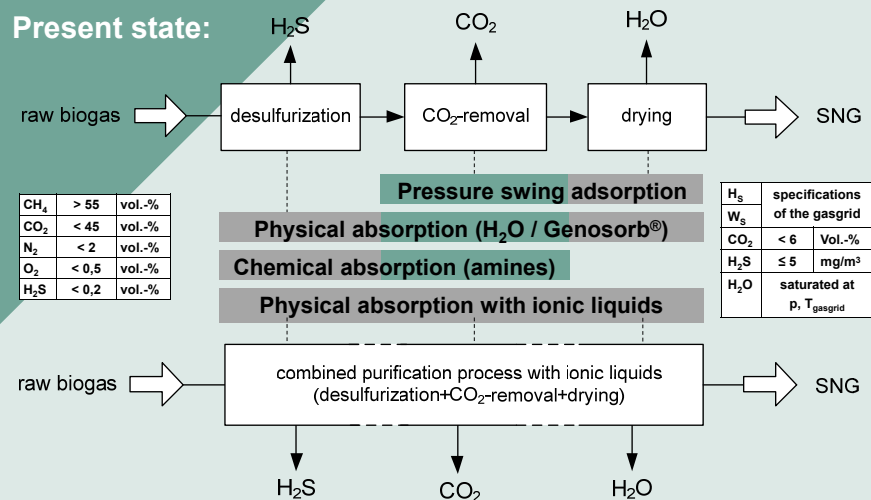


Application of Ionic Liquids in Biogas Purification

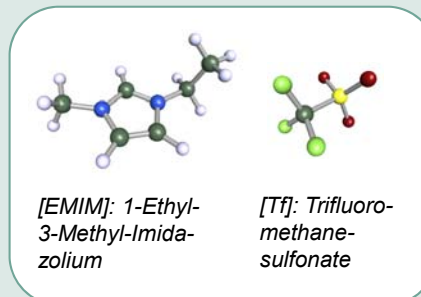
Dipl.-Ing. F. Ortloff, Prof. Dr.-Ing. T. Kolb

Challenges:



Objective: Development of an IL-based biogas purification process

Ionic Liquids (IL):



- Salts with low melting temperatures ($T_m < 100\text{ °C}$)
 - High number of cation and anion combinations
 - Adaptable to specific tasks
- “design-solvents”

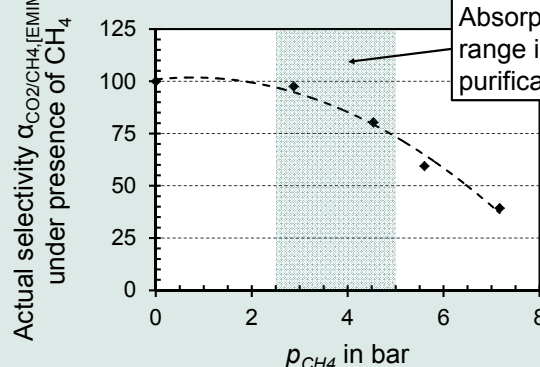
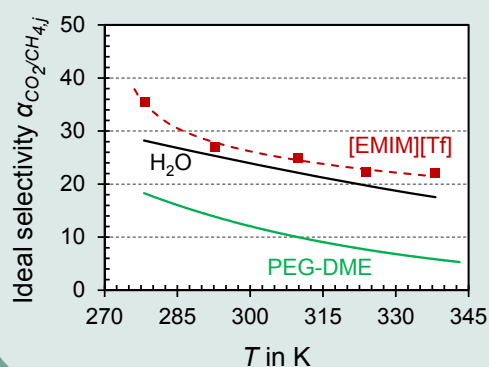
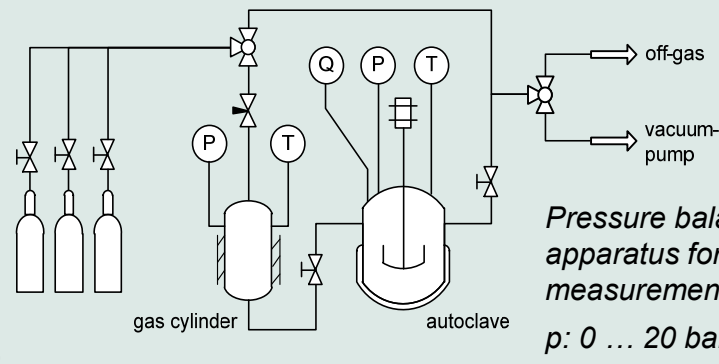
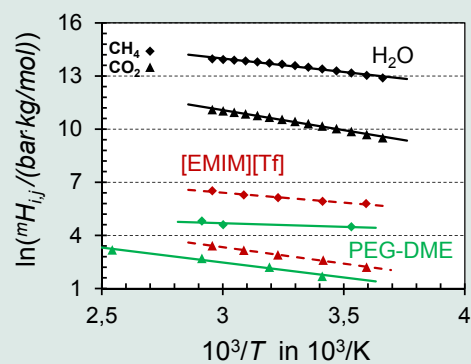
Advantages:

- Solubility for CO₂ and H₂S ↑
- Selectivity $\alpha_{\text{CO}_2/\text{CH}_4}$ ↑
- Hygroscopicity ↑
- Vapor pressure ↓

Disadvantages:

- Viscosity ↑
- Mass transfer ↓
- Price ↑

Preliminary Tests on the Solubility of CO₂ and CH₄



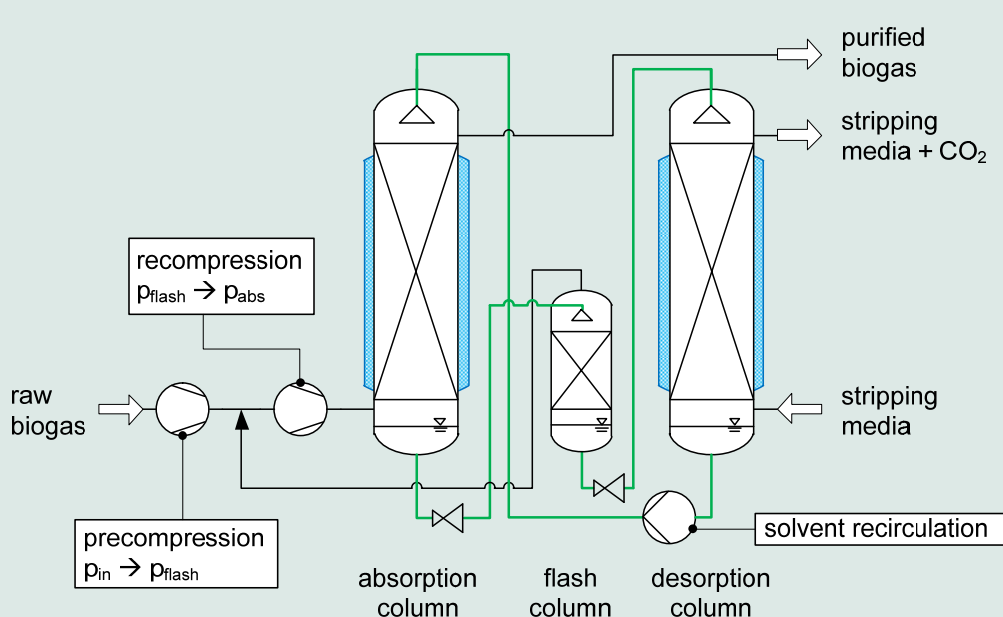
Focus:

- Solubility
- Ideal and actual selectivity $\alpha_{\text{CO}_2/\text{CH}_4,\text{IL}}$

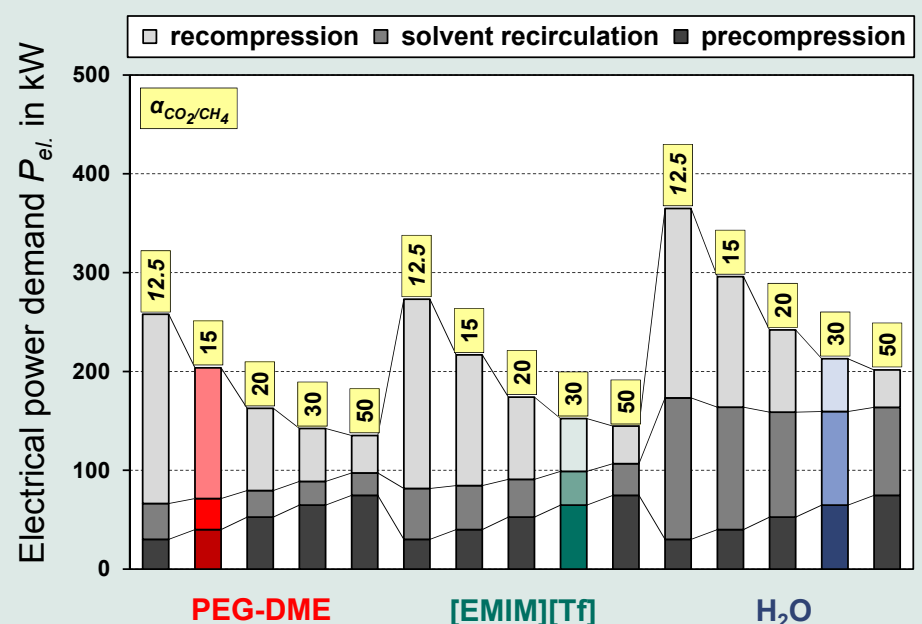
R&D Topics

- Identification of appropriate ionic liquids
- Application of ionic liquids into a lab scale continuous flow process
- Determination and optimization of operating conditions
- Analysis of the influences of minor constituents (e.g. H₂O, H₂S)
- Scale-Up
- Benchmarking and comparison with state-of-the-art technologies

Comparison with State-of-the-art Technologies



Set-up of a typical (bio-)gas purification plant run by physical absorption and basis for lab scale continuous flow process



Comparison of the electrical power demand of biogas purification processes with common solvents (water and polyethyleneglycol-dimethylether) and [EMIM][Tf] for 1000m³/h of raw biogas