Mission Innovation - SOLVENTS

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Solvents – MI CCUS Workshop Panel

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Solvents - intro

- Solvent based CO_2-capture technologies are the most mature
- Solvents have set the standard in benchmarking of capture technologies
- In the past 20 years, Specific Reboiler Duty – SRD – has been reduced with around 30-40% - RD&D works!
- Solvent technologies have moved towards evaluating the whole process system, not only the solvent.

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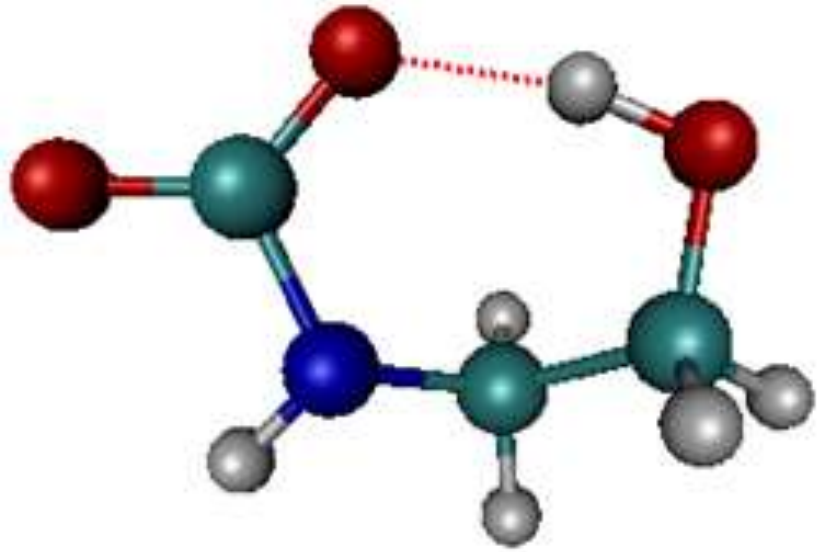

Capture - Solvents
C1- Designing High-Performing Solvents for CO_2 Capture

Challenges:

- To design new solvents and solvent mixtures with the necessary property combinations to result in high-performance CO_2 capture systems

- For a range of specific CO_2 sources and downstream use of the CO_2 → design tailor-made high-performance solvents and integrate them into optimized and intensified processes

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Capture - Solvents
C1- Designing High-Performing Solvents for CO_2 Capture

Summary of Prority Research Direction:

To design new solvents and processes:

- Use of molecular modeling and simulation tools in combination with advanced synthesis and design capabilities
- Design of new toolsets for the development and prediction of solvent properties and performance at a given scale
    - Non-Aqueous / Water Lean Solvents
    - Two-phase and phase-changing solvents
    - CO_2 binding organic liquids
    - Other systems

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Capture - Solvents
C2- Creating Environmental Friendly Solvent Processes for CO_2 Capture

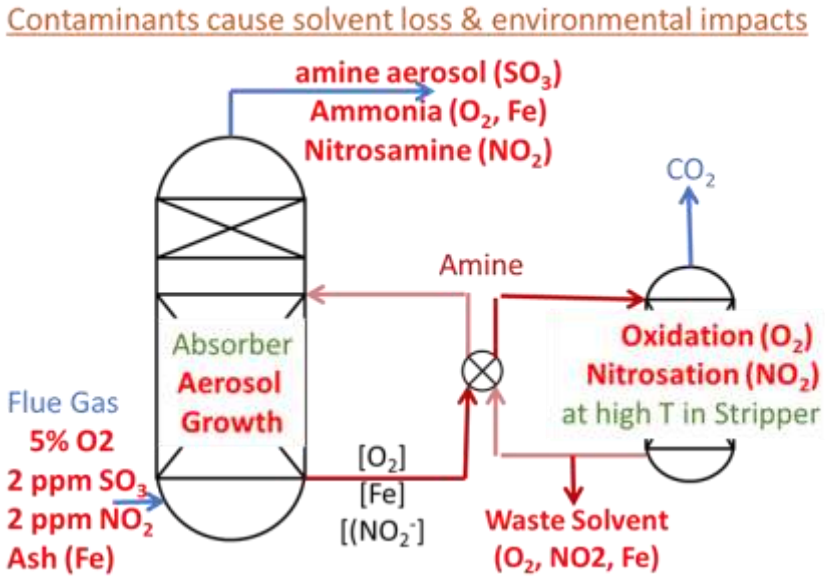
Challenges:

Solvent degradation

- Thermal degradation
- Oxidative degradation

Emissions

- Solvent vapor emissions
- Aerosol emission
- Volatile degradation products
  - Ammonia, aldehydes
- Other Contaminants and byproducts with environmental and HSE risk
  - Nitrosamines



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Capture - Solvents
C2- Creating Environmental Friendly Solvent Processes for CO_2 Capture

Summary of Priority Research Direction:

Solvent management;

Close the knowledge gap of solvent losses & environmental impacts

- Degradation mechanisms for new solvent systems
- Continue the work on understanding generically the aerosols formation and mitigation
- Understanding the effect of contaminants in the flue gas (e.g. NO_2/NO_x, SO_X, particles, etc.) for new solvent systems

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THANK YOU FOR YOUR ATTENTION

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