Carbon dioxide as a solvent for pyrolysis oils
Authors: Clarissa Baehr, Jonas Gulden, Klaus Raffelt, Nicolaus Dahmen

Motivation: Usage of classical solvents and carbon dioxide for stabilizing fast pyrolysis bio oils (FPBO)
- Determination of equilibrium constants and gas solubilities
- Enhancing the properties of FPBO and simplify its upgrading

Hypotheses:
- Dilutions with solvents lower the viscosity and prevent phase separation of FPBO.
- Dilutions with alcohols lead to an increase of the pH value and prevent corrosion.
- Carbon dioxide can be solved in FPBO significantly and reduce its aging.
- Solved carbon dioxide improves hydrogen to solve in FPBO and improve the hydrodeoxygenation.

First Results:
- Carbon dioxide
  - Viscosity reduction
  - No known consecutive reactions
  - Possibility of solving hydrogen and improving the hydrodeoxygenation
- Methanol and ethanol
  - Viscosity reduction
  - Consecutive reactions like esterifications
  - Increase of the pH value

Outlook:
- Classical solvents
  - Viscosity reduction
  - Consecutive reactions like esterifications
  - Increase of the pH value
- Carbon dioxide
  - Viscosity reduction
  - No known consecutive reactions
  - Possibility of solving hydrogen and improving the hydrodeoxygenation

Literature:
H. Foroughi, E. Acosta, M. Kawaji, Rev. Sci. Instrum. 2011, 82, 035104-1 - 035104-8

Contact and further information
Clarissa.Baehr@kit.edu
https://www.ikft.kit.edu

Acknowledgements
Hao Zhang, Saditha Kuppusanand, Catrina Kuenz, Energy System 2050, Helmholtz Research School for Energy-Related Catalysis