

Measurement and Modelling of the Piperazine Potassium Carbonate Solutions for CO₂ Capture

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The climate is in a critical state due to the impact of pollution by CO₂ and similar greenhouse gasses. Action needs to be taken in order to reduce the emission of harmful components. CO₂ capture is one process to help the world population back on track in order to return to normal condition, obtaining a sustainable use of natural organic resources. In this work the solid solubility has been measured for the promoted hot carbonate process using piperazine and K₂CO₃/KHCO₃. It entails a comparison of several newly developed methods in order to guarantee the accuracy of determined experimental work. Interesting and difficult phenomena has been observed in the analysis of the piperazine solvent. Various hydrates and complexes are formed. The loaded solutions are analysed using the same techniques. Guidelines for solvent handling are set up. These define a simple boundary for safe solvent handling in order to prevent precipitation during mixing. At the same time these can actively be used in the development in the process. Slurry formation is a core issue in these processes and need to be addressed carefully. The outcome of thermodynamic modelling by using the extended UNIQUAC model will be shown with the purpose of simulating the CO₂ capture process. This involves equilibrium studies on physical properties in the activated carbonate solvent. Energy consumption while applying the promoted carbonate solutions using piperazine is given in overview.