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Lerche, Benedicte Mai; Stenby, Erling Halfdan; Thomsen, Kaj

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PI-19. Dynamic flow method to study the CO₂ loading capacity of amino acid salt solutions

Lerche B.M.¹, Stenby E.H.², Thomsen K.¹

1 - CERE (Center for Energy Resources Engineering) Department of Chemical and Biochemical Engineering, DTU (Technical University of Denmark) Søtofts plads building 229, 2800 Kgs. Lyngby, DK

2 - CERE (Center for Energy Resources Engineering) Department of Chemistry, DTU (Technical University of Denmark) Søtofts plads building 229, 2800 Kgs. Lyngby, DK

bml@kt.dtu.dk

Introduction

Due to a number of advantages amino acid salt solutions have emerged as alternatives to the alkanolamine solvents for the chemical absorption of CO₂ from flue gas. The use of amino acids in CO₂ capture is a bio-mimetic process, as it is similar to CO₂ binding by proteins in the blood, such as hemoglobin. Amino acid salt solutions have the same amine functionality as alkanolamines, and are thus expected to behave similar towards CO₂ in flue gas. Despite rising interest, few studies have been performed so far on amino acids as CO₂ absorbents. [1]

Studying the CO₂ loading capacity of amino acid salt solutions

For the purpose of studying the CO₂ loading capacity of amino acid salt solutions, we have developed an experimental set-up (Figure 1) based on a dynamic analytical mode, with analysis of the effluent gas.

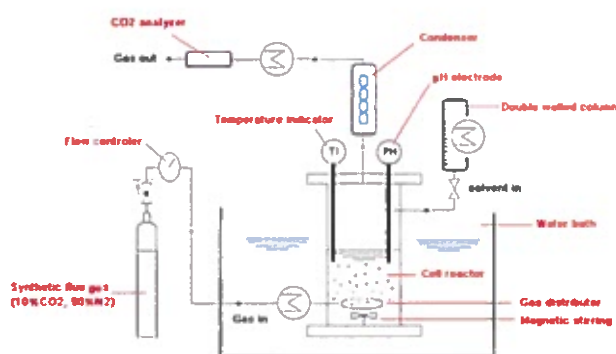


Figure 1: Experimental set-up to study the CO₂ loading capacity of amino acid salt solutions.

The aim has been to mimic, the actual conditions for CO₂ absorption from a coal fired power plant, as closely as possible. We describe the construction and validation of the set-up. Validation data were produced using aqueous solutions of mono-ethanolamine

(MEA), and compared to modelling data, as well as experimental data from literature. Following this validation, the CO₂ loading capacity of aqueous solutions of the potassium salts of selected amino acids was examined. These experiments were performed at a partial pressure of CO₂ close to 10 kPa, and a total pressure around 100 kPa, and a temperature close to 298 K.

References

[1] Benedicte Mai Lerche, Erling H. Stenby and Kaj Thomsen. "CO₂ Capture from Flue Gas using Amino Acid Salt Solutions". *Proceedings from Risoe International Energy Conference 2009*.