A comparison of different amino acid solutions for CO_2 capture using a membrane contactor

Vida Sang Sefidi[1], Patricia Luis[1]

[1] *Materials & Process Engineering (IMMC-IMAP), UCLouvain, Place Sainte Barbe 2, 1348 Louvain-la-Neuve, Belgium*

*(Corresponding author: vida.sangsefidi@uclouvain.be)

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The growing concern about the global warming has triggered the public attention to the main greenhouse gas contributor namely carbon dioxide (CO_2). The most extended post combustion CO_2 capture technologies rely on absorption columns. Alkanolamines are typical solvents due to low cost and high absorption rates [1]. However, amine-based systems have high energy requirements for solvent regeneration and large solvent losses due to amine vaporization [2]. Lower energy consumption would be achievable using a different kind of technology: membrane contactors, which also allow an ease control of operating conditions, large contact area and scale-up flexibility [3]. In addition, the use of novel absorption solvents have been proposed in membrane contactors. For example, solvents with similar functionality as amines, such as amino acid salts (AAS). AAS are positively characterized by their high surface tension, non-volatility , etc., and their kinetics is defined by zwitterion reaction [4]. While an amino acid is initially inactive in the solution, it can be activated by addition of sodium hydroxide (NaOH), potassium hydroxide (KOH) and sodium carbonate (Na_2CO_3) [5].

In this work, five different amino acids have been studied for CO_2 capture. The CO_2 capture feasibility is studied in the membrane contactor using the amino acid salts solutions as the solvent, activated with NaOH. The process performance using the amino acids was compared to that using only NaOH in solution.

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