Keynote Lecture KL 03

Applications of Deep Eutectic Solvents and Gas Hydrates in Gas Purifications

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Abstract (less than 300 words)

In the last decades, deep eutectic solvents (DESs) were investigated in a wide range of applications such as chemical synthesis, biochemistry, separation technologies, electrochemistry, and catalysis amongst other processes. In this work, the performance of DESs for the capture of impurities from oil and gas was investigated. The main objective was to propose a novel solution to some industrial challenges in the purification of oil and gas, and in particular, the extraction of mercury, oil desulfurization and CO_2 capture from flue gases. A series of equilibrium experiments was performed to assess workability of the DES for each application from a thermodynamics point of view.

Removal of acidic gases from natural gas mixtures is one of the prime objectives of industry. Depending upon the nature of separation and contaminants present in gas mixtures, there are various separation techniques available, e.g.: cryogenic fractionation, polymeric membranes, metal organic frameworks. Among them adsorption and absorption processes are the most common. Removal of high H_2S and CO_2 contents require adequate methods to isolate them from natural gas (NG) mixtures. However, economic factors, high energy consumption and effective removal from the NG mixture is a restraining step. To achieve an efficient separation, several attempts were made to find a reliable and energy efficient alternative compared to conventional separation methodologies. The use of hydrate formation for acidic gases removal can be a promising technique over a range of temperature, pressure and acidic gas contents.