

Natural deep eutectic solvent (NADES) berbasis kolin klorida dengan alkohol sebagai donor ikatan hidrogen untuk absorpsi CO₂ pada kondisi isothermal = Choline chloride based natural deep eutectic solvent

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Abstrak

[ABSTRAK

Penghilangan CO₂ dari natural gas atau penjerapan CO₂ pada flue gas ,bdari post-combustion industries menjadi tantangan besar karena .besarnya volume CO₂ yang terdapat pada sumber gas. Berbagai metode penangkapan CO₂ telah dilakukan, seperti selective adsorption/absorption, teknologi membran, dan ionic liquid. Meskipun metode tersebut telah berhasil digunakan di industri, metode tersebut masih mempunyai efek negatif seperti konsumsi energi, korosi dan masalah pencemaran. Penelitian ini dilakukan untuk mengetahui efektivitas Natural Deep Eutectic Solvent (NADES) berbasis Kolin Klorida dengan Alkohol sebagai pengganti MEA,DEA,dan MDEA dalam hal menjerap CO₂. Berbagai jenis Natural Deep Eutectic Solvent (NADES) digunakan untuk menjerap CO₂ didasarkan pada efisiensi, kompleksitas dalam desain sistem, biaya, dan dampak lingkungan. Penggunaan kombinasi NADES yang berbeda serta tekanan optimal dalam penjerapan CO₂ juga dipertimbangkan dalam penelitian ini. Kurva absorpsi menunjukkan hingga tekanan 30 bar dan menunjukkan hubungan liner antara fraksi mol CO₂ terabsorpsi dan tekanan sistem. Kolin Klorida : 1,4 Butanediol (1:2) menunjukkan NADES yang paling efektif dalam mengabsorpsi NADES sebesar 0,18 mol CO₂/mol NADES pada P 3 Mpa, T 50oC. Kemampuan NADES mengabsorpsi CO₂ berhubungan dengan struktur NADES.

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ABSTRACT

Removal of carbon dioxide from natural gas streams or absorption of carbon dioxide contained in post-combustion flue gas become a big challenge due to the large volume of carbon dioxide to be processed. Various methods of carbon dioxide capture have been performed such as selective adsorption or absorption, membrane separation, and ionic liquid absorption; however, these methods still have drawbacks such as energy consumption, corrosion and pollution problems. This study was conducted to determine the effectiveness of Natural Deep Eutectic Solvent (NADES), consisting of choline chloride and a hydrogen bonding donor (HBD) compound, in terms of carbon dioxide absorption. Solubility of carbon dioxide in NADES was found to be influenced HBD compound used and choline chloride to HBD ratio, carbon dioxide pressure, and contact time. HBD and choline used were alcohol based. The carbon dioxide absorption measurement was conducted using an apparatus that utilizes the volumetric method. Absorption curves were obtained up to pressures of 30 bar, showing a linear relationship between the amount absorbed and the final pressure of carbon dioxide. The choline and 1,4-butanediol eutectic mixture absorbs the highest amount of carbon dioxide, approaching 0.18 mole-fraction at 3.0 MPa and 50 C. We found that NADES ability to absorb carbon dioxide correlates with its polarity as tested using Nile Red as a solvatochromic probe, Removal of carbon dioxide from natural gas streams or absorption of carbon dioxide contained in post-combustion flue gas become a big challenge due to the large volume of carbon dioxide to be processed. Various methods of carbon dioxide capture have been performed such as selective adsorption or absorption,

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