National Congress on
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کنگره ملی
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محل برگزاری
۳ شهریور ۱۳۹۶

حضور و مشارکت ۵۰ دانشگاه ،انجمن و رسانه فعال علمی در
بزرگترین رویداد داخلی حوزه شیمی و نانو شیمی کشور

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شماره مجوز ISC
۹۶۱۷۰-۶۰۳۰۱

Removal of Carbon Dioxide by Absorption in Mixed Amines: Modelling of Absorption in Aqueous AMP/DEA Solutions

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ABSTRACT

This work presents an investigation of CO_2 absorption into aqueous blends of AMP + DEA. we used the Deshmukh Mather Thermodynamic models to predict the absorption of CO_2 into aqueous blended amine. The experimental results show that the solubility of CO_2 increase with partial pressure and decreases with temperature. The retrieved data from the literature of CO_2 loading in aqueous solutions of AMP + DEA at various temperature (303-323K) and CO_2 partial pressure (1–100kPa) were fitted simultaneously. We generated the different interaction parameters required to calculate the activity coefficients in the model. By using the generated interaction parameters, the model was applied to correlate the CO_2 loading in solutions of this mixture as well as data reported in the literature. Moreover was found that it can be able to give a good estimation of CO_2 loading over a wide range of operating conditions.

Keywords: **CO_2, absorption, solubility, modeling,AMP, DEA**

1. INTRODUCTION

Today, the removal of acid gases impurities such as carbon dioxide, from the flue gas is a major feature in the gas processing industry. A variety of chemical and physical processes, such as chemical absorption, adsorption, membrane and refrigeration for separating and removing emissions can be used. among them chemical absorption by alkanol amine solution is a very common process. different amines like mono ethanolamine (MEA), di ethanolamine (DEA), di-2-propanilamine (DIPA), and N-methyl di ethanolamine (MDEA) have been widely studied for this process. sterically hindered amines such as AMP Because of benefits such as high absorption rate and capacity and a high resistance to degradation have been much studied. [1-4] AMP is very similar to the MDEA because they have same equilibrium capacity but AMP solution can absorb CO_2 faster than MDEA. [5] Theory of blending Amines as a solvent have much attention of the years. park et al at 2002 presented The solubility data of carbon dioxide in aqueous solutions of mono ethanolamine (MEA), di ethanolamine (DEA), 2-amino-2-methyl-1-propanol (AMP), MEA+AMP and DEA+AMP at 40, 60, and 80 °C. The solubility of CO_2 in aqueous mixtures of AMP with MEA or DEA has been predicted using the modified Kent-Eisenberg model and reaction equilibrium constants, which were determined from each amine. The predicted values were in good agreement with the experimental data over a wide range of equilibrium CO_2 partial pressure [6] Shokouhi et al reported new experimental data for AMP+MDEA at (313.15, 333.15, and