

Accepted Manuscript

An experimental and modeling study of CO₂ solubility in a 2-amino-2-methyl-1-propanol (AMP) + N-methyl-2-pyrrolidone (NMP) solution

Peyman Pakzad, Masoud Mofarahi, Amir Abbas Izadpanah, Morteza Afkhamipour, Chang-Ha Lee

PII: S0009-2509(17)30625-5
DOI: <https://doi.org/10.1016/j.ces.2017.10.015>
Reference: CES 13847

To appear in: *Chemical Engineering Science*

Received Date: 22 April 2017
Revised Date: 6 October 2017
Accepted Date: 12 October 2017

Please cite this article as: P. Pakzad, M. Mofarahi, A. Abbas Izadpanah, M. Afkhamipour, C-H. Lee, An experimental and modeling study of CO₂ solubility in a 2-amino-2-methyl-1-propanol (AMP) + N-methyl-2-pyrrolidone (NMP) solution, *Chemical Engineering Science* (2017), doi: <https://doi.org/10.1016/j.ces.2017.10.015>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



An experimental and modeling study of CO₂ solubility in a 2-amino-2-methyl-1-propanol (AMP) + N-methyl-2-pyrrolidone (NMP) solution

Peyman Pakzad^a, Masoud Mofarahi^{*,a,b}, Amir Abbas Izadpanah^a, Morteza Afkhamipour^a, Chang-Ha Lee^b

^a*Department of Chemical Engineering, Faculty of Oil, Gas and Petrochemical Engineering,
Persian Gulf University, P.O. Box 75169-13798, Bushehr, Iran*

^b*Department of Chemical and Biomolecular Engineering, Yonsei University, 50 Yonsei-ro,
Seodaemun-gu, Seoul 120-749, Republic of Korea*

Abstract

In this study, an experimental setup based on the static-synthetic method was used to measure the new experimental data of CO₂ solubility in an aqueous solution of 2-amino-2-methyl-1-propanol (AMP) + N-methyl-2-pyrrolidone (NMP) solution. For the static-synthetic method, the mass balance of compositions and the pressure–volume–temperature conditions were used for measuring the amount of absorbed CO₂ by the AMP+NMP solution. The measurements were performed over a temperature range of 313.15 to 353.15 K, CO₂ partial pressure up to 316.7 kPa, and in different concentrations of the AMP+NMP solution. Two models, modified Kent–Eisenberg, and Deshmukh–Mather, based on the empirical correlations and activity-fugacity approach, respectively, were used for the prediction of experimental data. The parameters of the equilibrium constants of the protonation and carbamate reactions for the modified Kent–Eisenberg model and the interaction parameters for Deshmukh–Mather model were obtained. For validation of our setup, a new set of experimental data for the solubility of CO₂ in an aqueous solution of AMP, methyldiethanolamine (MDEA) and diethanolamine (DEA) were measured and compared with existing experimental data in the literature, and good results were obtained. The results of the modeling study showed that the Deshmukh–Mather model gave a better prediction of experimental CO₂ loadings data than the modified Kent–Eisenberg. Also, the results showed that the solubility of CO₂ in an aqueous solution of AMP+NMP increases as the CO₂ partial pressure increases while the temperature decreases.

* Corresponding author. E-mail: mofarahi@pgu.ac.ir. Fax: +98 7733441495.

Download English Version:

<https://daneshyari.com/en/article/6588899>

Download Persian Version:

<https://daneshyari.com/article/6588899>

[Daneshyari.com](https://daneshyari.com)