

Accepted Manuscript

High frequency ultrasonic-assisted chemical absorption of CO₂ using monoethanolamine (MEA)

W.H. Tay, K.K. Lau, A.M. Shariff

PII: S1383-5866(16)30283-0

DOI: <http://dx.doi.org/10.1016/j.seppur.2017.03.068>

Reference: SEPPUR 13661

To appear in: *Separation and Purification Technology*

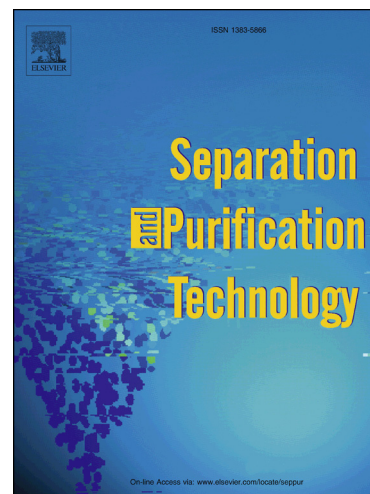
Received Date: 4 May 2016

Revised Date: 28 March 2017

Accepted Date: 28 March 2017

Please cite this article as: W.H. Tay, K.K. Lau, A.M. Shariff, High frequency ultrasonic-assisted chemical absorption of CO₂ using monoethanolamine (MEA), *Separation and Purification Technology* (2017), doi: <http://dx.doi.org/10.1016/j.seppur.2017.03.068>

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.



**High frequency ultrasonic-assisted chemical absorption of CO₂ using
monoethanolamine (MEA)**

W. H. Tay, K. K. Lau*, A. M. Shariff
Research Centre for CO₂ Capture, Department of Chemical Engineering,
Universiti Teknologi PETRONAS, 32610 Bandar Seri Iskandar, Perak
Malaysia

*Corresponding author. Tel.: +605-3687589; fax:+605-3656176.
Email address: laukokkeong@petronas.com.my

Abstract

The paper aimed to study the chemical absorption of CO₂ in monoethanolamine solvent (MEA) using high frequency ultrasonic irradiation of 1.7 MHz. The experiment was conducted at instantaneous regime in order to study the physical enhancement effect of the ultrasound. Hence, a mathematical model is proposed to justify the enhancement effects involved in the absorption process. The parameters of the experiment included ultrasonic power, MEA concentration, temperature, and CO₂ partial pressure. Results show that, a significant increase in the chemical absorption rate can be obtained by using ultrasonic power of 18 W, which is up to 60 times faster than the case without ultrasonic irradiation. Besides, the experimental data is in good agreement with the simulated data by obtaining the R² values ranged from 0.989 to 0.997. Therefore, this study demonstrates a new technology to improve the absorption process. Besides, the enhancement for the chemical absorption using ultrasonic irradiation is believed to be dominated by the fountain formation and also the convective dynamic. In overall, ultrasonic-assisted absorption would be one of the potential alternatives for CO₂ capture with its advantages of high mass transfer coefficient and compact design.

Download English Version:

<https://daneshyari.com/en/article/4989926>

Download Persian Version:

<https://daneshyari.com/article/4989926>

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