KINETICS OF CARBON DIOXIDE ABSORPTION INTO AQUEOUS SOLUTIONS OF 1, 5, 8, 12- TETRAAZADODECANE (APEDA)

Ilie Siminiceanu[1*], Ramona-Elena Tataru-Farmus[1], Chakib Bouallou[2]

[1]*Technical University "Gh. Asachi" of Iaşi, Faculty of Chemical Engineering, 71 Bd. Mangeron, RO- 700050 Iaşi, Romania*
[2]*Ecole Nationale Supérieure des Mines de Paris, Centre d'Energétique (CENERG), 60 Bd. Saint Michel, 75006 Paris, France*

Abstract

The absorption of CO_2 into an aqueous solution with 1.45 mol/L *1,5,8,12-tetraazadodecane (APEDA)* polyamine has been studied at three temperature (298, 313, 333 K) in a Lewis type absorber with a constant gas-liquid interface area of $(15.34 \pm 0.05) \times 10^{-4}$ m^2. The experimental results have been interpreted using the equations derived from the two film model with the assumption that the absorption occurred in the fast pseudo- first- order kinetic regime. The results confirmed the validity of this assumption for the experimental conditions: the enhancement factor was always greater than 3. The rate constant derived from the experimental data (k_{ov}, s^{-1}) was correlated through the Arrhenius plot (ln k_{ov} = A- B/T), and the optimal values of the constants A and B were obtained by the linear regression. The absorption of CO_2 from flue gas into APEDA solution is a promising process for practical application at least from the kinetic point of view. The rate constant derived from experiments is of the same order of magnitude as that for the absorption into 2- amino- 2- methyl- 1- propanol (AMP) activated with piperazine (PZ) which was found to be the most advanced system among the published data up to now.

Key words: acid gas absorption, Lewis cell absorber, enhancement factor, rate constant

* Author to whom all correspondence should be addressed: isiminic@ch.tuiasi.ro