Enthalpy of Solution and Solubility of CO_2 in Aqueous 2-amino-2-methyl-1-propanol (AMP)

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The removal of acid gases is an important process of natural gas processing both from the economical and environmental of view. Aqueous solutions of alkanolamines are well known to be efficient chemical solvents for the CO_2 and H_2S capture. Reliable experimental data for solubility and enthalpy of solution of acid gases in aqueous solutions of alkanolamines are required to develop thermodynamic models describing this process. A customized flow mixing units adapted to the SETARAM C-80 calorimeter [1] was used to measure the enthalpies of mixing CO_2 with aqueous solutions of alkanolamines as a function of the gas loading. The gas solubility is then determined from the analysis of the enthalpic data. The sterically hindered amines are of particular interest, compared with the conventional amines, because of their higher loading capacity. Steric effect influences the stability of the carbamate obtained from the reaction of CO2 with a secondary amine. The calorimetric measurements were performed for CO_2 in aqueous solutions of 2-amino-2-methyl-1-propanol (AMP). The influence of temperature, pressure and combination with other alkanolamines was studied. The comparison of our results (enthalpies and solubilities) with the literature data [2,3] and predicted values [4] will be discussed.

[1] D. Koschel, J.-Y. Coxam, and V. Majer. Water, Steam, and Aqueous Solutions for Electric Power- Advances in Science and Technology. Proceedings of the 14th International Conference on Properties of Water and Steam, Maruzen Co The Japan Society for the Promotion of Science, 377 (2005).
[2] D. Silkenbäumer, B. Rumpf, and R. N. Lichtenthaler, Ind. Eng. Chem. Res. **37**, 3133 (1998).
[3] M. Kundu, B. P. Mandal, and S. S. Bandyopadhya, J. Chem .Eng. Data, **48**, 789 (2003).
[4] S. H. Park, K. B. Lee, J. C. Hyun, and S. H.Kim, Ind. Eng. Chem. Res., **41**, 1658 (2002).