Phase Equilibrium Data, Caloric, and Transport Properties for Acid Gas and Carbon Capture in Amine Solutions

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The Laboratory for Thermophysical Properties (LTP) is a global service provider for the experimental determination of phase equilibria (e.g., vapor pressures, critical data, VLE, VLLE, or SLE), volumetric data like densities or density changes, caloric data such as enthalpy changes and heat capacities, and transport properties like viscosities, thermal conductivity or surface tension. Carbon capture and acid gas treatment mainly with amine solutions is still a focus in technical developments which resulted in intensive experimental determinations of various properties. Due to the large amount of flue and acid gas and the increasing environmental restrictions, any improvement with new or modified solvents is of high interest. Experimental projects in this field for many international chemical, petrochemical or engineering companies with various solvent-gas combinations were performed at LTP during the last 10 years. Usually all experimental determinations and results are exclusive and secret. Two years ago LTP launched an internal research project with determinations for aqueous MDEA solutions as solvent. For solutions with different carbon dioxide or hydrogen sulfide loadings experimental phase equilibrium data, densities, viscosities, thermal conductivities, surface tensions, heat capacities, and heats of absorption were determined. The results of these determinations will be presented together with the used experimental set-ups. Different methods will be presented like synthetic equilibrium cell, Stabinger viscometer, magnetic suspension balance, transient hot wire and hot plate, pendant drop method, flow calorimeter, or Tian-Calvet calorimeter.