

Experimental Data for Liquid-Liquid-Vapor Equilibrium for the Binary System Water + Propylene and the Quaternary System: Water + [Methyldiethanolamine + Diethanolamine (25 Weight % Total Amine)] + Propylene, at Different Temperatures

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This work reports experimental information obtained as part of a systematic phase equilibria study related to the sweetening of hydrocarbon streams. With the experimental device developed in this work, two (vapor and hydrocarbon rich liquid phase) of the three observed phases at equilibrium were sampled and analyzed on line with a gas chromatograph. The studied systems were the binary water + propylene, and the quaternary formed by water [methyldiethanolamine (MDEA) + diethanolamine (DEA), 25 weight % of total alkanolamine, with amine ratio 2.6/1] + propylene. The temperatures considered in this study were: 310.94, 318.15 and 344.26 K for the binary, and 313.15, 323.15, and 333.15 K for the quaternary system. The experimental uncertainties claimed for our determinations are as follows: ± 0.02 K, ± 2 kPa, and ± 0.0009 mole fraction. The experimental results for two of the temperatures (310.94 and 344.26 K) in the case of the binary were used to carry out a comparison with previously reported data [1], the remaining data are original from this work. The experimental information in the case of the binary consists for a given temperature, of different water or propylene concentration values for both, the vapor and hydrocarbon rich liquid phases in the three phase equilibrium, as a function of the total pressure, together with the corresponding concentrations of the vapor phase under conditions of liquid-vapor equilibrium. For the quaternary system, the reported information is similar to that for the binary, although the alkanolamine concentration is not included because the lower limit of detectability using the gas chromatograph ($x_{DEA} = 0.0051$, and $x_{MDEA} = 0.0003$) was not enough to quantify the amount of alkanolamines present in the hydrocarbon rich phases, which are supposed to be in the order of traces.

[1] C. C. Li and J. J. McKetta, J. Chem. Eng. Data 8, 271(1963).