Isothermal Vapor-Liquid Equilibria for Binary System of Dimethyl Ether + Pentafluoroethane at Different Temperatures

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New environment-friendly multi-component refrigerants composed of hydrochlorofluorocarbons are generally being used for the cleaning of electronic and magnetic devices, foaming, dry etching, and low-temperature refrigeration. The thermodynamic properties such as vapor-liquid equilibria are essential in screening promising alternative working fluids. The aim of this work was to study the behavior of vapor-liquid equilibrium of dimethyl ether (DME) + pentafluoroethane (HFC125) system at different temperatures. The apparatus consists of a home-made high-accuracy thermostatic bath, an equilibrium cell with a maximum operation pressure of 5 MPa including two quartz glass windows and an inside magnetic stirrer, a pressure measurement system involving a digital quartz pressure transducer and a differential pressure transmitter, as well as a gas chromatograph for vapor and liquid composition analysis. The total uncertainty of temperature measurements was estimated to be less than ±10 mK(ITS-90), and that of pressure measurements were less than ±0.7 kPa. The vapor-liquid equilibrium data of binary system DME + HFC125 at temperatures from 250 K to 330 K were obtained in this work. All the experimental results were correlated using the Peng-Robinson equation of state and the interaction parameters kij were also regressed from the experimental data.