Isothermal Vapor-Liquid Equilibrium of R161+DMETrEG within the Temperature Range of (293.15-353.15) K

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For the sake of environment, new alternative refrigerants have been looked for in recent years. Ethyl Fluoride (R161) is one of the most promising alternatives because of its high cooling capacity, relatively high volume cooling capacity, and excellent energy efficiency ratio. In addition, it is environmentally friendly because it does not have the ozone depression potential (ODP=0), which means it does no harm to the ozone layer, and has a low global warming potential (GWP=12). For R161 has excellent environmental and thermodynamic properties without corrosivity and toxicity, it was put forward in the absorption refrigeration combined with the corresponding absorbents. To make the refrigerant better applied in the absorption refrigeration system, the suitable absorbent should be selected for matching the R161. Vapor-liquid equilibrium data is the basis and the key of the chemical engineering simulation as well as the refrigerating cycle calculation, and its accuracy directly affects the efficiency and scale of the chemical and refrigeration equipment. On the basis of these, the vapor-liquid equilibrium data of the mixture (fluoroethane (R161) + dimethylether triethylene glycol (DMETrEG)) were obtained from 293.15 K to 353.15 K by a dual recirculation technique. The experimental apparatus set up for vapor-liquid equilibrium was consisted of a high accuracy thermostated bath, a equilibrium cell with sight glasses, a high accurate temperature measure system (the standard temperature uncertainty is less than 10mK), a high accurate pressure measure system (the standard pressure uncertainty is within 1.4 kPa), and a composition measure system (the standard composition uncertainty is within 0.003 mole fraction). The vapor-liquid equilibrium data were correlated by PR equation of state combined with the MHV1 mixing rule and NRTL model. The data showed that there was negative deviation compared to Raoult's law in the mixture (R161 + DMETrEG). Meanwhile, the results obtained in this work were compared with those of the mixture (fluoroethane (R161) + dimethylether diethylene glycol (DMEDEG)).