

Measurements of the Vapor Pressure and Isobaric Specific Heat Capacity of 2,3,3,3-Tetrafluoropropene(HFO-1234yf)

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The measurements of the vapor pressure and isobaric specific heat capacity of 2,3,3,3-tetrafluoropropene (HFO-1234yf) were carried out by a batch type calorimeter. The calorimeter is cylindrical with metal-bellows as a sample container in the pressure vessel. The pressure vessel is immersed in a thermostated oil bath whose temperature kept constant within ± 10 mK. It's temperature is measured by a $25\ \Omega$ standard platinum resistance thermometer (Chino R800-2) and a precise thermometer bridge (Tinsley 5840). The pressure is measured with a precise digital gauge (Paroscientific 43K). The isobaric specific heat capacity can be obtained on the basis of the thermal relaxation method. The experimental uncertainty of temperature, pressure and isobaric specific heat capacity are estimated to be within ± 10 mK, ± 1 kPa and 5.2 %, respectively. The sample was supplied from Daikin Industries, Ltd, and its purity was stated better than 99.99 mol%. The vapor pressure and isobaric specific heat capacity of 2,3,3,3-tetrafluoropropene (HFO-1234yf) was measured in the temperature range from 310 K to 360 K and pressure up to 5 MPa. On the basis of the present data, the vapor pressure was correlated as a function of temperature using a Wagner-type correlation. The critical pressure was calculated by extrapolation to the critical temperature determined in our laboratory. The standard and maximum deviations of the vapor pressure from the correlation were 0.4 kPa and 0.9 kPa, respectively. The acentric factor was also determined to be 0.290 from our vapor pressure correlation.