DEW-BUBBLE CURVE DETERMINATION OF NEAR-CRITICAL HYDROCARBON MIXTURES USING LIGHT-SCATTERING METHOD

Kiyachenko Yu.F.,* Deshabo V.A., Kosov V.I., Yudin D.I., Yudin I.K., Podnek V.E.

OGRI RAS, Moscow, Russia
**kiyatchenko@mail.ru*

The method of optical determination of the dew-bubble curve and the position of the liquid-gas critical point of near-critical multicomponent hydrocarbon mixtures simulating gas-condensate deposits of the so-called transitional type is presented. The work is a part of a comprehensive study of the phase behavior of model near-critical hydrocarbon mixtures, which includes calorimetry and PVT measurements in addition to experimental light-scattering methods. A high-pressure optical cell was elaborated and an apparatus was designed to measure the intensity of Rayleigh scattering of light in hydrocarbon mixtures at the temperature range from 10 to 120 °C and the pressures up to 50 MPa. The volume of the measuring optical cell is 3.2 cm^3. The intensity of light-scattering is measured at an angle of 45°. As a light source, a laser with a wavelength of 635 nm is used. Calibration of the measuring system was carried out at the critical isochore of carbon dioxide. Measurements of the intensity of light scattering were carried out along the isochores at cooling from a single-phase region. The position of the dew-bubble curve of the mixture was determined from the change in the character of the temperature dependence of the scat-tered-light intensity at the transition from the single-phase to the two-phase state. The position of the critical point was determined from the maximum intensity of the light scattering on the dew-bubble curve. The temperature dependence of the anomaly of the intensity of light scattering in a single-phase region was analyzed in the framework of the generalized "linear model" - the scaling parametric equation of state of a near-critical fluid. The results of the experimental study of the near-critical phase behavior of methane-pentane binary mixture (50/50 weight percent) are presented. A comparison of the obtained critical parameters of the mixture with the values determined previously by PVT method (Sage *et al.*, 1942) as well as with the results obtained by means of engineering programs PVTsim (Calsep) and REFPROP (NIST) intended for calculating of thermophysical properties of hydrocarbon mixtures has been also done.