

# PHASE TRANSITIONS AND BULK PROPERTIES OF THE TERNARY SYSTEM WATER-1-PROPANOL-*n*-HEXANE NEAR THE CRITICAL POINT

*Abdulagatov I.M., Bazaev A.R., Bazaev E.A.,\* Osmanova B.K.*

*IGR DSC RAS, Makhachkala, Russia*

*\*emilbazaev@gmail.com*

The phase equilibrium of observed ternary system at low temperatures is investigated by authors [1–3] and at high temperatures by authors [4]. In this work by the method of free-ballast constant volume piezometer [5] the data on  $p, \rho, T$  relations of water-1-propanol-hexane system (0.3333 mol.fractions) is obtained in the wide diapason of state parameters.

Isochoric P-T break point technique was applied to accurately determine phase transition  $p_s, \rho_s, T_s$  and the critical point  $p_k, \rho_k, T_k$  parameters. The measured  $p, \rho, T$  properties in the one-phase region including phase transition curve and supercritical conditions were used to develop multi-parametric polynomial type equation of state in the form of expansion of the pressure into series in powers of the reduced density  $\omega = \rho/\rho_k$  and the reduced temperature  $\tau = T/T_k$ :  $p = RT\rho_m \left[ 1 + \sum_{i=1}^m \sum_{j=0}^n a_{i,j} \omega^i / \tau^j \right]$ . Average relative deviation between the measured and calculated values of pressure is less than 1.3% in the whole measured temperature and pressure ranges. The results of the present work showed that volumetric behavior of the ternary system in the critical regions just like one-component system.

The work was supported by RBSF Grant N18-08-00124 A.

- 
1. Jones J.H., Hopson W.H. Ternary Solubility Data for Systems Involving 1-Propanol and Water // J.F.Ind. and Eng.Chemistry. 1953.V.45.N.2.P.454-456.
  2. Vorob'eva, A. I. Karapet'yants, M. Kh. Miscibility in systems water+aliphatic alcohol+n-alkane: II water+propan-1-ol+n-alkane (c(6)-c(9)) systems // Zh. Fiz. Khim., 1967, 41, 1144-9
  3. Hiroshi S., Takashi K. Liquid-Liquid Equilibrium Data for Three Ternary Systems of Aqueous Alcohol Solutions and Applicability of the Analytical Solutions of Groups // J. of Chem. Eng. of Japan. 1977. V.10. N5. P.400-402.
  4. Rasulov S.M., Rasulov A.R. Phase equilibrium and PVT-properties of 0.7223  $H_2O+0.1242C_6H_{14}+0.1535 C_3H_7OH$  ternary system // High Temp. High Press. 2005, V.43. N.1. pp.45-50.
  5. Bazaev. A.R.  $p, v, T, x$  - measurements and thermodynamic properties of aqueous solutions of hydrocarbons at supercritical conditions. Doctoral dissert. 1997. P. 264.