The (p,ρ,T) Properties and Apparent Molar Volumes of ethanol solutions of LiI or $ZnCl_2$

Huseyn Israfilov and Tavakkul Guliyev
Azerbaijan Technical University, Baku, Azerbaijan

Javid Safarov [C, S]
Institute of Technical Thermodynamics, University of Rostock, Rostock, Germany

Astan Shahverdiyev
Heat- and Refrigeration Techniques, Azerbaijan Technical University, Baku, Azerbaijan

Egon Hassel
Institute of Technical Thermodynamics, University of Rostock, Rostock, Germany

Absorption heat transfer systems take in heat at a lower temperature and release it at a higher one, with a reversing valve that allows the heat pump to provide space heating or cooling as necessary. The efficiency of an absorption heat transfer cycle is largely dependent on the physical and chemical properties of the heat transfer fluids. The most serious problems by using the conventional aqueous solutions of electrolytes were discussed in our previous publications. This work is continuing of the studyof alcohol solutions of electrolytes for the future application as heat transfer fluids in absorption heat transfer systems to avoid the problems and to replace aqueous solutions at temperatures below the freezing point of water. Ethanol has freezing point lower than methanol and can improve the circulation of heat transfer agent in the closed system.The (p,ρ,T) properties and apparent molar volumes V_f of the LiI or $ZnBr_2$ in ethanol at T=(293.15 to 393.15) K, pressures up to p=40 MPa and in various molalities are reported at the first time. These properties of investigated solutions were not available in the literature.The (p,ρ,T) measurements were carried out using a new modernized high pressure – high temperature vibrating tube densimeter DMA HPM. An empirical correlation for the density with pressure, temperature and molality has been derived. Using a program for standard thermodynamic analysis to describe the (p,ρ,T) properties of ethanol solutions of LiI or $ZnCl_2$, the equation of state was used. The apparent molar volumes V_f of LiI or $ZnBr_2$ in ethanol were defined.