7. ABSTRACT

The following doctoral thesis concerns the analysis of the densimetric, acoustic and calorimetric investigations results of monoglyme, diglyme, triglyme, tetraglyme, pentaglyme and hexaglyme in the whole range of composition of mixed solvent N,N-dimethylformamide and water at temperature (293,15; 298,15; 303,15; 308,15) K.

The obtained experimental values of density, speed of sound and specific heat capacity of mixtures allow calculation of some excess, apparent and partial molar quantities that describe intermolecular interactions between solution constituents.

On the basis of densimetric results, the values of excess (V_m^E) apparent $(V_{\phi,m,3})$ and standard partial molar volume $(V_{m,3}^0)$ of selected glymes in mixed solvent (DMF+water) were analyzed. It was also possible to discuss the values of the b_V coefficient of Redlich and Meyer's equation and the values of isobaric molar thermal expansibilities $(E_{p,m})$ of the studied systems.

Using the values of sound velocity of examined mixtures it was possible to calculate the values of isentropic (κ_S) and molar isentropic compressibilties $(K_{S,m})$ as well as apparent $(K_{S,\phi,m,3})$ and standard partial molar isentropic compressibilities $(K_{S,m,3}^0)$ of six glymes in the mixture of DMF with water in the whole concentration range of mixed solvent at four temperatures. In addition, the values of b_K coefficient were analyzed.

The values of apparent molar isobaric heat capacity $(C_{p,\phi,m,3})$ of mono-,di-, tri-, tetra-, penta- and hexaglyme in the mixture of (DMF+W) were calculated and analyzed in therms of intermolecular interactions between solution constituents.

All of the determined values were presented as a function of molar fraction of water in the mixture with N,N-dimethylformamide. The nature of the changes in the analyzed relationships obtained for all examined glymes is similar. In water rich area one could observe characteristic changes connected with hydrophobic hydration of glymes. The changes are the more intense, the more hydrophobic the properties of the linear polyether are. Based on the results obtained for the mixed solvent only, one could assume that N,N-dimethylformamide shows weak hydrophobic properties. The presence of a linear polyether in a mixture of DMF with water causes disruption of the structure of the mixed solvent and changes the intermolecular interactions

between the components of the system. The carried out tests do not give the possibility of a detailed description of the structures of the tested ternary systems. They only make it possible to determine the conditions under which significant changes in the intermolecular interactions take place.

On the basis of adiabatic compressibilities, the hydration numbers of glymes (n_h) and its values at infinitely diluted solution (n_h^0) were calculated. The influence of temperature and molecular size of solute was analyzed.

Additionally, the group contribution of $-CH_2-$ and $-O-$ to the values of standard partial molar volume ($V_{m,3}^0$), isobaric limited molar thermal expansibility ($E_{p,m,3}^0$) and standard partial molar compression of glyme in the mixture of DMF with water ($K_{S,m,3}^0$) were estimated.