DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The presented project comprises the fundamental investigations on thermodynamic and physicochemical measurements of phase equilibria of organic solvents, or water with ionic liquids, as well as the selection of new ionic liquids with aspect to the extraction and separation for different industrial processes. Measurements planed within the framework of this project have experimental character with the thermodynamic modeling of phase equilibria and physicochemical properties of new ionic liquids. Main aims of this project is determination of enthalpy of mixing, phase equilibria, (solid-liquid), SLE at normal pressure and at high pressure up to 10 MPa, (liquid-liquid) LLE and (vapor-liquid) VLE at low and high pressure in a range of 1-5 MPa, measurements of activity coefficients at infinite dilution, calorimetric measurements with DSC, TGA/DTA, measurements of density under ambient pressure and at high pressures up to 10 MPa, measurements of viscosity and surface tension, the volume expansivity (α), isothermal pressure expansion coefficient (κ_T), solubility parameters and octanol/water partition coefficients (in Poland). Measurements on the supercritical extraction, finding a selective and an efficient solvent up to 5MPa, gases absorption, including CO_2, as well as forming the clathrates using ammonium ILs for the extraction (in SA). These measurements will help with thermodynamic description of these processes with modern theories of solutions such as Mod. UNIFAC (the new base of parameters formation), equation of states such as Peng-Robinson, PC SAFT, or COSMO RS model. Moreover in the project besides collection, evaluation and interpretation of the results will be elaborated quantitative relationships of the structure of studied substance on solubility, phase diagrams and selectivity coefficientin extraction. Interpretation of the obtained results is especially interesting for solution thermodynamics (field which main aim is description of the phenomena occurring in the mixtures according to the intermolecular interactions). Obtained results are even more interesting because in systems with ionic liquids we deal with various complex interactions. The intention of the study is not a direct application or implementation, but they can be helpful in designing future processes using ionic liquids and different separation processes. Project realization undoubtedly will expand knowledge on basic phenomena in the thermodynamics of solutions containing ionic liquids.