

Nanochemistry and Nanobiotechnology

Influence of molecular size of methacrylic acid esters on the excess molar volumes of their solutions in organic solvents

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Densities and excess molar volumes of the binary systems of methyl-, isobutyl-, butyl- and lauryl- methacrylate with acetonitrile, hexane and acetic acid have been measured as a function of concentration, at 293 K and atmospheric pressure by pycnometric methods. The raw materials were of the commercial grade and were supplied by MERCK (Germany).

The nature of the dependency of the excess molar volume of equimolar solutions on the molecular size has been determined.

For the systems which contain the poorly associated solvents, such as acetonitrile, or does not associate is a hexane, with an increase of molecular size of methacrylic acid esters the values of excess molar volume of their equimolar solutions diminishes, that is the consequence of increase of energy of dispersible bonds between heterogeneous molecules and formation of more compact structures. For the system, with strongly associated solvent - acetic acid, the values of excess molar volume of equimolar solutions grows with an increase of molecular size of methacrylic acid esters as a result of formation of less compact structures in solution.

Excess molar volumes (cm^3/mol) of equimolar solutions of investigated systems

Compound	L^* , nm	Acetonitrile	Acetic acid	Hexane
Methylmethacrylate	0.659	-0.097	0.160	0.591
Isobutylmethacrylate	0.895	-0.153	0.358	-0.028
Butylmethacrylate	1.043	-0.190	0.447	-0.170
Laurylmethacrylate	2.051	-	0.618	-0.910

*The molecular size of esters was calculated using the HyperChem 8.08 program.