

Supramolecular organisation of liquids: structure and dynamics

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The experimental and theoretical results of studying of the structure of liquids are briefly reviewed. The results obtained are focused on the local ordering of liquid inside of the nearest coordination shells. The role of supramolecular organization of liquid with the long-ranged molecular correlations, which is characterized by the temporal lability is not fully recognized.

The main attention are given to the new approaches to describing of structural, thermodynamic and dynamic features of the supramolecular organization of liquid on the basis of the generalized quasichemical models of the processes, occurring in matter during molecular thermal motion. Models of thermodynamic, dielectric, optical fluctuation and relaxation properties of non-ideal liquid systems determined by the molecular parameters of a different nature are constructed.

Methods for studying supramolecular ordering in liquid due to non-covalent intermolecular interactions such as the hydrogen bonds, and describing of structure and properties of aggregates, thermodynamics of their formation, and integral (average number of aggregation) and differential (distribution functions of aggregates on structural type, size, etc.) parameters of aggregation have been developed. The methods presented allow to studying long-ranged molecular correlations outside the nearest coordination shells, which are inaccessible to study other experimental techniques.

For the first time long-ranged molecular correlations in liquid, self-organised by H-bonding were revealed. The results are illustrated by considering alcohols and their mixtures with solvents of different nature. Structure, properties and thermodynamics of formation of supramolecular aggregates consisting of tens of molecules of nanosizes are investigated. The comparison with the computer simulation data is presented.

The macroscopic manifestations of supramolecular ordering for equilibrium and kinetic properties of liquid systems and phenomena, proceeding in those are discussed.

The work was supported by State Support Program of Leading Research Schools (project N 1275.2003.3) and Russian Funding for Basic Research (project N 04-03-32819).

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