Impact of external physical effects on water and aqueous solutions: the problem of “memory”

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Abstract
A brief analysis of scientific publications on the changes in the physicochemical properties of water and aqueous solutions under the influence of temperature, magnetic and electric fields, laser and microwave radiation, ultrasound, and mechanical mixing was performed. A number of researchers have shown the influence of such effects on changes in pH and redox potential, electrical conductivity, surface tension and viscosity of an aqueous solution. The question of influence of external physical effects on water and aqueous solutions remains controversial. Some scientists suggest that water has a cluster structure, which is influenced by physical effects. An important aspect of the problem is the impact on the subsequent behavior and the final result of a chemical process involving previously treated aqueous solutions. Using water solutions of lead and thiourea as an example, the effect of their temperature prehistory in the range of 275-369 K on the kinetics of precipitation of the solid phase of lead sulfide and their microstructure is demonstrated. A threefold change in the composition of supersaturated CdPb1-xS solid solutions precipitated from solutions containing a lead salt with different temperature prehistory was established. It is shown that the “memory” on the preliminary temperature effect is maintained for at least a day. The influence of electromagnetic treatment of water and aqueous solutions on the content of dissolved oxygen, pH and electrical conductivity is analyzed. Some scientists explain these results by the influence of the field on the structure of hydrogen bonds, others by a change in the cluster structure of water, as well as by the presence of ferromagnetic particles in water. The review presents the current state of the problem of the “memory” effect and the related influence of the prehistory of the impact of physical factors. The review suggested that the “memory” of an aqueous solution is the preservation for a certain time of the changes in its structure and properties that have arisen as a result of the effect. The basic ideas about the mechanisms of influence of the prehistory of physical effects on aqueous solutions are given.

References
Review

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