# Free-Radical Trapping and Molecular Dynamics in Chemical and Biochemical Processes

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Foto- and Radiation Chemical induced and spontaneous formation of radicals at low temperatures is studied. Shown are specific features of mechanisms, molecular dynamics and kinetics of free-radical reactions in solid and viscous media at low temperatures; separation of macro-, microdiffusion and kinetic stages with supper slow molecular mobility ($\nu > 10^{-2}\ c^{-1}$, $D > 10^{-20}\ cm^2 c^{-1}$); the role of reorientational movements of molecules and separate groups; reaction dynamics of chemically anisotropic particles and correlation between the frequencies of translational and reorientational movements in solid and viscous media; algorithms of approximate solutions for inverse kinetic problems of polychronous kinetics and estimates of a spectrum of kinetic parameters for thermoactivated and tunnel processes.

Spontaneous formation of free-radicals in low-temperature reactions without UV-, $\gamma$-, $\beta$-radiation was studied. Multicentres sinchronous reaction of radical formation at chlorination of monomers, unsaturated polymers, phenols, at fluorination of synthetic and natural polymers, etc. at 77-200 K were shown.

The role of free radicals is discussed in some of the key processes of biomolecular evolution (formation of protobiomolecules and the biomembrane scenario of formation of prebiological systems, relative radiation - chemical stability and molecular evolution of nucleic acids RNA and DNA, etc.). Examined are also the use of free-radical labels to study the superlow molecular dynamics of a number of biochemically significant processes (dynamics of subglobular proteins, incorporation of proteins into membrans; formation and functioning of biomembrane structures). Free-radical labels were made through radiation- and photoinduced action on biomolecules.

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