# Dynamic Adsorption, Complexation, Aggregation and Sedimentation Processes in Aquatic Ecosystems.

Adsorption, complexation, aggregation and sedimentation processes in ecosystems are of great importance for the interpretation and predictions of the reactivity of chemical species and of their ecotoxicological impact. The transport and fate of both nutrients and toxic compounds largely depends on their interactions [1] with colloidal particles, biopolymers, etc, the complexes and aggregates they form and their settling velocities. The circulation and elimination of vital or detrimental compounds then depends upon the kinetics of formation, structure, and sedimentation rate of these aggregates. Because of the complexity and large number of biophysical and chemical factors influencing these processes, as well as to the fact that natural colloids include several components, no simple analytical theory can directly be derived and applied to all these dynamic processes in aquatic ecosystems.

Nonetheless, due to the development of computer modelling and the introduction of scaling concepts, numerical and theoretical models have been applied only relatively recently for investigating the dynamic behaviour of colloidal suspensions in aquatic ecosystems [2-8]. These models have proved to be important and represent convenient tools i) for the systematic investigation of some of the physicochemical factors (pH, temperature, solution ionic strength, particle concentration and chemical surface properties) influencing the morphology of the complex structures induced by perikinetic or orthokinetic aggregation (bridging flocculation by polymers, salt-induced coagulation, heteroaggregation, etc) and ii) when addressing fundamental issues such as fractal growth.

Some of the simulations and theoretical models used to investigate these dynamic processes will be presented. The models depend upon whether the problem under consideration is defined at a microscopic or mesoscopic level and on the appropriate degree of complexity and rigour that is required to solve real practical problems of interest.


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