Nanocomposites and nanomaterials

Flocculation ability of nanoscale complexes based on chitosan

A.F. Tymchuk, V.V. Tymchuk

Faculty of Chemistry, Odessa National University, Dvoryanskaya str. 2, Odessa, Ukraine,65026, Tymchuk@onu.edu.ua.

Chitosan has a complex of environmental and physic-chemical properties: biodegradability, playback of the raw material base, reaction and complexing ability, compatibility with living tissues without toxicity. Researches had shown that chitosan can be used for sorption from aqueous solutions of surfactants [1], heavy metals and for flocculation of suspensions.

The aim of our researches was to study the flocculation ability of the complexes based on chitosan and surfactants.

As a model system, we used an aqueous suspension of kaolin, in which the surface layer of the particle has a negative charge due to the silanol groups. Kaolin was dried to constant weight at 100 ° C, and kept in a desiccator. The concentration of the dispersed phase in the suspensions was 0,3-7,0 %. Before testing the slurry was stirred for uniform distribution of particles. The process of formation nanoscale complexes based on chitosan in solution with the addition of anionic surfactants (sodium alkylsulfates) was made previously. The existence of polymer-colloid complexes chitosan-anionic surfactants in solution was accepted of the changes of surfactant and rheological features. Reducing the viscosity shows minimized polyelectrolyte macromolecules [2].

It was defined that the presence of surfactant in the nanocomplex causes a change in its flocculating ability. The surfactant can have a flocculating or stabilizing effect. This is determined by the nature of the functional groups and the conformation of macromolecules of chitosan, a surfactant`s nature, the nature of the active centers of the surface of solids. It is achieved full coverage of the particle surface in dilute suspensions. Flocculant adsorbed on a few particles and aggregates them on the mechanism of formation of specific bridges. To destabilize concentrated suspensions is enough to take less of chitosan and less quantity of chitosan and surfactant. In this case are formed friable floccules, which are destroyed in the process of sedimentation.

Using of polymer-colloid complexes chitosan-anionic surfactants is making a positive contribution to improving the efficiency of the process of flocculation of suspensions compared with chitosan.

1. *Holmberd K., Jonson B., Kronberg B., Lindman B.* Surfactants and Polymers in Aqueous Solution. – New York, 2004. – 250 P.
2. *Tymchuk A.F.* Mechanism of Formation of Complexes in the Surfactant –Polyelectrolyte system /Issues of Chemistry and Chemical Technology. – 2015. – V.3 (101), p. 49-54.