Nanochemistry and biotechnology

Nanostructured flocculants Dextran-graft-Polyacrylamide. Effect of internal molecular structure on flocculative efficiency

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Branched nanostructured copolymers Dextran-g-Polyacrylamide (D-g-PAA) in uncharged and anionic form were synthesized, characterized and tested in flocculation aim in comparison with linear PAA. The polymers differ in conformation of grafted polyacrylamide chains determining a molecular compactness. Kaolin clay dispersion with high content (more than 60%) of particles less than 2 μm in size which difficult settle down was used as model system. It was shown that branched copolymers exhibited high flocculation activity in noncharged and ionic forms. In contrast to linear polymers not only the size of branched macromolecule polymer-flocculants, but its molecular nanostructure affected the parameters (sedimentation rate and degree of supernatant clarification) of flocculation process. The degree of supernatant clarification for branched polymers at optimal flocculants concentrations was comparatively higher than for linear PAA. The branched polyelectrolytes Dextran-graft-(Polyacrylamide-co-Polyacrylic acid) were less efficient in clarification but rather more effective in sedimentation rate in comparison with noncharged Dextran-g-Polyacrylamide copolymers. It was shown that D-g-PAA in ionic form with the lower grafting efficiency and long PAA grafts ensured the highest degree of supernatant clarification and the highest rate of the suspension sedimentation.