Abstract

The aim of the diploma thesis is to analyze the mechanisms involved in the coagulation of peptides and proteins contained in cellular organic matter produced by *Microcystis aeruginosa*, and to describe their influence on the coagulation of hydrophobic kaolin suspension. According to the results of jar tests, the coagulation effectiveness and removability of COM peptides/proteins and kaolin particles are heavily dependent on pH value which determines charge characteristics of peptides/proteins, kaolin and hydrolysis products of coagulant and therefore the prevailing mechanisms of interactions between them. Efficient coagulation and the highest removal of COM peptides and proteins were achieved in the pH range of 4-6 due to charge neutralization of peptide/protein negative surface by positively charged hydrolysis products of ferric coagulant. Peptides and proteins contributed to the coagulation of kaolin particles under the reaction conditions mentioned above, too. Charge neutralization and adsorption were found to be the dominant coagulation mechanisms under these conditions. At a low COM/Fe concentration ratio (COM/Fe < 0.33), adsorption of peptides/proteins onto ferric oxide-hydroxide particles, described as the electrostatic patch model, enabled the coagulation in the pH range of 6-8. On the contrary, at a high concentration ratio of COM/Fe (COM/Fe > 0.33), steric stabilization reduced the effectiveness of coagulation at pH 6-8. At pH around 6.2, the coagulation process was disrupted due to the Fe-peptides/proteins complexes formation. The maximum ability of peptides and proteins to form soluble complex compounds with Fe was observed around pH 6, when the binding capacity of peptides/proteins reached 1.38 mmol Fe per 1 g of peptide/protein DOC. Through affinity chromatography, complex forming peptides and proteins with affinity to Fe of relative molecular weights 1, 2.8, 6, 8, 8.5, 10 and 52 kDa were isolated.

Keywords

AOM – Algal Organic Matter; Binding capacity; Coagulation; COM – Cellular Organic Matter; Fe-peptide/protein complexes; *Microcystis aeruginosa*; Peptides/proteins.