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Effects of cationization hybridized biopolymer from Bacillus subtilis on flocculating properties

Abstract

Bacillus subtilis isolated from palm oil mill wastewater was able to produce biopolymer with high flocculating activity in treating kaolin clay suspension (Al2Si2O5(OH)4). Hybridization of the biopolymer with monovalent, divalent, and trivalent metal ions could enhance the flocculating activity. Hybridized biopolymer with divalent metal ion (Ca2+ or Mg2+) obtained the highest flocculating activity compared to that of monovalent (K+) and trivalent (Al3+) metal ions. Biopolymer hybridized with Ca2+ and Mg2+ ions achieved 71.61 and 62.72% flocculation efficiency, respectively, at dosage of 600 mg/L. Electron configuration of the metal ions is the prime factor that affects the formation of bonding between biopolymer and kaolin clay suspension. Under optimum growth condition, B. subtilis was able to produce 4.15 g/L of purified biopolymer with multivalent metal ion hybridization. CHNS/O analyzer has been used to analyze the ratio of C:H:N:S:O elements contained in the biopolymer. Fourier transform infrared spectrum has been used to analyze the functional group of biopolymer and reaction between hybridized biopolymer and kaolin clay suspension.

Keywords

Bacillus subtilis; Biopolymers; DNA; Kaolin clay suspension; Microbial growth; Water pollution