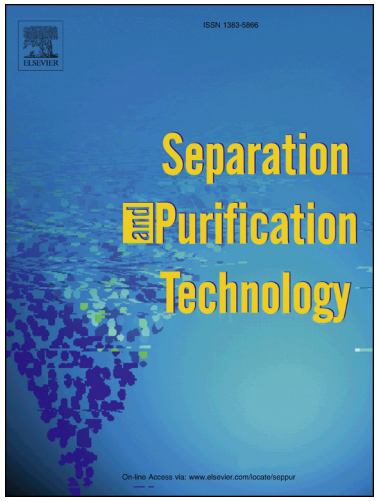

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Flocculation performance of cationic polyacrylamide with high cationic degree in humic acid synthetic water treatment and effect of kaolin particles

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Abstract: In current research, the flocculation performance of cationic polyacrylamide flocculant PAMC with high cationic degree was investigated in HA synthetic water treatment, and the effect of kaolin particles was studied in kaolin-HA flocculation. Influencing factors, such as pH, PAMC dosage, initial HA concentration, cationic degree, stirring speed and stirring time, were investigated and optimized for HA removal efficiency. Two-dimensional fractal dimension of the flocs was analyzed based on flocs images, and FTIR analysis was accomplished to understand chemical stuctures of the flocs. Three-dimensional excitation emission matrix spectra was measured to analyze the changes in organic composition and concentraion. Finally, the HA and kaolin-HA synthetic water flocculation mechanism were studied and summerized based on analysis of zeta potential and pH. The results showed that 80.7% and 91.2% of HA removal efficiency was achieved in HA and kaolin-HA flocculation process by using 12.5 mg/L and 4~6 mg/L of PAMC, respectively. Moreover, partial colloidal HA was absorbed by kaolin particles before flocculation and was removed in flocculation through synergetic effect from kaolin particles. Charge neutralization and bridging effect was confirmed to be dominant in acidic and alkline environment, respectively.

Keywords: cationic polyacrylamide, flocculation, humic acid, kaolin, flourescence spectra

1. Introduction

As a basis material for the survival of human beings, fresh water resource is gradually contaminated with the development of industry and economy in the world. The presence of organic and inorganic pollutants in surface water causes the deterioration of water quality [1]. Generally, organic substances can be degraded in natural waters by aquatic microorganism and photolysis, generating a large amount of humic substances which account for