Flocs of fly ash-silicon-ferric coagulant based on the fractal dimension and research on flocculation

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ABSTRACT
Fly ash-silicon-ferric coagulant prepared with fly ash extract and K₂FeO₄ by co-polymerization is a new kind of inorganic polymer coagulant for lead wastewater treatment. Basicity and pH value, as important parameters, played a vital role in the preparation and polymerization of fly ash-silicon-ferric coagulant. In this experiment, fly ash-silicon-ferric coagulants were prepared with different basicities, pH values and molar ratios of Si/FeO₂/C0₄. The objective of this work is to study the influence of basicity, pH and molar ratio of Si/FeO₂/C0₄ on physico-chemical properties and surface morphology of fly ash-silicon-ferric coagulant, and to research the influence of dosage and pH in raw water on the coagulation performance as well. To do so, scanning electron microscope and X-ray diffraction analyses were used to investigate the surface properties and morphology of flocs in coagulation based on the fractal dimension. Transmission electron microscope and infra-red spectroscopy were used to characterize the structure of fly ash-silicon-ferric coagulants. Results showed that the coagulant possessed branches shape structure. The comparison of coagulation efficiencies for turbidity, color, and Pb²⁺ was investigated by batch experiments. The results showed that the removal efficiencies of turbidity, color, and Pb²⁺ by fly ash-silicon-ferric coagulant were excellent in a lower dosage. The good coagulation efficiencies were 96% for Pb²⁺ removal, 98% for turbidity removal, and 90.5% for color removal.

Keywords: Fly ash-silicon-ferric; Coagulants; Flocs; Coagulation process

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