Impact of recycling alum sludge on coagulation of low-turbidity source waters

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ABSTRACT

This research project evaluated the recycling performance of alum sludge (AS), formed during sedimentation process in drinking water treatment, to enhance coagulation of low-turbidity source water. The results indicated that the recycling of AS effectively enhanced coagulation, when the optimal blended water turbidity was in the range of 13.6–21.7 NTU, with solid content of 0.072–0.124%. Furthermore, recycling AS could reduce up to 40% of fresh coagulant dosage in coagulation–sedimentation process. Bench-scale experiment results showed recycling AS prior to coagulation had insignificant effect on effluent water quality for all measured parameters: color, NH3-N, COD Mn, UV254, aluminum, and manganese. Scanning electron microscopy evidence revealed that the floc structures with AS were more smooth and more compact than that without AS. It was postulated that the aluminum hydroxide precipitate in AS provide nucleating sites for physical collision and that sweep coagulation might play a key role in the enhancement of coagulation in low-turbidity source water.

Keywords: Recycle; Alum sludge; Blended water; Coagulation; Floc structure

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