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Turbidity removal improvement for Yangtze River raw water

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ABSTRACT

Coagulation-flocculation followed by sedimentation and filtration is the most commonly used water treatment process, in which turbidity or particle removal is strongly dependent on proper coagulant dosage, flocculation mixing time, mixing intensity (Gt), and effective size (ES) of filter media. Jar tests and filtration column tests were preformed in this study to evaluate the turbidity removal of the Yangtze River raw water that has medium turbidity and low dissolved organic matters. The new internal standard of 1 NTU for settled water and 0.2 NTU for outlet water were targeted. Operational conditions of primary flocculation (coagulant amount, mixing time and Gt), secondary flocculation, and filter media ES, were tested. Results showed that under the same amount of coagulant, longer flocculation time and higher Gt with tapered mixing can enhance the turbidity removal. The optimal dosage and Gt were estimated as 12 mg l^{-1} PACL and 29,000, respectively. Secondary flocculation further reduced the turbidity of settled water by 80%, suggesting that the smaller particles retained in the primary settled water was focculable. Compared to using 0.95 mm ES, using 0.65 mm ES as filter media obtained higher turbidity removal and can lower the residual turbidity to 0.15 NTU.

Keywords: Coagulation; Filtration; Optimization; Turbidity; Particle size; Yangtze River

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