THE COMPARISON OF IGH/LOW TURBIDITY REMOVAL BY FERRIC SALT USING EXPERIMENTAL DESIGN

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Abstract

The optimum operation conditions in conventional coagulation process were mainly conducted by jar-testing as the relevant parameters was controlled. However, many parameters , for example, the intensity and time of agitation etc., have some significant effects on jar-testing. Consequently, a convenient and effective method was so important for water treatment to evaluate efficiency of coagulation. In this research, 2^k Fractional Factorial Design was applied to find the important factors from four parameters, including intensity of agitation , time , coagulant dosage and pH in high/low turbidity. Then, the range of optimum operation could be found by Central Composition Design.

From the results of 2^k Fractional Factorial Design, the coagulant and pH both were dominant parameters in turbidity removal of high/low kaolin concentration by ferric coagulant. Moreover, the turbidity removal had negatively relationship with coagulant in high kaolin concentration, and positively with pH. However, the above result mentioned was exactly opposite to low tkuolin concentration.

For high and low kaolin concentration, the range of optimum operation for pH and coagulant dosage had two region in this experiment. The former was 9.2~10, 4.9~6.8 for pH and 15~30 mg/L, 85 mg/L for coagulant, respectively. The latter was 8.05~9.8, 4.3~5.2 for pH and 2~26 mg/L, larger than 74~90 mg/L for coagulant, respectively. And the turbidity removal in high kaolin concentration was higher about 7~10% than low kaolin. It could be predicted that high kaolin could serve more nucleus than low kaolin while ferric salt hydrolyzed to form ferric hydroxide.

Key Words:2^k Fractional Factorial Design; Central Composition Design; Nucleus