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Increase the Turbidity Removal Efficiency in Raw Water Using Different Coagulation Process in Drinking Water Treatment: A Case Study in Water Treatment Plant of Kandana

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Abstract

Coagulation process is a most important part in the water treatment process. However, in the process of water treatment in water treatment plant Kandana, there is a problem on coagulation under higher and lower levels of turbidity using only Alum ($\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{H}_2\text{O}$). This research study was conducted to improve coagulation process to increase the turbidity removal efficiency under higher (>80) and lower (<8) turbidity conditions. Therefore, the objectives of the study are, to study the proper coagulation process for low and very high turbidity levels in source water under the efficiency of Alum with anionic polymers (Polyacrylamide) and to study the efficiency of Alum with pre-lime (Calcium hydroxide) usage in the coagulation process. Water samples were collected from the intake when the turbidity level was high and low and sample size was 50 L per once. The average optimum Alum dose of the low turbidity levels was determined by conducting jar tests. Optimum Alum dose of the low turbidities was used to determine the optimum lime dose and the effective polymer adding method and the optimum polymer dose for the low turbidities. Chemical and physical parameters were tested for raw water samples and settled water samples. Above same procedure was conducted for the high turbidity samples. As conclusions, there was not a considerable difference of final turbidity among the addition of Alum only, addition of pre-lime with Alum and addition of polymer with Alum for low turbidity raw water. Therefore, adding polymer and pre-lime with Alum have not given an efficiency for the low turbidity raw water. According to the results of high turbidity raw waters there was a considerable difference of final turbidity among the addition of Alum only, addition of pre-lime and Alum and addition of polymer and Alum. Adding polymer and pre-lime with Alum is effective for high turbidity raw water. Adding polymers with Alum more effective than the adding pre-lime with Alum for high turbidity raw water. There was a considerable pH deference by lime and polymer coagulation in high turbidity raw water.

Keywords: Turbidity, Raw water, Coagulation, Treatment, Jar test