

## Optimization of the Drinking Water Treatment Process Improvement of the Treated Water Quality by Using the Sludge Produced by the Water Treatment Plant

**Authors :** M. Derraz, M. Farhaoui

**Abstract :** Problem statement: In the water treatment processes, the coagulation and flocculation processes produce sludge according to the level of the water turbidity. The aluminum sulfate is the most common coagulant used in water treatment plants of Morocco as well as many countries. It is difficult to manage Sludge produced by the treatment plant. However, it can be used in the process to improve the quality of the treated water and reduce the aluminum sulfate dose. Approach: In this study, the effectiveness of sludge was evaluated at different turbidity levels (low, medium, and high turbidity) and coagulant dosage to find optimal operational conditions. The influence of settling time was also studied. A set of jar test experiments was conducted to find the sludge and aluminum sulfate dosages in order to improve the produced water quality for different turbidity levels. Results: Results demonstrated that using sludge produced by the treatment plant can improve the quality of the produced water and reduce the aluminum sulfate using. The aluminum sulfate dosage can be reduced from 40 to 50% according to the turbidity level (10, 20, and 40 NTU). Conclusions/Recommendations: Results show that sludge can be used in order to reduce the aluminum sulfate dosage and improve the quality of treated water. The highest turbidity removal efficiency is observed within 6 mg/l of aluminum sulfate and 35 mg/l of sludge in low turbidity, 20 mg/l of aluminum sulfate and 50 mg/l of sludge in medium turbidity and 20 mg/l of aluminum sulfate and 60 mg/l of sludge in high turbidity. The turbidity removal efficiency is 97.56%, 98.96%, and 99.47% respectively for low, medium and high turbidity levels.

**Keywords :** coagulation process, coagulant dose, sludge reuse, turbidity removal

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