

Original Paper

## Residual Aluminum from application of Alum and Polyaluminum Chloride in removal of turbidity from turbid water

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### Abstract

**Background and Objective:** Different coagulants including aluminum sulfate (Alum) and Polyaluminum Chloride (PAC) are used for water clarification process and deposition of colloidal particles. The use of coagulants causes some residual aluminum in water. The residual aluminum higher than 0.2 mg/l, has adverse effects on human health and environment. This study was conducted to determine the amount of residual aluminum by applying Polyaluminium chloride and aluminum sulfate for turbidity removal from turbid water.

**Methods:** In this laboratory study, the experiments were run by using synthetic water having low (10-30 NTU), medium (100-130 NTU) and high (200-230 NTU) initial turbidities. Synthetic turbid water was prepared by adding stock kaolin suspension into distilled water. Samples of 1 liter of water were poured on 6 Jars. After adjusting of pH, coagulant was added into each beaker at various doses and agitated at 100 rpm for 30s. The mixing speed was then reduced to 20 rpm and kept for another 15 minutes. The suspensions were left for sedimentation and after 30 minutes of sedimentation, clarified samples were collected from the top of the beakers. Residual turbidity and residual aluminum was measured. The residual turbidity was measured using a Turbidimeter according to Nephelometric method. The residual aluminum was determined by Eriochrome cyanine R method.

**Results:** Residual aluminium in low, medium and high turbidities was 0.006 mg/l, 0.05 mg/l and 0.07 mg/l by applying Polyaluminum Chloride and 0.065 mg/l, 0.15 mg/l and 0.22 mg/l by applying alum, respectively. There was a significant correlation between dosage of Alum and Polyaluminum Chloride with residual aluminium ( $P < 0.05$ ).

**Conclusion:** Polyaluminum Chloride due to low sensitivity to pH variation and less residual aluminum in treated water is more suitable than alum coagulant and could be used as a recommended water coagulant.

**Keywords:** Alum, Polyaluminum Chloride, Turbid water, Residual aluminum

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