

## REMOVAL OF TURBIDITY FROM WATER: SAFE AND COMPETENT METHOD

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**Abstract:** Alum is a coagulant that helps to settle down all floating suspended solids and colloidal particles present in the water. During raining season turbidity of water increases due to the presence of mud and other impurities alum will not remove any inorganic dissolved solids, heavy metals etc from the water it just settle down the colloidal particles and turbidity. In some rural areas they use only tap water as drinking water. But over a time the water began to deteriorate badly and change its colour. Because of this people are confused is it alum water is safe to drink or not. Alum purify water but it change the taste and pH of water from 8.2- 4.8 i.e. from basic or normal water pH i.e. 7 to 4.8 which is highly acidic. So we can use alum in limited quantity.

**Keywords:** Alum, coagulant, remove impurities.

### INTRODUCTION:

Due to rapid urbanization, human activities have had a significant impact on the ecological environment (wang, 2008) Rapid growth of population, urbanization and industrial as well as agricultural activities have increased water pollution, particularly in recent decades. Due to all these activities the demand for clean, safe water is increasing water treatment industry is among the most important industries in many industries such as Iran. Coagulation, flocculation sedimentation, filtration and disinfection are the most common treatment process used in the production of drinking water. Coagulation and flocculation process are of great importance in solid-liquid separation particles (Yukselen and Gregory, 2004) higher efficiency to treat turbid water has made inorganic chemicals favourite coagulants. Not only are they low priced but are also readily available (Duan and Gregory, 2003). Alum is one of the most widely used coagulants in the water treatment industry (Benschoten and the Edzwald, 1990). For water and water-waste treatment, the coagulant used more frequently are the inorganics salt of aluminium. When added to water, Al ions hydrolysed rapidly and form a range of metal hydrolysis species (Jiang, 2015). Turbidity could be described an expression of optical property that would cause light to scatter and get absorbed rather than transmit with no change in direction (Eaton et al, 2005). Materials that cause turbidity in water may include clay, slit along with microorganism; they usually impart cloudy appearance to the water and may associate with some other aesthetic concerns such as colour, odour or taste. Turbidity becomes a major concern as most of the health risks are associated with suspended organic matter, bacteria and other microorganism. As a result of this risk, turbidity removal continues to be a prime objective of coagulation operation (Davis and Edwards, 2014). With the addition of coagulant, turbidity can be removing and thus clear water may be obtained. However, addition of inorganic coagulants to remove turbidity may lead to adverse impact on human health (Simate et al 2012) and

hence the treated water may not be completely fit for drinking purpose. This clear treated water could thus be used for washing purpose once it is free of debris and turbidity, reducing the pressure on clean drinking water as resources. Upon hydrolysis, aluminium hydroxide precipitate is formed; this precipitate sweeps the suspension and is called the sweepfloc coagulation. Since it does not involve any charge reversal this is more popularly used in water treatment (Kim et al 2001). Flocculation is the formation of aggregate colloids destabilised the of requires gentle mixing to allow effective collision between particle to form be can which float heavy removed from water by settlement. Turbidity may contain many contaminants like pathogenic organism. Turbidity are pollutant concern to human health eg. Metals or some synthetic organic salts. Thus chemicals turbidity elimination is necessary to ensure removal of many health related contaminants. In this study the alum is used as a chemical coagulant which is commonly used to reduce the turbidity of synthetic water. The removal of turbidity from water is important because the colloids may directly or indirectly threaten the human health.

### MATERIALS AND METHOD:

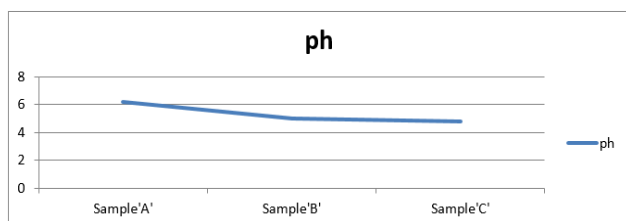
Water from sink is procured to make it turbid. Soil is added by adding soil into the water make the water turbid. Prepare a three water sample in three different beakers having a same turbidity. In beaker 'A' take 200ml of water and stir the water 5 times with the alum-bar and sample 'A' is ready. In beaker 'B' take 200ml of water and stir the water 10 times with the alum-bar, sample 'B' is ready. In beaker 'C' take 200ml of water and stir the water 15 times with alum-bar, sample 'C' is ready. iv) Observe the three beakers after every 5 minutes observation is recorded. When all the impurities of the water sample gets settled down at the bottom of the beaker, water is strained and filtered using filter in a three different beaker, pH is recorded of all observation.

**OBSERVATION:**

After 5 minutes no changes has taken place in sample 'A', whereas sample 'B' has started its purification process and there is faster rate of purification process is observed in sample 'C'. The samples were observed after every 5 minutes and it was observed that the colloidal particle was settling down at the bottom of the beaker and the water was getting purified, the fastest rate of purification is showed by the sample 'C' and then by sample 'B' followed by sample 'A'.

**DISCUSSION:**

We had sample X which was very turbid having pH 8.2. It is basic in nature due to high turbidity. After that we had 3 sample solution 'A', 'B' and 'C'. The pH of sample 'A' was 6.2 which are near to normal water pH i.e. 7 which is neutral. This is because of number of agitation or rotation of alum-bar in the water sample which is about 5 times. The pH of sample 'B' was about 5.0 which is more acidic than sample 'A'. The pH of sample 'C' was 4.8 which is highly acidic then both 'A' and 'B'. This increases the acidity of sample 'B' followed by 'C' is due to number of agitation or rotation of alum-bar in the water sample.

**RESULT:**

Research has finding the csro has conducted extensive research in this matter and in late 1998 found convincing evidence that the use of alum to treat drinking water is safe. Alum used as a flocculent to remove unwanted colour and turbidity from water supplies. But the alum should use in a low amount than is safe. If we will use alum in high amount/high concentration it will cause certain health problem. Side effect of alum is as follows:

- Burn
- Feeling faint
- Feeling of throat tightness
- Fluid accumulation around the eye
- Hypersensitivity drug reaction
- Life threatening allergic reaction
- Puffy face from water reaction

- Shallow skin ulcer

**CONCLUSION:**

The coagulation experiment using alum indicated that coagulation process effectively removed turbidity from synthetic high turbid water by using different agitation dosage. Alum solution are acidic if we use in a less amount it will be safe, otherwise it will harm our health. Application of different dosage and alternative coagulants to meet allowable limits should further be investigated. However, national standards vary among different countries. Investigating the influence of agitation number and settling time for varying dosage and pH conditions on turbidity removal by alum is suggested for future studies.

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**REFERENCES:**

1. Davis CC, Edwards M (2014) Coagulation with hydrolyzing metal salts: mechanisms and water quality impacts. *Crit Rev Environ Sci Technol* 44(4):303–347CrossRefGoogle Scholar
2. Diaz, A., N. Rincon, A. Escorihuela, N. Fernandez and E. Chacin et al., 1999. A preliminary evaluation of turbidity removal by natural coagulants indigenous to Venezuela. *Proc. Biochem.*, 35: 391-395. DOI: 10.1016/S0032.9592(99)00085.0
3. Driscoll, C.T., D. Raymond and D. Letterman, 1998. Chemistry and fate of Al(III) in treated drinking water. *J. Environ. Eng.*, 114: 21-37. DOI: 10.1061/ASCE.0733.9372.1988
4. Duan J, Gregory J (2003) Coagulation by hydrolysing metal salts. *Adv Colloid Interface Sci* 100:475–502CrossRefGoogle Scholar
5. Eaton AD, Clesceri LS, Rice EW, Greenberg AE (2005) Standard methods of the examination of water and wastewater, 21st edn. American Public Health Association, Washington Google Scholar
6. Jiang JQ (2015) The role of coagulation in water treatment. *Curr Opin Chem Eng* 8:36–44CrossRefGoogle Scholar
7. Shen, Y.H., 2005. Treatment of low turbidity water by sweep coagulation using bentonite. *J. Chem. Technol. Biot.*, 80: 581-586. DOI: 10.1002/jctb.1244
8. Van Benschoten J, Edzwald JK (1990) Chemical aspects of coagulation using aluminum salts. I. Hydrolytic reactions of alum and polyaluminum chloride. *Water Res* 24:1519–1526CrossRefGoogle Scholar
9. Wang, J.; Da, L.; Song, K.; Li, B.-L. Temporal variations of surface water quality in urban, suburban and rural areas during rapid urbanization in Shanghai, China. *Environ. Pollut.* 2008, 152, 387–393. [CrossRef] [PubMed]

10. Yukselen, M.A. and J. Gregory, 2004. The effect of rapid mixing on the break-up and re-formation of flocs. J. Chem. Technol. Biot., 79: 782-788. DOI: 10.1002/jctb.1056