

## “Use of Aloe Vera Gel as a Coagulant”

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**Abstract** - Impure water is the root cause for many diseases especially in developing countries. In many regions of the world mostly in villages where aloe vera is easily available, can be used to filter turbid water. Aloe vera is a plant which belongs to Asphodelaceae liliaceae family.

There are two types of coagulants inorganic coagulants and organic coagulants. Alum is used worldwide in the developing countries to treat the water in the process of coagulation and flocculation. Continuous use of Alum in the treatment of water can cause neurological diseases like Alzheimer's disease. Therefore it has become a need to treat the water by using some natural coagulants. Natural coagulants are the coagulants which extracted from natural plants or animals.

In this paper natural coagulant Aloe Vera gel has been used as a coagulant to treat the water. Waste water sample was used. Hardness and turbidity and the effect of variation of dosage and pH were studied on turbidity. The optimal dosage of each coagulant was determined in the beginning and this dosage was further used to find optimal pHs. Turbidity, pH, hardness and TDS of all samples are noted down and recorded. So this study is mainly focused on decreasing alum dose with use of Aloe Vera gel.

**Key Words:** Aloe vera, coagulation, Coagulant aid, Turbidity, pH, TDS.

### 1. INTRODUCTION

Water is a precious and essential natural resource, unevenly distributed on our planet. Freshwater represents only 2.5% of global supplies of water. About 70% of this freshwater quantity are either trapped under ice caps, or disseminated in the form of humidity or steam. Less than 1% of the world's freshwater, about 0.007% of planet's waters, are easily accessible to the various uses for development. The use of natural resources in the process of water treatment, thus constitutes a potential promising ways to reduce on one hand, the high costs and environmental impacts due to the use of synthetic products used previously, and secondly allow as many people as possible access to drinking water. This will constitute therefore a major economic issue for developing countries. In conventional method of coagulation and flocculation alum, ferric chloride, ferrous sulphates were used as coagulant for effective removal of turbidity.

Aloe Vera specifically refers to the Aloe barbadensis Miller plant. Aloe Vera is the oldest medicinal plant ever known and the most applied medicinal plant Worldwide. This is a perennial tropical plant that can be cultivated in drought prone areas. In India, it is scattered in the wild, along the coast of southern India. The leaves are thick and fleshy, green to greygreen, with some varieties showing white flecks on their upper and lower stem surfaces. Aloe Vera plant requires very less water for its growth as it contains 98% of water in its leaves. It contains around 75 nutrients and 200 active compounds including minerals, amino acids, enzymes and vitamins. In this study, in order to expand the range of natural flocculants used in water clarification properties of Aloe Vera gel were analyzed. This study also focuses on use of Aloe Vera gel as coagulant aid with alum for the treatment of low and high turbid water. Initially 800ml sample was withdrawn from each dilution and analyzed for its physiochemical characteristics like pH, TDS, hardness, turbidity, Jar test. Aluminum sulfate (alum) has been the chemical coagulant used for drinking water treatments due to the low costs, attainability and comfortable handling. However, continuous use of alum has caused several problems affecting human health. Studies have shown that aluminum is one of the causes for Alzheimer's syndrome. In addition, aluminum sulphate generates inconveniences because of the large amounts of sediments, which may be regarded as highly hazardous waste. Another adverse characteristic of aluminum sulfate is the permanence in the drinking water life-cycle that are present in natural water resources, animals, people and plants. Owing to various problems generated by the use of alum, new alternatives for drinking water treatments should be studied.

### 2. Materials Used

- i) **Water Samples** For the test conducted by Alum and Aloe vera the raw water samples were collected from the pond nearby Akurdi Station. 20 liters of water was collected from the pond.
- ii) **Coagulant Used:** - In this report natural coagulant Aloe Vera gel has been used as a coagulant to treat the water. Firstly turbid water was treated by using alum, desired results were obtained by using alum. After all the tests done with alum, we tried by doing the tests using aloe vera gel.

**iii) Preparation of Aloe Vera gel**

Aloe Vera leaves were collected from campus of Pimpri Chinchwad College of engineering, Akurdi, Pune. The leaves were washed under the tap water to remove the dirt. Thick green cover or epidermis was carefully separated from the gel part. Then the gel part was blended in mixer to form liquid and preserved in glass bottles.

**3. METHODOLOGY**

**a. Test with Alum**

- pH
- Jar Test
- Turbidity Test
- Total dissolved Solids

**b. Test with Aloe vera**

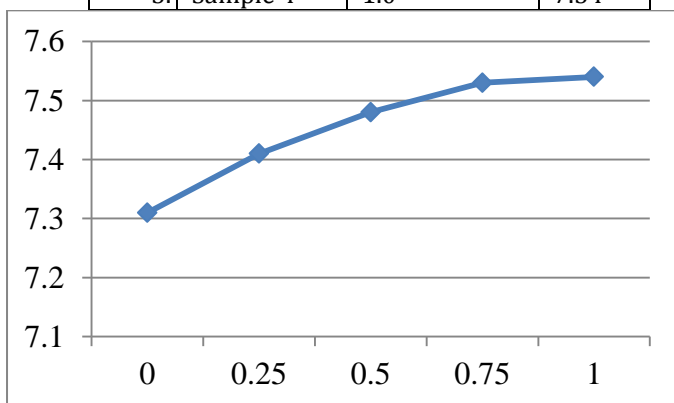
- pH
- Jar Test
- Turbidity Test
- Total dissolved Solids

**4. Details of Tests -**

**i. Ph test with alum**

**Table -1:** Observations of ph test of alum

Sr. No.	Sample	Alum Dosage (ml)	pH Value
1.	Raw Water	0	7.31
2.	Sample 1	0.25	7.41
3.	Sample 2	0.50	7.48
4.	Sample 3	0.75	7.53
5.	Sample 4	1.0	7.54

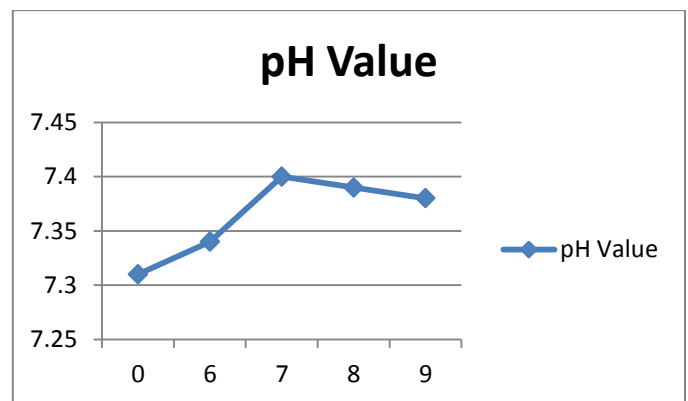


**Chart -1:** Variation in pH value with increase in dose of alum

**ii. pH test with Aloe Vera**

**Table -2:** Observations of ph test of aloe vera

Sr. No.	Sample	Aloe vera gel dose(ml)	pH Value
1.	Raw Water	0	7.31
2.	Sample 1	6	7.34
3.	Sample 2	7	7.40
4.	Sample 3	8	7.39
5.	Sample 4	9	7.38

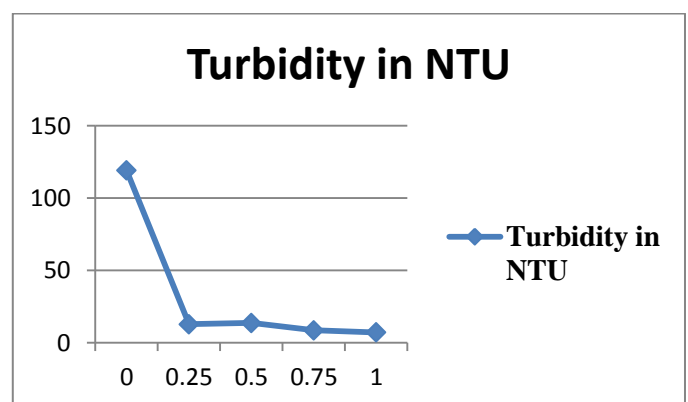


**Chart -2:** Variation in pH value with increase in dose of aloe Vera

**iii. Turbidity test of alum**

**Table -3:** Observations of Turbidity test of alum

Sr. No.	Sample	Alum Dosage (ml)	NTU
1.	Raw water	0	119
2.	Sample 1	0.25	12.7
3.	Sample 2	0.50	13.6
4.	Sample 3	0.75	8.48
5.	Sample 4s	1.00	7.08



**Chart -3:** Variation in NTU value with increase in dose of Alum

iv. Turbidity test of Aloe Vera

Table -4: Observations of Turbidity test of Aloe Vera

Sr. No.	Sample	Aloevera gel Dosage (ml)	NTU
1.	Raw water	0	119
2.	Sample 1	6	24.4
3.	Sample 2	7	24.5
4.	Sample 3	8	22.7
5.	Sample 4	9	20.1

5. Effect on turbidity when using Alum+aloevera

Table -6: Observations of Turbidity test of Alum+Aloe Vera

Sample	Aloevera +Alum	Turbidity (NTU)
Raw water	0	119
Sample 1	6.00 + 0.25	5.15
Sample 2	7.00 + 0.5	4.91
Sample 3	8.00 + 0.75	4.54
Sample 4	9.00 + 1.0	4.43

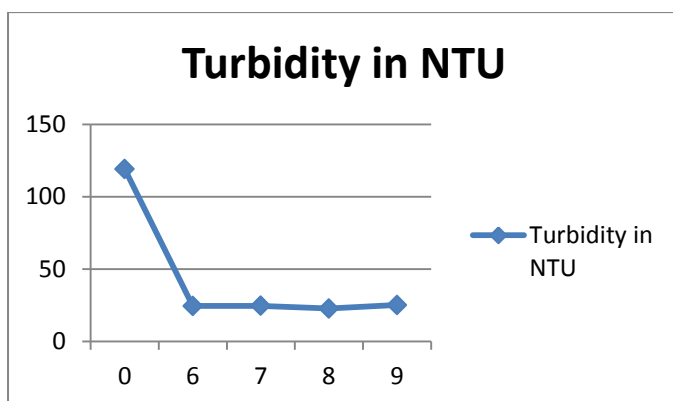


Chart -4: Variation in NTU value with increase in dose of Aloe Vera

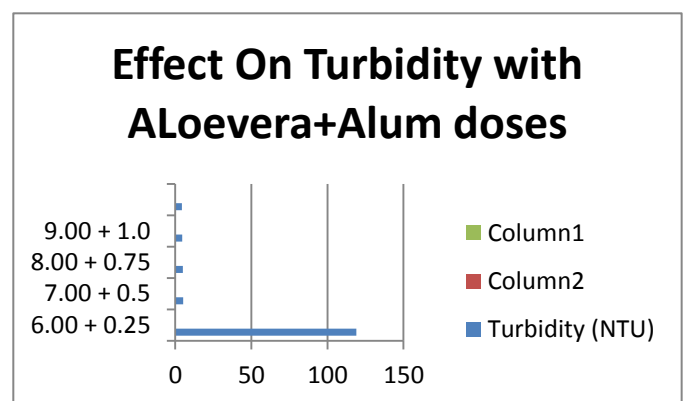


Chart -5: The graph shown below depicts the NTU values of Alum+ Aloe vera gel.

v. Result -

- As shown in Table 1 the value of pH increases with an increase in dosage of alum.
- As shown in Table 2 the value of pH mostly increases with an increase in dosage of aloevera gel.
- As shown in Table 3 raw water with no dose of alum has more turbidity. There is variation in Turbidity with increase in dose of alum. More the dose of alum less is turbidity.
- As shown in Table 4 raw water with no dose of aloevera has more turbidity. There is variation in Turbidity with increase in dose of aloevera. More the dose of aloe Vera less is the turbidity

6. Conclusion

Experiments were carried out using alum as coagulant for waste water. Alum dose was varied in the range of 0.25-1.0 ml/800l and aloevera dose was varied in the range of 6-9ml/800l. In results it was found that for effective turbidity removal Aloe Vera dose required was high as compared to alum dose. The turbidity removal efficiency after using alum and aloevera together as a coagulant was 84%. Chart-5 shows the effect of alum and aloevera dose on turbid water. The results showed that the amount of alum required was high for effective removal of turbidity .Aloe Vera is not as efficient as alum but it can be used as natural flocculent for water treatment mostly in rural areas. Use of Aloe Vera gel as coagulant aid with alum can effectively reduce the amount of alum required. Owing to various problems associated to alum, use of Aloe Vera gel with alum as a coagulant aid can be new alternative for drinking water treatment. The use of Aloevera, whose pharmacological properties have already been demonstrated, would be a possible alternative to chemical flocculants for the same treatment of drinking water in rural areas, only that it could increase the organic matter in the water. Aloe Vera can be promoted as a good natural flocculants in surface water clarification.

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