

# Use of Natural Coagulants in Waste Water Treatment

Manoj U. Deosarkar<sup>1</sup>, Ashish G. Hakke<sup>1</sup>, Nikam Krishna M<sup>2</sup>, Kathewad Kishan<sup>2</sup>,  
Karmude Pratiksha<sup>2</sup>, Mande Dnyaneshwar<sup>2</sup>

<sup>1</sup>Assistant Professor, Civil Engineering, Dr. D Y Patil School of Engineering & Technology, Pune, India

<sup>2</sup>UG Students, Civil Engineering, Dr. D Y Patil School of Engineering & Technology, Lohegaon,  
Pune, India

\*\*\*

**Abstract** - Water is the most vital natural resource that sustains life. Waste water has reduced the quality of water owing to the discharge of effluent into fresh water bodies. Effluent needs treatment to reduce turbidity before discharging into river. Conventional treatment of waste water includes coagulation, flocculation, sedimentation and filtration. Alum is the widely used chemical coagulant but it is a strong neurotoxin and causes Alzheimer's disease and other. Natural coagulants work as an alternative for chemical coagulants. It performs dual function of reducing turbidity as well as it is eco friendly. Addressing the problems of turbidity calls out for a tremendous amount of research to be conducted to identify and establish new methods of purifying water at lower cost and with less energy while the same time minimising the use of chemicals and its impact on environment. The presently study highlights the comparison of some natural coagulants like *Moringa oleifera* (Drumstick), *Cicer arietinum* (Chick pea), *Dolichos lablab* (Indian beans) and *Tamarindus Indica* (Tamarind) and their efficiency in reducing turbidity of waste water.

**Keywords** — Coagulants, Turbidity, Alum, *Moringa oleifera*, *Cicer arietinum*, *Dolichos lablab*, *Tamarindus Indica*

## I. INTRODUCTION

Water is an eventful element for human life and environment and water cannot be easily available in the right condition, right place. Today's quality of water becomes major problem and good quality water has expensive in rural and urban areas. Artificial coagulants are mostly used in waste water treatment but when it is used as a coagulant in waste water treatment, it can caused several bad effect on human health such as intestinal constipation, loss of memory, , abdominal colic's, convulsions, loss of energy and learning difficulties. So for the treatment of the waste water there are various system are used.

Use of natural coagulants can be very much beneficial as compared to chemical or synthetic

Coagulation is the most commonly used method for purifying water. Coagulants can be used in wastewater to reduce suspended solids and other pollutants. Many synthetic coagulants like aluminium sulphate (alum) and ferric chloride are widely used in conventional water treatment processes for turbidity will removal. On the other hand effect in the functioning of living cells but presents some toxic effects in elevated concentrations.

Natural coagulants work better with high turbid. And the use of natural coagulant suitable, easier, and environmental friendly option for water treatment.

Tamarind seed and Cicer Areitinum is grow in India and other countries and it can be great benefit for water treatment and it improve coagulant properties. Tamarind seed And Cicer Areitinum are organic natural polymer.

The present study focus on comparison the coagulant activity and accuracy of dose nearly IS requirement of alternative to treatment of waste water with environmental friendly. The objectives of this studies is to investiget assessment of two different material such as Tamarind seed and Cicer Areitinum.

## Objectives

- (1) To reduce the level of bacteriological contaminants and turbidity from water using locally available natural coagulants,
- (2) To make the water treatment process environmental friendly and easier for household applications.
- (3) Comparison and Assessment of the treatment of all two natural coagulants.

**II. METHODOLOGY**

**A. Materials:**

Waste water was obtained from sewage waste water. Materials are the main constituents which are required to perform experiment the various material used in this study are waste water, natural coagulants (Tamarind seed, Cicer Areitinum)

**B. Method:**

Jar Test was carried out to evaluate the initial and final turbidity values (NTU) before and after the coagulation process using natural coagulation. We have conducted 3 tests to take average turbidity value for a every coagulant dosage.

**III. RESULTS AND DISCUSSION**

***Cicer areitinum (bengal gram)***

From the Table 4.6 the volume of sample 500ml taken at different dosage 0.05, 0.1, 0.15, 0.2, 0.25gm/ml using Cicer Areitinum as natural coagulant in jar test apparatus, the maximum amount of removal percentage obtained was 83.0% at 0.15gm/ml.

Table. 1. Turbidity of sample using Cicer Areitinums

S.No	Volume of sample (ml)	Dosage (gm/ml)	Turbidity reading ( NTU)		Removal of turbidity (%)
			Initial	final	
1	500	0.05	115	27.56	76.0%
2	500	0.1	115	24.95	78.3%
3	500	0.15	115	38.75	83.0%
4	500	0.2	115	24.20	80.8%
5	500	0.25	115	32.2	72.0%

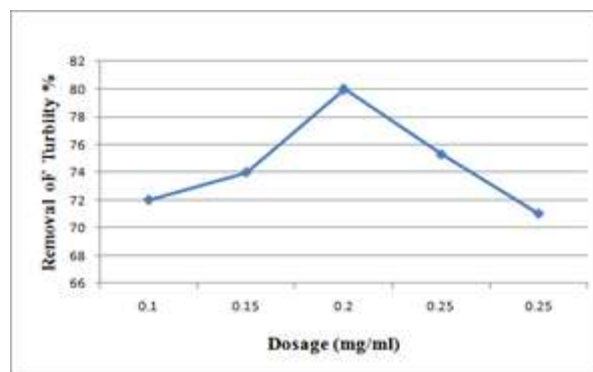


Fig. 1. Cicer Areitinum dosage Vs Removal of Turbidity (%)

***Determination of optimum pH***

The optimum pH was determined at a pH of 7 and the turbidity removal was 84.3% as shown in Table 2. It was found that the percentage of turbidity removal was gradually increased from pH 5 to 9 and the % of turbidity removal was gradually declined as shown in figure 1.

Table. 2. Removal of turbidity in percentage with optimum dosage (C.A)

S.No	Dosage(gm/ml)	pH	Turbidity reading ( NTU)		Removal of Turbidity (%)
			inital	final	
1	0.15	5	115	27.56	74.0%
2	0.15	6	115	24.96	79.0%
3	0.15	7	115	38.75	84.3%
4	0.15	8	115	24.20	80.0%
5	0.15	9	115	32.20	78.4%

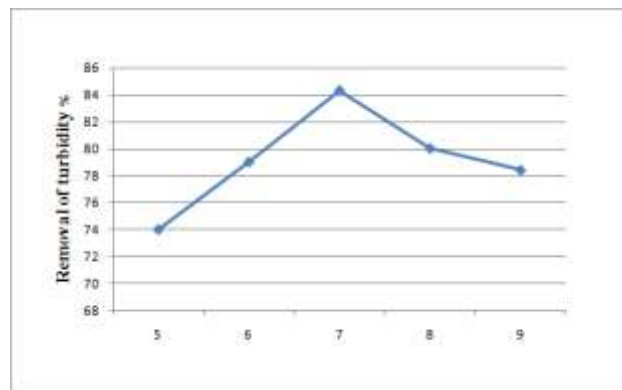


Fig 2. pH Vs Removal of turbidity (%)

**Tamarind seed**

From the Table 3. The volume of sample 500ml taken at different dosage 0.1, 0.15, 0.2, 0.25,0.3gm/ml using Tamarind seed as natural coagulant, the maximum amount of removal percentage obtained was 80% at 0.2gm/ml.

Table 3.Turbidity of sample using Tamarind Seed

S.No	Volume of sample (ml)	Dosage (gm/ml)	Turbidity reading ( NTU)		Removal of turbidity ( %)
			Inital	Final	
1	500	0.1	390	109	72.0
2	500	0.15	390	100	74.3
3	500	0.2	390	78	80.0
4	500	0.25	390	96.3	75.3
5	500	0.3	390	113	71.0

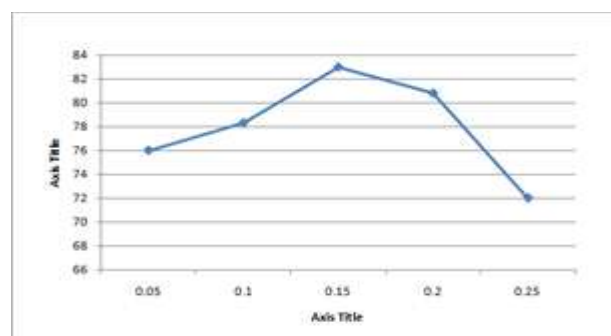


Fig.3. Tamarind seed dosage Vs Removal of Turbidity (%)

### Determination of optimum pH

The optimum pH was determined at a pH of 8 and the turbidity removal was 80.0% as shown in Table 3. It was found that the percentage of turbidity removal was gradually increased from pH 5 to 9 and the % of turbidity removal was gradually declined as shown in figure 3.

Table. 4. Removal of turbidity in percentage with optimum dosage (T.S)

S.No	Dosage (mg/ml)	pH	Turbidity reading ( NTU)		Removal of Turbidity (%)
			inital	Final	
1	0.2	5	115	37.95	67.0%
2	0.2	6	115	28.75	75.0%
3	0.2	7	115	26.10	77.3%
4	0.2	8	115	23.00	80.0%
5	0.2	9	115	35.19	69.4%

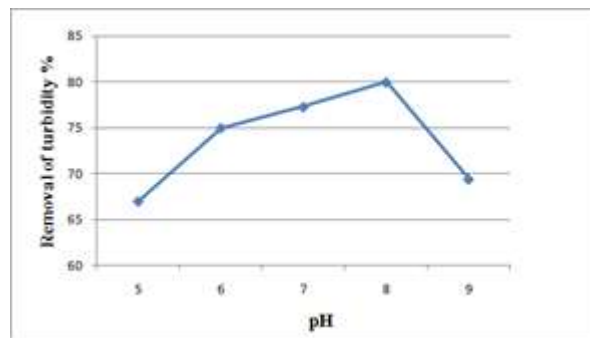


Fig.4 pH Vs Removal of turbidity (%)

### 4.4 COMPARATIVE ANALYSIS OF COAGULANTS

Table. 5.0 Comparison of Two different coagulants

Coagulants	Turbidity removal in %
Cicer areitinum	83.3
Tamarind seed	80

### V. CONCLUSIONS

The following conclusions were drawn from the present studies on the removal of Turbidity of the natural coagulant. From the study, it clearly shows that optimum dose of 0.6gm/ml with optimum pH of 6.

From the study, it clearly shows that the natural coagulant dosage the removal of turbidity was 88.7% at a optimum dose of 0.6gm/ml with optimum pH of 6. The natural coagulant Cicer Areitinum- dosage the removal of turbidity was 83.3% at a optimum dose of 0.15gm/ml with optimum pH of 7. And the natural coagulant Tamarind Seed dosage the removal of turbidity was 80% at a optimum dose of 0.6gm/ml with optimum pH of 8.

**REFERENCES**

- [1] .M. Mangale, S.G.Chonde,A.S.Jadhav, P.D.Raut; Study of Moringaoleifera (Drumstick) seed as natural Absorbent and Antimicrobial agent for River water treatment, J.Nat.Prod.PlantResour., volume 2(1), pp. 89-100 (2012).
- [2] Veeramalini , Sravanakumar. K and Joshua Amarnath. D , “Removal of reactive yellow dye from aqueous solutions by using natural coagulant (Tamarind seed)” , International Journal of Science, Environment and Technology, Vol. 1, No 2, pp.56 - 62, (2012)..
- [3] Ghebremichael, K.A. (2004).“Moringa oleifera seed and pumice as natural alternative materials for drinking water treatment, PhD, KTH land and water resources engineering” *American Water Works Association* .
- [4] S.V.Maruti Prasad, B. SrinivasaRao, A case study on low cost water treatment using Tamarind seed (Drum Stick), Environmental Science, An Indian Journal volume.8(4), pp. [161-166], (2013).
- [5] Baisali Sarkar, P. P. Chakrabarti, A. Vijaykumar, Vijay Kale, “Wastewater treatment in dairy industries possibility of reuse” pp. 141–152, (2006).
- [6] M. A. Aboulhassan, S. Souabi, A. Yaacoubi, “Pollution reduction and biodegradability index improvement of tannery effluents” , Internatinal . Journal Environmental Science Tech., 5 (1), pp. 11-16, (2008).
- [7] Md. Asrafuzzaman, A.N. M. Fakhruddin, and Md. Alamgir Hossain,(2011), “Reduction of Turbidity of Water Using Locally Available Natural Coagulants||” , ISRN Microbiology Volume , Article ID 632189, (2011).
- [8] J.P. Sutherland and G.K. Folkard, M.A. Mtawali and W.D. Grant, In proceedings of 20 th WEDC Conference, Affordable water Supply and Sanitation, pp. 297-299 (1994).
- [9] Babu R, Chaudhuri M. “Home water treatment by direct filtration with natural coagulant” , J Water Health vol. 3: pp . 27–30. (2005)
- [10] Veeramalini , Sravanakumar. K and Joshua Amarnath. D , “Removal of reactive yellow dye from aqueous solutions by using natural coagulant (Tamarind seed)” , International Journal of Science, Environment and Technology, Vol. 1, No 2, pp.56 - 62, (2012).
- [11] Saravanan J., Priyadharshini D, Soundammal A., Sudha G,Suriyakala K, “Wastewater Treatment using Natural Coagulants” SSRG - IJCE Volume 4 Issue 3 – March (2017)
- [12] Babu R, Chaudhuri M. Home water treatment by direct filtration with natural coagulant. J Water Health vol. 3: pp .vo27–30. (2005)
- [13] Tripathi P .N., Chaudhari M., Bokil S.D (2011) “Nirmali seed a naturally occurring coagulant” , *Indian Journal of Environ Health*,18,272–81.
- [14] Jahn, S. A. (2009) ” Using Moringa oleifera seeds as coagulant in developing countries”. *Journal of the American Water Works Association*.96: 43-50.
- [15] G.Vijayaragavan, T.Sivakumar, A.Vimal Kumar, “Application of plant based coagulants for wastewater treatment” , *International Journal of Advanced Engineering Research and Studies*, Vol. I, Issue. I, December(2011).