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To Study the Effect of Mixture of Natural and Chemical Coagulant on Water Treatment

Akshay Pawar[1], Mahesh Solanke[2], Vaibhav More[3], Vikas Sanap[4], Saif Momin[5], S.C. Tandale[6]
[1, 2, 3, 4, 5] *Student, Civil engineering department, KJEI'S TAE, Pune, India*
[6]*Assistant Professor, Civil engineering department, KJEI'S TAE, Pune, India*

Abstract: ***The present study was carried out to confirm the effectiveness of moringa seed powder extracted from mature-dried moringa oleifera and watermelon seed powder which are commonly available in most rural communities for water treatment. The main objective of this work is to evaluate the efficiency of mixture of natural and chemical coagulants in treating water sample. During this study, surface water samples are collected for treatment by mixing moringa seeds, watermelon seeds in powdered form with alum, resulting in an effective natural clarification agent for water treatment. Various doses of moringa seed, watermelon seed powder with varying percentage by weight of alum were taken and checked for the efficiency dose on sample water. Application of this low cost moringa oleifera seeds and watermelon seeds recommended for eco-friendly, Nontoxic, simplified water treatment where rural and semi-urban people living in extreme poverty.***
Keywords: Alum, Coagulation, Moringa Oleifera Watermelon seed

I. INTRODUCTION

Moringa Oleifera is a tropical multipurpose tree that is commonly known as the miracle tree. Among many other properties, M. Oleifera seeds contain a coagulant protein that can be used either in drinking water or wastewater treatment. It is said to be one of the most effective natural coagulants and the investigation on these kinds of water treatment agents is growing nowadays because of their low cost. Watermelon seed has high potential of water treatment by using it in coagulation process. Watermelon seed is a possible replacement for alum and other polyelectrolytes in treating Water. Alum (aluminium sulphate) is widely used for water treatment but it produces high volume of non-biodegradable sludge which cannot be treated properly and had adverse impact on surrounding environment.

II. PROBLEM STATEMENT

However, recent studies have raised doubts about advisability of introducing aluminium into the environment especially concerning about residuals in the treated water large production of sludge volume and Alzheimer's diseases. There is also another problem of alum's reaction with natural salinity present in water leading for reduction of PH and low efficiency in coagulation in cold water. Ferric salts and synthetic polymers have been used as alternatives but those chemicals can be seriously problem becomes many developing country can hardly afford costs as well as low availability of such chemicals for water and waste water treatment. Natural macromolecular coagulants shows bright future and are concerned by many researchers because their abundant source, low price, inequity, multifunction and biodegradation. An easy way to comply with IJRASET paper formatting requirements is to use this document as a template and simply type your text into it.

III. METHODOLOGY

A. General

Experiments are carried out in the laboratory on Moringa Oleifera, Watermelon seed and alum. All coagulation experiments are carried out using collected turbid water. A flocculator jar test apparatus is used in this experiment to coagulate sample of collected turbid water using coagulants.

B. Materials

The materials used in this study are natural coagulants as Moringa Oleifera, watermelon seed. Also a chemical coagulant such as alum is used.

C. Collection Of Sample

The water sample is collected from Khadakwasla Dam.

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D. Preparation Of Natural Coagulants

Seeds of moringa oleifera are collected and allow to dry for several days and then powder is made from that seeds. Same process is done for watermelon seed.

E. Tests On Water

1) pH test.
2) Turbidity test.
3) Jar test.

F. Test Procedure.

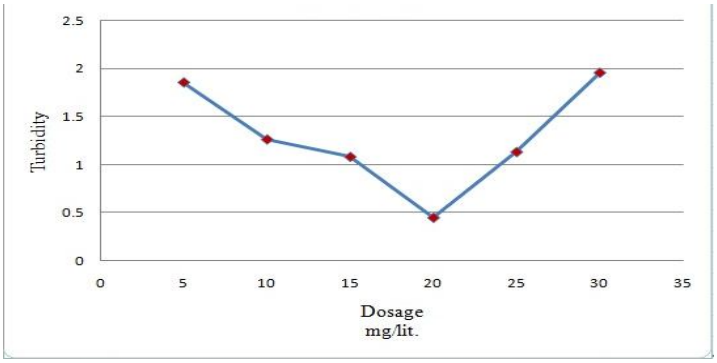
1) Firstly the pH test is carried out by using pH meter on the sample water for determination of pH.
2) Then the turbidity of water sample is determined by using digital turbimeter.
3) Determination of optimum alum dosage by using Jar test.
4) Determination of optimum M.O. dosage by using Jar test.
5) Determination of optimum watermelon seed dosage by using Jar test.
6) After taking out optimum dosage of alum, MO and watermelon seed powder the analysis of mix dosage is done. Then by considering various proportions the same tests are repeated with these proportions. Results came by these tests gives the most efficient mix dosage of chemical and natural coagulation for the treatment of collected water sample.
7) Then by taking the varying proportions of the natural and chemical coagulants the jar tests are carried out to get the optimum dosage of the coagulant.

IV. RESULTS AND DISCUSSIONS

A. Jar Test Results Of Alum Dosage For Collected Water Sample

Sample No.	Alum Dosage (Mg/lit.)	Initial Turbidity (NTU)	Final Turbidity (NTU)	Initial pH	Final pH
1	5	11.1	1.8	6.81	5.56
2	10	11.1	1.2	6.81	5.60
3	15	11.1	1.0	6.81	5.58
4	20	11.1	0.4	6.81	5.68
5	25	11.1	1.1	6.81	5.47
6	30	11.1	1.9	6.81	5.09

Table 1



Graph 1

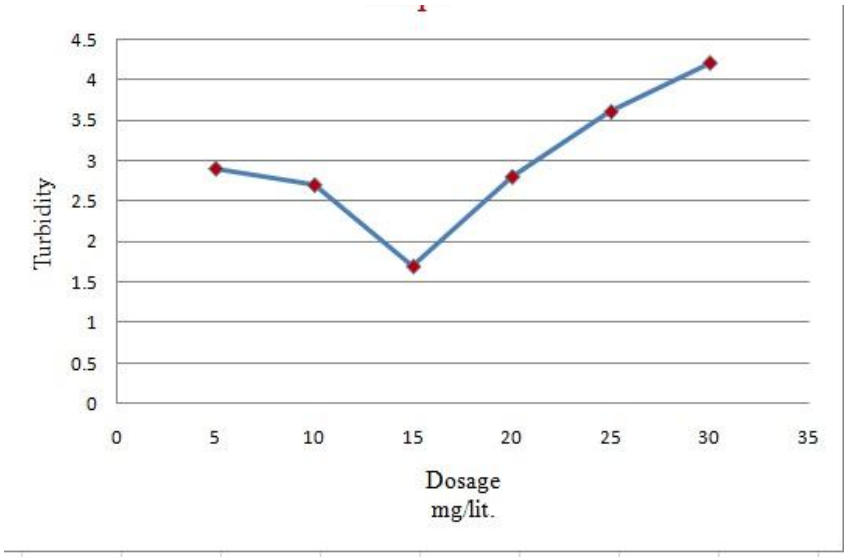
The most effective optimum dosage for alum observed is 20mg/lit.

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B. Jar Test Results Of Mo Seed Powder Dosage For Collected Water Sample

Sample No.	Moringa oleifera (Mg/lit.)	Initial Turbidity (NTU)	Final Turbidity (NTU)	Initial pH	Final pH
1	25	11.1	2.9	6.81	7.32
2	50	11.1	2.7	6.81	7.14
3	75	11.1	1.7	6.81	7.54
4	100	11.1	2.8	6.81	7.61
5	125	11.1	3.6	6.81	7.29
6	150	11.1	4.2	6.81	7.95

Table 2



Graph 2

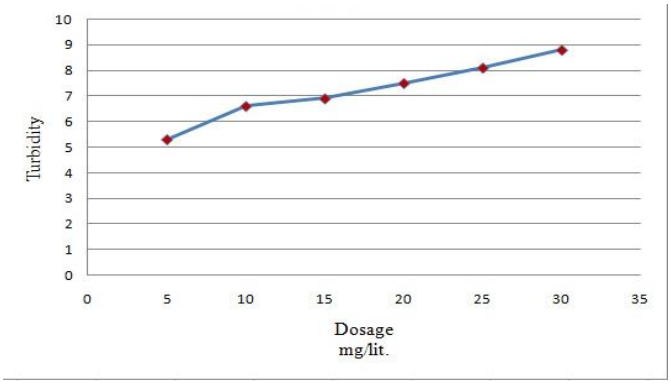
The most effective optimum dosage for Moringa Oleifera observed is 75mg/lit.

C. Jar Test Results Of Watermelon Seed Powder Dosage For Collected Water Sample

Sample No.	Watermelon Powder (Mg/lit.)	Initial Turbidity (NTU)	Final Turbidity (NTU)	Initial pH	Final pH
1	25	11.1	5.3	6.81	6.46
2	50	11.1	6.6	6.81	6.89
3	75	11.1	6.9	6.81	6.94
4	100	11.1	7.5	6.81	6.97
5	125	11.1	8.1	6.81	6.89
6	150	11.1	8.8	6.81	6.91

Table 3

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Graph 3

The most effective optimum dosage for Watermelon Powder observed is 20mg/lit.

D. Mix Proportion Results Of Watermelon, Alum And Mo Powder

In the following results the proportion is decided on the basis of maximum optimum amount of dosage of Mo, i.e. 75 mg/lit. Following four different proportions are used to find minimum turbidity of collected sample:

Alum	:	Watermelon	:	MO
1	:	1	:	1
0.5	:	1	:	1
0.5	:	0.5	:	1
0.5	:	1	:	0.5

Initial Turbidity of water sample: 11.1 NTU.

Sample No.	Alum (mg/lit)	Watermelon seed (mg/lit)	Moringa Oliefera (mg/lit)	Initial pH	Final pH	Final Turbidity (NTU)
1	25	25	25	6.81	6.56	0.9
2	15	30	30	6.81	6.22	0.7
3	18.75	18.75	37.5	6.81	6.37	0.2
4	18.75	37.5	18.75	6.81	5.89	0.5

Table 4

The most effective proportion for mixture of coagulants observed is 0.5: 0.5: 1.

E. Result Of Jar Test On High Turbid Water

A sample of sewage water is collected from a Nallah near Rajaram Bridge. This water sample is very turbid having turbidity of 84.7 NTU. Then this collected sample is allowed to settle down for 12 hours. pH occurred of collected sample is 7.4 which is Normal pH range. Then Jar test is performed on this collected sample by adding most efficient proportion of natural coagulants and chemical coagulant, i.e. alum, gram and MO. In the following results the proportion is decided on the basis of maximum optimum amount of dosage of Mo, i.e. 75 mg/lit.

The initial turbidity of water is 84.7 NTU.

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Alum : Watermelon : MO
0.5 : 0.5 : 1

Alum (mg/lit)	Watermelon seed (mg/lit)	Moringa Oliefera (mg/lit)	Initial pH	Final pH	Final Turbidity (NTU)
18.75	18.75	37.5	7.4	6.42	5.3

Table 5

In the following results the proportion is decided on the basis of maximum optimum amount of dosage of Mo, i.e. 50 mg/lit.

Alum : Watermelon : MO
0.5 : 0.5 : 1

Alum (mg/lit)	Watermelon seed (mg/lit)	Moringa Oliefera (mg/lit)	Initial pH	Final pH	Final Turbidity (NTU)
12.5	12.5	25	7.4	6.92	10.8

Table 6

V. CONCLUSION

From the analysis of results obtained it is observed that the mixture of natural coagulants, i.e. powder of MO seed and watermelon seed powder with the chemical coagulant, i.e. alum is very productive. Use of alum can be reduced in large extent by adding MO and Watermelon seed powder. 0.5: 0.5: 1 for 75mg/lit is the most effective proportion of Alum, watermelon seed powder and MO for the low turbid, medium turbid and high turbid water. Mixture of MO powder and watermelon seed powder also effects on pH of water and turns it to the range of potable water, i.e. 6 to 7.5. It is also observed that these natural coagulants attracts flocks and helps in reducing setting time of flocks in turbid water. For the small water treatment plant the use of mixture of natural and chemical coagulant is most efficient than the use chemical coagulants only. This is the most suitable method to treat water in regions where MO and Watermelon seeds are available in large extent such as South Asian region.

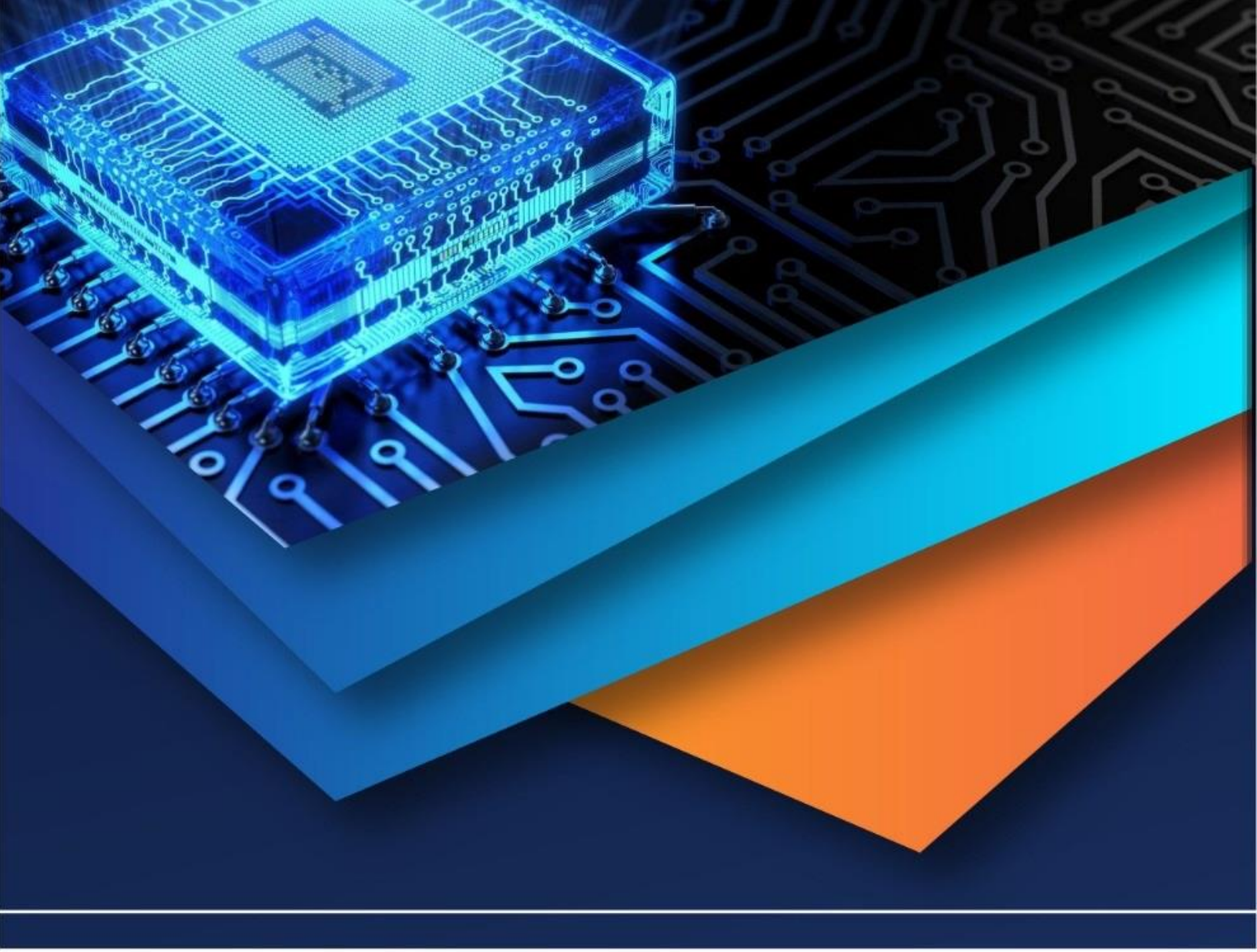
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