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REMOVAL OF TURBIDITY,TDS AND TSS FROM LAKE WATER BY USING NATURAL COAGULANTS

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Abstract :Natural waterways are contaminated due to industrialization , urbanization , population growth etc .,degrading their quality.contaminated waterways cause numerous health and environmental hazards. Therefore,it is imperative to remove contaminants. Coagulation is one of the efficient primary chemical treatment methods that could be used to treat such contaminants. Natural coagulants have gained popularity in the water and waste water treatment industry due to their advantage over chemical coagulants. Natural coagulants are derived from either plants,animals,or micro organisms. This study has elaborated on the nature and mechanisms, and types of natural coagulants. In this review work,many studies have proposed several types of natural coagulants . however , plant -based on their application and efficiency in water and waste treatment. The present study deals with the evaluation of the treatment efficiency of natural coagulants moringa oleifera , and tamarind seeds . the experiments were conducted at various proportions of dosages of natural coagulant (moringa oleifera ,tamarind seeds). the physio -chemical parameters of waste water are measured before and after the treatment to evaluate the removal of efficiency on the major pollutants of concerned in waste water treatment ,such as PH,Turbidity, Total dissolved and Suspended solids. Then, the experimental studies were carried out to find out the optimum dosage of natural coagulants . In this project optimum dosage of moringa oleifera and tamarind seeds is at 60 mg/l. It was found that natural coagulants was effective in reducing turbidity by 70 to98% in surface lake water samples.the maximum removal efficiency in moringa oleifera is higher than tamarind seeds on the major pollutants of concerned in waste water treatment ,such as PH,Turbidity,Total dissolved and suspended solids.

Keywords– : Jar test, pH ,Turbidity, TDS and TSS; Lake water, Natural coagulant, Moringa seeds, Tamarind seeds.

I. INTRODUCTION

Water is base of human life but present situation is not good because water pollution increases day by day by different reasons like industrial untreated discharge in water bodies, religious reasons, navigation in case of leakage of oil during transportation, through waste garbage directly into the water resources which affects the aquatic life. Many types of pollution present in water, turbidity , TDS and also the part of water pollution. So the treatment is required to minimize the water pollution and also to reduce the wastage of water. The present study,discusses about the usage of natural coagulants extracted from moringa seeds and tamarind seeds for the removal of Turbidity,TDS and TSS from lake water.

EXPERIMENTAL WORK

II. MATERIAL AND METHODLOGY :-

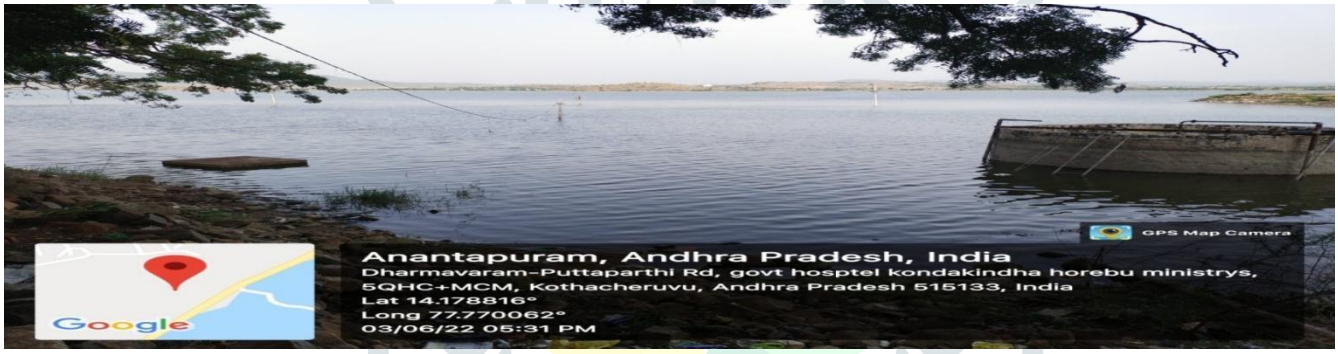
MATERIALS :

Preparation of coagulants :

The husk covering moringa seeds , were manually removed, good quality seeds were selected, and the kernel was grind to a fine power using an ordinary electric blender. A concentration (10mg/l of powder in 100ml) was used through out the study after several trains. The whole mixer was stirred for 30 min at room temperature magnetic stirrer. The suspension was filtered using whats man filter paper. The resultant filtrate solution was used as coagulant. A fresh solution was prepared everyday for reliable results . similarly natural coagulants extract will be prepared.

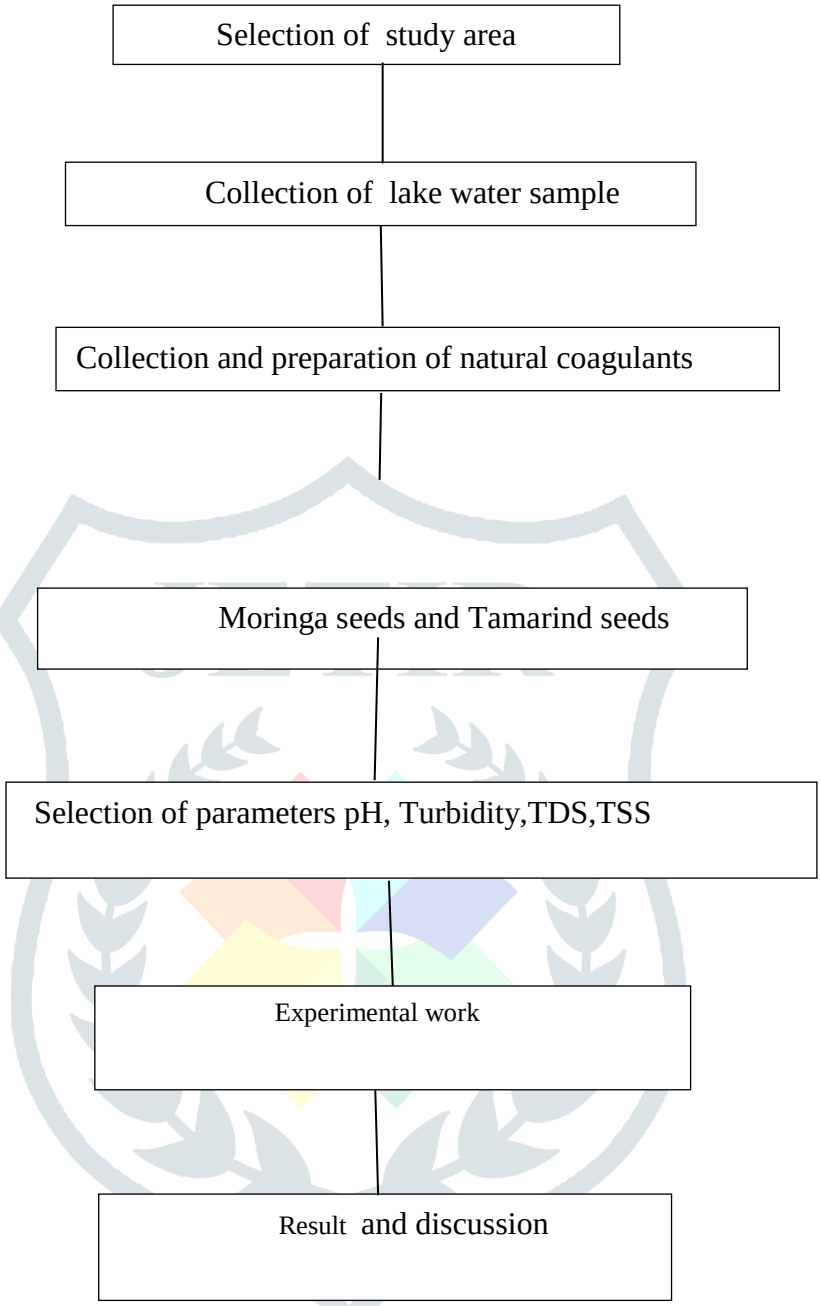
COLLECTION OF LAKE WATER SAMPLES :

Kothacheruvu is the village in sri sathya sai district of the Indian state of Andhra pradesh. It is the headquaters of kothacheruvu mandal in puttaparthi.The crop fields and lands in the village are mostly depends on this lake.There are many small scale industries, educational institution near to kotha cheruvu. Collected the lake water samples to remove the Turbidity, TDS & TSS by using natural coagulants.



Collection of water sample

Methodology



Standardization of pH :

The pH value was analyzed using a digital pH meter with a glass membrane electrode. The variation of pH over time during the course of experiment was analyzed using the pH meter. The pH was initially calibrated using lake water sample of pH values at before treatment value is 8.5 and after adding of coagulation values is 7.4 under suitable condition.

Jar test :

The coagulation studies were prefromed using Jar test apparatus, which allowed for 4 beakers in 1 liter to be agitated simultaneously and rotational speed could be varied(1min 100rpm) . The beakers we are filled with 100ml prepared lake water sample during rapid mixing (1min for 100rpm) and slow mixing (25min for 40rpm) coagulant dosage were adding(10mg/l,20,30,40 upto 80mg/l). the duration of sedimentation was kept 30mins. The supernatant of sedimentation was filtered using whats man filter paper.The removal of Turbidity, the As the settling time increases the residual turbidity get decreased at certain time limit above that period no much variation was found.

Turbidity :

Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in the air. The measurement of turbidity is a key test of water quality. Fluids can contain suspended solid matter consisting of particles of many different sizes. While some suspended material will be large enough and heavy enough to settle rapidly to the bottom of the container if a liquids sample is left to stand (the settable solids), very small particles will settle only very slowly or not at all if the sample is regularly agitated or the particles are colloidal. These small solid particles cause the liquid to appear turbid.

Total Dissolved Solid :

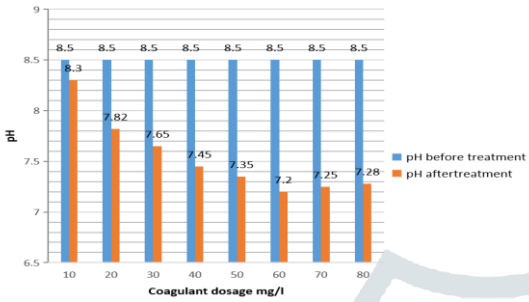
Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter that are dissolved in water.

Total suspended solid :

Total suspended solids refer is one of the method defined analytes. There is no specific chemical formula for a total suspended solid. Quite simply put, TSS is any thing that is captured by filtering the sample aliquot though a specific pore size filter.suspended solids can range from particles of silt or sediment to pieces of plant material such as leaves or stems.

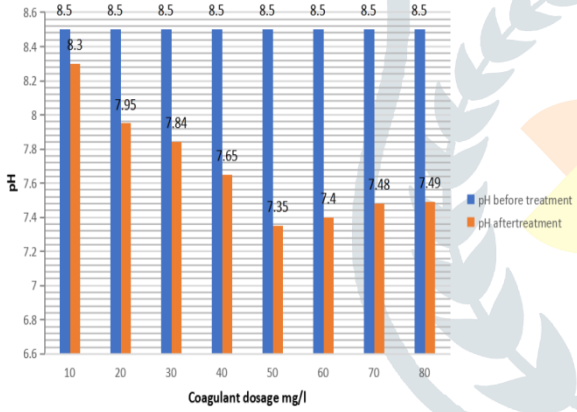
RESULT AND DISCUSSION

pH : The following table shown the pH values of lake water samples before and after treatment by using of Moringa seeds as coagulant.



S.no	Samples	Coagulant dosage (mg/l)	pH Before treatment	pH After treatment
1	Sample-1	10	8.5	8.3
2.	Sample-2	20	8.5	7.82
3.	Sample-3	30	8.5	7.65
4.	Sample-4	40	8.5	7.45
5.	Sample-5	50	8.5	7.35
6.	Sample-6	60	8.5	7.2
7.	Sample-7	70	8.5	7.25
8.	Sample-8	80	8.5	7.28

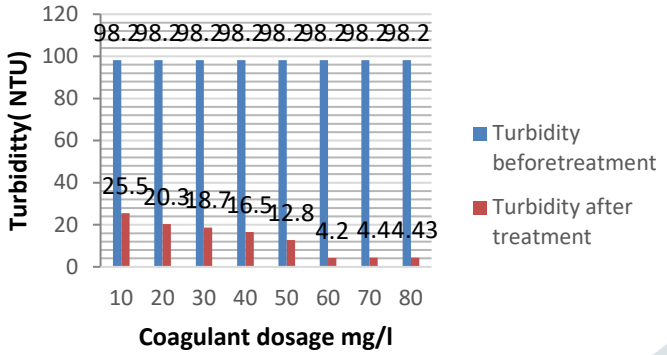
pH : The following table shown the pH values of lake water samples before and after treatment by using of Tamarind seeds as coagulant.



S.no	Samples	Coagulant dosage (mg/l)	pH Before treatment	pH After treatment
1	Sample-1	10	8.5	8.3
2.	Sample-2	20	8.5	7.95
3.	Sample-3	30	8.5	7.84
4.	Sample-4	40	8.5	7.65
5.	Sample-5	50	8.5	7.35
6.	Sample-6	60	8.5	7.4
7.	Sample-7	70	8.5	7.48
8.	Sample-8	80	8.5	7.49

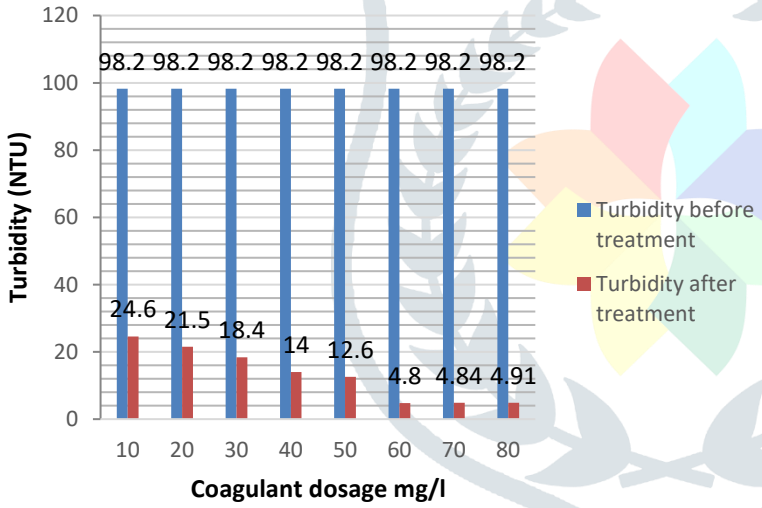
RESULT AND DISCUSSION

TURBIDITY: The following table shown the turbidity values of lake water samples before and after treatment by using of Moringa seeds as coagulant.



S.no	Samples	Coagulant dosage (mg/l)	Turbidity Before treatment	Turbidity After treatment
1	Sample-1	10	8.5	25.5
2.	Sample-2	20	8.5	20.3
3.	Sample-3	30	8.5	18.7
4.	Sample-4	40	8.5	16.5
5.	Sample-5	50	8.5	12.8
6.	Sample-6	60	8.5	4.2
7.	Sample-7	70	8.5	4.4
8.	Sample-8	80	8.5	4.43

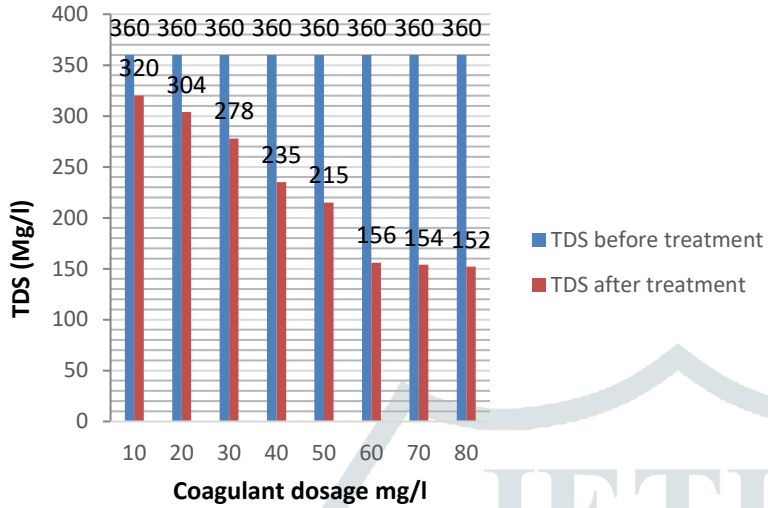
TURBIDITY: The following table shown the turbidity values of lake water samples before and after treatment by using of Tamarind seeds as coagulant.



S.no	Samples	Coagulant dosage (mg/l)	Turbidity Before treatment	Turbidity After treatment
1	Sample-1	10	8.5	24.6
2.	Sample-2	20	8.5	21.5
3.	Sample-3	30	8.5	18.4
4.	Sample-4	40	8.5	14.0
5.	Sample-5	50	8.5	12.6
6.	Sample-6	60	8.5	4.8
7.	Sample-7	70	8.5	4.84
8.	Sample-8	80	8.5	4.91

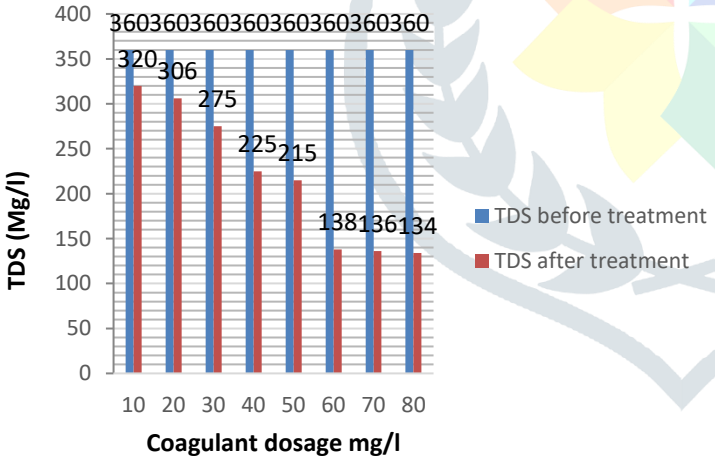
RESULT AND DISCUSSION

TDS: The following table shown the TDS values of lake water samples before and after treatment by using of coagulants Moringa seeds.



S.no	Samples	Coagulant dosage (mg/l)	TDS Before treatment	TDS After treatment
1	Sample-1	10	8.5	320
2.	Sample-2	20	8.5	304
3.	Sample-3	30	8.5	278
4.	Sample-4	40	8.5	235
5.	Sample-5	50	8.5	215
6.	Sample-6	60	8.5	156
7.	Sample-7	70	8.5	154
8.	Sample-8	80	8.5	152

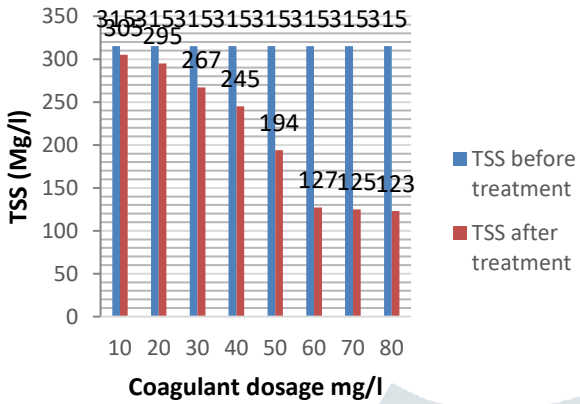
TDS: The following table shown the TDS values of lake water samples before and after treatment by using of coagulants Tamarind seeds.



S.no	Samples	Coagulant dosage (mg/l)	TDS Before treatment	TDS After treatment
1	Sample-1	10	8.5	320
2.	Sample-2	20	8.5	306
3.	Sample-3	30	8.5	275
4.	Sample-4	40	8.5	225
5.	Sample-5	50	8.5	215
6.	Sample-6	60	8.5	138
7.	Sample-7	70	8.5	136
8.	Sample-8	80	8.5	134

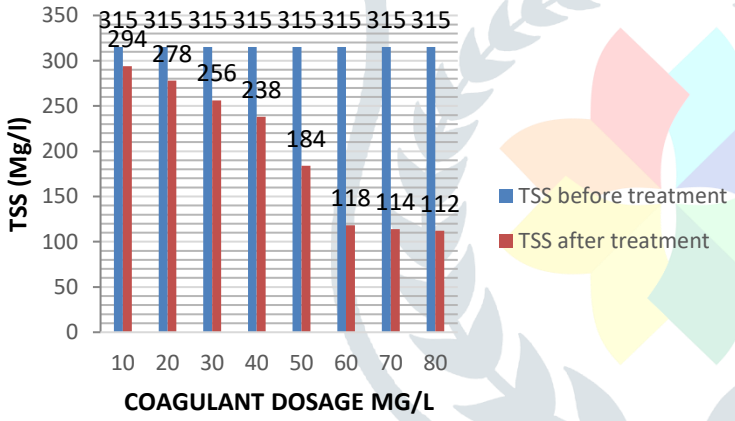
RESULT AND DISCUSSION

TSS:The following table shown the TSS values of lake water samples before and after treatment by using of coagulants Moringa seeds.



S.no	Samples	Coagulant dosage (mg/l)	TSS Before treatment	TSS After treatment
1	Sample-1	10	8.5	305
2.	Sample-2	20	8.5	295
3.	Sample-3	30	8.5	267
4.	Sample-4	40	8.5	245
5.	Sample-5	50	8.5	194
6.	Sample-6	60	8.5	127
7.	Sample-7	70	8.5	125
8.	Sample-8	80	8.5	123

TSS:The following table shown the TSS values of lake water samples before and after treatment by using of coagulants Tamarind seeds.



S.no	Samples	Coagulant dosage (mg/l)	TSS Before treatment	TSS After treatment
1	Sample-1	10	8.5	294
2.	Sample-2	20	8.5	278
3.	Sample-3	30	8.5	256
4.	Sample-4	40	8.5	238
5.	Sample-5	50	8.5	184
6.	Sample-6	60	8.5	118
7.	Sample-7	70	8.5	114
8.	Sample-8	80	8.5	112

CONCLUSIONS

The main conclusions that can be withdrawn from this study are as follows:
More efficient treatment was achieved in Turbidity, TDS and TSS removal from highly turbid lake water.Based on laboratory experiments it was found that natural coagulants was effective in reducing turbidity by 70 to 98% in surface lake water samples.High turbid water can be treated by adding natural coagulants, where the values that were recorded when using moringa seeds and tamarind seed were: effective turbidity 4.8 NTU and 4.2 NTU, removal turbidity efficiency of 97% and 98% respectivly . Increasing the concentration of the coagulants has an efficient effect in increasing the turbidity removal efficiency and reducing the residual turbidity.As the settling time increases the residual turbidity get decreased at certain time limit above that period no much variation was found.It is concluded that the natural coagulants gives better results for turbidity, TDS, and TSS removal.The water treated with natural coagualnts is much usefull for further uses like irrigation, public uses parks, cleaning of roads etc. The scope of natural coagulants in water treating increasing day by day as compared to other chemicals.

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