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AN EXPERIMENTAL STUDY ON USAGE OF ORANGE PEELS AS NATURAL COAGULANT TO TREAT WASTE WATER

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ABSTRACT

Growing population, increased economic activity and industrialization has not only created an increased demand for fresh water but also resulted in severe misuse of this natural resource. Reusing wastewater by effective treatment can contribute to counter the water scarcity. Natural macromolecular coagulants show bright future and are concerned by many researchers because of their abundant source, low price, multifunction and biodegradation. The present study deals with the evaluation of treatment efficiency of orange peels as natural coagulant . The experiments were conducted at various proportions of dosages of the Orange peel power. The physio-chemical parameters of waste water are measured before and after the treatment to evaluate the removal efficiency on the major pollutants of concerned in waste water treatment, such as pH, Turbidity, COD, Total Dissolved and Suspended Solids. Then, the experimental studies were carried out to find out the optimum dosage of natural coagulant. In the present study, The optimum dosage of orange peels was indicated at 90 mg/L, respectively for Chitravathi river water. The Turbidity removal efficiency was 70% to 98% after treatment for dosage 70 to 100 Mg/L, respectively. From this study, high turbidity removal indicates that orange peels powders has the potential for wastewater treatment application.

KEYWORDS: Natural coagulant, water, colour, orange peels.

INTRODUCTION

Growing awareness of pollution problems, dispersal of organic contamination in the environment is becoming a matter of concern. Ever increasing use of chemical and related compounds in each and every field of industry and agriculture summons an urgent need of method for their effective removal from water and wastewater. Synthetic dyes are an important source of water pollutants that are recalcitrant in nature and difficult to degrade. Water pollution causes serious impacts on socio-economic prominence of the people. Azadiracta indica leaves treat water on two levels, acting both as a coagulant and an antimicrobial agent. It is generally accepted that Azadiracta indica works as a coagulant due to positively charged water – soluble proteins, which bind with negatively charged particles (silt, clay, bacteria, toxins etc) allowing the resulting "flocs" to settle to the bottom or be removed by Filtration

METHODOLOGY

1. Collection of textile water samples

Water samples was collected from the Chitravathi river, The Chitravathi is an inter-state river in southern India that is a tributary of the Penna River. Rising in Karnataka, it flows into Andhra Pradesh and its basin covers an area of over 5,900 km2. The pilgrim town of Puttaparthi is located on its banks. It was observed that the sample was highly turbid and dark Black in colour. Sample was collected and stored in clear plastic containers.

2. Preparation of natural coagulant

Peels of orange was sun dried for 1week and dried in Hot Air Oven at 60°C for an hour. Then ground in a grinder and sieved to get the particles size 300 µm.

3. Determination of pH, Turbidity, TSS and TDS

The pH of raw water sample was measured using a digital pH meter. pH of raw water sample was found as 6.78.

4. Determination of Turbidity

The Turbidity of raw water sample was measured using a digital Nephelometric Turbidity Meter. Turbidity of raw water sample was found as 198.1 NTU.

5. Determination of TSS

Total Suspended Solids of raw water sample was found using standard procedure. TSS of raw water sample was found as 147 mg/L. After treatment with NC1 and NC2, TSS was found and discussed in the results.

6. Determination of TDS

Total Suspended Solids of raw water sample was found using standard procedure. TDS of raw water sample was found as 147 mg/L. After treatment with NC1 and NC2, TDS was found and discussed in the results.

RESULTS AND DISCUSSION

The collected waste water was analyzed before treatment with the orange peels as natural coagulant and the following observations were recorded

Table.1. Characterizations of waste water before treatment.

SN.	Parameters	Values
1	pH	6.78
2	Turbidity (NTU)	198.1
3	TSS (mg/lit)	147
4	TDS (mg/lit)	783
5	Colour	Brown

Table.2. Variation of Parameters with increase in coagulant dosage.

Dose in gm	pH	Turbidity (NTU)	TSS (mg/lit)	TDS (mg/lit)	Colour
70	6. 75	15.83	72	489	colourless
80	6. 73	9.9	61	465	colourless
90	6. 86	4.08	56	433	colourless
100	6. 94	7.93	62	459	colourless

7. Effect of coagulant dosage on pH

- It was observed that the change in pH value is small, after use of Orange peels in lake water. After treatment pH has changed from 6.75 to 6.94 Percentage change of pH was found to be 6%, which is very small**.**

8. Effect of coagulant dosage on Turbidity

- It was observed that initial turbidity of Chitravathi river water, was 198.1 NTU. Turbidity removal efficiencies after treatment at a various dosage range from 70 to 99%. The optimum dosage of Orange peels used for turbidity removal (4.08 NTU) was 90 mg/L.

9. Effect of coagulant dosage on TSS

- Due to an application of coagulant on wastewater observed that significant removal in TSS. Initial TSS of collected sample was found as 147 mg/lit. After treatment Orange peels in laboratory the TSS removal at optimum dosage was found as 56 mg/L with removal efficiency of 61 %, respectively.

10. Effect of coagulant dosage on TDS

➢ Due to an application of coagulant on wastewater observed that significant removal in TDS. Initial TDS of collected sample found to be 783 mg/lit. After treatment with Orange peels in laboratory the TDS removal at optimum dosage was found as 433 mg/L with removal efficiency of 44 %, respectively.

CONCLUSION

- The physio-chemical parameters of waste water before and after the treatment with orange peels as natural coagulant was analyzed during the study.
- From the study result it is concluded that the powdered orange peels are very effective in removing Turbidity, TSS, TDS and Colour from the waste water.
- In the present study, Turbidity removal efficiency was found to be 70% and 99% after treatment with orange peels, Respectively for the Chitravathi river water.
- Total Suspended Solids removal efficiency was found as 61 %.
- Total Dissolved Solids removal efficiency was found as 44 %.
- Hence, it can be concluded that Orange peels can be used as coagulants in water treatment.
- The water treated with natural coagulants is much useful 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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