



Treatment of textile waste water by natural coagulant

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Abstract— In this project, preliminary investigation was carried out for the possible use of natural coagulants for treatment of waste water. The industrial wastewater were treated by coagulation-flocculation and sedimentation using dyeing water extracts of Opuntia- Ficus Indica Gel as primary coagulant. The quality of the treated wastewater was analyzed and compared with Alum and gel. The experiments were conducted at various dosages of the dyeing water extract of Opuntia- Ficus Indica gel using jar-test experiment. The optimum dosage of the coagulant dosage was identified. Parameters of quality of the wastewaters were measured before and after the treatment to evaluate the removal efficiency on the major pollutants of concern in waste water treatment, such as BOD, pH, TDS, Turbidity, Hardness, Alkalinity, and Chloride. Result showed that the Opuntia- Ficus Indica gel were efficient as a primary coagulant in wastewater treatment and maintains pH. From the observed results, the Cactus is a suitable dyeing effluent. Compared to Alum, natural coagulants (Cactus Gel) gives better results.

Keywords

Cactus gel, Alum, Textile Waste water, pH, BOD, TDS, Turbidity, Hardness, Alkalinity, Chloride.

1. Introduction

Waste water disposal is the major problem being faced by the society. In developing countries, like India presently, only about 10% of the wastewater generated is treated; the rest is discharged as it into water bodies. Water bodies have an inherent capability to dilute the pollutants which enter the system. However, indiscriminate dumping of untreated sewage and chemical wastes directly into lakes and drains has made these water bodies unable to cope up with the pollutant load. The steady increase in the amount of water used and waste water produced by urban communities and industries throughout the world also poses potential

health and environmental problems. The contaminated waters disrupt the aquatic life and reduce their reproductive capability. The most commonly faced problem in disposal of wastewater is the color and turbidity. Finely dispersed suspended and colloidal particles are responsible for the color and turbidity of the waste waters. Color in water results from the presence of natural metallic ions, humus and peat material, plankton, weeds, and industrial wastes. Suspended and colloidal matter such as clay, silt, finely divided organic and inorganic matter and plankton and other microscopic organisms are responsible for turbid water.

2. Material

a) Alum (aluminium sulphate) , b)Cactus Gel

a) Alum (aluminium sulphate): one of the earliest, and still the most extensively used coagulant, is aluminum sulphate is also known as alum. It is an acidic with light tan to grey in color and available in blocks, lumps and powder. Alum can be bought in liquid form or in dry form. It is readily soluble in water. When alum is added to water, it reacts with the water and results in positively charged ions. The alum makes this very effective primary coagulant.

b) Cactus Gel: Cactus is potentially an effective natural coagulant that is also responsive to environmental and sustainability concerns. Cactus gel (opuntia- ficus indica) with polyelectrolytes in coagulating textile waste water. The study entailed a chemical characterization of the cactus gel alongside conditioning of the waste water with the gel and comparison chemicals, with analysis involving transform infrared spectral analysis and photometry. The findings demonstrated that the juice from the cactus promoted the coagulation of almost all of waste water, enabling liquid and solid separating and easing filtration process.



3. Experimental investigation

The two basic terms which can exactly explains the happenings of using alum and cactus gel in the experiment of coagulation process are flocculation and sedimentation.

3.1 Working Procedure

Take the sample in four beakers. Each beaker having 500 ml added with alum content.5ml,15ml,25ml,35ml respectively. Insert the beakers inside of jar test apparatus. Then start the apparatus by initially maintaining the speed paddles rotate at an angular velocity of 100 rpm. Maintain the speed for 10 minutes then turn off the jar test machine. Allow to settle down the beakers for 10 minutes. Then make an observation of four beakers most clearly. From this optimum coagulant dosage level of the sample has been found out.

Repeat the same procedure to measure the coagulant level using cactus gel.

Then using the samples of alum and cactus gel sample. find out the water quality to be used for industrial purpose. The following tests have been done and the results of the same have been discussed. The tests are pH, turbidity, chloride, hardness, total dissolved solids, alkalinity, dissolved oxygen and biological oxygen demand.

4. Results and discussion

Various parameters of textile industry waste water sample have been tested. The results are plotted by the graph at different dosage level of Alum and Gel.

Table 4.1 Coagulation with alum

S.NO	COAGULANT DOSAGE (ml)	FLOC FORMATION (ml)
1	5	46
2	15	67
3	25	92
4	35	146

Table 4.2 Coagulation with cactus gel

S.NO	COAGULANT DOSAGE (ml)	FLOC FORMATION (ml)
1	5	69
2	15	94
3	25	135
4	35	186

Coagulant vs Flocculation using with Cactus Gel & Alum

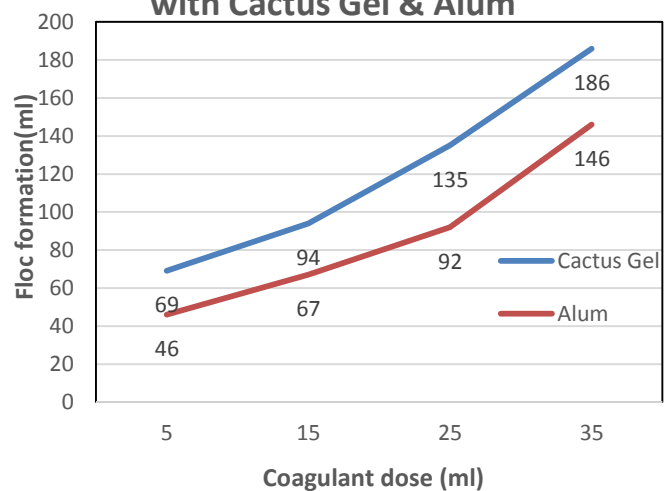


Table 4.3 Comparison of Tests Results

Optimum coagulant dosage (ml)	Parameters	Un Treated	Alum	Cactus gel	Permissible limits
35	pH	5.69	6.35	6.73	6-8.5
	Turbidity	612	394	317	< 500 NTU
	Chlorides (mg/l)	1115	733	803	<1000
	Hardness (mg/l)	450	413	428	500-800
	Dissolved oxygen (mg/l)	0	1.5	2	5-8
	Total dissolved solids (mg/l)	1640	1250	980	<2100
	Biological oxygen demand (mg/l)	14	20	26	<40
	Alkalinity (mg/l)	620	730	690	<1000

5. Conclusion

- In this project the characteristics of Textile waste water were analyzed and they are not within the permissible limits.
- The optimum dosage of natural coagulants Opuntia- Ficus Indica gel the chemical coagulant Alum were studied.
- By using Opuntia- Ficus Indica Gel the maximum efficiency for the removal of Chloride from the Textile waste water was measured as 39%.
- The removal efficiency of pH is 15% using Opuntia- Ficus Indica Gel.

- The removal efficiency of Turbidity is 49% using Opuntia- Ficus Indica Gel.
- There will be no changes in the reduction of Dissolved solids and Biological Oxygen Demand.
- When compared to Alum, Natural coagulant gives best results.
- Because of having greater efficiency in removing impurities and from the economic point of view, Opuntia- Ficus Indica is recommended as a natural coagulant for the treatment of Textile effluent.
- From the results, the natural coagulant can be gainfully used as an alternative of common chemical coagulant.
- Also the natural coagulant can be used with an advantage of replacing alum, the chemical coagulant.

6. Reference

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