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TREATMENT OF DAIRY WASTE WATER USING TAMARIND KERNEL POWDER AS A LOW COST ADSORBENT

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Abstract - *The dairy production is another significant wellspring of waste generation. It is necessary to give essential treatment before discharging the dairy waste to the surface and also to avoid contamination of ground water. These dairy industry effluents are portrayed with extreme COD, BOD, nutrients and so on. Such effluent is dealt with using Tamarind kernel seed as a low cost adsorbent and analysis is to be conveyed to verify the qualities of water similarly to COD, BOD, TDS, TS and turbidity. Experiments were assessed to check the impact of various dosages of adsorbent, rapid mixing contact time and slow mixing contact time. With the use of low cost adsorbent, the polluting influences from dairy waste water can be evacuated all the more effectively. Maximum removal of COD, BOD, TDS, TS and turbidity was obtained at an ideal dosage of 0.105 g/L (90.95%, 94.87%, 93.50%, 94.91% and 86.5% respectively) and maximum removal of COD, BOD, TDS, TS and turbidity was obtained at an ideal rapid mixing contact time of 25 min. (87.84%, 86.75%, 91.75%, 91.43% and 84.9% respectively). The maximum removal of COD, BOD, TDS, TS and turbidity was obtained at an ideal slow mixing contact time of 60 min. (89.65%, 88.48%, 94.4%, 91.2% and 92.78% respectively). The results indicated that the use of tamarind kernel powder as a low cost adsorbent to remove COD, BOD, TDS, TS and turbidity in the treatment of dairy waste water.*

Key Words: **Dairy waste water, Tamarind Kernel powder, COD, BOD, TDS, TS and Turbidity.**

1. INTRODUCTION

Industrial enterprise is spine for improvement of nation. The contamination brought about by modern part is a genuine worry in all through the world. Every modern action, the food sectors have perhaps the most elevated utilization of water and probably the greatest manufacturer of waste material. The dairy production is a case in this regard division. Dairy production is another significant industry in India, along with India positions foremost amongst them, most extreme significant milk delivering country. The dairy production is another significant wellspring of waste generation. The dairy industry include preparing of crude milk into items ,for example, milk, yogurt, cheese etc. and produces lot of wastewater which contains very huge combination of organic substances as, proteins, carbohydrates as well as lipids. Hence, it is expected to give required treatment before release into the environment. The treatment generally classified as aerobic and anaerobic treatment. Huge convergence of pollutants as far as amount and nature of liquid, solids, and gaseous pollutants shows harmful effects on flora and fauna as well as several regions on environment. Untreated industrial waste (lube and oil) causes biologic harms in favor of oceanic life forms, place, creature, as well as similarly, mutagenic and carcinogenic for individual. They release as of various origin to form a film on water surface to facilitate diminish dissolved oxygen level in the water. The goal of this examination is to find out the capacity of these adsorbents, which are Tamarind kernal powder as a low cost adsorbent in expelling pollution from wastewater. It includes the portrayal of adsorbent and the recital investigation of the adsorbent.

Adsorption is an exterior occurrence. The process of devotion regarding effluents particulate in distinction to liquid directed towards outside about concerning with adsorbent. The application of adsorption takes place commonly accompanied in the process of batch application as well as column application.

1.1 SCOPE OF THE STUDY

The dairy production is commonly viewed as biggest wellspring of food management. These industrial effluents are portrayed with extreme COD, BOD, nutrients and so on. Such effluent be dealt with low cost adsorbents and afterward analysis are to be conveyed to verify the qualities of water similar to COD, BOD, TDS, TS as well as turbidity, and so on. Mostly to decrease the untreated consignment of effluent in addition to lessen exterior and ground water contamination with its impacts on atmosphere and human being health. To reduce this issue the application of low cost adsorbents are endeavored to treat dairy wastewater.

1.2 OBJECTIVES OF THE STUDY

- To check the feasibility of use of Tamarind kernal powder as a low cost adsorbent for dairy waste water.
- Utilization of low cost as well as minimally accessible adsorbent resources which are nearby available.
- To establish different constraint of processed and unprocessed dairy effluent like, COD, BOD, TDS, TS and turbidity.
- To reclaim the waste water used for different worth for example, farming, cleaning drains, maintenance and cultivation.
- Treated waste water should be the same as fine as usual water. Subsequently it shall not be manipulate surroundings along with atmospheres.

2. MATERIALS AND METHODOLOGY

2.1 MATERIAL USED

The waste water from the dairy industries is treated by utilizing tamarind kernal powder as a low cost adsorbent which is natural, locally available.

India is considered as world's leading manufacturer of tamarind items, in the production of tamarind. India generates around 0.3 million tons of tamarind yearly, in that amount seed found around 30-34% concerning complete outgrowth. Both fruit and seed of tamarind is a consequence of the trade utilization. The tamarind seed includes the 20- 30 % of seed coat along with the kernal and 70-80 % of endosperm. These seeds are significantly rich in carbohydrates, fat, protein along with valuable amino acids. Tamarind kernel powder leftover as farming dissipate considered for valuable medium to formulate turbid industrialized effluent as purify. Use of alum may cause illness like Alzheimer's, because it increases toxic metal ions while in treatment of water. It is cost-effective compared to alum and other synthetic polymers as it is an agricultural waste. By assessment with alum, tamarind kernal powder is non-hazardous and environmental friendly. As it is regarded as natural waste, it is economical contrasted to use of alum or other artificial polymers.

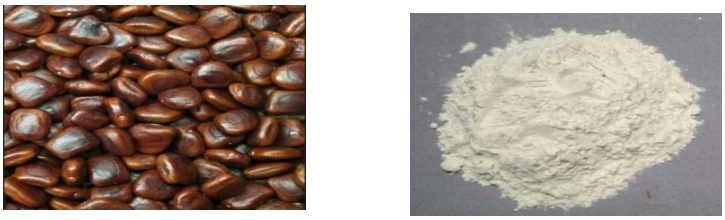

Fig.2.1: Tamarind kernel and Tamarind kernel powder.

2.2 PREPARATION OF TAMARIND KERNEL POWDER

In the treatment of dairy effluents tamarind seeds are utilized as adsorbent agent for expulsion of toxins. At first tamarind were washed with normal water and afterwards distil water to expel impure matter from their shell. Afterwards the tamarind kernels were dehydrated in an oven at 100^0 C for 24 hr. The dried materials were ground utilizing pistol and mortar and subsequently the tamarind kernels are grounded and sieved by using 300 microns to acquire regular size for utilization.

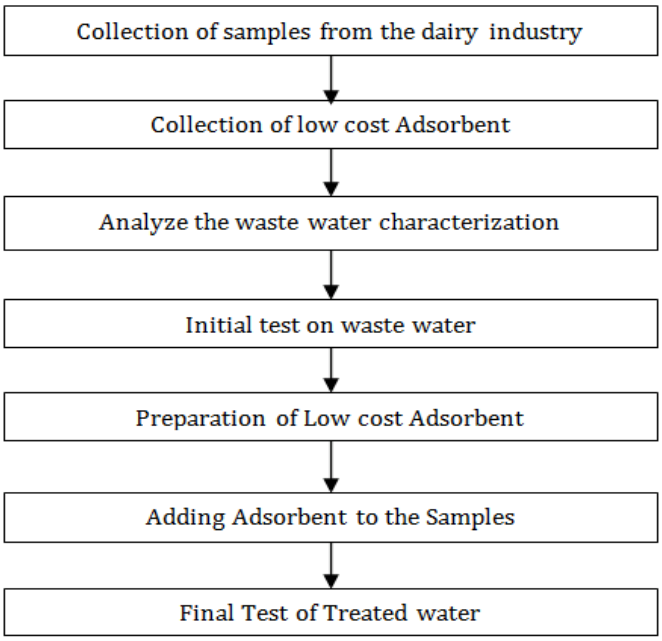

Fig.2.2: Steps followed in Treatment of Dairy Wastewater.

2.3 Experimental Setup

For Batch experimentation studies jar-test apparatus has been used.

1. Jar test is the most broadly utilized trial strategies for coagulation-flocculation. The tests were done in sections, viz. coagulation at different time and coagulation at different dosages.

2. Six jars of 1L capacity were utilized for each part of the investigations to coagulate sample of dairy waste water utilizing low cost adsorbents.

3. By accommodating a series of six numbers of jars along with six spindles steel paddles are used for conducting batch experiment.

4. The sample was blended uniformly, before conducting the jar test experiment. At that point, for expressing initial concentration, the sample have to be estimated for pH, COD, BOD, TDS, TS along with turbidity.

5. By varying rotation speed along with use of different amount of adsorbents were included in the beakers for experimentation.

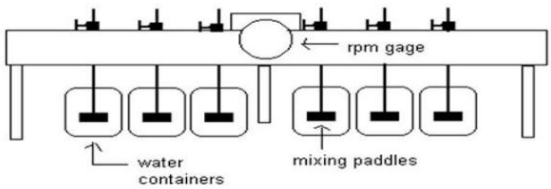

Fig.2.3: Schematic diagram of Jar test apparatus

245 Standard parameters considered for experiments

Summaries of parameters considered for present study are as follows.

Table 2.1: Parameters considered for Tamarind kernel seed powder.

Sl. No	Parameters	Values
1.	Adsorbent dosage, g/L	0.015, 0.03, 0.045, 0.06, 0.075, 0.09 and 0.105
2.	Rapid mixing contact time, min	5 to 35 (at an interval of 5 min)
3.	Slow mixing contact time, min	10 to 70 (at an interval of 10 min)

2.5 Collection and Analysis of samples

Investigation of Waste Water Characterization Variation in groupings of certain parameters for the waste water samples from Dairy waste water sources. The water portrayal factors like COD, BOD, BOD, TDS, TS as well as Turbidity. The initial values for COD, BOD, BOD, TDS, TS and turbidity are 790mg/L, 530mg/L, 1803mg/L, 2532mg/L and 1026 NTU respectively. This investigation done with batch experiments which are concerning with rapid mixing at the rotational speed of 150rpm along with slow mixing towards rotational speed of 30 rpm meant for improving flocculation method as well as sedimentation for a period of 60 minutes.

3. RESULTS AND DISCUSSIONS

3.1 Impact of Tamarind kernel Powder Dosage

This might be remarked by Fig.3.1 for dosage about 0.105g/L of Tamarind kernel powder, concentration of COD, BOD, TDS, TS and turbidity variations in dairy waste water diminishes, beyond which they reached a steady state specification.

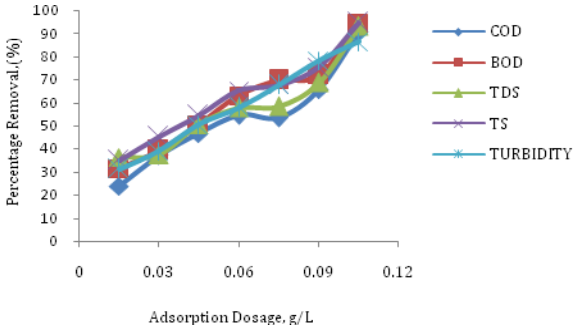

Fig.3.1: Impact of tamarind kernel powder dosage

Further, an ideal dose, that is related with expulsion of residuals such as COD,BOD, TDS,TS along with turbidity prevailed for the dairy waste water are exist as 71.495mg/L , 27.189mg/L, 117.195 mg/L,128.878 mg/L and 136.971 NTU respectively. The percentage contraction in accumulation for expulsion regarding COD, BOD, TDS , TS along with turbidity for a Tamarind kernel powder measurements of 0.105g/L was 90.95 %, 94.87 %, 93.50 %, 94.91 % and 86.65 % respectively.

3.2 Impact of Rapid Mixing Contact Time

Fig.3.2 reveals the impact of Rapid mixing contact time for expulsion of COD, BOD, TDS, TS and turbidity variation in dairy waste water with a dosage of 0.105g/L and also among 25 min. of rapid mixing contact time, accumulation for expulsion regarding COD, BOD, TDS, TS along with turbidity, further that they reaches an steady state condition. For about 25 min. of rapid mixing contact time, percentage contraction in concentration of COD, BOD, TDS, TS and turbidity was 87.84%, 86.75%, 91.75%, 91.43% and 84.9% respectively.

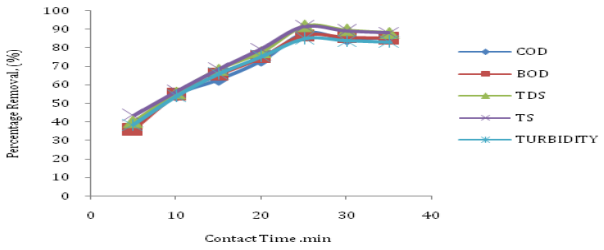

Fig. 3.2: Impact of Rapid Mixing Contact Time

Further, an ideal Rapid mixing contact time, that is related with removal of residuals such as COD, BOD, TDS , TS along with turbidity acquired for a dairy waste water were 96.064 mg/L, 70.225 mg/L, 148.747mg/L , 216.99 mg/L and 154.926 NTU respectively.

3.3 Impact of Slow Mixing Contact Time

This might be remarked by Fig.3.3 about 60 min. of slow mixing contact time, the accumulation of expulsion regarding COD, BOD, TDS , TS along with turbidity diminishes and beyond which they arrived at a steady state condition. Further, an ideal slow mixing contact time that is subsequent with removal of residuals like COD, BOD, TDS, TS along with turbidity prevailed for the dairy waste water were 81.765 mg/L, 61.056 mg/L, 100.968 mg/L, 222.816 mg/L and 74.077 NTU respectively.

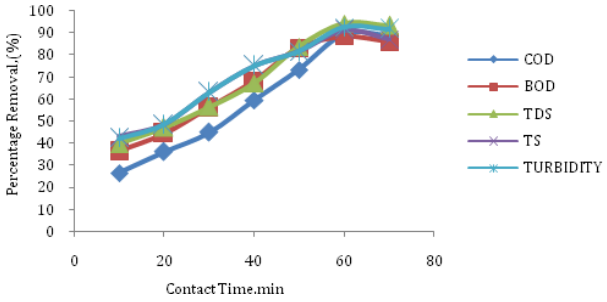

Fig. 3.3: Impact of Slow Mixing Contact Time

In this manner, maximum expulsion of COD, BOD, TDS, TS along with turbidity is accomplished with 60 min. of slow mixing contact time was 89.65%, 88.48%, 94.4%, 91.2% and 92.78% respectively .

4. CONCLUSIONS

The treatment of dairy waste water was analyzed by utilizing tamarind kernel seed powder as a low cost adsorbent. Depending upon the performance evaluation of investigation, the subsequent conclusions are summarized as below:

- In the current examination, demonstrations were accompanied to determine the appropriateness of tamarind kernel seed powder as a low cost adsorbent for the evacuation of COD, BOD, TDS, TS along with turbidity in treatment of dairy waste water along with varying dose of adsorbents, contrasting Rapid mixing contact time along with slow mixing contact time.
- For adsorption (Tamarind kernal powder), the results indicated that maximum percentage removal efficiency at an ideal dose about 0.105g/L, ideal rapid mixing contact time about 25 min. along with ideal slow mixing contact time about 60 min.
- By analysis we initiated that, the tamarind kernal powder has maximum percentage removal efficiency for residuals like COD, BOD, TDS, TS along with turbidity. With the use of low cost adsorbent, the polluting influences from dairy waste water can be evacuated all the more effectively.

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