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# Purification of Dairy Waste Water using Low-Cost Adsorbent

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**ABSTRACT:** The dairy industry involves processing raw milk into products including milk, butter, cheese, yogurt using processes such as chilling, pasteurization, and homogenization. An experimental investigation was carried out for the treatment of dairy wastewater using low cost adsorbents such as laterite soil, orange peel, rice husk and groundnut shells. Generally dairy waste water contains lactose, fat, casein, inorganic salts, detergents, sanitizers etc. These all contribute largely towards their high biological oxygen demand (BOD), chemical oxygen demand (COD) and oil and grease much higher than the permissible limits, which affect and disturb the environment. In this paper the wastewater from dairy industry is passing through the vertical stand which are filled with low cost adsorbents. The use of low cost adsorbents minimizes the hazardous effect which is harmful to the environment to considerable extent. After conducting the experiments, we found that the COD, BOD, Turbidity and pH of the dairy waste water is reduced and using filtered dairy wastewater in the construction industry.

**KEYWORDS:** Adsorbents, Dairy Wastewater, Purification, BOD, COD

### I. INTRODUCTION

In India dairy industries is the one of the major food industry, and have first position in production of milk among the maximum milk producing nation. Per year milk producing industry generates about 3.739 to 11.217 million cubic meters of waste. In dairy industry milk is processed and various products of milk are manufactured. Dairy industry, in which the cleaning tanks, homogenizers, heat exchanger and other equipment's cause large amount of effluent with high level of COD and BOD.

Some of the techniques used in waste water or water treatment plants to remove oil and grease, COD, BOD and colour are skimming tanks, oil and grease traps, sedimentation and flocculation etc. But these are not efficient and cost effective, they need frequent maintenance. An efficient method to remove oil and grease, COD, BOD and colour from wastewater using adsorption technique with easily and cheaply available laterite soil, groundnut shells, orange peels and rice husk as adsorbent material.

Adsorption is "the collection of a substance into the surface of adsorbent solids." It is a removal process where certain particles are bound to an adsorbent particle surface by either chemical or physical attraction.

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## II. METHODOLOGY

- Collection of dairy wastewater sample.
- To check actual quality of various parameter like pH, COD, BOD etc.
- Compare the actual result with permissible parameter.
- Treat a dairy wastewater with low cost adsorbents like laterite soil grains, groundnutshells, rice husk and orange peels.
- Testing of treated dairy wastewater for various quality parameters like pH, COD, BODetc.
- Compare the treated waste water readings with untreated wastewater parameters.
- Graphical analysis of results.
- After filtration, wastewater is tested to know its parameters and this treated wastewater is used in preparation of concrete cubes of 150mmX150mmx150mm mould using mixdesign of M20 grade.
- Prepared concrete cubes are placed for the curing for about 7,14 and 28 days.
- Prepared concrete cubes are tested for compressive strength using compression test machine.
- Result and discussion.
- Conclusion.

## III. EXPERIMENTAL RESULTS

Table 1: Characteristics of Dairy Wastewater Before Filtration

Name of Experiments	Dairy Wastewater
pH	9.8
Chloride(mg/L)	151.23
DO(mg/L)	1.23
BOD(mg/L)	578.42
COD(mg/L)	1456.8
Hardness(mg/L)	457.25
Total Suspended Solids(mg/L)	287.45
Total Dissolved Solids(mg/L)	1335.8
Oil And Grease(mg/L)	2.91

Table 2: Characteristics of Dairy Wastewater After Filtration

Name of Experiments	Dairy Wastewater
pH	7.94
Chloride(mg/L)	87.32

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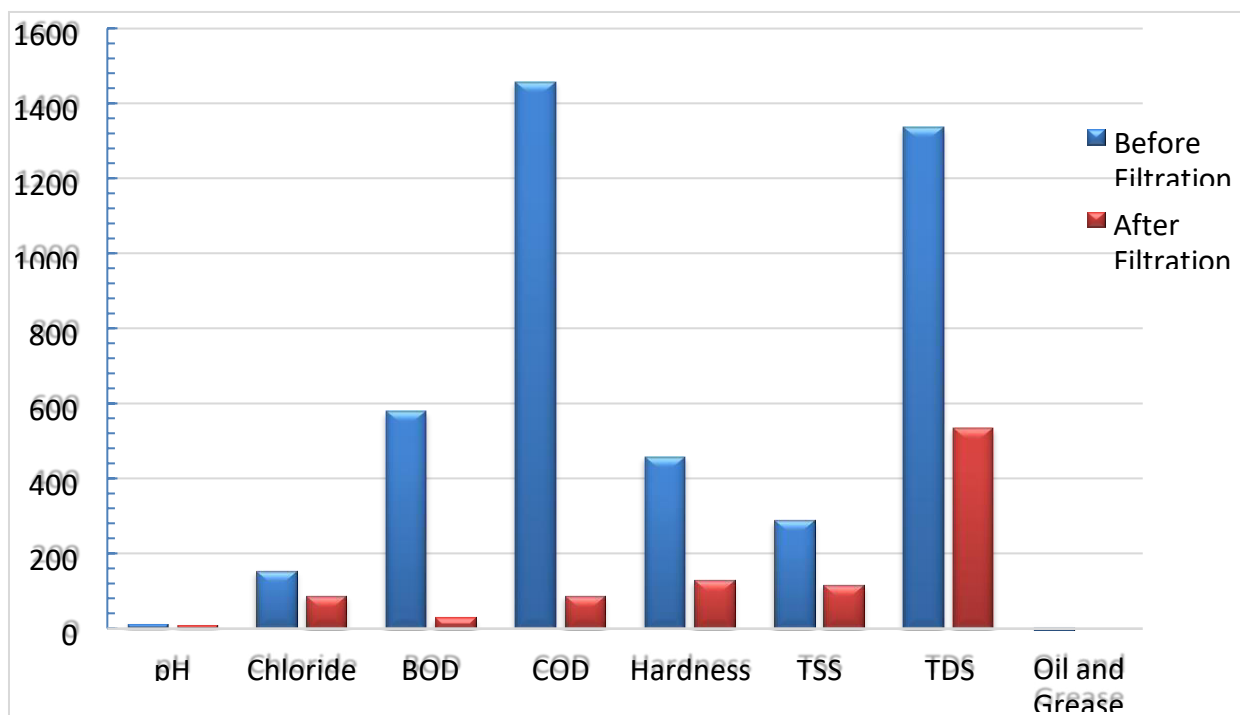
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BOD(mg/L)	28.93
COD(mg/L)	87.41
Hardness(mg/L)	128.03
Total Suspended Solids(mg/L)	114.98
Total Dissolved Solids(mg/L)	534.12
Oil And Grease(mg/L)	0.06

**Fig 1: Graph Showing Difference Between Before and After Filtration**



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Fig 2: Dairy Wastewater and Purified Dairy Wastewater



### IV. CONCLUSION

Based on the results obtained in the different stages of this experiment, it is quite evident that laterite soil, rice husk, orange peel and groundnut shells are powerful adsorbing mediums.

For vertical stand and slower flow rates, the contact period with adsorbent increased and thus efficiency increased. In addition, as the compartments of vertical stand increased efficiency also increased.

Thus optimum results may be obtained for using low cost adsorbents as filtration materials. Since laterite soil, rice husk, orange peel and groundnut shells are cheaply and easily available, expenses and maintenance incurred are very low as compared to other system.

After filtration it has been observed that the pH value of dairy wastewater is reduced by 19%, The Total Solids value of dairy wastewater is reduced by 60%, The BOD value of dairy wastewater is reduced by 95%, The COD value of dairy wastewater is reduced by 94% and Oiland Grease concentration is reduced up to 98%.

Since laterite, orange peel, rice husk and groundnut shell are cheaply available materials this method becomes economical as compared to other conventional methods. The treated water can be reused for different purposes and hence enormous quantity of water can be saved.

Hence this method can be conveniently employed in the construction industry for the construction purpose replacing wastewater into treated wastewater. However further investigations may be necessary on performance of adsorbent for continuous wastewater flow and its reuse potentials.

Based on the test results obtained and observations made, it is evident that further study is necessary for better evaluation of low cost adsorption materials.

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