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General Characteristics of Dairy wastewater at Karnataka Milk Federation (KMF), Kalaburagi

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Abstract: This work focuses on monitoring the general characteristics of Dairy wastewater. Dairy wastewater is collected from Karnataka Milk Federation (KMF). Dairy wastewater in India is a particular concern possibly due to its high organic content and its direct discharge into water bodies. By knowing the characteristics proper treatment method can be applied. Study characteristics include Colour, pH, Total solids, Total Organic solids (volatile organic compounds), and Total Inorganic solids, $BOD_{5,}$ COD, Chlorides, Total Alkalinity, Nitrates, Sulphate and Phosphate.

Keywords: BOD, COD, Dairy wastewater, Nitrates, VOC.

I. Introduction

Wastewater is characterized as any water, whose quality has been unfavorably being manhandled by anthropogenic impact. This incorporates fluid waste released from residential homes, businesses, and medical clinics, agrarian and business parts. A considerable lot of the poisons recognized in wastewaters are classified as non-directed "rising toxins". The contact of this sort of wastewater with the encompassing condition results in antagonistic impacts on the organic equalization of sea-going biological systems, causing awkwardness at various trophic dimensions conceivably identified with the activity of poisonous and genotoxic specialists and in a roundabout way by eutrophication [1].

Industrialization is spine for improvement of nation. Be that as it may, contamination brought about by businesses is a genuine worry all through the world. Of every single modern movement, the nourishment part has one of the most noteworthy utilizations of water and results in the generation of vast measure of wastewater. The dairy business is a case of this segment. Dairy industry is one of the real nourishment businesses in India, and India positions first among the most extreme significant milk creating country. The dairy business is one of the real wellsprings of wastewater. The Dairy business produces somewhere in the range of 3.739 and 11.217 million m3 of waste for each year (for example 1 to multiple times the volume of milk prepared). Wastewater is created in milk handling unit, for the most part in purification, homogenization of liquid milk and the generation of dairy items, for example, spread, cheddar, milk powder and so on.[2].

Large amount of water is used to clean dairy processing plants; hence, the resulting wastewater can contain detergent, sanitizers, base, salts and organic matter, depending upon source. Wastewater volume and strength fluctuated widely from day to day due to partly differences in production, therefore, data of waste water volume per unit of product processed (liters waste water/kg product),

Wastewater concentration (mg/L) and weight of waste generated per unit of product processed (gwaste/kg product) also changes. Climate of the area and production of the dairy plant are two major reasons, responsible for changing wastewater character. This variation is not only from one Dairy industry to another Dairy industry but also from season to season and even hour to hour. On land received wastewater affect the soil quality and soil structure and part of waste water can also reach underlying groundwater and affect its quality. The problem is more serious, when it concerns wastewater discharge before treatment from dairy or milk processing industry into water bodies and causes over load to the treatment plants when discharged directly into the sewers.

By studying the characteristics of Dairy wastewater proper treatment method can be suggested.

II. Materials and Methods

The fresh Dairy wastewater sample was brought from Karnataka Milk Federation (KMF) [latitude 17.3297° N, Altitide76.8343° E] located in Kalaburagi in Karnataka state of India. Kalaburagi is divisional headquarters of Gulbarga revenue division comprising Bidar, Raichur, Koppal, Bellary, Yadgir and Gulbarga as Districts. The city of Gulbarga is dry, arid and remains hot for most of the year. The present population is about 11 lakhs.

KMF procures on an Average 0.49 lakh L/day of milk and sells 0.51 lakh L/day[3]. The sample was collected only when the discharge of wastewater flow was steady and brought to the P.D.A college of

Engineering, Kalaburagi, civil engineering department of Environmental Engineering laboratory and Physico -chemical characteristics as per standard methods for the examination of water and wastewater (21st edition, 2012) where analyzed.

III. Results and Discussion

TABLE I: physico-chemical Characteristics of Dairy wastewater

Sl.No	Characteristics	Units	Dairy waste water
1	Colour	hazen	Whitish
2	pH	--	7.19
3	Total solids	mg/L	1692
4	Total Organic solids(volatile organic compounds)	mg/L	498
5	Total Inorganic solids	mg/L	1194
6	$BOD_5@20^0C$	mg/L	3667
7	COD	mg/L	4283
8	Chlorides	mg/L	354
9	Total Alkalinity	mg/L	492
10	Nitrates	mg/L	17
11	Sulphate	mg/L	124
12	Phosphate	mg/L	2.5
13	BOD/COD	---	0.856

TABLE II: Effluent Standards for discharge into Stream, Sewer and on land Water [4]

Sl. No	Characteristics	Units	Standards for discharge into streams	Standards for discharge into Sewer	Standards for discharge into on land
1	Colour	hazen			
2	pH	--	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
3	Total solids	mg/L			
4	Total Organic solids(volatile suspended solids)	mg/L			
5	Total Inorganic solids	mg/L			
6	$BOD_5@20^0C$	mg/L	250	350	30
7	COD	mg/L	-	-	250
8	Chlorides	mg/L		250	
9	Total Alkalinity	mg/L		200	
10	Nitrates	mg/L	10	-	-
11	Sulphate	mg/L			
12	Phosphate	mg/L	5	-	-
13	BOD/COD	---		0.5 or greater	

Effluent Standards for discharge into Stream, Sewer and on land Water are presented in TABLE II. From TABLE I Physico-chemical characteristics, it is observed that the wastewater is very strong and has high BOD and COD values, and also highly alkaline in nature. The Dairy wastewater contains Volatile organic compounds.

The value of COD, BOD, Chlorides and Total Alkalinity exceeds the Effluent standards limits for sewer, on land and stream .hence this Dairy wastewater cannot be discharged directly but requires proper and adequate Treatment.

IV. Conclusions

1. The Dairy wastewater is highly organic in nature because of high value of BOD.
2. For biological decomposition the BOD/COD ratio should be 60% but the ratio is 85.6%, Hence it can be easily degraded biologically.
3. The value of COD, BOD, Chlorides and Total Alkalinity for Dairy wastewater exceeds the discharge standards of sewer, streams and on land standards.
4. Biologically Anaerobic treatment is best to treat this Dairy wastewater.

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[4] Central Pollution Control Board (CPCB).