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A STUDY OF DAIRY EFFLUENT OF VARIOUS PRODUCTS ON THE BASIS OF OIL AND GREASE VALUE AND A COMPARATIVE STUDY BETWEEN COMMON ETP WITH RESPECT TO OTHER PLANTS AND POSSIBLE LOAD REDUCTION METHOD

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ABSTRACT

In this work, we have determined the oil and grease value of the effluents and provide plant-wise comparison with respect to common effluents treatment plant, generating effluent having high load and reduction of oil and grease load in common effluent treatment plant. In any dairy plant the quantity and characteristics of effluent is depending upon the extent of production activities, pasteurization to several milk products. In several plants containing various natural and synthetic chemicals like sugar and other flavoring agents that ultimately give higher value of oil and grease.

Key words: Oil and grease, Effluent, Load characteristics.

INTRODUCTION

The oil and grease contents of domestic and certain industrial wastes and the sludge, is of an important consideration in the handling and treatment of these material for ultimate disposal. Knowledge of the quality of the oil and grease present is helpful in proper design and operation of wastewater treatment system. The term grease applies to wide variety of organic substance that is extracted from aqueous solution or suspension by hexane. Hydrocarbons, esters, oils, fats, waxes and high molecular weight fatty acids are the major materials dissolved by hexane. All these material have a greasy feel and are associated with the problems in wastewater treatment related to grease.

Three methods by which oil and grease are estimated are (i) the partition-gravimetric method (ii) partition infrared method, and (iii) the solvent extraction method. Though method (i) does not provide needed precision, it is widely used for routine analysis of samples with high oil and grease contents because of its simplicity and no need of special instrumentation. In method (ii) adequate instrumentation allows for the measurements of as little as 0.2 mg oil and grease. Method (iii) is identical to gravimetric method but it is designed for the samples that might contain volatile hydrocarbons that otherwise would be lost in the solvent removal operation of gravimetric method. In the Partition-Gravimetric method, dissolved or

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emulsified oil and grease is extracted from water by intimate contact with trichlorotrifluoroethane; petroleum ether (40/60) or hexane.

EXPERIMENTAL

Methodology

Procedure

We have collected about 1 Litre of sample and mark sample level in bottle for latter determination of sample volume. Acidity adjusted at pH 2 by adding 5 mL HCldded. This was transfered to a separating funnel. We carefully rinsed sample bottle with 30 mL trichlorotrifluoroethane and solvent washing to separating funnel. It was shaked vigorously for 2 minute. However, if it is suspected for stable emulsion shakes gently 5 to 10 minute. Let layer separate out, drain solvent layer through a funnel containing solvent– moistened filter paper into a clean, evacuated distilling flask. If a clear solvent layer cannot be obtained, add 1 g Na_2SO_4, if necessary. Extract twice more with 30 mL solvent each time but first rinse sample container with solvent. Combine extracts in evacuated distilling flask and mash filter paper with an additional 10 mL to 20 mL solvent. We have distilled solvent from distilling flask in a water bath at 70^{o}C. The flask was placed on water bath at 70^{o}C for 15 minute and draw air through it with an applied vacuum for final 1 minute after the solvent has evaporated. If the residue contains water, 2 mL acetone is added, which evaporates on a water bath and the addition and evaporation is repeated until all water has been removed. It was cooled in a desiccators for 30 minute and weighed[6].

Materials

It in the present work HCl, trichlorotrifluoroethane (freon) were used; as purchased from market. Other than these some glasswares including beaker, separating funnel, distilling flask, desiccators and vacuum pump were used.

Calculations

The amount of oil and grease in the sample can be calculated as,

Oil and Grease (mg/L) = (A – B) 1000/volume of the sample where,

A = mass of evacuated flask and residue (g)

B = mass of evacuated flask (g)

RESULTS AND DISCUSSION

The following Table shows a DO value of common ETP, Ghee plant and Butter plant.

Table 1: Common ETP

S. No.	Sample (mL)	Date of taken	Oil and grease (ppm)
1	Water	14/10/11	1200
2		15/10/11	1400

Cont …

3		16/10/11	1100
4		17/10/11	1100
5		18/10/11	1400
6		19/10/11	1100
7		20/10/11	1200

Table 2: Ghee plant

S. No.	Sample (mL)	Date of taken	Oil and grease (ppm)
1		14/10/11	14200
2		15/10/11	13924
3		16/10/11	14000
4	Water	17/10/11	13922
5		18/10/11	14022
6		19/10/11	14340
7		20/10/11	13825

Table 3: Butter plant

S. No.	Sample (mL)	Date of taken	Oil and grease (ppm)
1		14/10/11	12200
2		15/10/11	11921
3		16/10/11	12200
4	Water	17/10/11	11934
5		18/10/11	11022
6		19/10/11	12341
7		20/10/11	11825

Load reduction

It has been reported that ghee plant and butter plant having high fat content so, during the cleaning in place (CIP) hot water is used and then it is treated with cold water to solidify the ghee and butter by layer sepration method. So ghee and butter are separated and water is discharge into ETP.

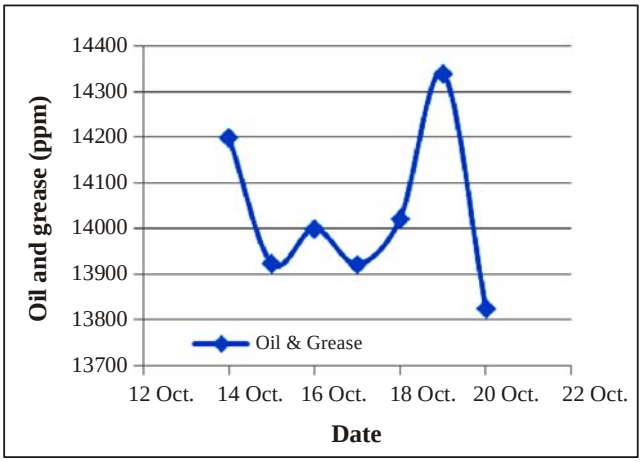

Fig. 1: Ghee plant

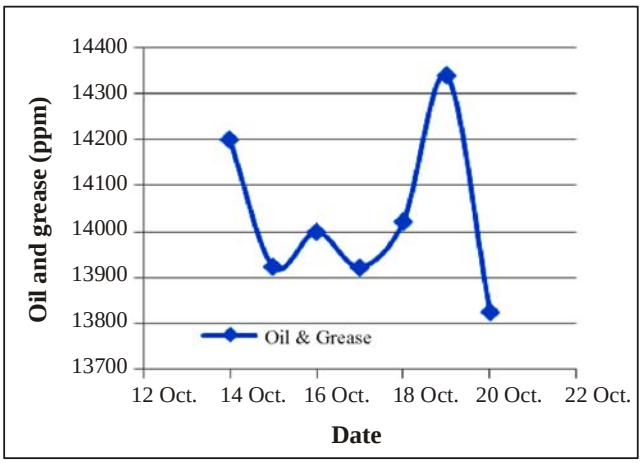

Fig. 2: Butter plant

CONCLUSION

The oil and grease load in the common effluent treatment plant is around 1250 ppm. The value of oil and grease observed from Ghee plant and Butter plant is higher compared to common ETP. It is high because of Ghee plant and Butter plant. Because the oil and grease load in both of the plants are high compare to other plants. Ghee plant contain high fat content and butter plant also having high fat content. So, both plants are playing crucial role in generating effluent having high oil and grease load.

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