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"Anaerobic Lagoon Treatment for Sugar Industrial Wastewater" A Case Study of Karmayogi Sugar Factory

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Abstract: **Anaerobic lagoons have been especially effective for pretreatment of high strength organic wastewaters. Applications include industrial wastewaters and rural communities that have a significant organic load from industrial sources. Biochemical oxygen demand (BOD) removals up to 60 percent are possible. Hence this the most suitable option for the treatment of high strength organic effluent. This paper reviews the suitability and the status of development of deign of anaerobic lagoon for sugar industry.**

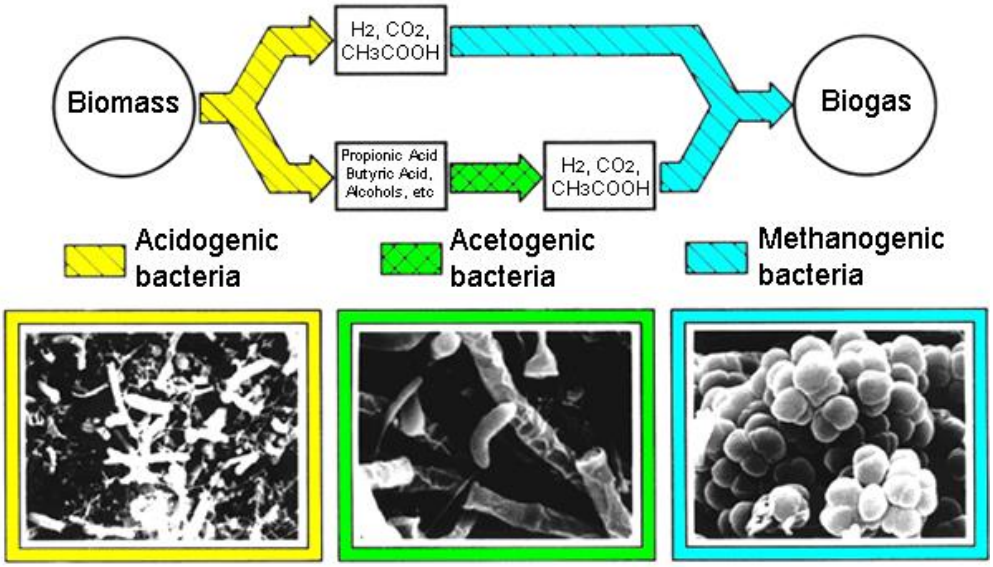
Keywords: **Anaerobic lagoon, Anaerobic bacteria, Effluent, Physicochemical.**

I. INTRODUCTION

In many developing countries, especially in Asia and South America, sugar cane industry is one of the most important agricultural industries. As a consequence, sugarcane industry has significant wastewater production. Unfortunately, due to the lack of know-how and financial support, most of sugarcane industries in developing countries discharge their wastewater without adequate treatment. Similar with other wastewater generated by food processing plants, wastewater from sugar cane industry generally contains organic materials such as carbohydrates and proteins. Current mainstream technologies for wastewater treatment, such as aerobic activated sludge and tertiary nutrient removal processes seem to be based on rather high capital costs, which consume more energy, more skilled labour requirement, produce more sludge, and do not allow recovery of valuable energy and nutrients. In some extends, those technologies are not economically and technologically affordable, especially for developing countries where the availability of high skilled personal and permanent energy supply are not guaranteed. An improvement in the efficient of anaerobic lagoon can be brought about by proper design of lagoon.

II. PROCESSES IN ANAEROBIC LAGOON

An anaerobic lagoon is a deep earthen basin with sufficient volume to permit sedimentation of settable solids, to digest retained sludge, and to anaerobically reduce some of the soluble organic substrate. Raw wastewater enters near the bottom of the pond and mixes with the active microbial mass in the sludge blanket. Anaerobic conditions prevail except for a shallow surface layer in which excess undigested grease and scum are concentrated. Sometimes aeration is provided at the surface to control odors. An impervious crust that retains heat and odors will develop if surface aeration is not provided. The discharge is located near the side opposite of the influent. The effluent is not suitable for discharge to receiving waters. Anaerobic lagoons are followed by aerobic or facultative lagoons to provide required treatment. The anaerobic lagoon is usually preceded by a bar screen and can have a Parshall flume with a flow recorder to determine the inflow to the lagoon. A cover can be provided to trap and collect the methane gas produced in the process for use elsewhere, but this is not a common practice.



A. Design Characteristics of Anaerobic Lagoon:

Anaerobic lagoons are earthen basins with a usual depth of 8 feet, though greater depths are more beneficial to digestion as they minimize oxygen diffusion from the surface. To minimize leakage of animal waste into the ground water, newer lagoons are generally lined with clay Studies have shown that in fact the lagoons typically leak at a rate of approximately 1 mm/day, with or without a clay liner, because it is the sludge deposited at the base of the lagoon that limits the leakage rate, not the clay liner or underlying native soil. Anaerobic lagoons are not heated, aerated or mixed. Anaerobic lagoons are most effective in warmer temperatures; anaerobic bacteria are ineffective below 15°C.

B. Applications of Anaerobic lagoons:

1. More effective for rapid stabilization of strong organic wastes, making higher influent organic loading possible.
2. Produce methane, which can be used to heat buildings, run engines, or generate electricity, but methane collection increases operational problems.
3. Produce less biomass per unit of organic material processed. Less biomass produced equates to savings in sludge handling and disposal costs.
4. Do not require additional energy, because they are not aerated, heated, or mixed.
5. Less expensive to construct and operate.
6. Ponds can be operated in series.

III. PARAMETERS OF SUGAR INDUSTRY WASTE WATER

Wastewater from sugar industries is one that has complex characteristics and is considered a challenge for environmental engineers in terms of treatment as well as utilization. Before treatment and recycling, determination of physicochemical parameter is an important mechanism. Many different types of techniques are introduced and modified for the purpose, but depend upon the water quality parameters.

The waste water was collected from Karmayogi Shankarrao Patil Sahakari Sakhar Karkhana Ltd. India. The initial water quality parameter is mentioned in Table1and it was preserved at 20ºC until used. The laboratory reagent (LR) grade chemicals were used in the experiments and analytical (AR) grade chemicals were used for analysis.

Sr. no.	Parameter	Parameter
1	Colour	Greens brown
2	Odour	Fishery
3	pH	4.2-6.0
4	DO mg/L	1.5-3
5	BOD_5 at 20ºC, mg/L	1000-1500

6	COD mg/L	2000-2500
7	Oil and grease mg/L	60-100
8	Temperature in ºC	30-40
9	Suspended Solids, mg/L	200-300
10	Total dissolved solid mg/L	1200-2000
11	Quantity of waste water generated in m^3/day	860.00

IV. CONCLUSIONS

The physicochemical value of the sugar industry effluent is very high which cross the standard limit. If it is not treated, it affects the ecology system. Physico-chemical and biological methods are generally used to treat the sugar industries effluent. The treated effluent of sugar industries is well balanced in chemicals if it is diluted with other fresh water and can be used for irrigation purpose. Effluents which are released from sugar industry after treatment may be utilized for industrial processing again. Physicochemical parameters of sugar industry waste water are shows suitable parameters for good operation of anaerobic lagoon to treat the waste water.

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