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Direct Sludge Blanket Treatment of Cluster Industries in a Common Effluent Treatment Plant

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Abstract – During the past 3 to 4 decades the industrial sector of India has quadrupled in size and money results a large pressure on water resources, leading to huge wastewater production.[6] This pressure leads to outcome that Industries need high quality treated water, with a low cost investment. The efficiency of the plant is closely related to the operations of the plant, leading to the cost management.[9] Various data sets of the BOD and COD are collected from a common efficient treatment plant present at Govindpura Industrial Area Bhopal also known as the Indrapuri Bhopal. The data is collected over a period of one year after the COVID-19 pandemic from both effluent and influent streams of waste water station. That is then analyzed and the conclusion is made for the local best technology modeling.

Keywords – Biological Oxygen Demand, Chemical Oxygen Demand, Low Cost Investment, Wastewater Treatment, COVID-19, Indrapuri, Local Technology.

Introduction – All over the world people lack the access of the safe water, for their daily uses and adequate sanitation. [1] In India about 30% of the people lack the basic sanitation coverage in generally the rural areas versus the urban areas. [4] Even though the earth is plentiful of water, still the freshwater is rare. In the whole community, as the basic use part of the earth resources of freshwater are less than 0.3% and this water is only there for human activities. [3] In the country wise rating of freshwater, India Falls 10th position, with 1911 cubic Kilometer of freshwater availability. The India constituted of 16% of the world's population but consist only 2.5% of the world area and 4% of the world's freshwater sources at its disposal. [2]

The increase in the anthropogenic activities degrade the water quality as the increase of the industrialization, urbanization and deforestation increase in the last 3 decade this also leads to the degradation of the water quality day by day. [10] A common effluent treatment plant is the concept of saving energy and treating the effluents by the collective efforts of a cluster industrial area or a bunch of small scale of industries. The collective measures done for the anaerobic treatment converts the organic waste of the water polluted into biogas and sludge. [7] The Up-Flow Anaerobic Sludge Blanket process is one where the recent various developments are been done for the increase of efficiency of the Up-Flow Anaerobic Sludge Blanket, in the field of secondary anaerobic treatment methods. [5]

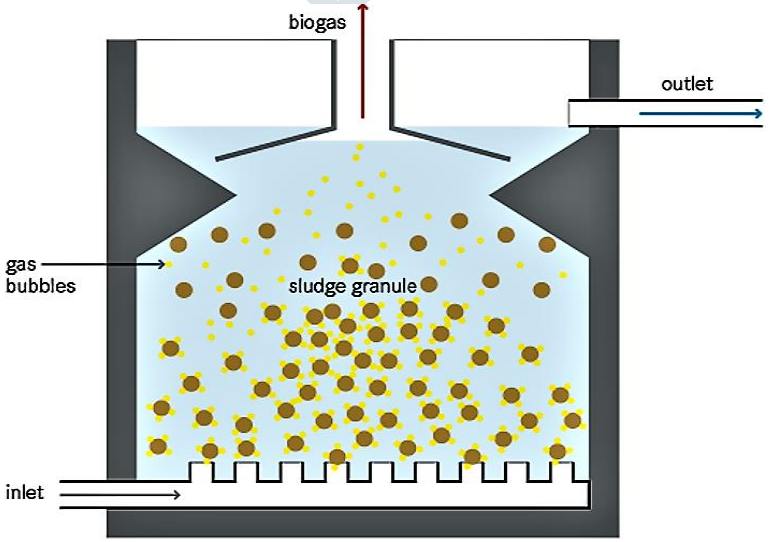

Figure 1 Up-Flow Anaerobic Sludge Blanket [18]

Material and Methods – In the secondary treatment the use of screens, grids and the filter bed of primary treatment is completely removed and is of no use, [13] the reducing the cost of the wastewater treatment in the Up-Flow Anaerobic Sludge Blanket treatment process. [16] The complex organic matter in the wastewater is been beaked resulting in Methane Gas through the stages of treatments like hydrolysis, methanogenesis and acetogenesis. The Up-Flow Anaerobic Sludge Blanket is one of the most cost effective process with high efficiency for the anaerobic treatment the Methane, liberated may be captured and stored easily and can be used as a biogas energy source for even food cooking. This Up-Flow Anaerobic Sludge Blanket process followed by the anaerobic process treatment is prove to be economic as it liberate the primary treatment and the waste water purification efficiency is more than 70%. The Up-Flow Anaerobic Sludge Blanket is also known as the anaerobic digester. [14] It is the duty of us chemical engineers to improve the existing waste water Technology efficiency or development of the combination of various processes which embedded the feasible treatment of the water treating treatment of high polluted tough the waste water. [15]

The common effluent treatment plant is a term used for combined effluent from small clustered industries or tanneries are brought to a centralized place for treatment. The amount of waste generated in India is about 38254 MLD and only there are 219 STP plants are installed purifying about 12000 MLD rest waste is thrown in the rivers and streams of India.

One of the common effluent treatment plant is fitted in Govindpura Audyogik Kshetra Pradushan Nivaaran Private Limited agency, designed at the capacity of about 900 M cube per day. The effluent treatment plant is design for the removal of BOD and COD with high efficiency of 90% approx. The treatment system consists of the equalization tank, holding tank, buffer tank, and anaerobic treatment unit i.e. Up-Flow Anaerobic Sludge Blanket with flash aeration tank.

For performance evolution, of the treatment plant, the composite sample is taken of the day. Four samples are collected each day and then mix to form a composite sample of a day. A 'V' notch is being provided for the flow measurement. In the monitoring time the 500 meter cube per day flow was observed because only 8 to 10 industries are participating in the common efferent treatment plant of Govindpura for the wastewater treatment. The equation of the various components of the different effluent streams for the treating of the wastewater. The waste is moved to the holding tank where the waste water is hold for 60 to 90 mins and this calm holding facilitates the setting of the heavy particles from the wastewater into the tank is been done. After the holding tank the waste water is then transferred to a naturalization tank. Where we insert alkali or acids, to maintain the pH dose of the wastewater. [11] This tank the aeration is done that is the rotation of the waste is done by means of the circular rotator. The Effluent now is been transfer to a buffer tank where it is kept again for 60 to 90 minutes the buffer tank has a re-circulation flow from the Up-Flow Anaerobic Sludge Blanket reactor along with the small opening of raw waste water the buffer tank is triggered and the acetogenesis phase is in the preconditioning treatment by anaerobic bacteria before the Up-Flow Anaerobic Sludge Blanket treatment.

Results – After it the Up-flow Anaerobic Sludge Blanket treatment is done in a common effluent treatment plant Govindpura. In an Up-Flow Anaerobic Sludge Blanket reactor the industrial wastewater accumulate flows to the bottom of the anaerobic tank flow, the sledge accumulates and forms granules the microorganism start living in the granules and start degrading its organic matter. The blanket above the sludge is formed and maintained by a flow regime and gas Bubbles. [12] This bubble liberates the biogas is which is recovered from the Up-Flow Anaerobic Sludge Blanket for energy production. The remains stabilize and then solidified and then packed in the small packets, which can be used for soil as a Fertilizer in Gardens and farms. For the optimum growth of the microorganisms that temperature should very between 33°C to 38°C, and the pH should be kept in range 6.2 to 7.8 as if the pH is high it will try to do the synthesis of the nitrogen and inhabits the growth of the Methane production bacteria. [17]

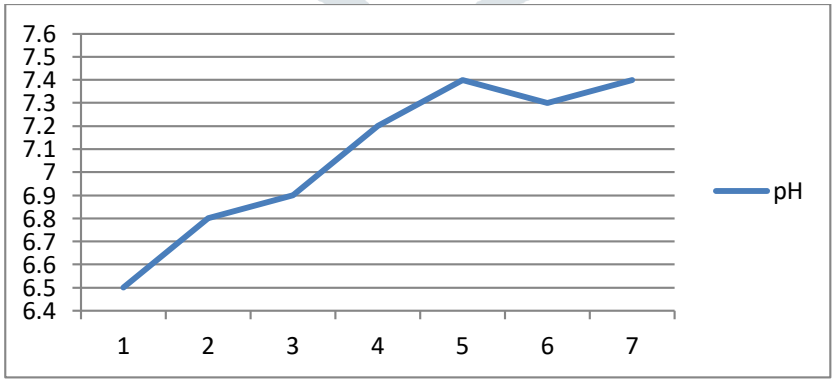

Figure 2 – pH to time (in hrs) graph

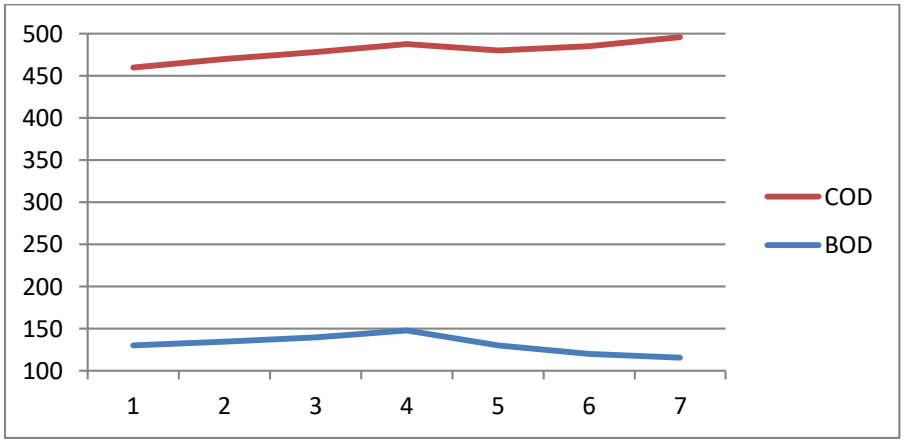

Figure 3 – BOD and COD (in mg/L) to time(in hrs) graph in Up-Flow Anaerobic Sludge Blanket reactor

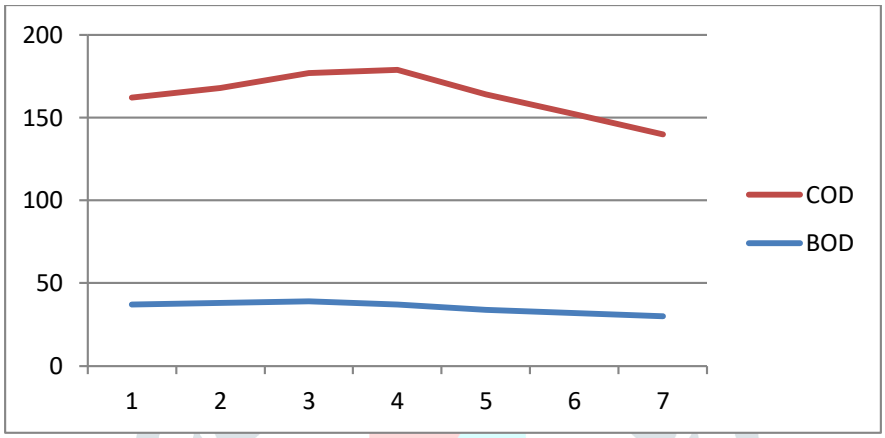

Figure 4 – BOD and COD (in mg/L) to time(in hrs) graph in Aeration Tank

Conclusion – The wastewater treatment Technology depend on the various factors such as the social conditions of the area, the Geographic climate economic conditions of the people their culture etc. The various new technologies are present in the water purification. It is very important to adopt the best out of them so here we use a Up-Flow Anaerobic Sludge Blanket treatment that to with a common effluent treatment plant to various Industries. This saves the money and the manpower of each industry and let them work more for their and Nations prosperity and the current contacts the common efferent treatment plant is considered a leading Technology. As it takes the account of the low construction cost low maintenance cost and also a very good in present social conditions because of each industry financial difficulties this enables us to emerge with more feasible treatment of wastewater.

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