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Effectiveness of Canteen Waste Water Treatment Plant in Saint-Gobain Industry Kanjikode

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Abstract

The projects mainly focus to the effectiveness of canteen sewage treatment plant of 'Saint-Gobain' industry Kanjikode. Canteen waste water treatment is the process of removing contaminants from waste water. To reduce water consumption, waste water from the canteen are recycled through STP process and reused for gardening. Water is one of the abundantly available substances in nature. To assess the quality of influent and effluent water we collect samples from inlet and outlet and analyze the parameters such as BOD, pH, suspended solids and MLSS. By analyzing this, the parameters are within the desirable limit. So the working of waste water treatment plant is very efficient.

Keywords: Waste water treatment; Canteen waste water; Biological oxygen demand; MLSS

Introduction

Wastewater is the waterborne, human, domestic and farm wastes. It may include industrial effluents, subsoil or surface waters, human wastes include fecal material. Domestic wastes include food wastes and wash water. Industrial waterborne wastes are acids, oils, greases and animal and vegetable matter and discharged by factories too. The composition varies depending upon the source of waste water. This also causes variation in the microbial flora of waste water. Almost all groups of microbes, algae, fungi, protozoa, bacteria and viruses are present.

Canteen waste water treatment is the process of removing contaminants from waste water, including household sewage and runoff. It includes physical, chemical and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce an environmentally safe fluid waste stream and a solid waste suitable for disposal or reuse. With suitable technology, it is possible to re-use sewage effluent for drinking water, although this is usually only done in places with limited water supplies, such as Windhoek and Singapore.

Saint-Gobain, the world leader in the habitat and construction markets, designs, manufactures and distributes building materials, providing innovative solutions to meet growing demand in emerging economies for efficiencies and for environmental protection.

Waste water treatment generally involves three stages, called primary, secondary and tertiary treatment. This study will help us in determining the degree and type of treatment required to be given to a given sewage and thus avoid the pollution of the source of its disposal. Physical examination of waste water is carried out in order to determine its physical characteristics. This includes tests for determining turbidity, color, odor and temperature. Tests

conducted for determining the chemical characteristics of canteen waste water help in indicating solids and settle able solids, pH value, chloride content, nitrogen content, presence of fats, greases and oils, sulphides, sulphatesand H_2S gas, dissolved oxygen, Chemical Oxygen Demand (COD), Bio-chemical Oxygen Demand (BOD) [1].

The aim of the present study is to analyze the effectiveness of canteen waste water treatment plant in Saint-Gobain industry, Kanjikode and the objectives are:

- To evaluate the treatment efficiency of the plant.
- To assess the quality of influent and effluent water.
- To assess if the plant reduce water consumption or not.
- To find out whether the plant is eco-friendly or not.

Materials and Methods

Effluent treatment plant consisting of collection tank, oil separation tank, settling tank, aeration, sludge drying beds for process effluent and bar screen, aerobic reactors 1 and 2, tube settler, chlorination, sludge drying beds for canteen effluents shall be functional at all times during operation of the facility.

Collection tank: It is used for collecting effluents from canteen.

Oil skimmer: Used to filter or remove oil debris and unwanted materials.

Aerobic reactor: Aerobic treatment plants widely used to areas where conventional septic system do not function properly. The plants are offering breaks down the solid and aerate waste.

Air blowers: Blowers in treatment plants function as a good air diffuser system.

Tube settler: Tube settler systems are an inexpensive solution for waste water plants to increase treatment capacity and improve effluent water quality.

Final tank: It is used for collecting the water after treatment.

Sludge drying bed: Drying of the digested sludge on open beds of land called sludge drying bed. It is used as the last step of dewatering system.

Sprinkler system: It involves the spraying of water into the air through a sprinkler nozzle and allowing it to fall on the land surface in a uniform pattern. This method ensures uniform and efficient distribution of water.

Collection of data regarded with sewage treatment plant various types of data collection and methods like field survey and personal interview were conducted and collected valuable information from staffs of the company. Canteen is working 24 hours continuously for the workers in this company.

- This treatment plant was installed to make use of used water for the purposes such as utensils wash, hand wash, vegetable wash, etc. Instead of wasting the water.
- An average of 20 kl (20000 L) water is treated.
- The treated water is used for irrigating more than 1.5 acres garden.
- An average of 30 kl of water is used for gardening per day.
- By the working of STP about 20 kl of water is saved.
- We collect samples from inlet and outlet to determine the quality of influent and effluent water. And then analyse the parameters such as BOD, pH, suspended solids, MLSS.

Sample testing

Obtain a sample of mixed liquor. Transfer the sample into a laboratory in order to analyze it. Measure the sample volume weight of the sample. Remove two filter papers from desiccators and record the weight of each. Place the

filter holder on a vacuum flask and then place another filter on top of the filter holder by using a pair of tweezers. Stir the sample of mixed liquor in order to get a good mixture for the experiment. 5 ml of the sample is added into a graduated cylinder. Turn on the vacuum pump and pour the sample into the filter holder. After all the mixed liquor has gone through, run three portions of 10 ml distilled water through the filter holder to rinse any particles that may have stuck to the glass. Allow the vacuum pump to run an additional three minutes. This will help remove any extra water from the filter before drying. Switch the vacuum pump off and remove the filter from the filter holder and place in the corresponding weighing dish. Repeat above process for as many trials as needed. Place the filter(s) into a drying oven, which is set to 103°-105° C, for one hour. Upon drying, replace filters into desiccators for 30 minutes. After 30 minutes in the desiccators, the filters are to be weighed. MLSS (mg/L)=[(A-B)*1000] ÷ [volume of sample in liters] where: A is the sample and filter weight. B is the weight of the filter (Table 1-5).

Results

Table 1: Date of receiving sample: 4.9.2014, Date of completion of test: 9.9.2014

Sl no	Parameters	Unit	Permisible limit	Value reported	
				STP inlet	STP outlet
1	pH		6.5-8.5	6.5	7.5
2	Suspended solids	Mg/l	100	97	71
3	BOD, 3 days, 27 degree Celsius.	Mg/l	100	95	68
4	MLSS (Mixed Liquor Suspended Solid)	ppm	-	350	

Table 2: Date of receiving sample: 11.9.2014, Date of completion of test: 16.9.2014

Sl no	Parameters	Unit	Permisible limit	Value reported	
				STP inlet	STP outlet
1	pH		6.5-8.5	6.6	7.96
2	Suspended solids	Mg/l	100	80.6	62.9
3	BOD, 3 days, 27 degree Celsius	Mg/l	100	80	60
4	MLSS (Mixed Liquor Suspended Solids)	ppm	-	350	

Table 3: Date of receiving sample: 18.9.2014, Date of completion of test: 23.9.2014

Sl no	Parameters	Unit	Permisible limit	Value reported	
				STP inlet	STP outlet
1	pH		6.5-8.5	6.58	7.65
2	Suspended solids	Mg/l	100	74.8	55
3	BOD, 3 days, 27 degree Celsius	Mg/l	100	75	52.6
4	MLSS (Mixed Liquor Suspended Solid)	ppm	-	300	

Table 4: Date of receiving sample: 9.10.2014, Date of completion of test: 14.10.2014

Sl no	Parameters	Unit	Permisible limit	Value reported	
				STP inlet	STP outlet
1	pH		6.5-8.5	7.27	7
2	Suspended solids	Mg/l	100	70	50
3	BOD, 3 days, 27 degree Celsius	Mg/l	100	69.33	48.55
4	MLSS (Mixed Liquor Suspended Solids)	ppm	-	300	

Table 5: Date of receiving sample: 15.10.2014, Date of completion of test: 20.10.2014

Sl no	Parameters	Unit	Permisible limit	Value reported	
				STP inlet	STP outlet
1	pH		6.5-8.5	6.89	7
2	Suspended solids	Mg/l	100	65.84	49.32
3	BOD, 3 days, 27 degree Celsius	Mg/l	100	61.02	39.98
4	MLSS (Mixed Liquor Suspended Solid)	ppm	-	300	

The parameters analyzed in canteen waste water treatment plant of Saint-Gobain industry, Kanjikode where pH, BOD, suspended solids and MLSS.

The pH analyzed in the sample was in the range of 6.5-7.5. The pH in the case of first sample it is slightly acidic but it is within the permissible rate of 6.5-8.5. Magnesium hydroxide liquid of about 60% is added to the canteen waste water to increase pH, which effectively limits the formation of hydrogen sulphide gas. In addition to odour and corrosion control, the use of magnesium hydroxide liquid can improve the performance of waste water treatment plants by increasing alkalinity and improving settling characteristics reported that the electro coagulation can neutralize wastewater pH. Several mechanisms associated with pH variation are also proposed [2-4].

Biological oxygen demand it is an important indication of the amount of organic matter present in the waste water. It serves as the measure of the amount of clean water required for the successful disposal of waste water. If water is having high BOD, aerobic bacteria will utilize the available DO of water in case of excess of BOD there will be deficiency of DO and water will be in anaerobic condition resulting the release of ammonia, methane, co_2 etc. The absence of oxygen, anaerobic bacteria become active [5]. When BOD value is medium, water will possess excessive nutrient. By analyzing the sample taken from the canteen waste water plant the BOD value range slightly equal to 50%. The standard value of BOD is 100 so the BOD is within the permissible limit. Because of that it doesn't create any harmful effects. Reported that Rotating Biological Contactor (RBC) has good effect for treating wastewater even in low ambient temperature [6]. That AOPs are very efficient compared to conventional treatment methods for degradationand mineralization of recalcitrant pollutants present in water and wastewater [7].

Discussion

Total Suspended Solid (TSS) are the solids which can be removed from the waste water by physical or chemical means, such as sedimentation or filtration more precociously, they are the solids which are retained all the filter mat or glass fiber. Suspended solid are approximately 70% organic solid and 30% inorganic solids. The standard value of suspended solid is 100 mg/l. By analyzing the suspended solid content we get the value ranging in between 45–95 mg/l. In the first sample suspended solid content is slightly greater compared to others but it is within the permissible limit. Reported that anaerobic digestion of organic solid wastes in waste water and limiting the emission greenhouse gases [8-11]. Mixed Liquor Suspended Solids (MLSS) is the concentration of suspended solids, in an aeration tank during the activated sludge process, which occurs during the treatment of waste water. The units MLSS is

primarily measured in are milligrams per liter (mg/L). Being treated with MLSS and other methods of treatment, the concentration of BOD in water is lowered to less than 2 mg/L, which is considered to be clean, safe to use water. Above parameters like BOD, suspended solids and pH, MLSS is also with in permissible limit.

Conclusion

Our present study which was mainly concerned with canteen STP in Saint-Gobain Industry, Kanjikode revealed that the installation of waste water treatment plant allowed a reduction of water consumption and also decrease the concentration of pollution discharged to the environment. The company does not produce any harmful waste to the atmosphere. The waste materials from the company is recycled and reused for the manufacturing purposes. So the company is eco-friendly. Here the waste water from the canteen was treated well. An average of 20 kl water is saved by the working of this plant. The waste water treatment plant does not create any environmental problems. The plant is performing well, because the analyzing parameters are within the permissible limit. The treated waste water is used for gardening and the dry sludge from sludge drying bed are used as manure and the vegetation around the plant was very much flourished with green plants which act as a green belts in the surrounding of industrial plants. From all these points we can understand that the canteen waste water treatment plant in Saint-Gobain industry does not create any environmental impacts.

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