Study of Waste water characteristics of Sanjay Ghodawat Group of Institution campus for Sustainable Development

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ABSTRACT

Sanitation preserves the health of the public by developing such conditions which will prevent the outbreak of diseases and dangerous for the general health of the public. Especially waste matter created and given out by human beings, animals and industries etc is allowed to accumulate. It will get decomposed and will contaminate or pollute air, water and food resulting in outbreak of epidemic. Hence it is a measure to prevent health of community in general. In the process of waste water treatment, conversion of energy takes place by knowing some useful parameters of the waste water. Paper highlights the characteristics of the waste water and process involved. BOD, COD and Ph value of the Sanjay Ghodawat Group of Institutions is calculated for the energy conversions. The values achieved are

Key words: SGI, Waste water, Characterization, BOD, COD

1. Introduction

Waste water disposal, water resources and waste water recycling is an important crisis to be addressed in rural area and industrial areas. As water resources are drained out because of dependency on rain, overutilization as well as mismanagement of water leads to decrease in ground water table. So, alternate solutions are also required to be identified. Industrialization and civilization is increasing day by day, due to which climatic conditions are affected because of reduction in greenery. Mainly rains are reduced which is intern affecting the ground water level. With the increase in number of industries consumption of water and also waste water from industries increasing. Managing waste water is an additional task for the management.

Waste water and sanitization is important with the increase in the population. Sanitization should also take care of health hazards of the society. Looking into all these parameters recycling of the waste water certainly try to bridge the gap between supply and demand. Energy crisis are increasing day by day and non renewable resources are getting vanished. Waste water treatment with the electricity generation will lead to satisfying the demand of energy and water. Conventional energy sources are getting exhausted and even there will be lack of energy against the demand. Bioelectricity or Microbial fuel cell is one of the other alternate solutions for the problems occurred. To generate electricity, characterization of the waste water is important. Certain parameters of the waste water will judge and help to design microbial fuel cell. Like cation and anions are required for the generation of electricity. Waste water contains cations and anions with the help of these ions one can produce electricity through MFCs.

For the same, we analyzed parameters such as chlorides, BOD, COD, PH and TDS of sewage of SGI campus. Sanjay Ghodawat group of institutions is located in 150 acres and having on campus 14000 students from KG to PhD. Waste water plant is located at the campus.

2. Methodology

2.1) pH :

The concentration of the hydrogen ion is expressed as pH and is a significant parameter in the task of biological units. Fresh sewage pH is slightly more than the water supplied to the community. However, the pH can be lowered by decomposition of organic matter. There is a extreme fluctuations in the pH due to presence of industrial wastewater. Generally, raw sewage pH is in the range of 5.5 to 8.0. Treatment of wastewater leads to removal of heavy metals and/or organic compounds from effluent streams. The adjustment of pH is done by adding acidic/basic chemicals. It is an important part of any wastewater treatment system because it allows to separate dissolved waste from water in the process of water treatment.

Water consists of a negatively charged hydroxide ion and positively charged hydrogen ion. In acidic (pH<7) water the concentration of positive hydrogen ions is high and w the concentration of hydrogen and hydroxide ions in neutral

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water is balanced. Basic (pH>7) water consists of negative hydroxide ions in excess. We can remove heavy metals and other toxic metals from water by chemically adjusting the pH. Usually in runoff or wastewater, metal and other contaminants are dissolved and will not settle out. If we raise the pH, the positively charged metal ions, the amount of negative hydroxide ions, will form bonds with the negatively charged hydroxide ions. It forms a dense, insoluble, metal particle can settle out of wastewater in given time or can be filtered manually using a filter press.

2.2) Total Dissolved solids :

The conductivity of the can be related to the total dissolved solids concentration. But the relationship is not a constant. The relationship between the conductivity and total dissolved solids is a function of the type and nature of the dissolved cations and anions in the water and the nature of any suspended materials. For example, KCl solution and a NaCl solution with a conductivity of 10000 umhos/cm will not have the sample concentration of NaCl or KCl and which will have different total dissolved solids concentration. The measurement of conductivity by a meter and is usually about 100 times the total cations or anions which is expressed as equivalents and the total dissolved solids (TDS) in ppm which is usually ranges from 0.5 to 1.0 times the electrical conductivity.

Total Dissolved SSolids can be measured in the field using an electronic pen. Many of these devices actually measure the conductivity of the water, i.e., the ability of the water to carry a charge, and not the actual total dissolved solids. The devise which calculate the total dissolved solids by assuming that the primary dissolved minerals are either a combination of NaCl or KCl.

2.3) COD :

COD i.e. Chemical Oxygen Demand is a measurement of the oxygen required to oxidize soluble and particulate organic matter in water. Chemical Oxygen Demand is an important parameter of water quality because, similar to BOD, it gives an index to assess the effect of discharged wastewater which will have on the receiving environment. Higher the COD level, greater amount of oxidizable organic material in the sample, which will reduce dissolved oxygen (DO) levels. The reduction in DO can lead to anaerobic conditions, which is deleterious to higher aquatic life forms. The COD test is usually used as an alternate to BOD because of shorter length of testing time**.**

The method in which a strong oxidizing chemical, potassium dichromate $K_2Cr_2O_7$, to oxidize the organic matter in solution to carbon dioxide and water under acidic conditions. The test also involves a silver compound to encourage oxidation of certain organic compounds and mercury to reduce the interference from oxidation of chloride ions. Then the sample is digested nearly about 2 hours at 150°C. The required amount of oxygen is calculated from the quantity of chemical oxidant consumed.

2.4) BOD :

Biological Oxygen Demand or Biochemical Oxygen Demand, is a measurement of the amount of dissolved oxygen (DO) which is used by aerobic microorganisms when decomposing organic matter in water.

Biochemical Oxygen Demand is an important water quality parameter as it gives an index to find the effect discharged wastewater will have on the receiving environment. The higher the BOD value, the greater the amount of organic matter or “food” available for oxygen consuming bacteria. If the rate of DO consumption by bacteria exceeds the supply of DO from aquatic plants, diffusing from air or algae photosynthesis, un favorable conditions occur. Reduction of DO causes stress on aquatic organisms, which makes the environment unsuitable for life. Hence, dramatic depletion form to hypoxia or anoxic environments. BOD is also can be used for wastewater treatment, as decomposition of organic waste by microorganisms is usually used for treatment. The regulations for BOD will vary by country and region. In general, maximum allowable concentration for direct environmental wastewater discharge is about 10 mg/L BOD and maximum allowable concentrations for discharge to sewer systems is about 300 mg/L BOD.

The common approved laboratory method for determination of Biochemical Oxygen Demand is Standard Method. A sample is first analyzed and conditioned to ensure favorable growth conditions for bacteria, which include the adjustment of pH, the neutralization of residual chlorine, and/or reduction of DO in supersaturated samples, which is then diluted and the appropriate amount of seed bacteria added. The initial dissolved oxygen content is recorded and the sample is then incubated for 5 days at 20°C. After the 5 day period, the sample is removed from the incubator and the final dissolved oxygen reading is taken. BOD is calculated from the DO depletion and volume of sample used following the formula below.

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BOD_5 = BOD mg/L = [(IDO -DO_5) – seed correction] x dilution factor.

3. Result and Discussion

Table 1 Observations of characterization of wastewater

Sr.No.	Parameter	1st test	2nd test	3rd test	Range
1	pH	6.67	6.58	7.1	6.58 - 7.1
2	Chloride content (mg/L)	78.31	94.71	89.46	78 - 89.46
3	COD (mg/L)	348.5	368.4	571	348 - 571
4	BOD (mg/L)	88	74	144	74-144
5	Oil and Grease (mg/L)	1.3	0.9	1.1	0.9-1.3

Ranges of COD, BOD mentioned are calculated of four samples with different time intervals like morning, afternoon, evening. It is been understood by the references that these parameters will definitely help to generate electricity.

4. Conclusion

Sanitation and generation of electricity possible .so, to confirm the same characterization of the waste water gives output as mentioned COD lies between 348-571 and BOD ranges from 74-144.

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