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TREATMENT OF WASTEWATER BY USING FAB REACTOR

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Abstract - *The waste water treatment plant which we are going to design mainly uses primary, secondary and tertiary treatment units for treating predominantly waste water. The waste water generated from administrative block, hostel and college in our campus will be collected and analyzed. The treated effluent is used for gardening and also for the development of green belt. The samples are collected regularly at the plant inlet as well as before and after each treatment process. The raw sewage is characterized by high dissolved solids, medium strength BOD, low COD/BOD ratio, high concentration of chloride, sulphate.*

Key Words: *BOD (Bio Chemical Oxygen Demand), Wastewater treatment, COD (Chemical Oxygen Demand), Sewage*.

1.INTRODUCTION

Sewage indicates the liquid waste generated from the residential and commercial establishments. It includes the silage, discharge from bathrooms, latrines, stables and also the ground water and storm water. Treatment of sewage is essential to ensure that the receiving water into which the effluent is ultimate discharged is not significantly polluted. However, the degree of treatment required will vary according to the type of receiving water. Thus, a very high degree of treatment will be required if the effluent discharges to a fishery or upstream of an abstraction point for water supply, A lower level of treatment may be acceptable for discharges to coastal waters where there is availability of rapid dilution and dispersion.

The objectives of sewage treatment are associated with removal of pollutants and the protection and preservation of our natural water resource. The specific concern is protection of human health by the destruction of pathogenic organisms present in wastewater prior to disposal of effluent into receiving waters.

1.1 FLUIDIZED AEROBIC BIOREACTOR

Two stages of aeration tanks are proposed for the treatment of the sewage by adopting Fluidized Aerobic Bed Reactor. The system is carrier in a fluidized bed was fluidized within the state, so that solid (bio film), liquid (waste water), gas (air) between the three phase full contact with collisions between particles. The bio film surface has continuous growth of micro-organisms in as vigorous stage. The technology allows the bed to maintain a high concentration of biomass; mass transfer efficiency is extremely high so that the matrix degradation of waste water is fast. The hydraulic retention time is short and running load is greater than the general activated sludge by 10 ~ 20- fold and it is resistance to shock load capability.
Fluidized Aerobic Bio-Reactor (FAB), the space and power saving technology is a better alternative to conventional wastewater treatment plant that are large sized, power intensive and required a lot of monitoring.
FAB offers an effective option to the conventional system made unviable due to scarcity of space, geographical network of piping and high power. Fluidized Aerobic Bio-Reactor (FAB) As the name indicates consists of floating media of cylindrical shapes and different sizes. As compared to conventional technologies FAB reactors are compact, energy efficient and user friendly.

1.2 STUDY AREA

- Our project is carried out in S.G.Balekundri Institute of Technology. The college is situated in Shivabasav nagar, Belgaum.
- Population of college is nearly 2000 including students (hostel), teaching and non-teaching staffs.
- The water consumption for the institution is 45MLD and for hostel it is 135MLD.
- The rate of wastewater generated in the campus is considered to be 0.8 times the water consumption.
- For our project wastewater sample is collected at a main disposal point which includes wastewater generated from canteen, hostels and administration blocks.
- Therefore the total wastewater generated for campus is 288MLD.

2. OBJECTIVES

- Analization of sewage samples collected at SGBIT Campus for Physical, Chemical characteristics.
- Designing and developing a model for treating the sewage.
- Analization of effluent quality of the treated wastewater.
- To obtain the optimum HRT.

3. METHODOLOGY

In this project, study is carried out to design and develop a treatment unit (model of the unit) in such a way that the act as aeration tank as well as settling tank with decanting system to more the treated wastewater.

In this project a model is prepared to find out the parameters that affects the performance of the sewage treatment plant. The design parameters that affect the performance of this model are characteristics of incoming wastewater, sequential process phases for the repeated cycles, ratio of treated wastewater to working volume of the reactor, aeration rate, contact time, BOD,COD,TSS,TDS and pH. In the present study, aeration and settling tank time are varied to check the efficiency of the reactor basin. Experimental works are also carried out to check the efficiency of the unit. Based on results conclusions have been drawn. All the samples are analyzed in Environmental Engineering laboratory and experimental procedure is as per Standard method.

4. RESULTS AND DISCUSSIONS

The hourly average value of all the water quality parameters at different HRT are shown in table-1 respectively. The graphical representation of the variation of the parameters at different HRT are represented in chart-4.2, 4.3, 4.4 & 4.5

pH: It is observed that the pH value increasing with increase in settling time. After certain duration it decreases and reaches an optimum point and that duration is 24hrs which is taken as optimum HRT.

Biochemical oxygen demand (BOD): The BOD value goes on decreasing with increase in both aeration time and settling time after certain interval again decreases. The BOD value is minimum for aeration period of 24hrs with the value of 58mg/L.

Chemical oxygen demand (COD): The COD value goes on decreasing with increase in aeration time and settling time after certain interval again decreases. The COD value is minimum i.e. mg/L for 24hrs aeration with the value 110mg/L.

Total dissolved solids (TDS): The total dissolved solids value is found to be minimum i.e. 500mg/L for 24hrs aeration period.

Table 4.1: Experimental analysis of all parameters at different HRT

Characteristics	Influent	48 hrs	24 hrs	12 hrs	6 hrs	3 hrs	1.5 hrs
pH	8.65	8.22	7.98	8.04	8.3	8.75	8.8
BOD (mg/l)	95	70	58	62	68	77	77
COD (mg/l)	185	168	110	148	156	167	146
TDS (mg/l)	960	840	500	624	748	766	788

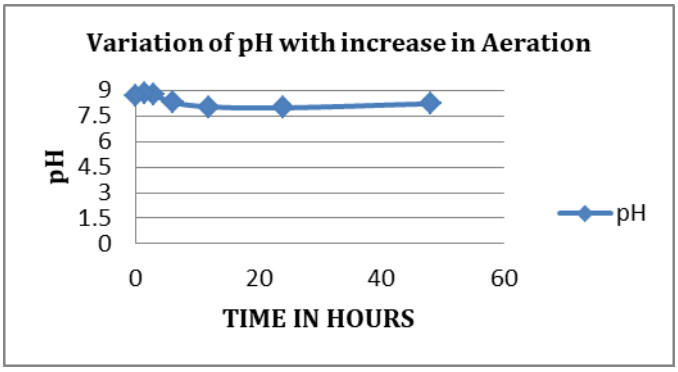

Chart 4.2: Variation of pH with increase in Aeration

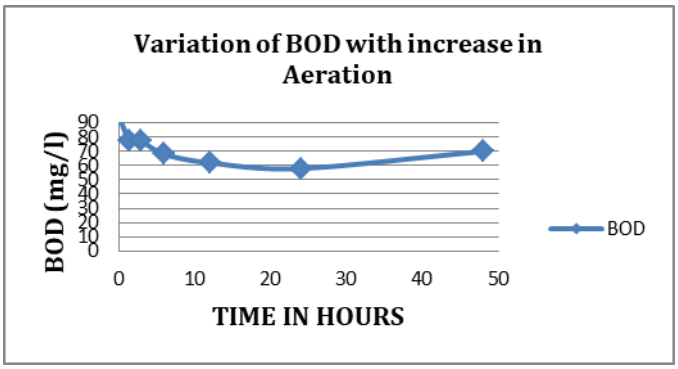

Chart 4.3: Variation of BOD with increase in Aeration

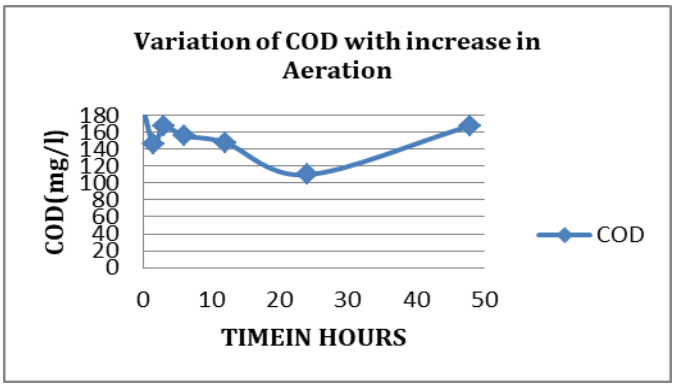

Chart 4.4: Variation of COD with increase in Aeration

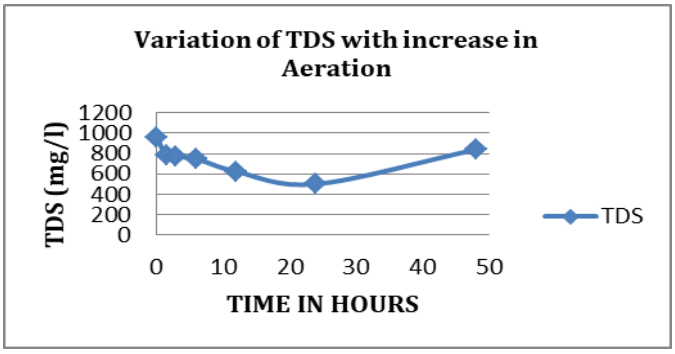

Chart 4.5: Variation of TDS with increase in Aeration

5. CONCLUSIONS

- In the presence study, a model of FAB (Fluidized Aerobic Bioreactor) is prepared to treat the sewage.
- For the given reactor the optimization time for aeration is form to be 24hr optimization time.
- Before treating the influent had BOD value of 95mg/L and after treatment the BOD value reduced to 58mg/L
- The initial COD value of wastewater sample was 185mg/L and after treatment it got reduced to 110mg/L.
- The initial dissolved solids value was 960mg/L and after treatment it got reduced to 500mg/L
- All the above parameters are within the limits prescribed by Central Pollution Control Board (CPCB)
- Hence, this reactor is capable of treating sewage and treated sewage can be used for gardening or for flushing of toilets.
- The main advantages of FAB process are simple in construction, plant can fit into almost any shape, requires sewer channels and pipe work, odorless operation with the self-regulating system, reduce power consumption, non-clogging system.
- This method is very effective and the treated wastewater can be utilized for gardening purposes and even is fit for agriculture purposes and curing building constructions.

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