



RETROFITTING OF BADWAI SEWAGE TREATMENT PLANT

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ABSTRACT

Sewage is mainly composed of human domestic wastes including wash-water , fecal material, and industrial wastes. The growing environmental pollution needs for decontaminating wastewater result in the study of characterization of waste water both for domestic sewage and industrial sewage . Recently, increasing pollution in the waste water and updated criteria for disposal, leads to developing and implementing new treatment techniques to keep the parameter of sewage within the present permissible limits .Sewage Treatment Plant is a facility designed to receive the waste from domestic, commercial and industrial sources and to remove materials that damage water quality and compromise public health and safety when discharged into water receiving systems. It includes physical, chemical and biological processes to remove various impurities depending on its constituents. The present study comprises the study on quality of waste water that is discharged from the domestic and industrial outlets . The present study is to make treated sewage as per the latest codal provisions . The study includes characterization tests for pH value, acidity, alkalinity, chloride, residual chlorine, turbidity & DO , the retrofitting of plant and calculation of parameter of treated sewage .

KEY WORDS – Sewage treatment , Retrofitting , Mix Activated Sludge , Advanced Treatment Process .

INTRODUCTION

Pollution in basics includes all the changes which inance deterioration of natural Things and natural lifes . Due to growing population and industrialization , resultants in degradation of the environment causes big threat to the quality of human life and other lifes on earth .The degradation of water quality is the unfavorable alteration of the physical, chemical and biological properties of water that prevents domestic, commercial, industrial, agricultural, recreational and other beneficial uses of water. The disposal of Sewage and sewage effluents are highly pollutant for flowing river water .

The main objective of waste water treatment is generally to make human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. Sewage includes waste from many places and of many types . Sewage also includes liquid waste from industry . After the whole treatment process , the safe Waste water should be produced. No danger to human health or unacceptable damage to the natural environment is expected from any sewage treatment process . The sewage of cities are now more concentrated and have more impurities than previous . The CPCB has also revised the norms for the disposal of sewage into the streams . It is observed that the sewage treated from the present sewage treatment

plant is not as per the latest norms . So it is essential to modify the sewage treatment plant , so as to fulfill the norms specified by the CPCB .

The most desirable scenario for a retrofit is the ability to use existing structures to accommodate the new system with only a minimum amount of changes. For our study we have taken Badwai sewage treatment plant located in Bhopal city .

The study consist of

1. Physical, chemical and biological characterization of the domestic waste water from Waste water treatment of Bhopal city .
2. The parameter values are compared with standard values prescribed by latest norms decided by CPCB .
3. Retrofitting of existing sewage treatment plant to fulfill the present criteria as per CPCB for disposal of sewage .

LITRETURE REVIEW

- Chan et al in 2013 worked on heavy metal uptake by three types of algae *Chlorella* sp., *Spirulina* sp., and other algae found in wastewaters of industries. They used untreated and autoclaved effluents as a substrate and observed that microalgae removed up to 81.7% of copper and 94.1 % of zinc and also found that higher heavy metal removal is obtained in autoclaved effluents because the presence of microbes in untreated effluents put negative impact on the removal efficiency.
- Deviram et al in 2011 used the microbial mats for the study using different species of algae such as *Ulva* sp., *Cladophora* sp. and *Chlorella* sp. and observed COD and BOD in three different types of process free cell process, batch process and continuous process and found that better results were developed in continuous process with 52.1(COD) and 50.8(BOD) along with changes in dissolved oxygen (DO) and pH.
- Kim et al. in 2010 studied the capability of *Chlorella vulgaris* to remove nitrogen in the form of ammonia and ammonium ion from local wastewater. The wastewater effluent leaving the plant was found to include high concentrations of nitrogen (7.7 ± 0.19 mg/L) (ammonia (NH₃) and ammonium ion (NH₄⁺)) and total inorganic carbon (58.6 ± 0.28 mg/L) at pH 7, and to be suitable for growing *Chlorella vulgaris*. When *Chlorella vulgaris* was cultivated in a batch mode under a closed system, half of the nitrogen concentration was dramatically removed in 48 h after a 24h lag-phase period.
- Kothari et al in 2012 studied the physical and chemical parameters of dairy wastewater quality such as nitrates, sulphides, phosphates, chlorides and hardness. They founded that nitrogen and phosphate removal is achieved to be 49 % and 83 % respectively.

REVISED STANDARDS OF WATER QUALITY PARAMETERS FOR SEWAGE EFFLUENT DISPOSED IN RIVER SET BY CPCB –

Central Board in its 168 th meeting held on 27/03/2015 resolved to notify the standards for treated sewage. These standards for discharge of treated sewage from STPs have also been endorsed in the Minister's Conference held during April 6-7, 2015 and 59 th Conference of Chairmen & Member Secretaries of Pollution Control Boards and Pollution Control committees held on april 8, 2015.

EFFLUENT DISCHARGED STANDARDS FOR SEWAGE TREATMENT PLANT

Sl. No.	Parameters	Parameters Limit (Standards for New STPs Design after notification date) *
1.	pH	6.5-9.0
2.	BOD (mg/l)	Not more than 10
3.	COD (mg/l)	Not more than 50
4.	TSS (mg/l)	Not more than 20
5.	NH ₄ -N (mg/l)	Not more than 5
6.	N-total (mg/l)	Not more than 10
7.	Fecal Coliform (MPN/100ml)	Less than 100

Note:

(i) These standards will be applicable for discharge in water resources as well as for land disposal. The standards for Fecal Coliform may not be applied for use of treated sewage in industrial purposes.

(ii) * Achievements of Standards for existing STPs within 05 years from the date of notification.

EXPERIMENTAL WORK

Waste water samples of raw sewage and the treated sewages are taken in the sewage treatment plant . The various parameter listed below for this sewage samples of Bhopal city are calculated .

The following physical characteristics were studied:

- i. Odour
- ii. Taste
- iii. Colour
- iv. Floatables
- v. Turbidity

The following metallic characterstics were calculated :

- i. Total Iron
- ii. Copper
- iii. Zinc
- iv. Potassium
- v. Lead
- vi. Aluminum

The following chemical characteristics were studied:

- i. Alkalinity
- ii. Acidity
- iii. Chloride
- iv. Residual Chlorine
- v. Sulphate
- vi. Ph. of the sample
- vii. Biochemical Oxygen Demand
- viii. Dissolved Oxygen

VISIT OF BADWAI SEWAGE TREATMENT PLANT



RESULT FROM EXPERIMENTAL WORK

The sewage samples from the Badwai treatment plant is collected at inlet and outlet points . The samples are tested as per the Indian standard specifications .

Results of testing at the effluent end of treatment plant –

S.No.	Test	Value
1.	pH	7.13
2.	Total Suspended Solids	51 mg/lt
3.	Phosphate	0.11 mg/lt
4.	COD	60m g/lt
5.	BOD (3 day 27 degrees)	14 mg/lt
6.	DO	2.1 mg/lt

7.	NH4-N	12 mg/lt
8.	N-Total	15 mg/lt

Results of testing at the Influent end of treatment plant –

S.No.	Test	Value
1.	pH	7.5
2.	Total Suspended Solids	233 mg/lt
3.	Phosphate	8 mg/lt
4.	COD	432 mg/lt
5.	BOD (3 day 27 degrees)	210 mg/lt
6.	DO	1 mg/lt
7.	NH4-N	25 mg/lt
8.	N total	35 mg/lt

CALCULATIONS –

The various units of treatment plant is re designed with designed population of treatment plant . The various elements are designed to get sewage characteristics as per latest CPCB guidelines .

Screening Unit Design

Grit Chamber and Detritus Tank

Sedimentation with Coagulation Process

Mix Activated Sludge Process

Miscellaneous Advanced Treatment Process

RESULT :-

The sewage after treatment have characteristics as per the CPCB norms .

S.No.	Test	Value
1.	pH	7.5
2.	Total Suspended Solids	15 mg/lt
3.	Phosphate	0 mg/lt
4.	COD	<50 mg/lt
5.	BOD (3 day 27 degrees)	< 10 mg/lt
6.	DO	4 mg/lt
7.	NH4-N	0.5 mg/lt
8.	N total	10 mg/lt

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