Laboratory scale Treatment of Wastewater from a Common Effluent Treatment Plant

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Abstract

Industrial wastewater treatment has been slow to develop, and in some respects has not kept up with advances in manufacturing technology. This article discusses the various wastewater treatment technologies in more detail and includes tables that compare their applications, advantages, and disadvantages. It also provides guidance on when to apply what type of treatment to which waste streams. This information can help bridge the gap between where the plant needs to be, in terms of effluent quality, and where it is, in terms of wastewater characteristics. Technologies include wet air oxidation, supercritical oxidation, incineration, activated sludge, aerated lagoons, stabilization ponds, trickling filters, fixed-film reactors, and anaerobic degradation. The aim of this study is to evaluate the performance efficiency of effluent treatment facility and lab scale research to reduce pollutant loads through adoption of recent developments in the areas of effluent management systems.

Keywords: *Performance Evaluation, Wastewater Analysis, Wastewater Treatment, Treatment Efficiency*

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1. INTRODUCTION

The Present study has been undertaken to evaluate performance efficiency of a CETP located in jetpur, (Gujarat). The CETP is operating on conventional treatment method with an average wastewater inflow of 13 m3/day. It has been considered for case study. The effluent is coming from Small Scale Industries like textile industries, printing units, process out, die intermediates, Cotton manufacturers and domestic waste.

Many CETPs have been installed and operated all over the country for tackling the water pollution problems arising from the clusters of SSIs. All is not well even with the CETPs. There are very few CETPs, which have been successful in tackling the water pollution problems from SSIs. Heterogeneous nature of the effluent generated by different units of the cluster is seen as one of the major causes for the failure. Thus, Performance evaluation study is to be done.

2. MATERIAL AND METHOD

Samples were collected from the three sampling locations i.e. from the influent, Primary Clarifier and Final outlet of the plant. Collection of Samples once in a week. Before collection of samples containers were rinsed with the samples being collected. Composite type sampling technique was used to collect the samples. Collected samples were analyzed for the parameters pH, BOD, COD, TSS, and TDS. As possible samples were analyzed on the same day whenever it was possible. Analysis was done in the laboratory by determining various parameters according to "standards methods for examination of water and waste water.

3. ANALYSIS RESULTS

Sampling Location : Inlet

Date	pH	TSS	TDS	COD	BOD
4/03/2019	9.64	243	5321	1340	516
11/03/2019	9.11	312	4620	2386	523
18/03/2019	9.13	340	4125	2379	496

Sampling Location : Primary Clarifier Outlet

Date	pH	TSS	TDS	COD	BOD
4/03/2019	8.26	214	5120	1256	326
11/03/2019	8.92	286	3926	1897	398
18/03/2019	8.34	269	3298	1938	358

Sampling Location : Final Outlet					
Date	**pH**	**TSS**	**TDS**	**COD**	**BOD**
4/03/2019	**7.45**	**186**	**4526**	**874**	**298**
11/03/2019	**7.14**	**237**	**2968**	**793**	**197**
18/03/2019	**7.26**	**196**	**3125**	**864**	**256**
Average	**7.28**	**206.33**	**3539.66**	**843.66**	**751**

From the above parameters analysis:

The pH is permissible limit. The COD, BOD, TSS and TDS are higher than the permissible limit.

4. FEASIBLE TECHNOLOGY IDENTIFICATION

The proposed process involves adding powdered activated carbon to the aeration tank of the activated sludge process, achieving cost effectiveness by operating at a very high sludge age and a low carbon dose. Activated carbon is produced from any carbonaceous material like Eucalyptus, Rice husk, Coal, Wood, Lignite and coconut shell. But in this case activated carbon is manufactured from coconut shell only. So, It is hard compared with other carbon and has a high surface area. Coconut shell based activated carbon gives more adsorption capacity due to its microspores structure and superior hardness. Activated carbon is carbon that has been exposed to very high temperatures, creating a vast network of internal pores. Two types of activated carbon, granular and powdered have been used widely in water treatment.

Studies indicate that powdered activated carbon may be a practical and economical substitute for granular carbon. For example, powdered carbon costs only about one-half as much as granular. In addition, recent studies have shown that powdered carbon can be added directly to the mixed-liquor in activated sludge aeration tanks. Activated carbon removes contaminants through adsorption, primarily a physical process in which dissolved contaminants adhere to the porous surface of the carbon particles. Appropriate alterations in operating procedures may eliminate the need for regeneration by making it economically feasible to discard the spent carbon with the waste sludge. The activated carbon powder was dosed 200 mg/l, 100 mg/l, 25 mg/l and 10 mg/l. The best result found in 25 mg/l dose of activated carbon powder. The powder activated carbon was used in this experiment The 7 lit reactor was used for PAC experiment.

Aerator bubbling due to aerator

Sampling Location : Final Outlet					
Date	**pH**	**TSS**	**TDS**	**COD**	**BOD**
15/04/2019	**7.26**	**119**	**2268**	**256**	**89**
22/04/2019	**7.27**	**106**	**2146**	**186**	**59**
29/04/2019	**7.14**	**132**	**2289**	**249**	**62**
Average	**7.22**	**119**	**2234.33**	**230.33**	**79**

4. CONCLUSION

The study indicates that all major pollutants were reduced in the wastewater after treatment. The pH, TSS, TDS, COD, and BOD at the influent were recorded to be 9.13, 340mg/l, 5321mg/l, 2386 mg/l and 523 mg/l for CETP, while the average values of the same parameters in the effluent were 7.22, 119mg/l, 2234.33 mg/l, 230.33 mg/l, 79 mg/l respectively. The BOD, COD, TSS and TDS values were reduced to much extent which shows the removal of organic and inorganic content. The percentage removal of TDS was found to be comparatively low than other parameters. The study indicates that all major pollutants were reduced after the treatment and the effluent values for this CETP were well within limit of discharge as per CPCB standards.

5. ACKNOWLEDGMENT

Authors would like to acknowledge the Department of Civil Engineering, Aadishwar College of Technology, venus , Gandhinagar for their kind support and correspondence. I would also thankful to principal Dr D.J. Shah and Head of the Department Prof.usman shaikh for their encouragement and kind support for this research.

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