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The Study of Waste Water Treatment of CETP

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ABSTRACT

The study was based on the common effluent treatment plant of NEPL. Composite samples were collected from collection tank and primary clarifier. Common Effluent Treatment Plants [CETPs] are specifically designed for collective treatment of effluent generated from small scale industrial facilities in an industrial cluster. CETPs are designed to collect and treat effluent from a multitude of facilities which can also require CETPs to deal with varying qualities and quantities of effluent. Testing was required to obtain the necessary design and parameters like pH, COD (Chemical Oxygen Demand), Total Dissolved Solids (TDS), Density and Moisture content. Collected composite samples were analyzed in the laboratory. Water quality can be determine by the physiochemical treatment to the effluent. The various coagulants used in the primary treatment of coagulation and flocculation process. The commercial available coagulants such as alum, lime, PAC (poly aluminum chloride) are used. The flocks will be generated after the coagulation-flocculation process. Then after the effluent were pumped to the primary clarifier. In this the primary sludge from the bottom were collected to the primary sludge sump. In this the water from the tank will overflow from the launder and will go to the aeration tank. Primary sludge collected in the sump will be taken to the sludge dewatering device. i.e. decanter. After that the water will be remove from the primary sludge and cake form of sludge will send to the disposal.

KEY WORDS: Common Effluent Treatment Plant, Waste Water Treatment, Physical and Chemical Treatment

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INTRODUCTION

A common effluent treatment plant offers an alternative to the practice of better utilization of resources of an industrial area. Most of the small-scale industrial units cannot individually afford to set-up their own effluent treatment plants to meet the prescribed pollution control norms. This has been responsible for the origination of the concept of CETP. Concept of common effluent treatment plant (CETP) was originally promoted by the Ministry of Environment and Forests (MOEF) in 1984 for the treatment of wastewaters from a large number of small and medium scale industries.[1] In India, the chemical industry is one of the most important industries of the country. However, large volumes of wastewater are generated during the process. Different conventional physicochemical and biological treatments have been used to treat the effluent wastewater. The pollutants in the wastewater are different salts, surfactants, heavy metals, mineral oils and others. This wastewater can cause serious environmental problems due to their high color, large amount of suspended solids, and high chemical oxygen demand.[2]The huge quantity of industrial wastewater generation process threat to quality of surface as well as ground-water. Water can change physical, chemical and bio- logical characteristic in such an extent that it is neither use for drinking nor use for other activities. The treatment process may be physical, chemical and biological method and advanced treatment.[3]Like many industries, textile industry also requires large volumes of water and chemicals for wet processing of textile. The textile unit generates various types of wastewaters at variance in magnitude and quality. They discharge large quantities of effluent and azo dyes. There are several methods have been developed for the treatment of dye wastewater like reverse osmosis, electro dialysis. But this treatment methodology cannot be used individually because at times, dye wastewaters have high salinity, COD, color and non- biodegradable organics.[4]The efficiency of any treatment plant especially a CETP, depends on its optimum design and functioning and also strict compliance by member facilities.[5]The treatment with the help of CETP requires similarity of the generated effluent. This is a feasible solution for those small scale industries, clustered together who can't afford to install a separate individual treatments units at their disposal.[6]Dyeing and printing of cotton fabrics in the major activity of this industrial complex besides other activities such as desizing, mercerizing, kiering, bleaching etc. This CETP is based on physico- chemical followed by aerobic biological treatment.[7]A significant reduction in COD and BOD levels were achieved during the course of treatment in CETP.[8] Till 1990, only one CETP at Jeedimetla, Hyderabad was in operation. Government of India initiated an innovative financial support scheme for CETPs to ensure the growth of the small and medium entrepreneurs (SMEs) in an environmentally compatible manner.[9]Oneof the famous treatment methods to reduce suspended solids and turbidity is the coagulation and flocculation. Coagulation uses salts such as aluminum sulfate (alum) or ferrous of

ferric (iron) salts, which bond to the suspended particles, making them less stable in suspension, i.e., more likely to settle out. Flocculation is the binding or physical enmeshment of these destabilized particles, and results in flocks that is heavier than water, which settles out in a clarifier.[10] The Concept of CETP is different from STP in two aspects: homogeneity and biodegradability. Composition of effluents from different industries varies widely depending on process and products. When mixed effluent from different industries the nature of effluent becomes heterogeneous and treatment process becomes challenge. The organic compounds present in industrial effluent are hard to biodegrade compared to domestic waste water.[11]The use of constructed wetlands is now being recognized as an efficient technology for wastewater treatment. Compared to the conventional treatment systems, constructed wetlands need lesser material and energy, are easily operated, have no sludge disposal problems and can be maintained by untrained personnel.[12]An estimated 38354 million liters per day (MLD) sewage is generated in major cities of India, but the sewage treatment capacity is only of 11786 MLD. In Delhi around 3296 MLD (Million Liters per day) of sewage is dumped in the River.[13]The treatment methods adapted in these plants are dissolved air floatation, dual media filter, activated carbon filter, sand filtration and tank stabilization, flash mixer, clariflocculator, secondary clarifiers and Sludge drying beds, etc. Coarse material and settable solids are removed during primary treatments by screening, grit removal and sedimentation. Treated industrial waste water from CETPs mixed disposed in rivers. One of the major problems with waste water treatment methods is that none of the available technologies has a direct economic return. Due to no economic return, local authorities are generally not interested in taking up waste water treatment.[14]

MATERIAL AND METHODS

Sample Collection and Materials:

Sample of the effluent waste water was collected from a CETP, NEPL Company, which is situated in Ahmedabad, India. Chemical coagulants like alum, polyelectrolyte and PAC (poly aluminium chloride) are used.

Methods:

There are various processes to treat the effluent from the industries. The effluent which is collected in collection sump before subjecting it to further treatment. Walls of the collection sump are acid proof lined as an apprehended protective measure against the accidental discharge of acidic effluent. The effluent from the collection sump is pumped to flash mixer. A flash mixing chamber is that in which coagulants and other chemicals are blended with waste water chemicals like alum, polyelectrolyte and PAC(poly aluminum chloride) are added to the water stream that encourage coagulation. The mixture is agitated quickly and thoroughly in a processcalled flash mixing. The

chemicals added into the water stream will attract any fine particles, which will not readily settle or filter out and make them clump together. These larger, heavier formation are called flock. Then the effluent will pumped to further process. Primary clarification is the physical treatment process for removing solids before biological treatment. Effluent from the flash mixer will come to clarifier by gravity. The flocculator will be perform two different function: The central part provided with two step of paddles type flocculator having 20 to 30 RPM. The slow mixing of the paddles will form the flocks. The outer portion of the clarifier provides quiet zone for settlement and separation of the flocks. The flock's free water will then overflow from the launder and will go to the further process.The sludge settle at the bottom will be remove from the bottom by gravity to primary sludge sump. Primary sludge sump is provided to collect the clariflocculator. The primary sludge collected in the sump will be taken to the sludge dewatering device i.e. the decanter. Two type of sludge dewatering system have provided. They are; Sludge drying beds (for secondary sludge), Decanter of Alpha level. The study was carried out for the characterization of the waste water samples. In the first step parameters were analyzed which are pH, TDS(Total Dissolved solids),COD(Chemical Oxygen Demand) and Density. In the second step the physiochemical treatment applied to wastewater to reduce COD and TDS.[15]

RESULT AND DISCUSSION

To assess the functioning of CETP, the physical – chemical properties of waste water before and after treatment has to be taken into consideration.

Table1. Composition of the Effluent before Treatment

Parameters	Observations			
	Week 1	Week 2	Week 3	Week 4
pH	7.9	7.2	7.7	7.4
TDS	21336	24500	26200	27500
COD	3200	3250	3390	2980
Density	1.10	1.08	1.06	1.08

Table2. Composition of the Effluent after Treatment

Parameters	Observations			
	Week 1	Week 2	Week 3	Week 4
pH	7.6	7.1	7.3	7.1
TDS	19200	22120	23500	24100
COD	2500	2530	2620	2470
Density	1.08	1.06	1.05	1.07
Moisture content(sludge)	62%	69%	64%	65%

Table3. Percentage reduction of COD and TDS after the primary treatment process

Parameters	WEEK-1	WEEK-2	WEEK-3	WEEK-4
COD	21%	22%	23%	17%
TDS	10%	9%	10%	12%

After the primary treatment the COD will reduce 15-25%. TDS will also decrease as it was at the time of collection. TDS will reduce 9-15%. Moisture content can be calculated between 60-70%

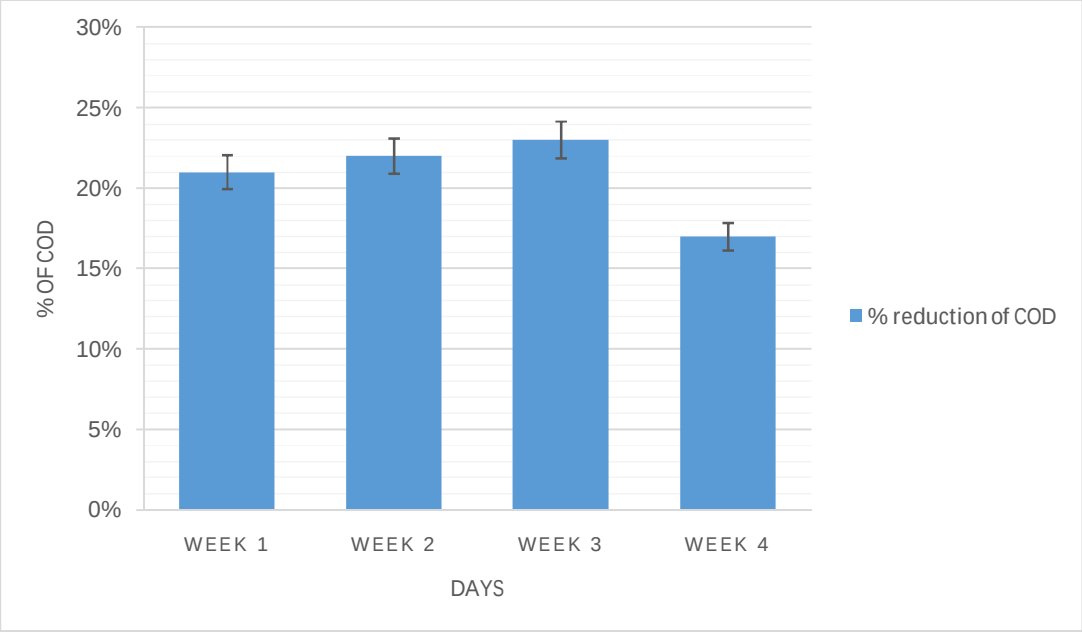

Figure1. Percentage Reduction of Chemical Oxygen Demand (COD)

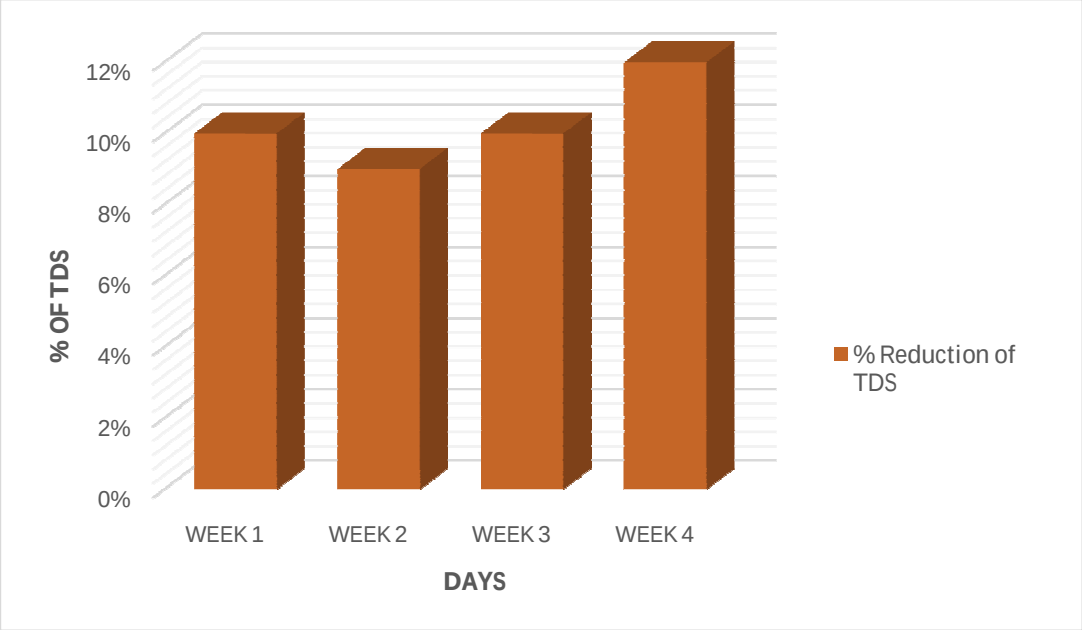

Figure2. Percentage Reduction of TDS

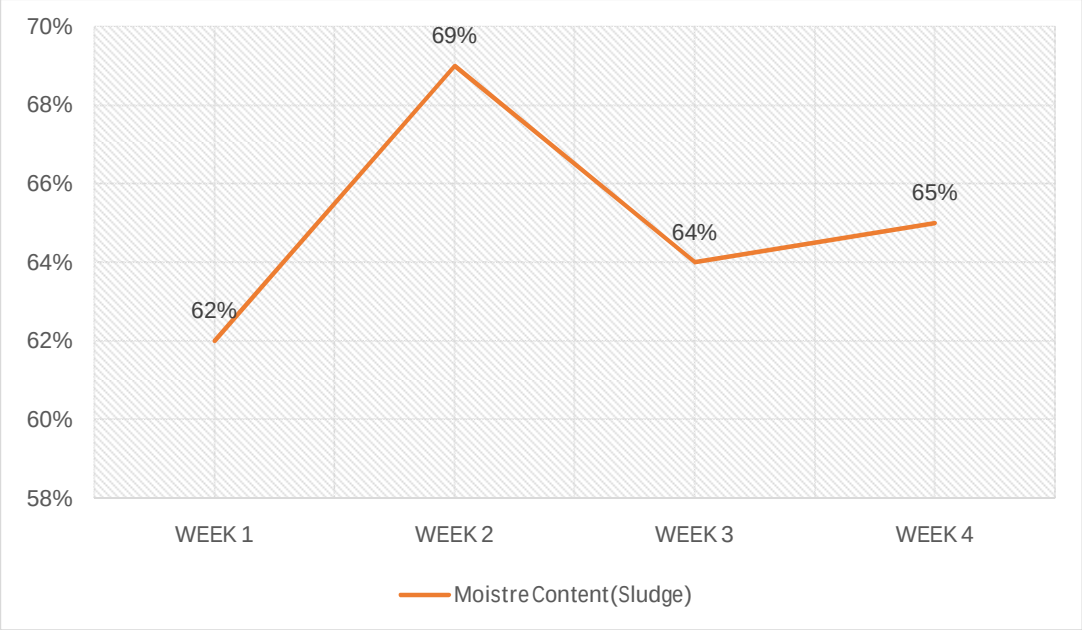

Figure3. Moisture Content of Sludge

CONCLUSION

It can be conclude that the industrial effluent should be treated before to be drained into the natural water bodies. The waste water from Naroda GIDC industries comes under the nomes to the NEPL. The primary and secondary treatment will give to the waste water. At the primary stage of treatment 15-25% of COD can be reduced. Sludge can also be removed at the primary stage. Due to that the TDS can also be reduced. After giving treatments to these effluent it cannot reused. It cannot used in agriculture, gardening or in another purposes.

After the primary process the effluent waste water will be goes to secondary treatment. Then after the effluent waste water will be discharged to mega pipeline. The GPCB nomes of COD the discharge effluent is 250mg/l. the sludge after the treatment will be sent to the disposal. Due to the addition of the coagulants to the flash mixer like alum, lime and poly-aluminum chloride (PAC) will be resulted in decrease of COD.

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