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Efficiency Assessment of the Common Effluent Treatment Plant (CETP), MIDC Chincholi, Solapur

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Abstract:

Common effluent treatment plant plays vital role in protecting the environment and different lives from harmful industrial wastewater. CETP is used for secondary and tertiary effluent treatment for various industries like textile, pharma, oil refinery, rubber, chemical, agro etc. CETP helps to control water pollution and provide good services to industries. The study analyzed the physico-chemical parameters of inlet and outlet samples of CETP. The percentage removal efficiency of CETP of TDS, TSS, COD and BOD was found to be 10.58 %, 89.6 %, 61.14 and 93.25 % respectively. The efficiency of the CETP was good with respect to removal of TSS, BOD and COD. Present study was performed towards efficiency of CETP over a period of 2013-2014.

Key words: CETP, Environment, Efficiency, Effluent, Pollution and Treatment.

INTRODUCTION:

Generally Common effluent treatment plant (CETP) is designed to help the industries in easier control of pollution, as well as it act as a step towards cleaner environment and service to the

industrial sector at large scale. CETP is much more helpful for the small scale industries; as such industries cannot invest in effluent treatment plant.

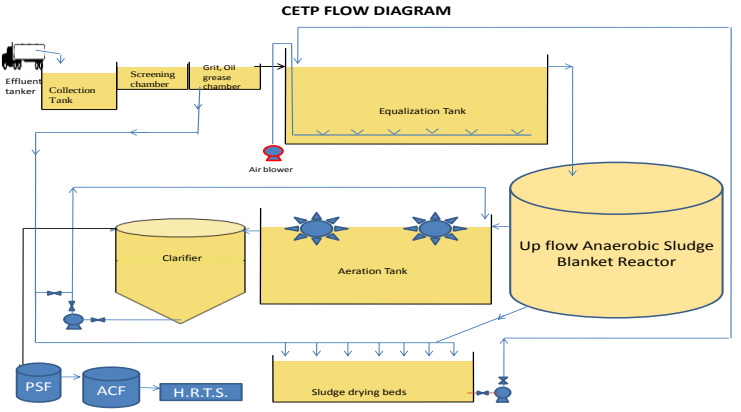
Rapid industrial development and growth of cities throughout the world especially in the developing world have led to the recognition and increasing understanding of the relationship between Pollution, public health and the environment at large (WHO, 1982). Industries produces large amount of effluent, which contain many harmful chemicals, such as acids, bases, metals and organic, inorganic pollutants depending on the nature of industries. Many of these chemicals are persistent and toxic and exert a variety of health effects, such as endocrine disruption, genotoxicity, bioaccumulation and ecotoxicity (Patel and Pandey, 2012).

Performance efficiency of each unit was calculated, which is the evidence that CETP has been working with the norms of MPCB and meeting the standard discharge limits (Govindaswamy *et* al 2006). The high alkalinity and traces of chromium which is employed in dyes adversely affect the aquatic life and also interfere with the biological treatment processes (Palamthodi *et al*., 2011). The large volumes of wastewater generated also contain a wide variety of chemicals used throughout processing. (C Parvathi *et al*., 2009). Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD5), or Chemical Oxygen Demand (COD), may be in the tens of thousands mg/L (W.J. Ng 2006).

MATERIAL AND METHODS

Study area

The CETP is situated at Chincholi MIDC (Lg. 17.6599 and Lt. 75.9064) Solapur district of Maharashtra, India. The capacity of CETP is 1.5 MLD.



Sample collection and Analytical method

Sampling was carried out monthly over a period of 12 months for physico-chemical analysis. Untreated (Inlet) and treated (Outlet) effluent samples were analyzed for physico-chemical parameters. The parameters like total dissolve solids (TDS), total suspended solids (TSS), chemical oxygen demand (COD), biological oxygen demand (BOD) were determined according to the standard methods (APHA 1998).

$$\text{Treatment efficiency \%} = \frac{\text{Inlet effluent} - \text{Outlet effluent}}{\text{Inlet effluent}} \times 100$$

RESULTS AND DISCUSSION:

The physico-chemical parameters of treated effluent were found within the permissible limits of MPCB. The performance efficiency of CETP is presented in the following table.

Months	COD	BOD	TSS	TDS
March	65.54	90.23	89.84	12.71
April	61.62	93.83	90.88	9.96
May	65.97	92.02	89.23	11.68
June	62.96	94.71	91.85	4.72
July	60.77	92.76	91.76	15.42
August	64.18	90.71	87.48	9.96
September	58.04	94.74	88.83	10.01
October	56.20	92.71	91.02	14.77
November	45.56	95.65	88.29	7.09

December	65.98	92.13	88.75	6.33
January	62.72	94.78	87.41	17.41
February	64.17	94.85	89.89	7.04
Average	**61.14**	**93.26**	**89.60**	**10.59**

Table – 1: Treatment efficiency of CETP during the year 2013-2014

The efficiency of CETP was calculated by considering COD, BOD, TSS and TDS of the inlet and outlet. The percentage of reduction in COD and BOD is 61.14% & 93.26% respectively. It was indicating satisfactory removal efficiency in term of chemical oxygen demand while the reduction in biological oxygen demand found to be very much better. The efficiency of BOD removal is higher than that of COD removal.

The percentage of reduction in TDS is 10.59% and TSS is 89.60%. It was indicating that poor efficiency in term of total dissolve solids removal while the reduction in total suspended solids found to be very efficient. It was observed from the table the primary tube settler having more reduction than aeration tank except BOD & COD. In primary tube settler removal of TDS is 58.4%, TSS 85.83% as the removal of TDS was more than the BOD & COD reduced to 33.89% and 38% respectively. (Sumitkumar Patel et, al, 2013).

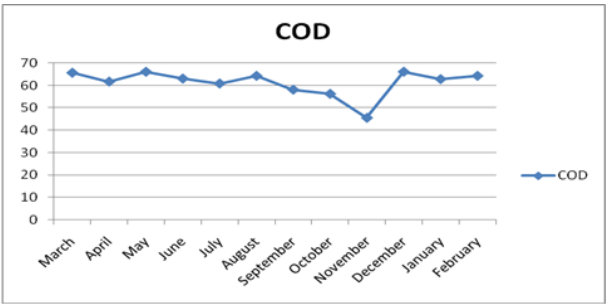


Fig. 1. COD removal efficiency in percentage.

It was observed that during the month of March COD removal efficiency is higher (65.54 %) whereas in the month of November is less (45.56 %). Similarly the COD removal

efficiency of 95.26 % was observed by Pratiksinh Chavda and Apurva Rana (2014).

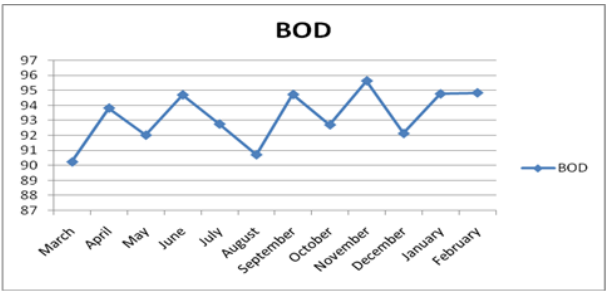


Fig. 2. BOD removal efficiency in percentage.

It was observed that during the month of November BOD removal efficiency is higher (95.65 %) whereas in the month of March it is less (90.23 %). Similarly the BOD removal efficiency of 98.18 % was observed by Pratiksinh Chavda and Apurva Rana (2014).

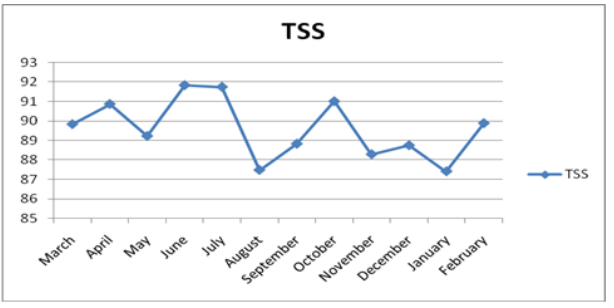


Fig. 3. TSS removal efficiency in percentage.

It was observed that during the month of June TSS removal efficiency is higher (91.85 %) whereas in the month of January it is less (87.41 %). Similarly the TSS removal efficiency of 94.45 % was observed by Pratiksinh Chavda and Apurva Rana (2014).

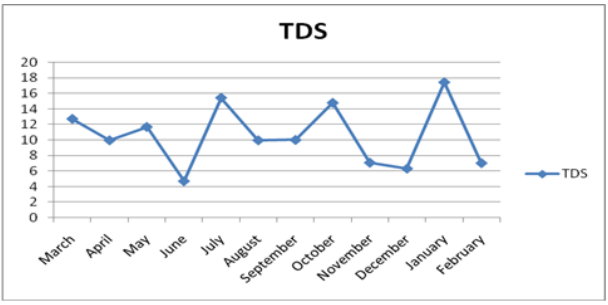


Fig. 4. TDS removal efficiency in percentage.

It was observed that during the month of January TDS reduction efficiency is higher (17.41 %) whereas in the month of December it is less (6.33 %). Similarly the TDS removal efficiency is very low i.e 4.5% (Sumitkumar Patel et, al, 2013).

After treatment the treated effluent of CETP is discharged into HRTS designed by NEERI. CETP is having total area of 50 acres. CETP has developed High Rate Transpiration System (HRTS) on 45 acres of land. CETP has planted around 40,840 Nos. of trees in the HRTS; these are mainly Eucalyptus, Bamboo, Acacia & Silver Oak, Kashid, Neem, Karanj, Gulmohar etc. The outlet of CETP is discharged in HRTS. HRTS is full of biodiversity. There was observed 59 bird species, 7 snake species, 9 lizard species, 6 colorful butterfly species and turtle in rainy season. It also observed wild cat, rabbits, mongoose and honey bee's colonies.

CONCLUSION:

The performance study on the common effluent treatment plant (CETP) indicated a positive efficiency. The efficiency is in the order of TDS<COD<TSS<BOD respectively. Treatment efficiency of common effluent treatment plants has a good impact on biodiversity.

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