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Evaluation of Effluent Treatment Plant

KEYWORDS: Pharmaceutical effluents, Effluent Treatment Plant (ETP), Total Dissolved Solids (TDS), and Ammonia (NH3).

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ABSTRACT *Poorly treated wastewater with high level of pollutants caused by poor design, operation or treatment systems creates major environmental problems when discharged to the surface land or water. Considering the above stated implications an attempt has been made in the present project to evaluate the efficiency of ETP. Samples are collected fromraw effluent and treated effluent for a duration of six monthsto evaluate the performance of ETP. Parameters analyzed for evaluation of performance of ETP are pH, TDS, COD and NH3. The TDS, COD and NH3removal efficiency of ETP were 96.46%, 95.64%, 86.23% respectively.*

Introduction

In terms of water pollution control, most developed nations have already surpassed the basic stages of water pollution problems, and more attention is being given to the removal of specific compounds and the impact of pollutants in sensitive areas. However, most developing nations still have grossly polluted rivers and watercourses that are environmentally unacceptable and that pose substantial risks to health. As a result, these countries need to focus on the abatement of gross pollution, thus requiring the provision of basic wastewater treatment facilities to overcome the environmental degradation.

Significant scientific and technological developments have opened the way for several treatment processes that are able to comply with a wide range of discharge standards. However, the pure availability of a technology is not by itself sufficient, because it should be cost-effective, appropriate to the local conditions and affordable. While developed countries, in general, have extensive sewerage networks and a high degree of sewage treatment and industrial wastewater control, most developing countries have inadequate sewerage systems and simply use watercourses as open sewers (Sílvia and Marcos, 2011).

Rapid growth of industries has not only enhanced the productivity but also resulted in the production and release of toxic substances into the environment, creating health hazards and affected normal operations, flora and fauna. These wastes are potential pollutants when they produce harmful effects on the environment and generally released in the form of solids, liquid effluents and slurries containing a spectrum of organic and inorganic chemicals (Panesar et.al., 2006)

Before discharging the treated effluent on to the land or any surface water body the industries should meet the effluent discharge standard norms. In order to have proper processes in the ETP, Characterization of waste water, treatability studies and planning of proper units and processes for effluent treatment is very much necessary (Dipali and Dhoble, 2010).

The study included characterization of wastewater before and after treated in the Effluent Treatment Plant. The parameters that are considered in the study arepH, COD, NH_3 and TSS.

Methodology

Study Area

Founded in 2003 with a mission to make healthcare affordable, the Hyderabad based MSN Labs is one of the fastest growing research-based pharmaceutical companies in India. Boasting a diverse product portfolio, with multiple products in the market and in the pipeline, MSN has 10 API (including an Oncology) and 3 finished dosage facilities and an integrated R&D Center.

Effluent treatment plant

The system was designed to handle to treat waste water having high organic content and suspended solids.The treatment is in three stages i.e. primary, secondary and tertiary:

- Primary treatment comprising of collection and equalization followed by pH adjustment, filtration and solid – liquid separation through Stripper, MEE and ATFD.
- Secondary treatment comprises of aerobic biological treatment.
- Tertiary treatment comprising of filtration followed by RO plant.

Liquid Effluents The main sources of effluent generation from the plant are process, washings, Scrubber, blow downs from utilities like cooling tower, boiler & domestic effluents. The process effluents are segregated on the basis on TDS and COD loads and treated in Effluent treatment system.

The systematic flow diagram of ETP is shown in Figure

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Sampling Collection and Analysis

Wastewater samples were collected for the determination of pH, total dissolved solid (TDS), chemical oxygen demand (COD), and ammonia using standard procedures. ETP wastewater samples were collectedduring the period of the study that lasted from July 2014 to December 2014. The procedures of the Water and Wastewater Standards Methods were used for the analysis of the samples [IS 3025-1984].

Results:

Inlet and outlet characteristics of ETP for six months (Average of each month) are presented in Table – 1.Inlet values of Total Dissolved solids ranged between 28,000 to 31,000 mg/l. Chemical Oxygen Demand ranged between 77,000 to 86, 000 mg/l. Whereas ammonia values ranged between 700 to 1000 mg/l. The outlet values of all above said parameters reduced significantly as discussed individually below.

The performance of ETP in terms of average change (%) in the pollution parameters is represented in Figures 1 to 5. pH reduced from alkaline towards acidity (Fig – 1). Total Dissolved Solids reduced up to 96.46% (Fig – 2). Chemical Oxygen Demand reduced to a maximum of 95.64% (Fig – 3). Ammonia reduced 86.23% (Fig – 4). The reduction of all the parameters was achieved to be 93% on an average (Fig – 5).

Conclusion

Present study concerned with the performance evaluation of ETP for pharmaceutical industry. The TDS, COD and NH_3 removal efficiencyof ETP was observed to be 96%, 95% and 86% respectively in spite of the fact that raw sewage was having very high values of these parameters. It was observed that the plant workingcondition is good.

Table – 1 Monthly Average values of the Inlet (Raw) and Outlet (Treated) wastewater

Month	pH		TDS [mg/l]		COD [mg/l]		NH_3 [ppm]	
	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated
July	7.95	7.2458	31962	1769.8	78393	3808.6	940.83	130.67
August	8.0148	7.3067	30431	1433.3	81841	3569.3	896.97	143
September	7.8377	7.6893	30130	1148.8	82483	4628.6	883.43	142.43
October	7.8642	7.1286	30129	1107.1	86026	5290	915.52	158
November	8.1258	7.15	29500	1270.8	77421	6241.7	725.02	145.58
December	7.7358	7.084	28984	1026.6	77777	3510.4	995.29	154.8

Fig – 1 Variation of pH in raw and treated effluent during July to December

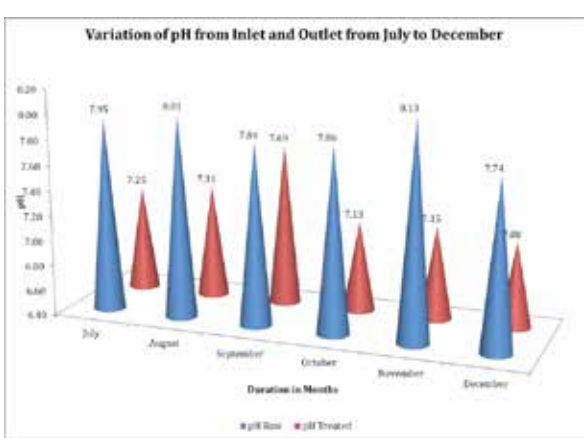


Fig – 2 Variation of TDS in raw and treated effluent during July to December

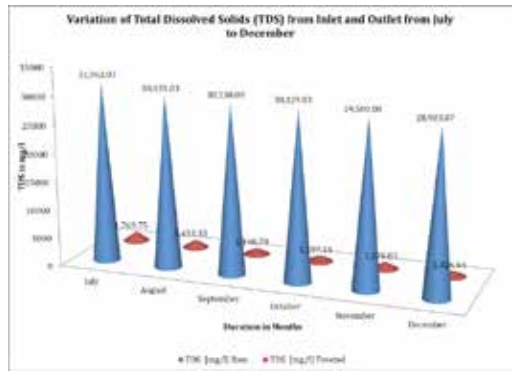


Fig – 3 Variation of COD in raw and treated effluent during July to December

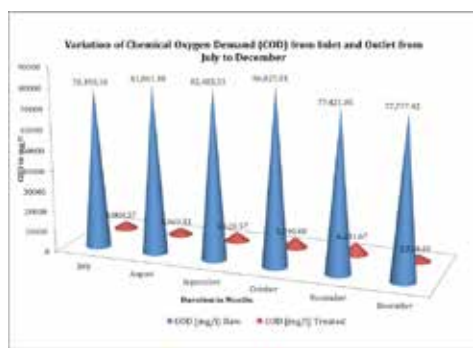


Fig – 4 Variation of NH_3in raw and treated effluent during July to December

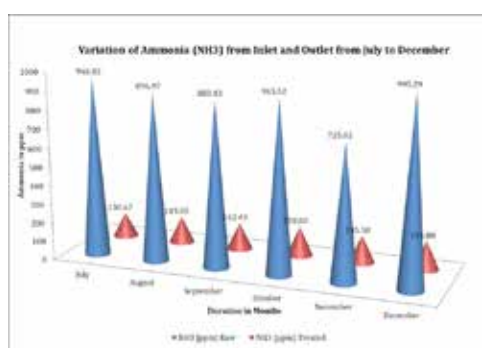
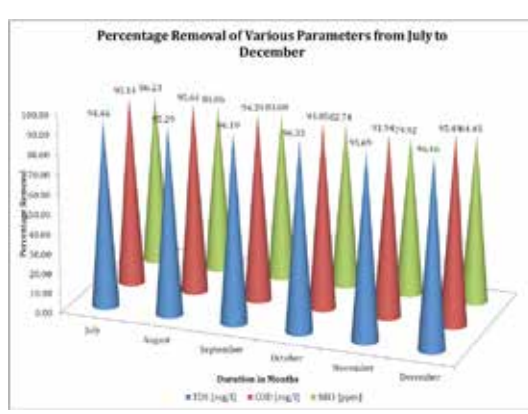


Fig – 5 Percentage removal of various parameters during July to December



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