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PERFORMANCE EVALUATION OF EFFLUENT TREATMENT PLANT FOR TEXTILE INDUSTRY

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ABSTRACT

The present study has been undertaken to evaluate performance efficiency of an effluent treatment plant of a textile industry. An existing effluent treatment plant has physical, chemical and tertiary treatment method with an average inflow of 0.06 MLD. The effluent samples were collected from inlet and outlet of each units of effluent treatment plant. The samples of waste water are analyzed for major quality parameters such as pH, TDS, TSS and Color. The results obtained are compared with permissible limits. The overall efficiency of the plant in terms of ability to remove these impurities is determined.

Keywords: Performance evaluation, efficiency, pH, TDS, TSS, Color, ETP, Textile Industry.

Introduction

The textile industry is primarily concerned with the design and production of yarn, clothes, clothing and their distribution. The raw material may be natural or synthetic using products of the chemical industry.

The impacts on the environment by textile industry have been recognized for some time, both in terms of the discharge of pollutants and of the consumption of water and energy (Lacasse and Baumann, 2006). Finishing process can be categorized into purely mechanical and wet processes. The risks are generally associated with the wet process – scouring, desiring, mercerizing, bleaching, dyeing and finishing. Desiring, scouring and bleaching processes produce major quantities of waste water.

The aim of the present research work was to determine the behavior of various parameters of the textile industry wastewater. Characterization of waste water was evaluated in terms of pH, TDS, TSS, Color for the influent and effluent from selected plant. The performance of ETP was also evaluated and quality of reclaimed waste water was compared with GPCB standards to determine its suitability for reuse.

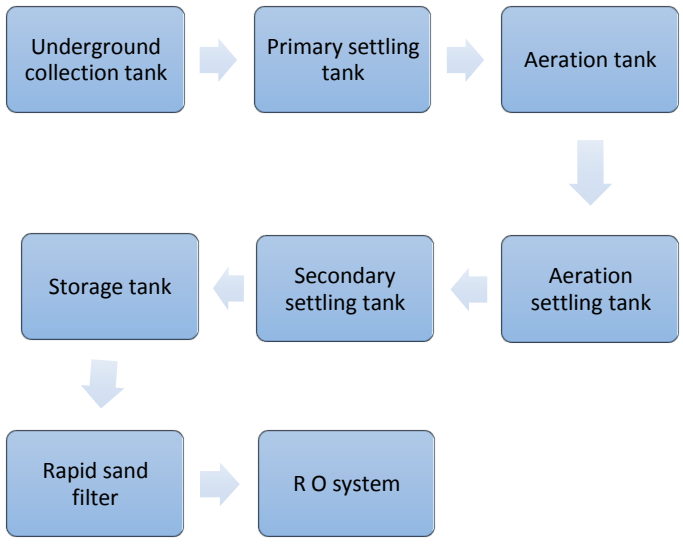
Materials and Methods:

The study was carried out at a textile industry near Surat, Gujarat, India. The industry uses raw water of 60,000lit/day. The duration of study was 4 months. The samples were collected from inlet and outlet of each treatment unit. They were analyzed by comparing the concentrations as per Indian standard method. The composite samples were taken using a wide mouth bottle having a diameter 35 mm at the mouth and capacity 120 ml. Table 1 gives capacities of different units of effluent treatment plant and Fig. 1 gives flow diagram of effluent treatment plant of textile industry.

Table 1: Capacities of different units of ETP

Sr. No.	*Treatment unit*	*Capacity(m^3)*
1	*Collection tank*	*115*
2	*Primary settling tank*	*121.5*
3	*Aeration tank*	*110*
4	*Aeration settling tank*	*58.8*
5	*Secondary settling tank*	*45*
6	*Storage tank*	*17*
7	*Rapid sand filter*	*85.5*
8	*Sludge drying bed*	*30*

Figure 1: Flow diagram of ETP of textile industry



Results and Discussion:

The experimental data on physico-chemical properties of effluent from different units of ETP is presented in the table-2 and table-3. Table-2 shows value of pH and TDS at inlet and outlet of PST, AT, SST, RSF and RO. Table-3 shows value of TSS and Color at inlet and outlet of PST, AT, SST, RSF and RO. By providing tertiary treatment, the percentage removal efficiency in the TDS, TSS and Color was 89.63%, 77.87% and 99.21% respectively as shown in Chart-1. Chart- 2, 3,4,5,6 shows percentage removal efficiency of PST, AT, SST, RSF, and R.O respectively.

Conclusions:

A waste water treatment plant of textile industry with primary, secondary and tertiary treatment has been considered for performance evaluation. Based on above results, it is found that the overall efficiency of the ETP is found to be satisfactory. Industry uses R. O. as tertiary treatment. As per IS standards the values of the parameter are within permissible limits. Industry also reuses treated water so there will be considerable saving of economy and environment.

Acknowledgments:

I would like to thank the management of the textile industry for their support and co operation during the study period.

Tables and figures:

Table -2

Physico-Chemical characteristic (pH and TDS) of various units of ETP.

Month	ETP Unit	pH		TDS	
		Inlet	Outlet	Inlet	Outlet
July	P.S.T.	7.98	7.49	1440	1139
Aug		8.21	7.41	1522	1210
Sep		7.72	7.4	1570	1195
Oct		8.12	7.45	1500	1175
July	A.T.	8.15	7.98	1139	1114
Aug		8.21	8.11	1210	1140
Sep		8.17	7.72	1195	1167
Oct		8.12	7.17	1175	1109
July	S.S.T.	8.17	8.15	1114	820
Aug		8.19	8.11	1140	855
Sep		8.17	8.14	1167	832
Oct		8.14	7.17	1109	861
July	R.S.F.	8.17	7.72	820	680
Aug		8.18	7.7	855	756
Sep		8.14	7.72	832	460
Oct		8.16	7.73	861	740
July	R.O.	7.72	7.06	680	158
Aug		7.7	7.01	756	162
Sep		7.76	7.03	460	158
Oct		7.73	7.03	740	147

Table-3

Physico-Chemical characteristic (TSS and Color) of various units of ETP.

Month	ETP Unit	TSS		Color	
		Inlet	Outlet	Inlet	Outlet
July	P.S.T.	69	32	580	120
Aug		64	31	580	130
Sep		72	32	550	124
Oct		72	29	570	140
July	A.T.	32	22.5	120	110
Aug		31	24	130	100
Sep		32	23	124	115
Oct		29	22.5	140	125
July	S.S.T.	22.5	21	110	100
Aug		24	22	100	93
Sep		23	20.5	115	108
Oct		22.5	21	125	113
July	R.S.F.	21	19	100	16
Aug		22	20	93	14
Sep		20.5	16	108	15
Oct		21	18	113	21
July	R.O.	18	15.6	16	6
Aug		21	17.3	14	4
Sep		16	14	15	5
Oct		18	14	21	3

Chart-1

Percentage Removal efficiency of ETP

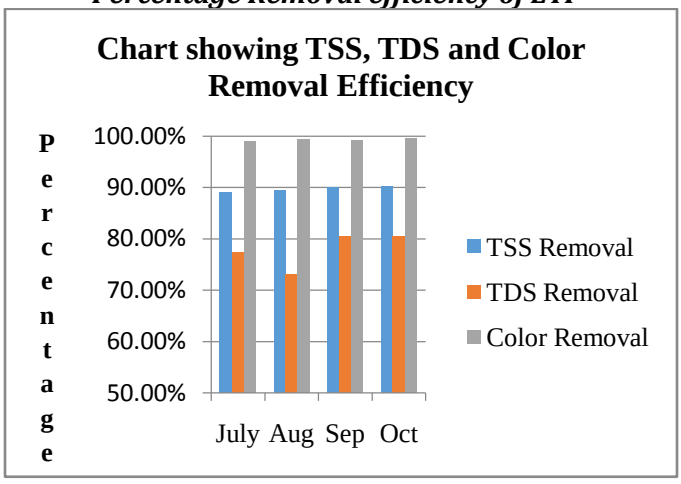


Chart-2

Percentage Removal efficiency of PST

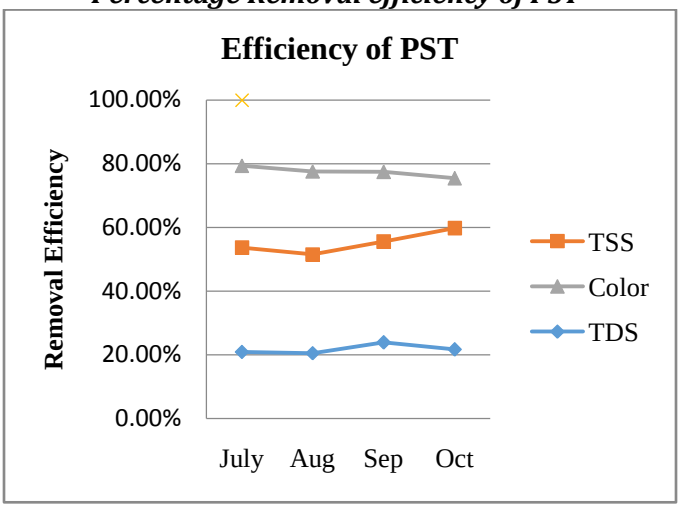


Chart-3

Percentage Removal efficiency of AT

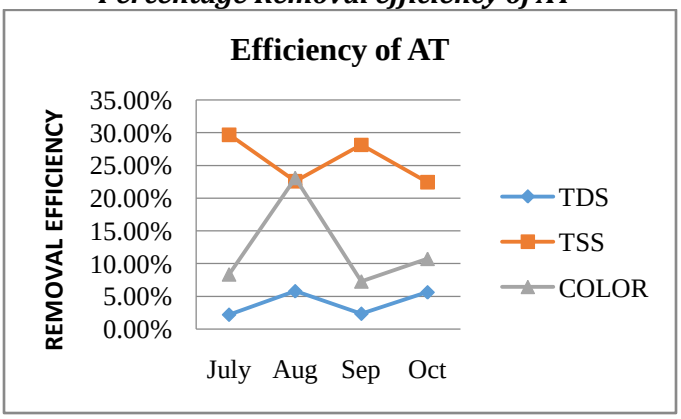


Chart-4

Percentage Removal efficiency of SST

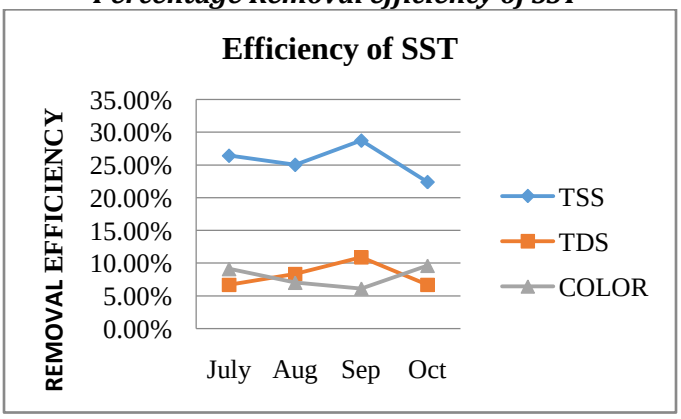


Chart-5

Percentage Removal efficiency of RSF

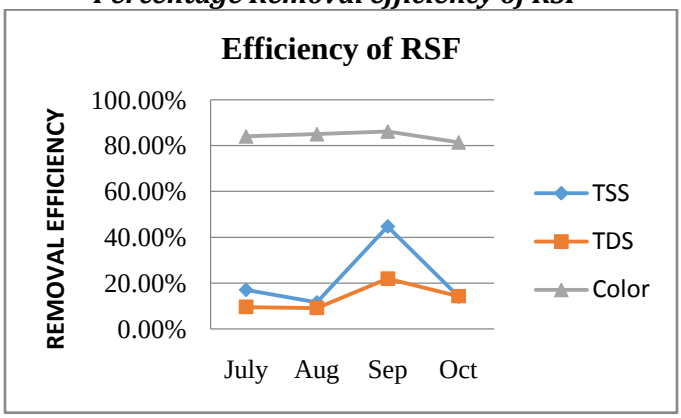
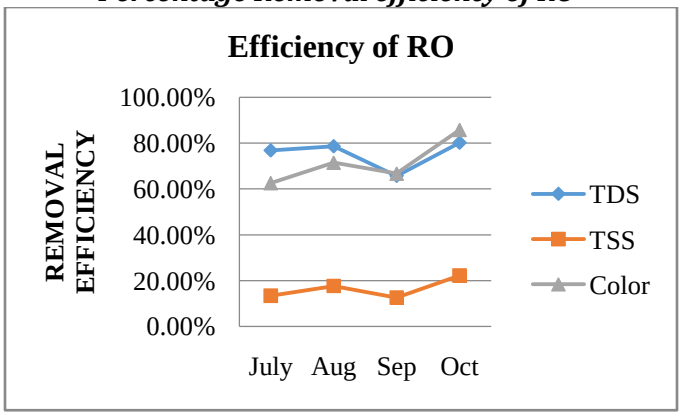


Chart-6

Percentage Removal efficiency of RO



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