Study on Physico-Chemical Characteristics of Wastewater from Textile Industries of Surat, Gujarat, India

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Abstract:
Textile industries are one of the major environmental pollution problems in the world, because they release undesirable dye effluents. Physicochemical characteristics of some industrial effluents collected from various industries in and around Sachin Industrial Estate in Surat. According to the report, industrial estate effluents must be appropriately treated to prevent land and water pollution. Pharmaceutical, Chemical, dyes & textile industries are some of the major industries responsible for polluting surrounding aquatic environment. It was observed that pH values of effluent samples collected from Textile industries shows high degree of Total dissolve solid, COD, BOD, values. Besides this various other parameter were also calculated for waste water samples like pH, Temperature, TSS. The findings of the current analysis highlight the necessity of implementing new and improved wastewater treatment techniques as well as a variety of compatible policies and goals.

Keywords: *Wastewater Treatment, Dye, Pollution, Textile Industry Effluent, Physicochemical Parameter*

1. Introduction

Without Water, life would not be possible because it is essential to all of a living things action. Each stage of the system in every micro and macro environment requires water. Water is a necessary component in addition to playing a vital function in the living environment. The biosphere's ability to exist depends greatly on the availability of water. For drinking, irrigation, agriculture, and aquaculture, water is essential. (Shamsur R et.al).

The majority of the textile factories in India are situated close to the banks of rivers where they can easily access water and remove waste and dust. Heavy metals, dyes and other pollutants that alter the physico-chemical properties of water are frequently present in these wastes. All of these substances are detrimental to fish and the aquatic environment or even only accidentally poisonous. (Ram S. Lokhande et al.: study on Physico-Chemical parameters of waste water effluents from taloja industrial area of Mumbai, India).

It also leads to problems with foaming and color persistence due to the significant usage of dye and chemicals, forms of the majority of substances in water. Although in modest amount, the bulk of heavy metals are required for organism growth. (Akpoveta O V, Osakwe S A, Okoh B E, Otuya B O 2010. Physiochemical characteristics and levels of some heavy metals in soils around metal scrap dumps in some parts of delta state, Nigeria. J. Appl. Sci. Environ. Mangae. 14(4): 57-60).

Groundwater quality has been more negatively impacted by the rapid urbanization of places due to improper trash extraction. (Hariprasad and Deccaraman, 2008).

Authorities are having a lot of problems getting rid of the industrial waste. In order to effectively dispose of wastewater effluent, this led to the development of effluent treatment systems around the world. Water effluent treatment takes many different forms around the world, but it is mostly offered in primary, secondary and tertiary forms in various effluent treatment plants. The ultimate goal is to produce water that can be used, whether that be through chemical treatment or biological treatment, depending on the circumstances.

Where the quality of wastewater is still a concern, several localities use Common Effluent Treatment Plants (CETP) to preserve consistency and cost effectiveness. However, different effluent sources are still unable to deliver the necessary outcomes and end up in any way damaging natural water bodies. Due to rapid growth of the population and industrialization, there has been a tremendous increase in the demand for freshwater in recent years. (Ramakrishnaiah et al., 2009). Due to this irregularity, efficient treatment equipment has failed, which has ultimately contaminated freshwater supplies.

2. Methodology

2.1 Collection of samples

The wastewater treatment facilities of several textile industries provided the samples for analysis. In order to conduct the analysis, wastewater samples were taken from ETP inlet and ETP final outlet. Grab sampling was used to gather the samples. When it was necessary, samples were taken and stored in glass and plastic containers. Samples were stored in a refrigerator at 4° C. APHA (2017) and Indian standards were used in the analysis of the samples.

2.2 Analysis of Wastewater

Analysis of wastewater samples was carried out in laboratory, Surat. The pH was measured by pH meter. Total suspended solids and Total dissolved solids was measured by WHATMAN filter paper. (v.p. 1933. water of crystallization in total solids of water analysis. ind. eng. chem. anal. ed. 5;336), BOD was determined by Winkler's azide method (Young. j.c 1973. chemical methods for nitrification control. j. water pollut. control fed. 45;637), COD was determined by open reflux method. (Pit Well. STANDARD COD. (1983) Chemical Brittania, 19, 907)

2.3 Results and Discussion

The wastewater for analysis collected from the ETP inlet was more polluted in comparison to the ETP Final outlet after treatment from the ETP. The results of weekly analysis of pH, TSS, TDS, BOD, COD are analysed after treatment and compared with the standard values. (Table)

	pH Outlet	pH Inlet	TDS Outlet	TDS Inlet	TSS Outlet	TSS Inlet	BOD Outlet	BOD Inlet	COD Outlet	COD Inlet
Sep 1st week	7.3	6.5	1809	2634	352	722	259	416	1260	1440
Sep 2nd week	6.8	7	2408	2916	447	688	316	349	1340	1680
Sep 3rd week	6.7	6.3	2427	2783	426	826	297	362	1260	2060
Sep 4th week	6.3	8.2	2567	3128	398	628	264	428	820	1240
Oct 1st week	7.2	7.9	1784	2641	487	856	258	296	1280	1460
Oct 2nd week	7.3	8.7	2317	2611	386	688	334	487	1480	2280
Oct 3rd week	6.4	8.1	2774	2936	365	826	246	427	1340	1680
Oct 4th week	6.7	7.9	1886	2517	328	677	254	326	920	1480
Nov 1st week	7.1	9.2	2672	2466	309	629	239	376	1720	2460
Nov 2nd week	7.3	6.9	2757	2907	428	811	257	368	1440	1880

Parameter	Unit	ETP outlet value	CPCB Permissible limit
pH	-	6.9	6.5 – 8.5
TSS	mg/l	546	400
TDS	mg/l	1924	2100
BOD	mg/l	272	300
COD	mg/l	1206	1000

pH

Fig.1 shows pH of the Factory ETP Inlet was measured to be 6.6 to 9.2 compared to ETP Outlet 6.2 to 8.3 with as shown in Figure 1

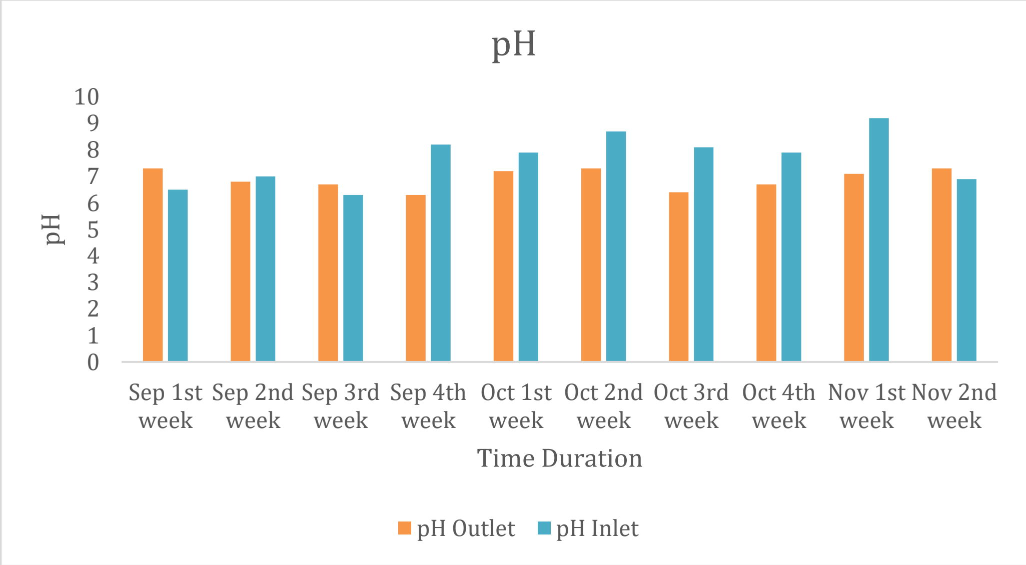


Figure 1: pH

2.4 Total Suspended Solids

Fig.2 shows the concentration of Total suspended solids measured from factory ETP inlet ranges from 620-860 mg/l compared to ETP Outlet were measured from 300-490 mg/l respectively.

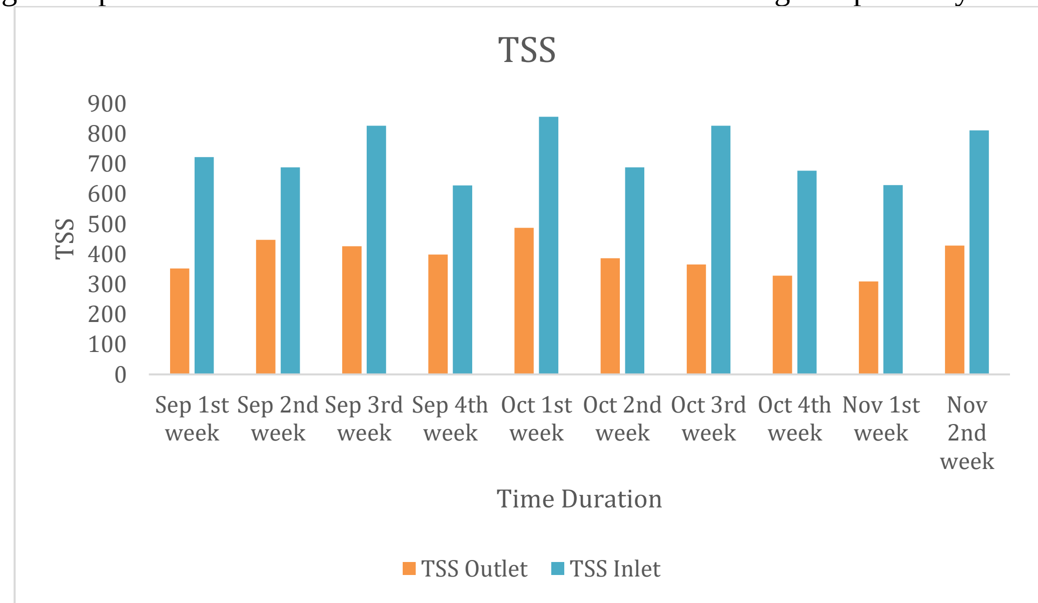
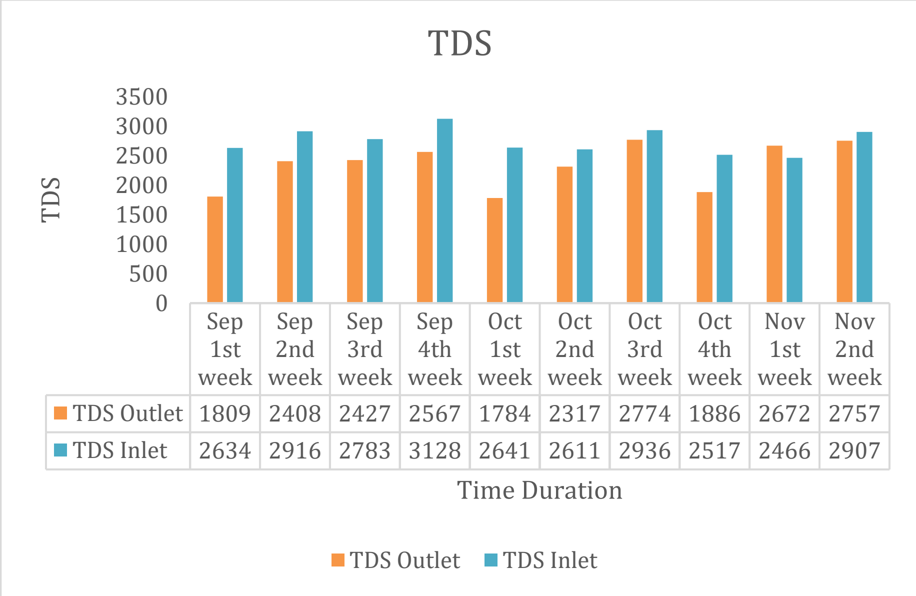


Figure 2: TSS

2.5 Total Dissolved Solids

Fig.3 shows the concentration of Total dissolved solids measured from factory ETP inlet ranges from 2200-3130 mg/l compared to ETP Outlet were measured from 1800-2780 mg/l respectively.



	Sep 1st week	Sep 2nd week	Sep 3rd week	Sep 4th week	Oct 1st week	Oct 2nd week	Oct 3rd week	Oct 4th week	Nov 1st week	Nov 2nd week
TDS Outlet	1809	2408	2427	2567	1784	2317	2774	1886	2672	2757
TDS Inlet	2634	2916	2783	3128	2641	2611	2936	2517	2466	2907

Figure 3: TDS

2.7 BOD and COD

Fig.4 shows the concentration of Biochemical Oxygen Demand measured from factory ETP inlet ranges from 280-490 mg/l. compared to ETP Outlet were measured from 230-340 mg/l respectively. Similarly,

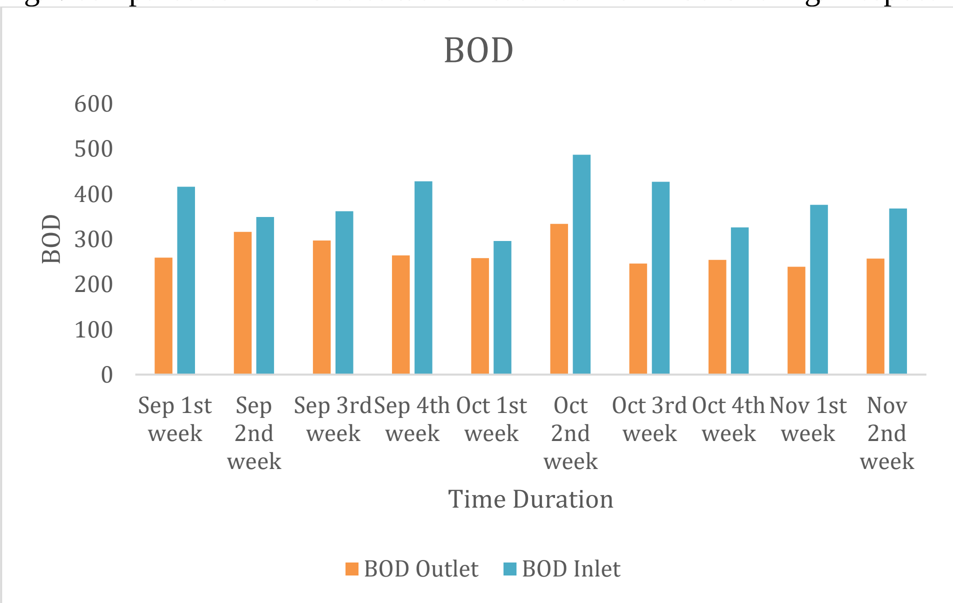


Figure 4: BOD

Fig 5. shows the concentration of Chemical oxygen demand measured from factory ETP inlet ranges from 1200-2360 mg/l compared to ETP Outlet were measured from 800-1700 mg/l respectively.

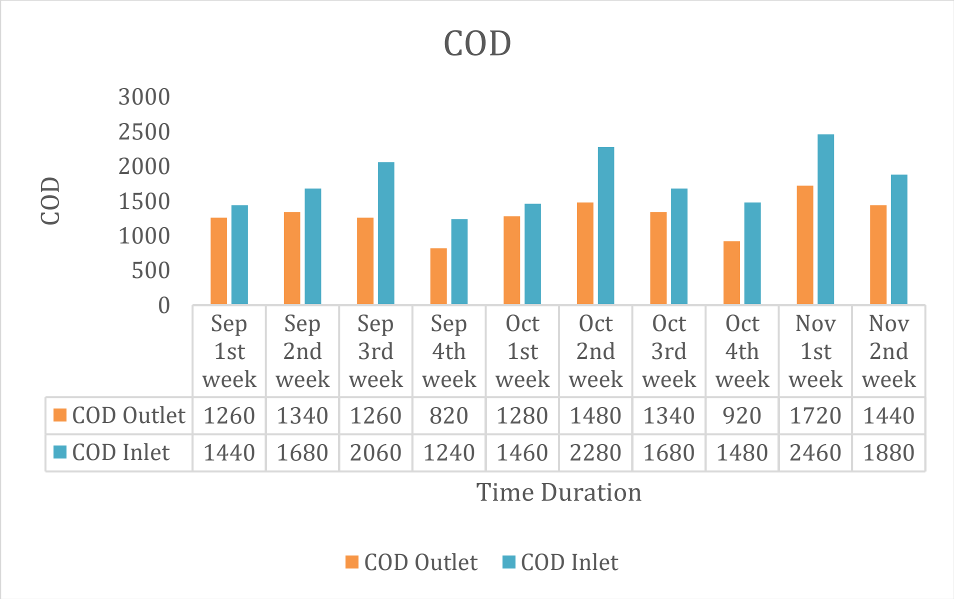


Figure 5: Cod

3. Conclusion

The Wastewater parameters shows that the level of treatment quality utilized at various textile factories in Surat varies to some extent. However, a few factors still fall outside of the acceptable range and need to be upgraded or changed in the ETP design in order to get the desired outcomes. This study aims to understand these aspects and the results of the study would help the pollution regulatory authorities to device a redesigned system at par with international standards so as to save the water environment at local & national level.

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