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A CASE STUDY ON PHYSICO-CHEMICAL CHARACTERISTICS OF EFFLUENT FROM DIFFERENT PHARMACEUTICAL INDUSTRIES

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ABSTRACT

It is important for the industry to develop its own wastewater treatment system before discharging the effluent in order to meet the M.P. State Pollution control Board standards. Reduction of pollutants in the wastewater down to permissible concentrations is necessary for the protection of ground water and the environment. In order to design an appropriate treatment system the characteristic of the wastewater generated need to be found out with reference to the following parameters; pH, chloride, total suspended solids (TSS), suspended solids (SS), total dissolved solids (TDS), Biological oxygen demand (BOD), Chemical oxygen demand (COD).

Keywords- pH, chloride, total suspended solids (TSS), suspended solids (SS), total dissolved solids (TDS), Biological oxygen demand (BOD), Chemical oxygen demand (COD).

I. INTRODUCTION

Industrialization is necessary for the growth of any country. The pulse of any nation is felt by its industrial development. (Junico M. and Shelef G.,1994; Khan and Ahmad ,1992) But with rapid industrialization and urbanization problems of environmental pollution also come into the picture. (Das et al, 2006) Industries pay less attention towards the treatment of effluents and spend very little money on neutralization of effluents (Zboon-Al et al, 2008). These industries are growing rapidly in our country. Looking to the national need we cannot restrict the start of new industries, at the same time government may not allow the increase in pollution. Therefore, the only way to get rid of the problem is to find the ways for minimization the pollution. (Desitti Chaitanyakumar et al, 2011; El-Gohary et al,1995).

The wastewater discharged is highly polluted in nature with highly variable characteristics such as temperature, color, total solid, biological oxygen demand, chemical oxygen demand. (Balasubramian S et al, 1999; Buzzini AP and Pires EC, 2007) Due to highly polluting nature, it is not possible to discharge treated and untreated waste either into water course on land without causing great damage. Thus these wastes create a great problem for environmental engineers. (Desitti Chaitanyakumar et al, 2011; Krishanamoorthi S et al, 2009). Different types of pollutants are present in the wastewater generated during the manufacturing process of different drugs. (Kapur, A., Kansal et al,1999; Kolhe A.S. and V. P. Pawar, 2011) Wastewater treatment at source is required to deal with pollutants, acids and alkalies before they are allowed to get mixed with other effluents. The possibilities of corrosive action on sewers are to be taken into account. (Ernst M, et al, 2007; Hammer MJ, 1996)

Necessity of treatment

Considering the pollution effects of the pharmaceutical waste effluent, adequate treatment is essential prior to its disposal. (Garcia, A.,Rivas H. M., Figueroa, J. L. and Monroe A. L.,1995). With the enforcement of pollution control laws, Pharmaceutical industries are required to have the pollution parameters within the limits prescribed by state pollution board. (Hashmi Imran 2005; Haydar S, et al.,2007) . The approach followed for evolution of pollution load and treatment involved physico-chemical process, with a perspective of recovery of some products during waste water treatment. (Ammary B, 2007).

II. MATERIALS AND METHOD

Collection of samples

Polythene bottles of 2.5 L and 2.0 L were used to collect the grab water samples (number of samples collected). The bottles were thoroughly cleaned with hydrochloric acid, washed with tap water to render free of acid, washed with distilled water twice, again rinsed with the water sample to be collected and then filled up the bottle with the sample leaving only a small air gap at the top. The sample bottles were Stoppard and sealed with paraffin wax. . (Junico M. et.al., 1994; Kapur, A., et.al,1999; Kolhe A.S. et.al 2011)

Experimental

The samples for our study were collected from tube wells inside the factory premises and also from inside the plant. Samples were collected manually in two to four liter polythene jerry cans for physicochemical studies 2-3 liters volumes of the samples were taken.(Balasubramian S, et.al 1999).

All the parameters were analyzed in our laboratory except pH, which were noted at the site. All the observations are recorded in the tables.

III. RESULTS AND DISCUSSION

We take the comparison units. It is seen that the pH of the untreated effluents of the entire unit is acidic. It is clear from the data that chloride, BOD and COD, total solid concentration of these parameters is minimum in Nicholas and maximum in Syncom during the study period. Here the reason is quite obvious and the observations prove that the equipments technology and process used in Nicholas is much superior to those used in rest of the units.

Untreated effluent

Table [1]. result of m/s ipca laboratories (untreated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Dark Black	Dark Black	Dark Black	Light Black	Black	Black
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	3.8	4.1	4.2	5.4	5.2	5.0
Total solid	10297	11045	11527	9364	9940	10660
Dissolved solids	9112	9710	10005	8256	8795	9420
Suspended solid	1185	1335	1412	1108	1145	1240
Chloride	2605	2890	3012	2210	2322	2715
BOD	5865	6125	6365	5580	5729	5990
COD	23899	24943	25575	22980	23485	24380

Table [2].result of m/s syncom formulation india limited (untreated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Dark Black	Dark Black	Blackish	Dark Blackish	Blackish	Blackish
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	4.6	4.2	4.0	5.4	5.2	5.0
Total solid	13232	14188	14625	12063	12889	13655
Dissolved solids	10850	115500	11884	9915	10625	11145
Suspended solid	2382	2638	2741	2148	2264	2510
Chloride	3990	4180	4250	3750	3800	4054
BOD	7500	8110	8425	6750	7150	7835
COD	31080	32725	33914	29615	30022	32016

Table [3]. result of m/s biochem synergy (untreated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Black	Black	Black	Light Black	Light Black	Black
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	4.6	4.2	4.1	5.4	5.2	5.0
Total solid	6950	7294	7586	6495	6706	7242
Dissolved solids	6175	6401	6599	5857	6032	6298
Suspended solid	775	893	987	638	674	844
Chloride	3167	3392	3427	3017	3097	3285
BOD	1372	1497	1545	1283	1310	1433
COD	9310	9987	10427	8529	8921	9622

Table [4]. result of m/s nicholas piramal laboratories limited (untreated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Dark Black	Dark Black	Blackish	Black	Blackish	Light Black
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	5.6	5.2	4.4	4.2	5.1	5.2
Total solid	4992	5617	5900	4471	4718	5174
Dissolved solids	4400	4882	5110	4015	4208	4511
Suspended solid	592	735	790	456	510	663
Chloride	1665	1762	1806	1524	1582	1717
BOD	825	912	956	610	775	865
COD	1963	2063	2109	1812	1889	1962

Treated effluent

Table [5].result of m/s ipca laboratories (treated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Light Blak	Light Black	Blackish	Black	Black	Black
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	7.8	7.6	8.2	8.2	7.8	8.1
Total solid	5934	6144	6271	5658	5800	6053
Dissolved solids	5024	5195	5296	4810	4920	5105
Suspended solid	910	949	975	848	880	948
Chloride	1274	1325	1356	1225	1250	1295
BOD	685	765	790	580	615	710
COD	1298	1486	1592	1180	1210	1375

Table [6]. result of m/s syncom formulation india limited (treated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Light grey	Light grey	Light grey	Dirty white	Dirty white	Greyish
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	8.2	8.4	8.8	7.6	7.7	8.0
Total solid	7859	8224	8421	7372	7688	8025
Dissolved solids	6684	6872	7112	6308	6556	8025
Suspended solid	1175	1252	1309	1064	1132	1210
Chloride	1665	1762	1806	1524	1582	1712
BOD	964	1062	1110	882	915	1015
COD	1963	2063	2109	1812	1889	1962

Table [7]. result of m/s biochem synergy (treated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Light Black	Light Black	Light Black	Greyish	Greyish	Blackish
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	8.2	8.4	8.8	7.8	8.0	8.1
Total solid	3840	4080	4160	3584	3682	3960
Dissolved solids	3095	3285	3340	2899	2972	3184
Suspended solid	745	795	820	685	710	776
Chloride	785	855	895	700	745	815
BOD	452	470	492	428	444	465
COD	925	1015	1083	865	890	981

Table [8]. result of m/s nicholas piramal laboratories limited (treated effluent)

STANDARD	JAN	MAR	MAY	JULY	SEPT	NOV
Color	Dirty white	Dirty Grey	Dirty Grey	Dirty white	Dirty white	Dirty white
Appearance	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Odour	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
pH	7.5	7.6	8.0	7.0	7.2	7.4
Total solid	3632	3987	4148	3247	3449	3733
Dissolved solids	3132	3452	3592	2799	2884	3213
Suspended solid	500	535	556	448	465	520
Chloride	512	558	575	470	495	545
BOD	65	95	120	35	58	75
COD	585	565	690	480	575	610

Note: All the parameters except pH are in mg/l.

I have seen that even after the treatment the water of the effluent is not fully free from various pollutants and it can be hardly used for irrigation purposes. My observation has shown that the effluents of all these industries are highly polluted; the results obtained are higher as compared to permissible limits, so it cannot be disposed directly into the surrounding areas. In such circumstances it is feared that this water after treatment can and may reduce the fertility of the soil and damage some of the crops

IV. CONCLUSIONS

We observe from the four pharmaceutical industries that on one side they have produced the drugs which are very useful for mankind. Whereas on the other side they have not taken much care to treat pollution inside the plant. The pollution present in factory has not be reduced much spite of their sincere affords therefore it is the moral duty of manufactures to save the surrounding area from water and air pollution. Many ways and means are available for minimization of pollution pharmaceutical industries they should employ modern technology to prevent pollution in their plants.

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