Comparative Study of Physico-Chemical Characteristics of Industrial Wastewater and Groundwater Samples

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Abstract: The current investigation is the comparative study of physicochemical characteristics of wastewater and ground water samples from two different MIDC areas for five different parameters. The samples were collocated from five different sites of each MIDC area.

Key words: Physicochemical Characters, Wastewater, Ground water, pH Electric Conductivity etc.

INTRODUCTION

Water the most vital resources for all kinds of life on this planet is also the resource, adversely affected both qualitatively and quantitatively by all kinds of human activities on land, in air or in water. The increasing industrialization, urbanization and development activities and consequent pollution of water has brought a veritable water crisis. Today most of the rivers of world receive millions of litres of sewage, domestic waste, industrial and agricultural effluents containing substances varying in characteristics from simple nutrients to highly toxic substances (Shrivastava, V.S. and Patel S.S 1999, Singh et al., 2001 and Shahbazi et al., 2009). The fate of ground water is also same in most of the areas (Mehta Kiran 2011 and Vikas et al., 2013). The industry continues to be one of the most significant causes of pollution of aquatic ecosystems due to a diverse kind of wastes produced by industrial waste. Most of the major industries have treatment facilities for industrial effluents. But this is not the case with small scale industries, which cannot afford enormous in-vestments in pollution control equipment as their profit margin is very slender (Elizabeth et al., 2005).

Pollution of water is responsible for a very large number of mortalities and incapacitations in the world (Murhekar et al., 2011). Polluted state of the water resources has led to a steady decline in fisheries and has also affected the irrigated land. Water no longer remains a 'free good'. Availability of clean water is going to become the greatest constraint for development tomorrow. In past few decades natural and polluted water have been studied in detail all over the world and considerable data are now available in most kind of pollutants and their effects on ecosystem as well as organisms (Elizabeth et al., 2005 and Chauhan et al., 2009). A large number of parameters signifying the quality of waters in various uses have been proposed. A regular monitoring of some of them not only prevents diseases and hazards but also checks the water resources from going further polluted (Massed et al., 2009).

This paper based on chemical composition of wastewater at several collectors site, from Satpur MIDC, Nasik and Ambad MIDC, Nasik. Possible relationships between concentrations of various chemical residues in wastewater and with pollution sources are also investigated between both study areas. The study deals on daily measurements of chemical parameters at five sites, of Satpur MIDC, Nasik and Ambad MIDC, Nasik.

MATERIAL AND METHOD

Some salient physico-chemical parameters like, pH, Electric Conductivity (EC), Chloride (CI"), SO_4" and Total-nitrogen (T-N) are investigated as per standard methodology (Vijender et al., 2006, Nwidu et al., 2008 and Nkansah et al., 2009).

RESULT AND DISCUSSION

Physico chemical characteristics are best indicator of pollution. The physico chemical parameters were analysed for samples collected from various sites of Satpur and Ambad MIDC, Nashik. The results thus obtained are being described under the following sub headings:

1] pH: During prsent study the pH of industrial wastewater samples from Ambad MIDC varies between 7.9 - 8.6, while the pH of industrial waste water samples from Satpur MIDC varies between 6.9 - 8.9.(Table 1-2).

2] Electrical Conductivity : The electrical conductivity of industrial wastewater samples of Ambad MIDC varies between 1400-2020 μmhos/cm while in industrial wastewater samples from Satpur MIDC varies between 1000-1940 μmhos/cm. .(Table 3-4).

3] Chloride: The concentration of chloride in industrial wastewater samples of Ambad MIDC varies between 1200-1740 ug/ml. while in industrial wastewater samples of Satpur MIDC varies betweenl070-2190 µg/ml. .(Table 5-6).

4] Sulphate (SO;2) : During the course of present study the concentration of sulphate in Satpur industrial waste water varies between 646-2798 ug/ml. While in industrial waste water samples of Ambad MIDC it varies between 913-186 jig/ml. .(Table 7-8).

5] Total nitrogen (TN): The concentration of total nitrogen in industrial wastewater samples from Satpur MIDC varies in the range between 18.2-26.1 fig/ml. While in industrial wastewater samples in Ambad MIDC it varies in the range between 40-159 mg/ml. .(Table 9-10).

Table 1: pH in industrial wastewater, and groundwater collected from Satpur MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Alpa Mech.F 101	6.3	7	7.4	6.9	0.4	0.23	6.9 ± 0.99
2	Apurva chemical, 45, Gurukul, Vanivihar colony	8.1	7.3	8.6	8	0.72	0.41	8.0 ± 1.791
3	Delta Industries	7.4	8	8.7	8.03	1.48	0.85	8.03 ± 3.67
4	Bharat Inorganic Chemical	7.8	8.4	8.9	8.36	1.4	0.81	8.36 ± 3.48
5	Nasik Chemical Pvt. Ltd.	6.4	8	8	7.46	0.84	0.48	7.46 ± 21.08

Table 2: pH in industrial wastewater, and groundwater collected from Ambad MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Gaurav Nitrate Pvt. Ltd. F-42, MIDC, Ambad.	8.2	8.4	8.6	8.4	0.2	0.115	8.4 ± 0.4968
2	Kulram Chemicals, W-32, MIDC, Ambad.	7.6	7.9	8.1	7.86	0.25	0.147	7.86 ± 0.63
3	Delta Polyster Ltd. F-6, MIDC, Ambad.	6.8	7.8	7.9	7.5	0.61	0.35	7.5 ±1.51
4	Glaxo Industries J-7, MIDC, Ambad.	6.7	6.8	6.9	6.8	0.1	0.057	6.8 ±0.25
5	Kunal Industries, J-7, MIDC, Ambad.	7.9	7.5	8.1	7.83	0.31	0.18	7.83 ± 0.76

Table 3: EC in industrial wastewater, and groundwater collected from Ambad MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Gaurav Nitrate Pvt. Ltd. F-42, MIDC, Ambad.	1650	1690	1740	1693.3	45.09	26.03	1693.33 ± 112.02
2	Kulram Chemicals, W-32, MIDC, Ambad.	1840	1770	1890	1833.3	60.27	34.8	1833.33 +149.75
3	Delta Polyster Ltd. F-6, MIDC, Ambad.	1950	2010	2100	2020	75.49	43.59	2020 ± 187.56
4	Glaxo Industries J-7, MIDC, Ambad.	1940	2010	1990	1980	36.05	20.81	1980 ± 89.57
5	Kunal Industries, J-7, MIDC, Ambad.	1640	1650	1690	1660	26.45	15.27	1660 ±65.73

Table 4: EC in industrial wastewater, and groundwater collected from Satpur MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Alpa Mech.F 101	1040	1120	1160	1106	61.1	35.27	1106.66 ± 151.80
2	Apurva chemical, 45, Gurukul, Vanivihar colony	1830	1750	1780	1786	10.41	23.33	1786.66 ± 100.40
3	Delta Industries	1920	1890	1940	1916	25.16	14.53	1916.66 ± 92.52
4	Bharat Inorganic Chemical	1470	1460	1490	1473	15.27	8.81	1473.33 ± 37.98
5	Nasik Chemical Pvt. Ltd.	1220	1290	1270	1260	36.05	20.81	1260 ± 89.57

Table 5: Chloride: in industrial wastewater and groundwater collected from Ambad MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Gaurav Nitrate Pvt. Ltd. F-42, MIDC, Ambad.	1210	1250	1270	1243.3	3.55	17.63	1243.3 ± 75.90
2	Kulram Chemicals, W-32, MIDC, Ambad.	1650	1640	1680	1656.6	20.81	12.01	1656.66 ±51.71
3	Delta Polyster Ltd. F-6, MIDC, Ambad.	1547	1553	1485	1561.6	37.64	21.73	1561.66 ±93.53
4	Glaxo Industries J-7, MIDC, Ambad.	1575	1443	1392	1436.6	94.44	54.52	1436.66 ± 234.62
5	Kunal Industries, J-7, MIDC, Ambad.	1592	1691	1705	1662.6	61.59	35.56	1662.66 ± 153.03

Table 6: Chloride: in industrial wastewater, and groundwater collected from Satpur MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Alpa Mech.F 101	1369	1370	1376	1369	5.74	3.31	1369.66 ±14.27
2	Apurva chemical, 45, Gurukul, Vanivihar colony	1545	1675	1690	1636	79.73	46.63	1636.66 ± 198.10
3	Delta Industries	2384	1985	2190	2186	199.5	115.2	2186.33 ±495.70
4	Bharat Inorganic Chemical	2156	2245	2050	2154	97.6	56.33	2154.33 ± 242.53
5	Nasik Chemical Pvt. Ltd.	1114	1015	1070	1066	49.6	28.63	1066.33 ±123.23

Table 7: Sulphate in industrial wastewater, and groundwater collected from Ambad MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Gaurav Nitrate Pvt. Ltd. F-42, MIDC, Ambad.	1040	1090	1140	1090	50	28.86	1096 ± 124.22
2	Kulram Chemicals, W-32, MIDC, Ambad.	1164	1180	1175	1173	8.18	4.73	1173 ± 20.33
3	Delta Polyster Ltd. F-6, MIDC, Ambad.	1296	1335	1451	1360.6	80.62	46.55	1360.66 ± 200.304
4	Glaxo Industries J-7, MIDC, Ambad.	1720	1734	1738	1730.6	9.45	5.45	1730.66 ±23.48
5	Kunal Industries, J-7, MIDC, Ambad.	1624	1670	1595	1629.6	37.81	21.83	1629.66 ± 93.95

Table 8: Sulphate in industrial wastewater, and groundwater collected from Satpur MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Alpa Mech.F 101	1000	1011	990	1000.3	10.5	6.06	1000.33 ± 26.09
2	Apurva chemical, 45, Gurukul, Vanivihar colony	1693	1520	1490	1567.7	109.57	63.26	1567.66 ±272.22
3	Delta Industries	2871	2613	2912	2798.6	162.09	93.58	2798.6 ± 402.70
4	Bharat Inorganic Chemical	1463	1623	1728	1604.7	133.4	77.04	1604.66 ±331.53
5	Nasik Chemical Pvt. Ltd.	970	886	895	917	46.11	26.62	917 ±114.57

Table 9: Total nitrogen in industrial wastewater, and groundwater collected from Ambad MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Gaurav Nitrate Pvt. Ltd. F-42, MIDC, Ambad.	81	85	73	79.66	610	3.53	79.66 ±15.18
2	Kulram Chemicals, W-32, MIDC, Ambad.	36	39	47	40.66	5.68	3.28	40.66 ±14.13
3	Delta Polyster Ltd. F-6, MIDC, Ambad.	101	91	83	91.66	9.01	5.21	91.66 ±22.45
4	Glaxo Industries J-7, MIDC, Ambad.	118	104	95	105.66	11.59	6.69	105.66 ± 28.79
5	Kunal Industries, J-7, MIDC, Ambad.	125	147	158	143.33	16.86	9.7	143.33 ±41.74

Table 10: Total nitrogen in industrial wastewater, and groundwater collected from Satpur MIDC, Nasik

Sr. No.	Sites of sample collection	I	II	III	X	S.D.	S.E.	95% Confidence limit
1	Alpa Mech.F 101	883	793	846	840.6	45.23	26.11	840.66 ±112.34
2	Apurva chemical, 45, Gurukul, Vanivihar colony	687	681	742	703.3	33.6	9.4	703.33 ±43.53
3	Delta Industries	755	768	697	740	37.04	21.82	710 ± 93.91
4	Bharat Inorganic Chemical	913	939	857	903	41.9	24.19	903 ± 104.108
5	Nasik Chemical Pvt. Ltd.	676	678	671	675	3.605	2.08	675 ± 8.95

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