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Analysis Of Effluent Discharged From Chemical Industries Near Gwalior (M.P.)

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Abstract
The present study is carried out to determine the important organic, inorganic and metallic pollutants in Malanpur area, a major industrial Complex nearby Gwalior, Madhya Pradesh. Samples were collected to assess the important physico chemical parameters viz. color , odor, Temperature , Electric Conductivity, pH, DO, COD, Turbidity, Total Hardness, TDS, phosphate ,Mercury ,Arsenic, Chromium and Zinc by standard analytical procedures. The obtained results were compared with BIS and found that some of the parameters showing that the level of pollutants above the permissible limit. The observations of work forced the need to apply programmes for improvement in effluent treatment processes.
Keywords:-*Industry,effluent,COD,Hazards.*

1- INTRODUCTION

Manufacturing industries are engaged in transforming raw material into finished product, can be either consumer goods or producer goods. E.g. Chemical, textile, paper and pulp, metals etc. Our state has wide industrial base and the number of industries have increased manifold in the last few decades and almost all types of manufacturing plants are existing or are being setup in different regions of the state. The Small and Medium Scale Industries form the backbone of our economy and 10,986 such units are registered in Gwalior district [1]. These Industries are major sources of environmental contamination arising primarily from the discharge of untreated industrial effluents containing toxic chemicals into the environment. The industrial wastewater is specific and particular to industries, each having its own undesirable waste constituents and their negative effect. Among the various industrial sectors around the district, a substantial portion of industrial effluents containing organic pollutants are mainly generated from diary and food product industry, soaps and detergent, pharmaceutical and fine chemical industry while inorganic pollutants and heavy metals are effectively generated by photographic industry, electroplating, textile and chemical industry. Industrial activities can increase concentration of metals and toxic chemicals, add suspended sediments, increase temperature and lower dissolved oxygen in water. Each of these effects can have a bad impact on aquatic ecosystem along with nearby persons and make water unsuitable for established or potential uses.

Noticeable research work has been reported on waste water quality of this area but various devastating ecological effects and human disasters in the last two decades have

arisen majorly from industrial wastes causing environmental degradation [2-3]. A number of environmental scientists after research reported all types of industrial activities as major source of contamination [4-7]. The presence of toxic chemicals in water resources poses unacceptable chronic and acute health risks [8]. Therefore, the aim of present study is to monitor the extent of chemical pollution by industrial effluents for safety assessment of the environment.

2- EXPERIMENTAL METHOD

Gwalior is a historical city of Central India, having humid subtropical climate and population of the city [9] is 2,030,543. The industries in the vicinity of the city are discharging waste water into the surface water bodies which is poured in ground water table and lead to water pollution.

All the samples were collected from drainage of marked manufacturing plants located in different industrial regions near Gwalior, in sterilized plastic bottles and were stored at 4^0C for further investigation as per standard procedure by APHA [10]. All the chemicals used for the analysis were of analaR grade. Also, the instruments and glass wares were of standardized and calibrated.

The collected samples were analyzed for various physico-chemical parameters as per standard procedures of analysis [10-11]. The quality of wastewater has been assessed by comparing each parameter with the BIS [12].

3- RESULTS AND DISCUSSION

Results of the study were indicated about the physico-chemical parameters of Industrial effluents (Table 1). All collected samples had color along with unpleasant odor. The temperatures of all samples were within the permissible limit as per BIS. Electric conductivity ranged from 132.6 mho cm^{-1} to 155.3 mho cm^{-1}. The highest value of EC was measured in the S_4 indicating high TDS emanating from various chemicals used as food preservatives in food processing units. The pH of effluents was slightly alkaline (6.1 to 8.9) and was within the permissible limit as per BIS. Any alteration in water pH is accompanied by the change in other physico-chemical parameters [13].High value of pH may results due to waste discharge, microbial decomposition of organic matter in the water body [14].Water with high or low pH is not suitable for irrigation. At low pH most of the metals become soluble and become available and therefore could be hazardous in the environment. At high pH most of the metals become insoluble and accumulate in the sludge and sediments. The DO levels of all samples were within the permissible limit.COD values convey the amount of dissolved oxidisable organic matter including the non-biodegradable matters present in it. The COD of all the samples were in range of 403-508 mg /l while the maximum permissible limiting value of COD for Industrial effluent is 250 mg/ l, according to BIS. Hence the observed COD values in all the areas were not within the permissible limit. The turbidity was found to be in the range of 33.2 to 75.2 NTU and the high value of turbidity is probably due to the presence of organic particulate matter in the effluents, discharged from production units. Hardness is an important parameter in decreasing the toxic effect of poisonous element. The hardness was found to be in the range of 285 – 368 mg/l. The hardness of water increases in the polluted waters by the deposition of calcium and magnesium salts [15].TDS was found to be in the range of permissible limit. The concentrations of phosphate were in the range of 3.45 to 6.92 mg/l and As, Cr, Zn was found at various concentration levels except Hg. These toxic substances enter into the food chain of primary and secondary hosts [16-17].

Table-1: Physico-chemical parameters of Industrial effluents of major industries in Malanpur Industrial area.

S.No.	Parameter	BIS (Permissible limit)	S_1	S_2	S_3	S_4	S_5	S_6
1	Color	-	Yellow	Blue	Blue	Green	Blue	Yellow
2	Odor	-	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant	Unpleasant
3	Temperature (^{0}C)	40	30	28	28	31	31	28
4	Electric Conductivity (mho cm^{-1})	2.25	140.5	138.4	145.4	155.3	148.2	132.6
5	pH	5.5-9.0	8.8	6.1	8.1	8.1	6.9	8.9
7	DO(mg/L)	4	5.2	4.5	3.8	2.9	3.5	4.3
8	COD (mg/L)	250	403	471	412	467	421	508
9	Turbidity (NTU)	50	33.2	61.1	52.0	48.2	75.3	56.7
10	Total Hardness (mg/L)	300	320	340	300	368	312	285
11	TDS (mg/L)	2100	1580	1535	1725	1975	1800	1650
12	Phosphate (mg/L)	5.0	5.20	3.45	4.98	6.23	5.98	6.92
13	Mercury (mg/L)	0.01	-	-	-	-	-	-
14	Arsenic (mg/L)	0.20	0.08	0.41	-	-	0.24	0.30
15	Chromium (mg/L)	2.0	0.018	0.138	0.110	0.215	0.810	0.180
16	Zinc (mg/L)	5	0.221	0.431	0.113	0.126	0.240	0.019

4- CONCLUSION

The discharge of industrial effluents into receiving water bodies in Malanpur Industrial area, invariably result in the presence of high concentrations of pollutant in the water and sediment. The pollutants have been shown to be present in concentrations, which may be toxic to different organisms. The effluents also have considerable negative effects on the water quality of the receiving water bodies and as such, they are rendered not good for human use. The higher concentrations of metals in industrial effluents indicate negligence of industries towards waste water treatment. Various small scale and some major industries in this area, release their effluents openly which may contaminate water reservoir and cause serious health hazards in humans. Therefore, there is an urgent need to enforce effluent treatment to reduce environmental and health risks.

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5- REFERENCES

[1] Brief Industrial profile of Gwalior district, ministry of msme, govt. of India.

[2] Abdel-Shafy HI and Abdel-Basir SE (1991). Chemical treatment of industrial

waste water.Environ. Manage. Health, 2:19-23
[3] Shridhar MKC, Olawuyi JF, Adogame lA, Okekearu OCO, Linda A (200). Lead in Nigerian environment: problems and prospects in 11th Annual International Conference on Heavy metals in the Environment. University of Michigan, School of public Health, p.862
[4] Maier E.A., (1996). Certified Reference Materials for quality control of Measurements of Industrial effluents and waste: Trends in Analytical Chemistry. 15(8):341-348.
[5] Jyoti M., Pandey V. and Singh V. (1994). Effects of some heavy metals on Root Growth of Germinating seeds of Vierafaba. J. of Environmental science and Health.A29 (10): 2229-2234.
[6] Sharma S. and Mathur R. (1995). Seasonal changes in ground water quality in Gwalior: Health risk assessment. J. pollution Res.14 (4): 373-396
[7] Verma Avnish K. and Saksena D.N. (2010). Assessment of water quality and pollution status of Kalpi (Morar) River, Gwalior, Madhya Pradesh: with special reference to conservation and Management plan. Limnology research unit, JU. Asian J. Exp. Biol. Sci. Vol. 1(2) 419-429.
[8] Roy D, Greenlaw PN, and Shane BS (1993). Adsorption of heavy Metals by Green Algae and Ground Rice Hulls, Journal of environmental science and Health. A 28(1):37-50
[9] www.censusmp.gov.in/censusmp/pdfs.
[10] APHA (1995). Standard methods for examination of water and waste water. 18th edition, American Public Health Association, Washington DC.
[11] USEPA (1983). Methods for Chemical Analysis of Water and Wastes (MCWW).
[12] BIS (2009). Indian standards drinking water specification, Bureau of Indian Standard, Indian Standard 10500.
[13] Wetzel R.G., (1975).Limology, W.B., Saunders Co., Philadelphia, USA, 743.
[14] Patil S.G., Chonde S.G., Jadhav A.S. and Raut P.D., (2012). Impact of Physico-Chemical Characteristics of Shivaji University lakes on Phytoplankton Communities, Kolhapur, India, Research Journal of Recent Sciences, 1(2), 56-60.
[15] Bhatt L.R., Lacoul H.D., Lekhak H. and Jha P.K., (1999). Physicochemical characteristics and phytoplankton of Taudaha Lake, Kathmandu, Poll. Res., 18(4), 353-358.
[16] Duffus J.H. (1980). Environmental toxicity, London. Edward Arnold Ltd. p.560.
[17] Birch N.J. and Saddler P.J. (1979). Inorganic Elements in Biology and Medicine, Special Periodical Reports. The Chemical Society. Inorganic Chemistry. 1:357.