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Suggestive Measures of Water Pollution

Vijendra Singh*

Associate Professor, Department of Chemistry, Rajkiya Mahila Snatkottar Mahavidhyalaya, Kandhla (Shamli)

Abstract - The fundamental purpose of water treatment is to remove impurities that may be offensive or injurious to health and well-being of the individual and community. It should be inexpensive, and non-toxic, to humans and should provide protection against only contamination in water during conveyance or storage. The Govt. should immediately make laws banning industrial pollution. Failure to do so will lead to substantial penalties and fine. Through strict implementation of the Government's Water Treatment Programme, water can be rendered safe for drinking.

Keywords - Groundwater, Wastewater, Toxic Pollutants, Wastewater Treatment, Dissolved Inorganic Materials.

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INTRODUCTION

Industrial activities generate a large number and variety of waste products, which are generally discharged into water streams. The nature of industrial wastes depends upon the industrial processes in which they originate. The ultimate disposal of wastewater can only be onto the land or into the water. But whenever the watercourses are used for the ultimate disposal, the wastewater is given a treatment to prevent any injury to the aquatic life in the receiving water. Normally, the treatment consists of the removal of suspended and dissolved solids through different units of the treatment plants. Engineers can design a treatment plant to accomplish any degree of treatment. But a complete treatment or 100% removal of the pollution load is uneconomical and never aimed at in any waste treatment plant. Wastewater treatment technology should be developed and implemented area-wise. The watercourses can assimilate certain portion of the pollution load without affecting seriously the water quality and the environment.

Suspended Solids (SS) and 5-day 20^0C BOD $(BOD)_5$are the usual parameters of pollution, particularly in domestic wastewaters. However, with a greater amount of water use, more amount of solids per capita are expected to join the wastewater flow, but it remains fairly constant beyond a waste flow rate of about 450 litres/capita/day. The per capita contributions of SS, Total Solids and BOD_5in different Indian cities are shown in Table 1.

Table 1: Per Capita Contributions to the Pollution in Different Indian Cities

Parameters Cities	BOD_5, gms/day	Total Solids, gms/day	SS, gms/day	BOD removal rate constant, per day	Flow, l/day
Housing Estate near Calcutta	38-44	246-270	88-100	0.232-0.251	327
Bombay	32-64	–	–	0.281	122
Kanpur	(i) 70	–	64	–	580
	(ii) 32-39	–	–	–	–
	(iii) 58	–	198	0.345	490
Madras	27	–	–	–	–
Nagpur	18	–	–	–	–
Jamshedpur	27	–	–	–	–
Ahmedabad	(i) 27-45	–	–	–	–
	(ii) 63	–	70	–	340
Durgapur	45	–	–	–	–
Jaipur	35	–	35	–	81
UK & Germany average	54	–	–	–	–
USA average	54	–	90	–	300

The natural purification is a slow process and depends on various factors. When pollutants are discharge into a stream, a succession of changes in water quality take place, in the down-stream side of the point of pollution. The resulting pattern of change along the stream establishes a well-defined profile of pollution and self-purification, which again changes with seasons and hydrology. The removal of organics are accomplished by :

(i) Settling and adsorption

(ii) Micro-Biological activities.

INDUSTRIAL WASTEWATER TREATMENT

While a huge amount of water is required for different industrial processes, only a small fraction of the same is incorporated in their products and lost by evaporation; the rest finds its way into the watercourses as wastewater. Thus, the industries join the municipalities to contribute to the "pollution" of the natural bodies of water.The industrial wastes either join the streams or other natural water bodies directly or are emptied into the municipal sewers. Thus, these wastes affect in some way or other, the

normal life of a stream or the normal functioning of sewerage and sewage treatment plants. Much attention is now given in India on the treatment of industrial wastes, due to its growing pollution potential arising out of the rapid industrialization of the country. We have three alternatives for the disposalof industrial wastes viz. (i) The direct disposal of waste into the streams without any treatment, (ii) Discharge of the wastes into the municipal sewers for combined treatment and (iii) Separate treatment of the industrial wastes before discharging the same into the water bodies. The selection of a particular process depends in various factors like the following:

(i) Self-purification capacity of thestreams.

(ii) Permissible limits of the pollutants in the water bodies, established by law.

(iii) Economic interests of both the municipalities and theindustries.

(iv) Technical advantages, if any, in mixing the industrial wastes with domesticsewage.

CHARACTERISTICS OF INDUSTRIAL WASTEWATER

Unlike the domestic sewage, the industrial wastes are very difficult to generalize. The characteristics of the industrial wastes not only vary with the type of the industry, but also from plant to plant producing same type of end products. Difficult types of liquid wastes originate from various types of industrial processes. The pollutants include the raw materials, process chemicals, final products, process intermediates, process by-products and impurities in raw materials and process chemicals. Broadly, these pollutantscan be classified as follows:

(a) Organic substances that deplete the oxygen content of the receiving streams and impose a great load on the biological units of the sewage treatmentplant.

(b) Inorganic substances like carbonates, chlorides, nitrogen, etc. that render the water body unfit for further use and sometimes encourage the growth of some undesirable micro-plants in the body ofwater.

(c) Acids or alkalis which make the receiving stream unsuitable for the growth of fish and other aquatic life there and cause serious difficulties in the operation of sewage treatmentplants.

(d) Toxic substances like cyanides, sulphides, acetylene, alcohol, petrol, etc. which cause damage to the flora and fauna of the receiving streams, affect the municipal treatment processes and some tomes endanger the safetyoftheworkmen.Alistofthetoxicsubstancesfromsomeselected industries is given in Table 2.

Table 2: Toxic Chemicals from Some Selected Industries

S. No.	Industries	Toxic Pollutants
1.	Fertilizers	Ammonia, Arsenic
2.	Coke Ovens	Phenols, Cyanide, Thiocyanate, Ammonia
3.	Metallurgicals	Heavy metals, e.g. Copper, Cadmium, Zinc
4.	Electro Plating	Hexavalent chromium, Cadmium, Copper, Zinc
5.	Synthetic Wool	Acrylonitrile, Acetonitrile, HCN
6.	Petrochemicals	Phenol, Heavy metals, Cyanides

(a) Color producing substances like dyes, which though not toxic, are aesthetically objectionable when present in the watersupplies.

(b) Oil and other floating substances, which not only render the streams unsightly, but also interfere with the self-purification of the same, and the operation of the sewage treatmentplants.

Characteristics of the wastes from some selected Indian industries are given in Table 3.

Table 3: Pollution Characteristics of Different Industries

Industries	Pollution Characteristics	Suggested Treatment Methods
Paper and Pulp	Strong Color, High BOD, High COD/BOD ratio, Highly Alkaline, High Sodium Content	Chemicals Recovery, Lime Treatment for Color, Biological Treatment
Tannery	Strong Color, High Salt Content, High BOD, High Dissolved Solids, Presence of Sulphides, Lime and Chromium	Chemical Treatment, Biological Treatment
Textile (Cotton)	Highly Alkaline, High BOD, High Suspended Solids	Chemical Treatment, Biological Treatment
Distillery and Brewery	Strong Color, High Chloride, High Sulphate, Very High BOD	Biological Treatment
Petrochemicals	Oil, High BOD & COD, High Total Solids	Chemical Treatment, Biological Treatment
Pharmaceuticals	High Total Solids, High COD, High BOD/COD ratio, Either Acidic or Alkaline	Chemical Treatment, Biological Treatment
Coke Oven	High Ammonia Content, High Phenol Content, High BOD, Low Suspended Solids, High Cyanide	Chemical Treatment, Biological Treatment
Oil Refineries	Free and Emulsified Oil	Oil Separation, Chemical Treatment, Biological Treatment
Fertilizer	High Nitrogen Content	Biological Treatment
Dairy	High Dissolved Solids, High Suspended Solids, High BOD, Presence of Oil and Grease	Biological Treatment
Sugar	High BOD, High Volatile Solids, Low pH	Biological Treatment

The chemical treatment should be provided only when it becomes unavoidable. The selection of the particular treatment process depends on the effluent requirements and the characteristics of thewaste.The situation of wastewater treatment is not satisfactory even in metropolitan cities. Proper collection and disposal of liquid and solid waste is very important for the overall health of urban cities. It is a pity to note that none of the cities in the country collects and disposes its solid waste in a safe manner. Besides the municipal solid waste, which is organic and inert in composition, the hospital waste,

which contains germs of contagious diseases, is not disposed-offproperly.

SUGGESTIVE MEASURES

i) The Govt. should immediately make laws banning industrial pollution. Failure to do so will lead to substantial penalties and fine. The Govt. of India has passed 'The Water Act', 'The Air Act' and'EnvironmentalProtection Act, 1986.

ii) The 90% water pollution in cities is due to human wastes, which can easily be avoided by using the wastes in the preparation of useful things, e.g. in America the house waste is used for constructing the roads. Recently C.B.R.I., Roorkee, has used the ashes of thermal power stations in preparing bricks. Thus wastes can be utilized for useful purposes.

iii) The water treatment plants should be installed in ruralareas.

iv) The rural inhabitants should try to avoid the use of pesticides in their fields. The DDT is the most harmful compound and hence must be completely banned inIndia.

v) The effluent from the factories should be treated first before adding to the rivers. The excess harmful constituents of the effluent should be removed in the factory by designing various plants such as screw pumps, screens, settling tanks, thickness and aerators. For solid waste pollution, the dust free, smoke free and flash free incinerators can be recommended for organic and pathologicalwaste.

vi) All small scale and big industries must have anti-pollutionunit.

vii) Persons carrying on industry, operation, etc. not to allow emission or discharge of environmental pollutants in excess of thestandards.

viii) Create the awareness about the effects of high concentration of nitrate, fluoride, solids and hardness amongvillagers.

ix) Provide the knowledge of de-fluorination of water invillagers.

x) The Government and Community should do better water management in conservingwater.

xi) Through strict implementation of the Govt's water treatment programme. Water can be rendered safe fordrinking.

xii) The villagers should use Tulsi leaves in drinking water as they destroy the pathogens, which cause various diseases in humanbeings.

xiii) Spending an equal amount on water supply systems as society would have spent in curing them can eliminate 75% of diseases that afflict Indian culture.

xiv) Environmental courts should be set up in every district to deal with the cases relating to violations of environmentallaws.

CONCLUSION

It is concluded that the wastewater and groundwater contain excessive levels inorganic and organic pollutants in water have harmfulto the health of humans and stood environment stresses. Water sources may be contaminated by all pollutants owing to the incomplete treatment and may not be acceptable for drinking purposes. So, the water treatment plants should be installed in rural areas. Create the awareness about the effects of high concentration of nitrate, fluoride, solids and hardness among villagers. The Government and Community should do better water management in conserving water. The Govt. should immediately make laws for banning industrial pollution. Failure to do so will lead to substantial penalties and fine. Environmental courts should be set up in every district to deal with the cases relating to violations of environmental laws.

REFERENCES

1. Walton G., Survey of Literature Relating to Infant Methemoglobinaemia Due to Nitrate Contaminated Water, *American Journal of Public Health*, 41: 986–996(1951).

2. Fair G.M., J.C. Geyer and D.A. Okun, Water and Waste Water Engg.: Vol. 2, *John Wiley – Toppan Co. Ltd.*(1968).

3. Koziorowski B. and J. Kucharski, Industrial Disposal, *PergamonPress* (1972).

4. Hammer H.J., Water and Waste Water Technology, *John Wiley Co. Ltd.*, New York(1975).

5. Rao M.N. and A.K. Datta, Waste Water Treatment, 2nd Edi., *Oxford &IBH Publishing Co. Pvt. Ltd.*, New Delhi(1987).

6. Sharma H.S., Agrawal P.K. and Prabha S., Water Quality of Sewage Drains Entering Yamuna River at Mathura (U.P.), *J. Environ. Biol.*, 21(4): 375–378 (2000).

7. Sharma B.K., Environmental Chemistry, 8th Edi., *Krishna Prakashan Media (P) Ltd.*, Meerut(2005).

8. Singh Vijendra, Assessment of the Quality of Wastewater and Groundwater for Irrigation Purpose. *Chemical and Environmental Research*. 15(1&2): 165–168 (2006).

9. Singh Vijendra, Analytical Study of Heavy Metals of Industrial Effluents of Jaipur, Rajasthan. *Journal of Environmental Science & Engineering*. 48(2): 103–108 (2006).

10. Matta Gangan, Amit Chauhan, Avinash Kumar, Ajendra Kumar, Impact of industrial affiliate on groundwater and surface water quality. A case study of damper region (UP),*India General of Chemical and Pharmaceutical Sciences,* 9(2) : 709-713 (2016).

11. Singh Vijendra,Estimation of Heavy Metals in Groundwater at Residential Area Nearby Major Industrial Areas of Jaipur City. *International Journal for Environmental Rehabilitation and Conservation*. VIII(2): 82–87 (2017).

12. Singh Vijendra, Appraisal of Toxic Heavy Metals in Groundwater at Suburban Area Nearby Major Industrial Regions of Jaipur. *Journal of Advances and Scholarly Researches in Allied Education*. 16(4): 1288 – 1290 (2019).

Corresponding Author

Vijendra Singh*

Associate Professor, Department of Chemistry, Rajkiya Mahila Snatkottar Mahavidhyalaya, Kandhla (Shamli)