

Consideration of Waste Water Characteristics Parameters

Dr. Savita Dubey

Department of Chemical Engineering IES IPS Academy Indore

Abstract

A large amount of water is used in drug industries in different processes. After use of this water, it is discharged as a waste and this waste contains many soluble and insoluble pollutants. Due to high industrialization, water demand increases and they create serious problems, resulted in the increased discharge of the effluent in water bodies which contain toxic chemicals and hazardous compounds. There is an increasing trend to require more efficient use of water resources, both in urban & rural areas. The aim of the present research work was to determine the behavior of various parameters of the wastewater. 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.

Keywords: hazardous, parameters, wastewater treatment,

I. Introduction

The pharmaceutical industrial waste is 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. The pollutants include the raw materials, process chemicals, final products, process intermediates, and process by-product and impurities in raw materials and process chemicals.

Broadly, these pollutants can be classified as follows:

1. Organic substances.
2. Inorganic substances.
3. Acids or alkalies.
4. Toxic substances.
5. Colour- producing substances.
6. Oil and floating substances.

There are ten processing steps for the manufacturing of drugs in the existing pharmaceutical industry. The quantity of waste water generated is from batch process. Hence, quantity and quality of the discharged waste depends on the batch in process and washing of the reactors.

Collection of samples

The sample were collected from the wastewater generated from process step II, step III and reactor washing and at inlet and outlet of various units of effluent treatment plant since the wastewater is discharged in the form of batch process from step II, step III and washings, so it was collected as grab samples. In case of effluent treatment plant, the

wastewater is collected from their units, in the form of grab samples was made for analysis.

II. Waste Water Characteristics Parameters under Consideration

While selecting the parameters for characterizing the wastewater, due consideration is given for pollutional potential and wastewater generated with the result of raw materials during manufacturing processes. The parameters considered at a glance for wastewater characterization with high pollutional load are colour, temperature, pH, acidity, total solids, total dissolved solids, total fixed solids, chemical oxygen demand, chlorides, Magnesium, Calcium and Aluminium etc.

III. Analytical Methods

The sample have been collected and preserved for testing as per standard procedure described in "Standard Method for Examination of Water and Waste Water 1985" published by American Health Association. The analysis of waste water samples were made in accordance with the standard methods.

IV. Characterization of Wastewater from Process Steps

The wastewater is produced from the processing step II step III during manufacture of drugs. The quality of wastewater is of very high pollutional potential.

The grab samples have been collected and preserved for analysis.

The pharmaceutical industrial waste is very difficult to generalize. The characteristics of the industrial wastes not only vary with the types of the industry but also from plant to plant.

V. POLLUTION CHARACTERISTICS OF DIFFERENT INDUSTRIES

Industry	Pollution Characteristics	Suggested Treatment
Paper and pulp	Strong colour, High BOD, High COD/BOD ratio, Highly alkaline, High sodium	Chemical recovery, Lime Treatment for colour, Biological treatment
Tannery	Strong colour high salt	Chemical treatment,

	content.High BOD, high dissolved solids, presence of sulphides, lime and chromium	Biological treatment
Textile treatment(Cotton)	Highly alkaline, high BOD, high suspended solids.	Chemical and Biological treatment
Distillery and brewery	Strong colour, high chloride, high sulphate, very high BOD	Biological treatment
Petrochemicals	Oil, high BOD and COD, high total solids.	Chemical treatment, Biological treatment
Fertilizer	High nitrogen content	Biological treatment
Dairy	High dissolved solids, high BOD, presence of oil and grease	Biological treatment
Sugar	High BOD, high volatile solids, low pH	Biological treatment
Pharmaceutical	High total solids, high COD,high COD/BOD ratio, either acidic or alkaline.	Chemical treatment, Biological treatment

VI. Sources of the wastewater in plant include

1. Detergent solvents and other materials used to clean reactors.
2. Solvents and other materials used to wash and purify the products.
3. Filtrate from product dewatering and drying.
4. Water from the vacuum jets.
5. Blow down from recalculating cooling system.
6. Still bottoms.
7. Materials used to clean floors of production area.
8. Storm water runoff from the production areas.

Discharges from the reactor to the floor drain system contribute most of the organic load in the plant while discharges from cooling systems and jets contribute the majority of the wastes loads.

It should be mentioned that plant measure such as conservation of water, recovery of chemicals, products segregation of waste stream, good house keeping and reduction spillage reduce the waste treatment problem.

VII. Effluent Standards

These standards are prepared by Indian Standards Institute for disposal of industrial effluent into environment.

- a. IS: 2490-1974- the industrial effluent discharged into inland surface waters.
- b. IS: 3306-1974- the industrial effluent discharged into public sewers.
- c. IS: 3307-1974- the industrial effluent discharged inland for irrigation.
- d. Standard for industrial effluent into Environment (M.P.) Gazette Notification, 1988.
- e. Minimal National Standards – 1990.

The tolerance limits are presented in table. Pharmaceutical Manufacturing & formulation industry standards for liquid effluent discharged as M.P. Pollution Control Board are also presented in table.

VIII. ISI STANDARDS FOR THE DISPOSAL OF INDUSTRIAL EFFLUENTS

S. No	Characteristics	Into Inland surface waters(IS :2490-1974)	Into Public Sewers(IS:3306-1974)	Onland for Irrigation (IS:3307-1974)
1.	BOD5 days, 20 ^o C	30	500	500
2.	COD	250	-	-
3.	pH	5.5-9.0	5.5-9.0	5.5-9.0
4.	Suspended solids	100	600	-
5.	Total dissolved solids(Inorganic)	-	2100	2100
6.	Temperature	40	45	-
7.	Oil and grease	1.1	5	-
8.	Cynides	.2	2.0	-
9.	Sulphides	2.0	-	-
10.	Flourides	2.0	-	-
11.	Total residual chlorides	1.0	-	-
12.	Insecticides	Absent	-	-
13.	Arsenic	0.2	-	-
14.	Cadmium	2.0	-	-
15.	Chromium(H exavalent)	-	2.0	-
16.	Copper	3.0	3.0	-
17.	Lead	0.1	1.0	-
18.	Mercury	0.01	-	-
19.	Nickel	3.0	2.	-

20.	Selenium	0.05	-	-
21.	Zinc	5.0	15.0	-
22.	Chlorides	-	600*	600
23.	Boron	-	2*	2
24.	Sulphate	-	1000*	1000
25.	Percent sodium	-	60	60
26.	Ammonical nitrogen	50	50	-
27.	Radioactive materials	10^{-7}	10^{-7}	10^{-9}
	a. Alpha emitters(μ c/ml)	10^{-6}	10^{-6}	10^{-8}
	b. Beta emitters			

NOTE: All the units are in mg/l except pH, temperature and Radioactive materials.

SOURCE: Course Manual on Industrial Waste Treatment-NEERI, 1975

IX. Conclusion

We observe from the 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 been reduced much in spite of their sincere efforts 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 have the vast field and they should employ modern technology to prevent pollution in their plant.

References

- [1] Mr. Howe R.H.I. 1960 "Pharmaceutical industry". Wastes Engineering, 31,728-731,752-753,Dec.
- [2] Howe R.H.L.1961 "Biological degradation of wastage containing certain toxic chemical compounds" Proceeding of 16th Purdue industrial waste conference, Lafayette Ind., 262-276.
- [3] Patil, D.M. , Srinivasan, T.K. ,et al 1962 "Treatment and disposal of synthetic drug wastage"
- [4] Herion,R.W. 1963 "Pharmaceutical waste" IWW,8,2:28 , March-April.
- [5] Molof,A.H. and Zaleiko, N. 1965 "Parameters of disposal of waste from pharmaceutical industries". Ann..New York Academy Sciences, 130: 851-857.
- [6] Murdy S.S. and Phadke, N.S. 1968 "Characteristic of antibiotic wastes". Environmental Health, V-10,No. 1, PP 42.
- [7] McCarty P.L. 1968 "anaerobic treatment of soluble waste" Advance in water quality improvement. University of Texas Press, Austin, Texas.
- [8] Mohan Rao, G.T., Subrahmanyam, P.V. et al 1970 Waste treatment at a synthetic drug factor in India".Journal WPCF 42, 8 Part, 1530-1543,Aug.
- [9] Anderson, D.R. 1970 "Study of pharmaceutical manufacturing waste water characteristics and aerated treatment system". Industrial waste conference, Lafayette, Ind. Part I,26-35.
- [10] Rajgopalan, S. and Jayangoudev, I.S. 1973 Treatment and disposal of effluent from pharmaceutical industries and dyestuff industries in Baroda".Proc.Symp. on Environmental Pollution, pp. 93.
- [11] Mack,K. 1973 "The problem of waste water purification in chemical pharmaceutical industry". In Jenkins, vol. 3, Pergamon Press, Oxford.
- [12] George, L.H. 1974 "Solid waste management in the drug industry" Proceedings of Purdue University, 26th :444-449.
- [13] Struzeski, E.J. 1975 Waste treatment and disposal methods for the pharmaceutical industry" USEPA, Office of Enforcement, National Field Investigation Centre, Deuva EPA 330/1-75-001, Denves, Colorado, USA.
- [14] Stracham, J.L. and Campbell,W. 1976 "Pharmaceutical production experience in the disposal of waste water" Progress in water technology, vol.4, No. 8, 2/3 PP 1-3 Pergamon Press, Great Britain.
- [15] Delanine, J. and Gough, D.H.1980 "An evaluation of processes for treatment of pharmaceutical effluent" Effluent treatment biochemical Ind.Conf. Pap. 3rd (Watford, Engl. Heat 1 and 1979, paper No.15).