National Conference on Recent Research in Engineering and Technology (NCRRET-2015)
International Journal of Advance Engineering and Research Development (IJAERD)
e-ISSN: 2348 - 4470 , print-ISSN:2348-6406

Water and Wastewater Quality Monitoring

Krunali Patel
Civil Engineering Department
Dr. Jivraj Mehta Institute of Technology
Anand, India
krunalivpatel@yahoo.com

***Abstract*—Water and Wastewater are of great concern to any of the developing countries. Bad water quality is creating problem to civilians of country too. These water and wastewater samples are required to bring them to proper standards. Government and private firms are working for proper and perfect reuse of wastewater. Water standards are define by Indian Standard codes, these standard are require for differ use of water such as drinking, washing, cleaning, gardening, etc. water and waste water sample were collected from various industries and waste water treatment plant. Tests are perform on water to found standard of water like DO, TSS, BOD, COD, pH value, alkalinity, turbidity, etc. According to test result treatments are provided to water sample to eliminate more or less proportion of constituent in sample. Pollution can be reduced and water quality can be increase. This indirectly helps civilian as well as earth to reduce pollution from earth.**

Index Terms*— *pH, total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved oxygen.

I. INTRODUCTION

A. Water :

Every living thing on earth needs water to survive. Human bodies are made up of more than 60 percent water. We use clean water to drink, grow crops for food, operate factories, and for swimming, surfing, fishing and sailing. Water is vitally important to every aspect of our lives. There are different source of water but those sources of clean water are contaminated due to disposal of untreated industrial wastewater and domestic wastewater. Rivers are characterized by uni-directional current with a relatively high velocity ranging from 0.1 to 1 m s-1. The river flow is highly variable in time, depending on the climatic situation and the drainage pattern. In general, thorough and continuous vertical mixing is achieved in rivers due to the prevailing currents and turbulence. Lateral mixing may take place only over considerable distances downstream of major confluences.

For better future and to get fresh water various tests are conducted over water and then it is passed through proper treatment to obtain pure water for general use.

B. Waste Water:

Waste water is getting the most crucial term for today's environment. In this world of industrial revolution, gallons of waste water is produce in various production processes which is directly or indirectly being disposed in rivers, lakes, ponds, etc which is dangerous for ecosystem.

The principal sources of domestic wastewater in a community are the residential area and commercial district area other important sources includes institutional and recreational facilities.

Depending on the type of industry and the nature of its wastes, industries must utilize methods such as those used for advanced treatment of sewage to purify wastewater containing pollutants such as heavy metals and toxic chemicals before it can be discharged. Industrial wastewater is discharged by manufacturing processes and commercial enterprises. Process wastewater can contain rinse waters including such things as residual acids, plating metals, and toxic chemicals.

Wastewater is treated to remove pollutants (contaminants). In order to minimize the environmental and health hazards, these pollutants need to be brought down to permissible limits for safe disposal of wastewater.

TABLE I. GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS

Wastewater treatment is a process to improve and purify the water, removing some or all of the contaminants, making it fit for reuse or discharge back to the environment. Discharge may be to surface water, such as rivers or the ocean, or to groundwater that lies beneath the land surface of the earth. Properly treating wastewater assures that acceptable overall water quality is maintained.

Water quality assessment includes the use of monitoring to define the condition of the water, to provide the basis for detecting trends and to provide the information enabling the establishment of cause-effect relationships. Important aspects of an assessment are the interpretation and reporting of the results of monitoring and the making of recommendations for future actions.

Monitoring the quality of surface water will help protect our waterways from pollution. Farmers can use the information to help better manage their land and crops. Our local, state and national governments use monitoring information to help control pollution levels. We can use this information to understand exactly how we impact our water supply and to help us understand the important role we all play in water conservation.

Reduction of pollutants in the wastewater down to permissible concentrations is necessary for the protection of ground water and the environment.

The objective of this paper is to monitor quality of river water, domestic waste water & waste water collected from different industries.

II. METHODOLOGY

The water sample for this study is collected from Mahi River near vasad.

Wastewater sample is collected from GIDC VU nagar. They are working on aluminium section. Another sample of wastewater is collected fromone chemical company at Sojitra GIDC, they are working on aluminium and copper puring process.

Domestic waste water is collected from VV nagar waste water treatment plant. Wastewater samples were collected in plastic containers. It is important for the industry to develop its own wastewater treatment system before discharging the effluent in order to meet the National Environmental Quality Standards (NEQS). 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, total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD 5), chemical oxygen demand (COD), dissolved oxygen.

The total dissolved solids present, is an essential feature of the quality of any water body resulting from the balance between dissolution and precipitation. Oxygen content is another vital feature of any water body because it greatly influences the solubility of metals and is essential for all forms of biological life.

Turbidity, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Total Suspended Solids, Alkalinty were determined by standard methods. pH was measured using digital pH meter.

III. RESULT & DISCUSSION

Oxygen is necessary for many aquatic species to survive. This test tells you how much oxygen is dissolved in water for fish and other organisms to breathe. Most healthy water bodies have high levels of DO. The potential of Hydrogen, also known as pH, is a measure of acidity and ranges from 0 (extremely acidic) to 14 (extremely basic) with 7 being neutral. Most water is in the range of 6.5–8.0

TABLE II. QUALITY PARAMETERS FOR WATER & WASTE WATER

Type of Water	**Quality parameters**		
	pH	D.O	TSS
Mahi river water	7.69	7.6	19
Indusrial waste water-1	7.22	2.0	14
Domestic waste water	7.55	3.8	8
Industrial waste water-2	6.85	3.9	6

TABLE III. QUALITY PARAMETERS FOR WATER & WASTE WATER

Type of Water	**B.O.D**	**C.O.D**	**TURBIDITY**

Sr. No.	Parameters	Inland Surface water	Public Sewers	Land of irrigation	Marine/Costal areas
1	Suspended solids mg/1, max.	100	600	200	a. For process waste water 100 b. For cooling water effluent 10 per cent above total suspended mater of influent
2	pH	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
3	Biochemical oxygen demand (3 days at 27oC), mg/l, max	30	350	100	100
4	Chemical oxygen demand, mg/l, max	250	-	-	250

Mahi river water	7.69	7.6	12
Indusrial waste water-1	7.22	2.0	-
Gutter water	7.55	3.8	-
Industrial waste water-2	6.85	3.9	-

IV. DISCUSSION & CONCLUSION

As per IS: 10500 requirement desirable limit of pH is 6.5to 8.0 so pH is above 8.0 for any sample then that sample should be treated with alkaline reagent. But here pH of domestic wastewater and powder coating wastewater is neutral while pH of mahi river water is above neutral, it may be due to discharge of water and wastewater from industries situated near river bank.

As per IS: 10500 criteria of DO 4.0 mg/l to 8.0mg/l. In our result mahi river water is lies in criteria which value is 7.6 and other samples are to be treated in **Aeration tank.**

As per IS: 10500 requirement desirable limit of turbidity is 10 and may be relaxed up to 25 in the absence of Alternate. In our result mahi water's turbidity is 12 so no need to treatment of water.

As per IS: 10500 requirement desirable limit of TSS should be < 20 mg/l . According to reading no treatment for TSS is required.

Alkalinity: - It is nill for each sample. So there is no need of treatment.

As per IS: 10500 requirement desirable limit of BOD criteria for Inland Surface Water is 30, in result ammonia water, gutter water, and ionodysing water is near to the criteria.

As per IS: 10500 requirement desirable limit of COD criteria for Inland Surface Water is 250, in our result gutter water is not matching with IS: 10500 code standard.

To reduce BOD and COD they should pass through,

1) Primary treatment

Undissolved solids in row sewage are allowed to settle of suspension forming sludge. BOD is reduced to 1/3 of its origin.

2) Secondary treatment

Here effluent is brought in contact with oxygen and aerobic microorganism.

It removes 90% of BOD after chlorination water can be return to the local surface water.

3) Advance waste treatment

Nitrogen and phosphorus which are remaining in primary and secondary treatment are removed here.

These inorganic nutrients can cause eutrophication, causing blooms of algae. To avoid this tertiary or advance waste treatment are provided.

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