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Studies on organic pollution level from different water bodies at Madhepura District (North Bihar)

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Abstract: The present investigation was carried out to evaluate organic pollution level from different water samples in vicinity of Madhepura district. A total of 16 water samples were collected from different source. The sources were Ganga (4), Kosi (4), Waste water (4) and tube well (4) from different localities. All the collected samples were subjected to use quality parameters viz pH, dissolved oxygen, biological oxygen demand, chemical oxygen demand and chlorine following standard methods of BIS. Dissolved oxygen value ranged between 4.05-9.3 mg/l. Biological oxygen demand ranged between 1.85-3.8 mg/l. Chemical oxygen demand value between 3.2-95.3 mg/l and chloride value ranged between 1.85-76.82 mg/l.

Key words: Madhepura district, dissolved oxygen, biological demand, chemical oxygen demand, chloride.

INTRODUCTION

The quality of life is closely associated with the quality of environment. With increasing industrialization and pollution growth, water source available for various purposes such as drinking, recreation, aquaculture, agriculture, have been adulterated with industrial as well as human wastes. Pollution water contains solids and dissolved organic compounds that impart an offensive odor and serve as an excellent medium for the growth and multiplication of microorganisms.¹

A survey conducted by World Health Organization in 2001, at least 20,000 people die every day in developing countries of the world because of unsanitary water supplies. Sewage consists of approximately 99.9% water, 0.02-0.03% suspended solids and other soluble organic and inorganic substances. Dissolved oxygen is an important

indicator for aquatic plants and animals need to survive. Respiration by aquatic animals, decomposition, and various chemical reactions consume oxygen.²⁻³

If more oxygen is consumed than is produced dissolved oxygen level decline and some sensitive animals may disappear.⁴ In view of above points in consideration the physico chemical evaluation viz pH, dissolved oxygen biological oxygen demand, chemical oxygen demand and chloride of water samples in the vicinity of Madhepura district were carried out.

MATERIALS AND METHODS

Sixteen samples (4- Ganga water, 4-Kosi water, 4-waste water and 4-Tube well water) of 1000 ml each were collected from different areas and sources in Madhepura district. The collected samples were immediately transferred to laboratory and subjected for physico-chemical characteristics as per the standard methods (BIS

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1991, APHA 1992). Dissolved oxygen was calculated using Winker-Azide method.

For measuring biological oxygen demand, water samples were including at 27°C for 3 days. Oxygen is also consumed during nitrification; therefore, 1 ml of 0.05% allylthio urea should be added to water sample to check over estimation of BOD. Chemical oxygen demand was estimated by titration method and the chloride ions were estimated by titration with silver nitrate solution.

RESULT AND DISCUSSION

The study reveals that the pH of samples from all sources was ranging in between 6.4-7.8 that is within prescribed limit of BIS. The sample from all sources tested was found to be in ranged between 4.05 to 9.3 mg/l. The amount of dissolved oxygen for different water bodies (Table 1) show that most highly oxygenated among them was the tube well water. If the oxygen level in water less than 4 mg/l, then it is highly contaminated, and that water is not fit for aquatic life.⁵

In the present study biological oxygen demand (BOD) value ranged between 1.8 to 3.8 mg/l. If there is a large quantity of organic waste in the water supply, there will also be a lot of bacteria present working to decompose in this waste. In this case the demand for oxygen will be high, so the BOD levels will begin to decline. When BOD level are high, DO levels decrease because the bacteria are consuming the oxygen that is available in the water? Since less DO is available in the water, fish and other aquatic organism may not survive.

Microorganisms such as bacteria are responsible for decomposing organic waste. As the waste is consumed through the water, BOD levels will begin to decline, and DO levels will to rise. The DO levels will fluctuate daily and seasonally. They are also varying with water temperature.

Cold water holds more oxygen than that of warm water. The most critical time for many aquatic animals are early morning on hot summer days, when river flows low, water temperature are high, and plants have not been producing oxygen since sunset. Maximum pollution occurs in Allahabad city due to presence of sewage water.

Chemical oxygen demand (COD) is one the major parameters per determination organic pollution in water bodies from (Table 1) it could be seen that, the highest value for COD was for waste water and lowest was for tube well water. High value of COD indicates various chemicals present in the water body, this clearly shows that the amount of organic matter is high and hence the water body is more polluted.⁶

The chloride constitute one of the major pollutants present in water, they are lethal if in excess. Chloride usually occurs as NaCl, CaCl₂ and MgCl₂. High chloride content may harm metallic pipes and structures, as well as growing plants. The presence of chloride also affects the conductivity of water. The table by loose for the chlorides in the water bodies showed that its concentration was more in waste water than that of any other water bodies. The high value of chlorides clearly indicates towards more pollution.

Table 1. Evaluation of physiological characteristics.

Sl. No.	BIS standard	pH	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Chloride
	Source	6.5-8.5	10.0	30.0	250.0	250.0
1.	Ganga Water	7.0-7.5	6.6-8.3	3.3-3.8	10.1-10.6	45.1-51.65
2.	Kosi Water	7.0-7.3	6.2-7.8	3.5-4.05	4.13-4.51	51.3-51.4
3.	Waste Water	6.8-7.2	3.85-4.15	3.4-3.8	70.1-95.8	71.3-76.8
4.	Tube Well Water	7.0	9.1-9.6	1.35-1.85	3.1-3.6	1.55-1.85

Sallu *et al* (1996) studied water quality parameters of Ganga River. They found that pH exceed the permissible limit but the increase was not much harmful, the low dissolve oxygen (0.6-1.7) at Baruni though out the study, which is harm tull for aquatic iife d ittl other purpose. To some extent ont result are in agreement with the study as we also found low dissolved oxygencontent in a few

sources (4.5-9.3 mg/I). Sigh et al 1999 observation of biochemical and chemical demands of certain pollution stretch of river Ganga. They found that pH, dissolved oxygen, BOD COD and chlorides content were much below the standard limits our result are in concurrence with this study. Winker, L.W. conrincted a study for determination of dissolved oxygen in water. He found that

the river showed higher concentration of oxygen. In our study the dissolved oxygen value was within the desirable limits. From the studies carried out on limited number of samples it clearly indicates that majority of sources tested for organic pollution levels in response to their potability; fulfills test parameters. Slightly of higher concentration undesirable quantities chloride.

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