



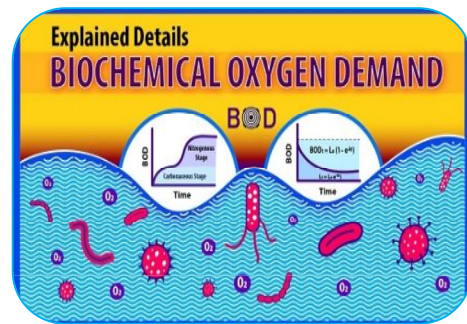
“STUDY OF BIOLOGICAL OXYGEN DEMAND AT THE BISAIKHA DAM DISTRICT - SIDHI (M.P.)”

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ABSTRACT

BOD is measured by confining a sample of water in a bottle in the dark at 20 degrees-C for a specific period of time, and determining the amount of dissolved oxygen consumed by microorganisms in the water. Freshwater contains 9.08 milligrams per liter dissolved oxygen at saturation, while under the same conditions, seawater will contain 7.38 milligrams per liter. The oxygen demand of water confined in a BOD bottle must not exceed the saturation concentration for dissolved oxygen at 20 degrees-C, or the water will become depleted of dissolved oxygen and BOD measurement will be impossible.



KEYWORDS: BOD, water, oxygen demand and Bisaidha dam.

INTRODUCTION

The oxygen in water which is available for species' use is called “dissolved oxygen,” (DO). When organic matter from sewers, algal blooms, and other sources enters water, it is immediately broken down by bacteria, which requires some of the dissolved oxygen. When DO levels fall below a certain level, it adversely impacts aquatic life, sometimes causing mass fish kills. This, in turn, causes further problems because of the sheer number of decaying organisms requiring oxygen.

BOD is the measure of the degradable organic material present in water sample and can be defined as the amount of O₂ required by the microorganisms in stabilizing the biologically degradable organic matter under aerobic conditions. BOD is measured by incubating the sample at 27°C for three days (BOD₃, 27°C). The following method is suggested by Adoni (1985). Adjust the pH of sample to neutrality using in acid and alkali solution. Fill the sample in 6 BOD bottles without bubbling. After this add 1 ml of Allylthiourea to each bottle and determine dissolved oxygen content in three of the bottles by modified Winkler's method. Incubate the remaining three bottles in BOD incubator at 27°C and after three days incubation, estimate the oxygen concentration and recorded it.

BOD was obtained by using following formula –

$$\text{BOD}_3 \text{ in mg/L} = D_1 - D_2$$

where, D1 = initial D.O. in the sample
D2 = D.O. after three days

MATERIAL AND METHODS :

STUDY AREA: Sidhi is the Distt. of old Vindhya Pradesh. Presently it is one of the very important Distt. of Madhya Pradesh. Sidhi is situated on the North-East border of the state. The geographical location is

23°15'N - 24°15'N latitude and longitude 81°45'E- 82°45'E. The town is located on a plateau and is situated 65.7 meters above the mean sea level. The Son, Gopad, Banas and Mahan rivers surround the town from almost three sites and mark its Northern, Southern and Western boundaries. Hills mark the Eastern boundary.

It is advantageous to measure the quality of water in situ by means of sensors which is lowered into position other than by withdrawing samples. However, it is not always possible. Water samples are, therefore, collected in suitable containers. A sample container must satisfy the following requirements :

- (1) It should be free from contamination.
- (2) It should not change the relevant water characteristics on contact.

The sampling bottles were made of either glass or plastic usually polyethylene. It must be capable of being tightly sealed either by stopper or cap. The bottles should be soaked with 10% HCl for 24 hrs and then thoroughly cleaned and rinsed with distilled water.

Samples expected to have a high BOD must be diluted. When samples must be diluted more than two or three times, the concentration of nutrients and bacteria will be diluted greatly. Nutrients and bacterial seed must be added to dilution water to prevent dilution effects from lessening the rate of expression of BOD. A blank to measure oxygen demand of dilution water is necessary.

RESULT AND DISCUSSION :

Water quality criteria are developed by scientists and provide basic scientific information about the effects of water pollutants on a specific water use. They also describe water quality requirements for protecting and maintaining an individual use. Water quality criteria are based on variables that characterise the quality of water and/or the quality of the suspended particulate matter, the bottom sediment and the biota. Many water quality criteria set a maximum level for the concentration of a substance in a particular medium which will not be harmful when the specific medium is used continuously for a single, specific purpose. For some other water quality variables, such as dissolved oxygen, water quality criteria are set at the minimum acceptable concentration to ensure the maintenance of biological functions.

BIOLOGICAL OXYGEN DEMAND (BOD):

Site S₁ - BOD ranges at this site from 8.0 to mg/l to 37 mg/l. During the study maximum values was observed in April, 2021 (Table-1).

Site S₂ - BOD ranges from 8.0 mg/l to 38 mg/l. During the study maximum value was observed in 2021 and minimum was observed in Jan. 2021 (Table-1).

Site S₃ - BOD ranges from 78 mg/l to 476 mg/l, maximum value was observed in July 2020 and minimum was observed September 2021 (Table-1).

Site S₄ - BOD ranges from 82 mg/l to 1400 mg/l. During the study maximum value was observed in Aug. 2021 and minimum was observed in Sep. 2020 (Table-1).

Site S₅ - BOD ranges from 10 mg/l to 120 mg/l. During the study maximum value was observed in Feb. 2021 and minimum value was observed April, 2021 (Table-1).

During the course of present study it was observed that lowest value of BOD was recorded in the month of Apr. 2021 and highest BOD was recorded in the month of Aug. 2020. It is also noted that lower value was found at Site S₅, higher value was found at Site S₄.

Table-1 : Monthly values of BOD of water (in mg/l) at S₁-S₅ sampling Sites of Bisaidha Dam during 2020-2021.

S.No.	Months	Sampling Sites				
		S ₁	S ₂	S ₃	S ₄	S ₅
1.	Jul 2020	8.8	8.6	476	1230	45
2.	Aug 2020	8.4	8.8	432	1400	40
3.	Sep 2020	8.0	10.0	86	82	18
4.	Oct. 2020	20.0	10.0	122	212	20
5.	Nov 2020	9.0	22.0	242	246	24
6.	Dec 2020	12.0	20.0	260	322	40
7.	Jan 2021	14.0	8.0	277	376	58
8.	Feb 2021	16.0	17.0	280	512	120
9.	Mar 2021	20.0	38.0	134	348	34
10.	Apr 2021	37.0	13.0	139	392	10
11.	May 2021	22.0	26.0	332	435	26
12.	Jun 2021	20.0	8.0	300	320	42
13.	Jul 2021	8.6	9.0	332	876	40
14.	Aug 2021	8.8	8.6	368	1260	42
15.	Sep 2021	10.0	9.0	78	88	13
16.	Oct 2021	18.0	20.0	92	210	66
17.	Nov 2021	24.0	22.0	208	432	15
18.	Dec 2021	15.0	14.0	222	378	14

CONCLUSION:

The Biochemical Oxygen Demand (BOD) are important parameters to estimate the pollution rate of particular water body. In the present study it was recorded that at station S₁, S₂, and S₅ BOD ranged between 8 mg/l and 52 mg/l, which indicated normal levels. Station S₃, S₄ showed a sudden rise in BOD values (a range of 78.0 mg/l to 1400 mg/l), which started decreasing downstream up to station S₃. In general BOD values were higher in summer at stations S₃ to S₄ with highest values in June. High BOD values during winter mansoon availability of large amount of water which contained enough D.O. to satisfy BOD, from upstream got decreased and second, microbial activities also got increased due to higher temperature. Continuous reduction BOD values from station S₄ onwards to station S₅ could be due to process of self purification. Klein (1957) reported that temperature rise in a stream not only decreased the D.O. content due to its lower solubility but also increased the rate of utilization of D.O. in biochemical reaction.

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