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# Analysis of Dissolved Oxygen on Markandeya River Using Javascript

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**ABSTRACT:** In this physiochemical parameter such as DO, BOD is evaluated at selected sites of River Markandeya. The river is subjected to severe domestic sewage and industrial pollution at Honaga village. The present studies indicate the water quality due to pollution caused in river Markandeya by various types of waste water disposal by nearby Industries. The computer program java script is developed for the comprehensive analysis of Dissolved oxygen, where dissolved oxygen content is analysed using standard procedures.

Results of analysis show that pH, dissolved oxygen(DO), biological oxygen demand(BOD) of sample of wastewater were as the river water is moving ahead Ph and DO increasing and BOD is decreasing. It is observed that DO at wastewater Disposal point is 2.1 mg/L where it is critical for aquatic life to sustain, but as the river is moving ahead it is getting self-purified and reaching a maximum DO of 7.7mg/L at distance of 3.2km from waste water disposal point. The BOD of stream is observed to be 240mg/L where, Industrial to Disposed their waste to stream BOD should be less than 30mg/L. By making use of JavaScript we have made an attempt to analyse oxygen deficit (DC) on different days at the points where we have collected the samples.

**KEYWORDS:** Dissolved oxygen, Winkler's method, BOD, Markandeya., .

## I. INTRODUCTION

DO levels that are too high or too low can harm aquatic life and affect water quality DO is a main physico-chemical parameters important in conveying a number of biological and ecological processes in aquatic eco systems. Because the survival of all aerobic water organisms depends on it live on oxygen concentration and reproduce changes in concentration DO are often reflected in behavioral changes of organisms. Produce aquatic plants and algae oxygen as a by product of photosynthesis. But at night they consume oxygen through breathing. Bodies of water with large populations of aquatic plant or algae are likely experience the largest DO fluctuations. In such water systems, the DO concentration is usually increase to the peak from morning to afternoon due to photosynthesis late afternoon. in some highly productive water bodies, DO is consume at night breathe faster than is replaced by oxygen defusing from the atmosphere. Consequently, fish and other marine organisms can die from lack of oxygen. "hypoxia" is an environmental condition where the concentration of DO is low enough to have biological effects. The EPA defines hypoxic water as a water with oxygen concentration of 2 mg/L or less than 4.

Zones of Purification: There are four zones of purification as follows

- zone of degradation
- zone of active decomposition
- zone of recovery
- zone of clear water

II. self-purification, which occurs in all natural streams or rivers, is called self-cleaning of natural streams or rivers. So it turns out that natural streams or rivers polluted by sewage are naturally cleaned by the phenomenon of self-cleaning. The self-cleaning rate depends on various factors, such as the aeration rate, the type of organic matter present in the effluent, the temperature, the flow rate, the presence of available oxygen in the receiving water, sedimentation, etc

- Dilution
- Oxidation



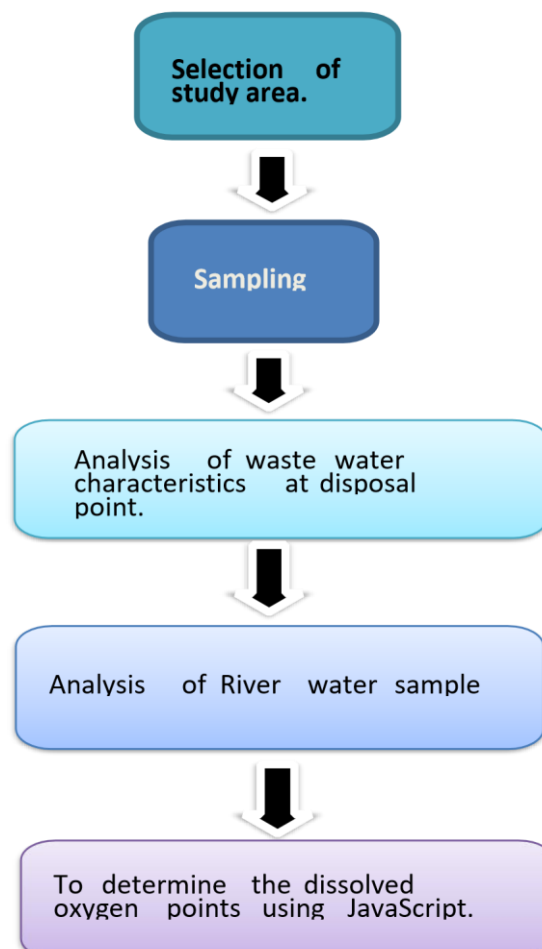
- c. Reduction
- d.. Sedimentation
- e. Action of sunlight.

In a flowing polluted stream exposed to the atmosphere, both deoxidation and reoxidation go hand in hand. The resulting oxygen deficit level can be obtained by algebraically adding the deoxygenation and reoxygenation curves. The resultant curve thus obtained is called the oxygen sag curve or oxygen deficit curve.

### JavaScript

JavaScript is a platform that uses an object-oriented scripting language to build web pages interactively. There are better versions of JavaScript such as Node JavaScript that allow you to access a website more conveniently than downloading files in a bulk environment. JavaScript involves asking its environment to offer programmatic execution through it. JavaScript contains a typical library of materials such as array, date, math, and a core set of language components such as operators, control structures, and statements. Core JavaScript can be enriched by supplementing it with supplemental objects for a variety of functions.

### III.METHODOLOGY





### Selection of study area

Dissolved oxygen concentrations in a body of water can vary greatly over a short period of time due to the dynamics of physical, chemical and biological processes in this system. Photosynthesis adds oxygen to a body of water, while respiration and the breakdown of organic matter consume oxygen. Aeration allows DO to be added to or removed from the water depending on the DO saturation level. A number of environmental factors can affect photosynthesis and aeration rates in a body of water, including light, wind, and temperature, which can change both periodically and spontaneously throughout the day. Due to the complexity and variability of these many influences, predicting high-frequency DO changes in a natural water body is challenging.

In order to assess diurnal (diurnal/everyday) and seasonal variations in dissolved oxygen in flowing waters, it was decided to conduct a comprehensive study to assess diurnal and seasonal variations in dissolved oxygen in flowing waters at selected Markandeya River. Fine Aggregates

### Sampling (Grab Sampling)

There are two types Sampling. When the Samples are collected: 1) discrete Sampling

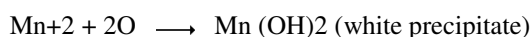
2) Grab Sampling (composite Sampling)

Samples will be collected at the selected study site of the Markandeya River. where the sewage from the nearby industry is discharged into the river water. We will collect water samples at different intervals of known distance and time. The collected samples are tested in the labs to verify the DO content of the collected sample. **Dissolved oxygen analysis methods**

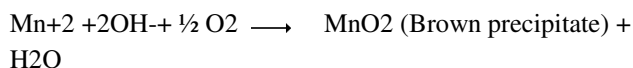
Here three methods for measuring DO concentrations are available. Modern techniques include an electrochemical or optical sensor, the colorimetric method, and the Winkler titration method. The first two methods are fast and inexpensive, but limited in scope and prone to error due to other redox agents present in the water. The traditional method is the Winkler titration. This method was developed by L.W. Winkler, a Hungarian chemist, in 1888. The Winkler method, also known as the iodometric method, is a titrimetric method based on the oxidizing property of DO.

### Winkler's method (Azide Modification Method)

In the first step, manganese sulfate and alkali iodide reagents are added. In the absence of oxygen, the manganese ion only reacts with the hydroxide ion to form a white precipitate of manganese hydroxide.



If oxygen is present, the manganous ion is oxidized and brown precipitate of manganese dioxide is formed.



In the second step upon addition of sulphuric acid ( $\text{H}_2\text{SO}_4$ ) iodine ( $\text{I}_2$ ) is formed by oxidation of iodide ( $\text{KI}$ ).  $\text{MnO}_2 + 4\text{H}^+ + 2\text{I}^- \longrightarrow \text{Mn}^{2+} + \text{I}_2 + 2\text{H}_2\text{O}$

In the third step Sodium thiosulphate standard solution is used to titrate iodine ( $\text{I}_2$ ).  $\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \longrightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}$



The endpoint of the titration is reached by first titrating iodine to a pale straw color and then adding starch indicator which combines with iodine to give a blue color. The titration is continued until the iodine complexed with starch has also reacted and the blue color disappears.

#### Determination of $P^H$

For determination of PH there are methods like Conductivity meters meter indicators, PH paper. We are using PH paper to determine PH value in waste water.

#### Determination of Dissolved Oxygen (Do) REAGENTS:

- Manganese sulfate solution ( $MnSO_4 \cdot H_2O$ ).
- Alkali iodide azide reagent (KI).
- Concentrated sulfuric acid ( $H_2SO_4$ ).

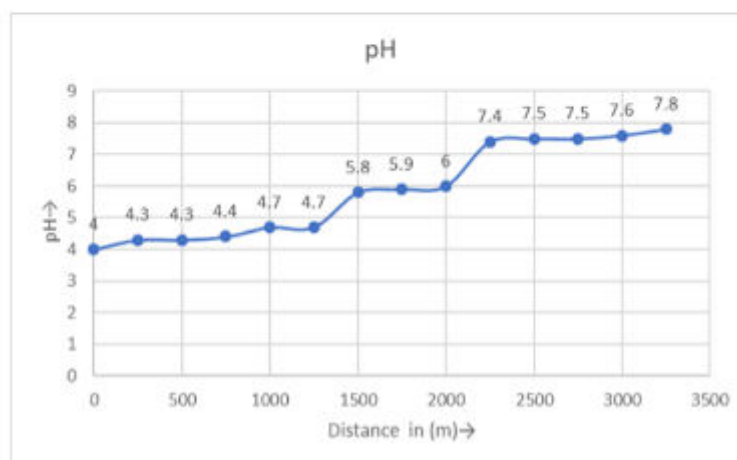
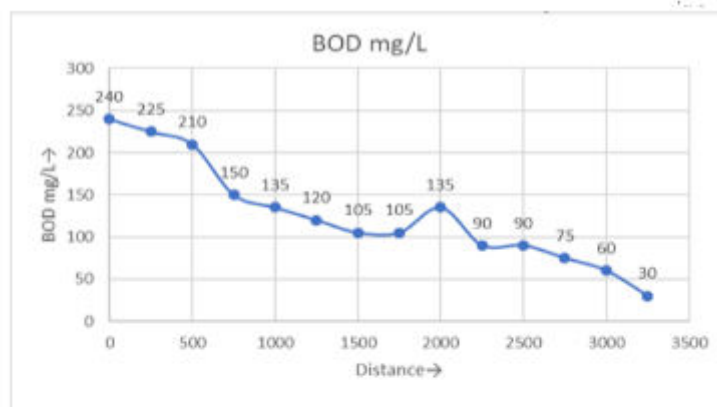
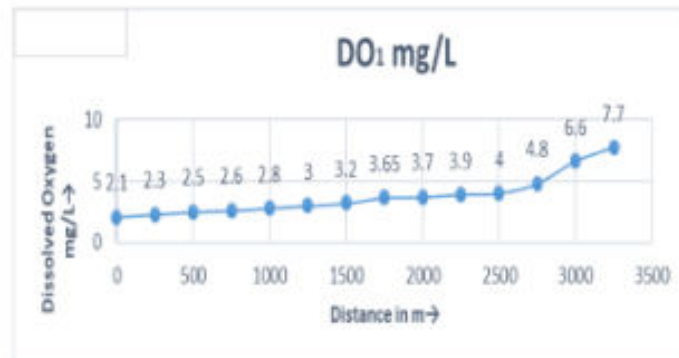
### IV. RESULT AND DISCUSSION

#### TABULAR COLUMN

Distance (m)	pH	D.O <sub>1</sub> (mg/L)	D.O <sub>2</sub> (mg/L)	BOD (mg/L)
0	4	2.1	0	240
250	4.3	2.3	0.25	225
500	4.3	2.5	0.5	210
750	4.4	2.6	0.8	150
1000	4.7	2.8	1.05	135
1250	4.7	3	1.3	120
1500	5.8	3.2	1.55	105
1750	5.9	3.65	1.9	105
2000	6	3.7	2	135
2250	7.4	3.9	2.15	90
2500	7.5	4	2.5	90
2750	7.5	4.8	3.25	75
3000	7.6	6.6	5.1	60
3250	7.8	7.7	6.3	30



## Graphs





## Analysis Of Oxygen Deficit Value Using JavaScript

```
<html>

<head>

<h1 style="text-align: center;"><u> ANALYSIS OF DISSOLVED OXYGEN FOR MARKANDEYA
RIVER</u></h1>
</head>

<body>

<form style="text-align:center">

<label>Value Of DO -</label>

<input type="number" id="doValue" placeholder="Enter
The value Of
DO"><label>mg/l</label><br>

<br>

<label>Value Of T - </label>

<input type="number" id="tValue" placeholder="Enter The value Of
T"><label>days</label><br>

<br>

<button type="button" onclick="myFunction()">Submit</button><br>

<br>

<label>Value Of DT : </label>

<output type="number" id="dtValue" ><br>

<br>

</form><script> function myFunction () { const kd = 0.02; const kr = 0.034; const l = 2.2;

var t = document. getElementById("tValue").value; var d = document. getElementById("doValue").value; //value of
DO

var a = Math. Pow (10, (-kd*t)); var b = Math. Pow(10,(kr*t));

var dt = (kd * l)/(kr - kd)*(a - b) + (d * b);
document.getElementById("dtValue").innerHTML = dt + " mg/l";
```



}

</script>

</body>

</html>

#### The constant input values

1.  $K_D = 0.02 \text{ mg/day}$
2.  $K_R = 0.034 \text{ mg/day}$
3. Ultimate BOD,  
 $L = 22 \text{ mg/L}$

#### The variable input value

1.  $D.O = \text{saturation D.O} - \text{actual D.O}$
2.  $T = 't' \text{ Days}$





- Oxygen deficit values obtained from JavaScript.

Sl. No	Value of DO	Value of T	Dt value (output)
1	6	1	6.5
2	5.9	1	6.4
3	5.7	1	6.22
4	5.6	1	6.13
5	5.5	1	6.03
6	5.3	1	5.85
7	4.9	1	5.48
8	4.8	1	5.39
9	4.6	1	5.2
10	4.5	1	5.11
11	4.3	1	4.93
12	2.9	1	3.63
13	0.90	1	1.78
14	0	1	0.95



#### IV.CONCLUSION

1. Initially Ph of the river is observed to be Acidic at wastewater disposal point with Ph of 4, and slightly becoming alkaline as the river is moving ahead.
2. The DO of the stream should be more than 4mg/L for normal fish life to exists, but it is observed that DO at wastewater disposal point is 1.7mg/L where it is critical for aquatic life to sustain, but as the river is moving ahead it is getting self-purified and reaching a maximum DO of 7.7 mg/l at a distance of 3.2kms from wastewater disposal point.
3. The BOD of Stream is observed to be 240mg/L when waste water is Disposed to stream as per CPCB for Industrial to Disposed their waste to stream BOD should be less than 30 mg/L.
4. By making use of JavaScript, we have made an attempt to analyse Oxygen deficit (Dc) on different days at the points where we have collected the samples.

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