PROJECT REPORT ON

"Physiochemical Analysis of Natural Water body and Study of Pond Productivity of MIDC lake"

DEPARTMENT OF ZOOLOGY & FISHERY SCIENCE,

RAJARSHI SHAHU MAHAVIDHYALAYA

(AUTONOMOUS), LATUR

FOR THE AWARD OF

B.SC. DEGREE

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(B.SC.III YEAR)

(SEAT NO. RBS2260917)

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Certificate

This is to certify that the work presented in the project

"Physiochemical Analysis of Natural Water body, MIDC Lake"

submitted in the fulfillment of the Degree of Master of Science. The project work is completed by Miss.Rutika Dharmraj Devanikar Swami my supervision and Guidance and to the best of our knowledge, this work in the report has not performed earlier for the Award of Degree of other University or Examination Body

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Declaration

I hereby declare that submitted research project entitled

"Physiochemical Analysis of Natural water body, MIDC Lake"

Submitted to department of Zoology and fishery Science, Rajarshi Shahu mahavidhyalaya(Autonomous) Latur during Academic Year 2021-22 For the Award

of B.Sc. Degree is written by me and has not previously been formed on the basis of award of any degree or diploma or other title of this or any other University or Examining Body

Miss.Rutika D.Devanikar Swami

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1. ABSTRACT :

People on globe are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. Due to increased human population, industrialization, use of fertilizers and man-made activity water is highly polluted with different harmful contaminants. Natural water contaminates due to weathering of rocks and leaching of soils, mining processing etc. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. The availability of good quality of water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know details about different physico-chemical parameters such as temperature, hardness, pH, chloride, Chemical oxygen demand (COD), dissolved oxygen (DO), alkalinity used for testing of water quality.

2. INTRODUCTION :

Water is one of the most important and abundant compounds of the ecosystem. All living organisms on the earth need water for their survival and growth. As of now only earth is the planet having about 70% of water. But due to increased human population, Industrialization, use of fertilizers in the agriculture and man-made activity it is highly polluted with different harmful contaminants. Therefore it is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomenon fully because the chemistry of water revels much about the metabolism of the ecosystem and ecosystem and explain the general hydro – biological relationship

The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. Natural water contains different types of impurities are introduced in to aquatic system by different ways such as weathering of rocks and leaching of soils, dissolution of aerosol particles from the atmosphere and from several human activities, including mining, processing and the use of metal based materials . The increased use of metal-based fertilizer in agricultural revolution of the government could result in continued rise in concentration of metal pollutions in fresh water reservoir due to the water run-off. Also faucal pollution of drinking water causes water born disease which has led to the

death of millions of people.

People on globe are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. These are related to animal and plants and finally affecting on it . Industrial development results in the generation of industrial effluents, and if untreated results in water. Having mainly excessive amounts of heavy metals such as Lead (pb), Chromium (Cr) and Iron (Fe) as well as heavy metals from industrial processes are of special concern because they produce water or chronic poisoning in aquatic animals. High levels of pollutants mainly organic matter in river water cause an increase in biological oxygen demand, chemical oxygen demand, total dissolved solids, total suspended solids and fecal coli form. They make water unsuitable for drinking, irrigation or any other use

The quality of ground water depends on various chemical constituents and their concentration, which are mostly derived from the geological data of the particular region. Industrial waste and the municipal solid waste have emerged as one of the leading cause of pollution of surface and ground water. In many parts of the country available water is rendered non-potable because of the presence of heavy metal in excess. The situation gets worsened during the summer season due to water scarcity and rain water discharge. Contamination of water resources available for household and drinking purposes with heavy elements, metal ions and harmful microorganisms is one of the serious major health problems. The recent research in Haryana concluded that it is the high rate of exploration then its recharging, inappropriate dumping of solid and liquid wastes, lack of strict enforcement of

law and loose governance are the cause of deterioration of ground water quality.

Most of the rivers in the urban areas of the developing countries are the ends of effluents discharged from the industries. African countries and Asian counties experiencing rapid industrial growth and this is making environmental conservation a difficult task . sea water contains large number of trace metals in very small concentration. This is a challenging matrix for the analytical chemist due to the very low concentrations of many important trace metals .

The objective of water quality monitoring is to obtain quantitative information on the physical, chemical, and biological characteristics of water via statistical sampling. The type and sensitivity of the analysis depends on the purpose of the analysis and the anticipated use of the water.

3. MATERIAL AND METHODS :

The present study was conducted for knowing the ground water quality of Latur. Geographical location 18.43° N 76.48° S and for this sample were collected from MIDC area of Latur city. The different physico-chemical parameters were determined by APHA (1992) , IAAB (1998) . For results and discussions the sum mean values are taken. The work is conducted in February 2022 The samples were collected between 1.00 pm to 2.00 pm . The parameters like temperature , pH were noted at the sampling station ,Do was fixed at the station with the reagents and estimated at the laboratory.

1. **Temperature : temperature is a physical quantity that expresses hot and cool. It is the manifestation of thermal energy present in all matter. Which is the source of the occurrence of heat , a flow of**

energy when a body is in contact with another that is colder or hotter. Take a sample in a beaker and submerge the thermometer two-third below the surface of water. Let the thermometer adjust water temperature for at least one minute before removing the thermometer from water. Remove the thermometer and take the reading quickly.

2. **pH : a measure of how acidic or basic substance or solution is. pH is measured on a scale of 0-14 . on this scale a pH value of 7 is neutral which means it is neither acidic nor basic. Take a pH standard solution and the water that is to be tested. Take the calorimetric paper. Dip this paper in the water sample the obtained colour is computed from the standard table and the respective pH value is recorded.**

3. **Dissolved oxygen : dissolved oxygen is the amount of oxygen that is present in the water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water swift moving stream dissolves more oxygen than the water of pond or lake. Requirements are Winkler's A, Winkler's B, Na_2So_3, indicator- 1% starch solution. Fill the reagent bottle with water sample**

completely then the bottle is stopped well and air bubble is removed if present. Then 1 ml of Winkler's A is added with pipette the bottle is well stopped and well shaken then 1ml of Winkler's B is added then bottle is shaken and kept aside to settle down the ppt. ppt is white in colour. Then add 1ml of concentrated HCL to reagent bottle to disappear the ppt. Now the solution turns yellow taken in conical flask and a few drops of 1% starch are added colour turns blue. This titrate against Na_2So_3 till solution become colourless. Then record the reading .

4. Chloride and salinity : chlorides are salts resulting from the combination of the gas chloride with a metal. Some common chlorides include sodium chloride and magnesium chloride. Chlorine alone as Cl2 is highly toxic and it is often used as a disinfectant. In combination with a metal such as sodium it becomes essential for life. Small amounts of chlorides are required for normal cell functions in plant and animal cell. 3.397g of silver nitrate first dissolve in 1L distilled water and then 3g of potassium chromate was dissolved in 100ml of distilled water. Take 10ml of water sample in a conical flask then add few drops of potassium chromate in it. Colour of sample changes to yellow. This solution is titrated against silver nitrate till yellow colour changes to brick

red. Burette readings are noted and experiment is repeated for 3 times so as to get accurate reading.

5. **Total Hardness : hardness of water can be defined as a soap destroying power of water. It is temporary when there is presence of calcium bicarbonate and magnesium bicarbonate and permanent when it is containing calcium sulphate chlorides and nitrates. Take 50ml of water sample in a conical flask and add 1ml of ammonia buffer and a pinch of NaCN inhibitor then add a pinch of Eriochrome black T titrate the solution against 0.01 N EDTA solution. End point is red to blue.**

6. **Chemical oxygen demand : COD is the amount of dissolved oxygen that must be present in water to oxidize chemical organic materials, like petroleum. COD is used to gauge the short-term impact wastewater effluents will have on the oxygen of receiving waters.**

   Requirements are burette, pipette, conical flask and chemicals like H_2So_4 and potassium iodide (10%). Take 50ml of water sample in 250ml conical flask and 50ml of distilled water in another flask to run the blank. Add 5ml of $KMno_4$ solution to the both and heat

them on a water bath as boiling point for one hour and then cool to the room temperature add 5ml of KI in both the flask followed by 10ml of 25% v/v H_2So_4. Titrate both samples with 0.1N sodium thiosulphate solution using starch as an indicator. The blue colour produced by starch would disappear sharply. Note the readings for sample.

7. **Alkalinity : alkalinity is water's capacity to resist acidic changes pH, essentially alkalinity is water's ability to neutralize acid. This ability is referred to as a buffering capacity. Requirements are burette, pipette, conical flask and phenolphthalein indictor. Take 50ml of water sample in a conical flask add 2-3 drops of phenolphthalein indicator in it to develop pink colour it indicates absence of free carbon dioxide and alkalinity due to Co_3 and OH. Titrate the sample against 0.02N of H_2So_4. End point is pink to colourless and record the readings.**

4. RESULT AND DISCUSSION :

1. Temperature :

Temperature is an important parameter which helps in governing different physical, chemical and biological properties of an aquatic environment. In the present study the Atmospheric as well as water temperature were recorded at MIDC area of Latur.

2. pH :

pH is the negative logarithm of the hydrogen ion concentration. pH change is accompanied by changes in the physico-chemical aspects of the aquatic medium. pH is also an important parameter for determining the acid base balance of the river water. An adverse concentration of hydrogen ion is difficult to treat by biological means. pH range between 7 to 8 has been indicated good for fish culture (Jhingran, 1977). In the present study, pH ranges between 7 to 8 . Comparatively the pH value of sample is suitable for fish culture taken from the MIDC area of Latur. (Table no. 1 with the permissible limits of WHO and ISI

and relevance).

3. Dissolved Oxygen :

Dissolved oxygen (DO) is not only an important for indicator of pollution (NEERI, 1988) but it also indicates the physical, chemical, and biological activities of water body. In the present study the value of dissolved oxygen is 13.02 mg/lit at NTP generally the high values are recorded in winter and low values are recorded in summer. (The data is tabulated in table no. 1 with the permissible limits of WHO and ISI and relevance).

4. **Chloride :**

It is measured by titrating a known volume of sample with standardized silver nitrate solution using potassium chromate solution in the water in alcohol as indicator. The latter indicator is an adsorption indicator while the former makes a red coloured compound with silver as soon as the chlorides are precipitated from solution. Increasing concentration of chloride in fresh water bodies acts as an indicator of pollution. The mean values of chloride is found to be in between 600 mg/lit to 866.2 mg/lit in the pond water sample. The high value of chloride is due to the pollution of pond water as well as water sample from

chloride rich effluent. The data tabulated in table no.1 with the permissible limits of WHO and ISI and relevance. In the present sample the chloride value is above the permissible limits of WHO and ISI.

5. **Salinity :**

The mean value of salinity recorded is 1377.16 mg/lit . the high value of salinity is recorded from the pond water sample. The high value of salinity level can make water unfit to use for any purpose and even low can create health problems for individuals who may suffer from high blood pressure. The high value of salinity is recorded at MIDC area pond and this water is not able to use and the value recorded is above the permissible limit of WHO and ISI. (The data is tabulated in table no. 1 with the permissible limits of WHO and ISI relevance).

6. **Total hardness :**

The mean value of hardness of water sample is 393.2 mg/lit . total hardness, calcium and magnesium above limits causes encrustation in water supply structure and adverse effect on domestic use. (Ramteke etal 1988) . High value of hardness is

commonly defined as the sum of the polyvalent cat ions dissolved in water. The most common cations are calcium and magnesium, although iron and manganese may contribute. The data tabulated in table is with the permissible limits of WHO and ISI relevance . The value recorded of the sample is below the permissible limit of WHO and ISI.

7. **Chemical Oxygen Demand :**

COD is another measure of organic material contamination in water specified in mg/l. COD is the amount of dissolved oxygen required to cause chemical oxidation of the organic material in water. Both COD and BOD are key indicators of the environmental health of a surface water supply. They are commonly used in waste water treatment but rarely in general water treatment. Capacity of water to consume oxygen during the decomposition of organic matter. COD helps to indicate the pollution status of water body in study period the maximum values ranged between 32 to 97.6 mg/l . The values of COD were below the permissible limits given by WHO and ISI.

8. Alkalinity :

It is composed primarily of carbonate and bicarbonate .

Alkalinity acts as a stabilizer for pH . Alkalinity , pH and hardness affect the toxicity of many substances in the water. Alkalinity in boiler water essentially results from the presence of the hydroxyl and carbonate ions. Hydroxyl alkalinity in boiler water is necessary to protect the boiler against corrosion. The alkalinity value provide guidance in applying proper doses of chemicals in water and wastewater treatment process. High alkalinity values are indicative of the eutrophic nature of the water body. In study period the maximum values ranges between 24 to 60 mg/l. The data is tabulated in table with the permissible limits and relevance

Parameters	Sample reading	Permissible limit by ISI/WHO	Relevance
Water temp.	28° C	--	--
pH	7	6.5 -8.5	Potable
Oxygen	3.02 mg/lit	6 mg/lit	Potable
Carbon Dioxide	30 mg/lit	--	--
Chloride	600 mg/lit	250 mg/lit desirable	Potable may be extended up to 1000
Salinity	1377.16 mg/lit	--	--
Hardness	393.2 mg/lit	600 mg/lit	Potable
Chemical oxygen demand (COD)	46 mg/lit	250 mg/lit	Potable
Alkalinity	50 mg/lit	--	--

5. CONCLUSION :

The present study was undertaken with an aim to analyse certain physico-chemical parameter in the pond water sample in Latur District. The pond water sample were analysed to find out the effect of industrial effluent, other pollution load or domestic activities on ground water quality. It is found that ground water is contaminated due to effluent percolation. Chloride and salinity in this region are well above Indian standard specification for drinking given by WHO and ISI. It may be due to addition of industrial effluent and other pollution load on the ground water. So it is the duty of every citizen to take the care of our ecosystem and should avoid the pollution which is dangerous for everyone.

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