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PHYSICO-CHEMICAL ANALYSIS OF LAKE WATER SAMPLE FROM UMRED REGION, NAGPUR DISTRICT, MAHARASHTRA

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Abstract: The present study evaluates the physical chemical characteristics of a lake water sample from sides in umred region in Nagpur district Maharashtra to assess its quality and suitability for domestic, agriculture and ecological purposes in India standard analytical methods are used to study. to determine parameter such as pH ,temperature ,turbidity ,total dissolved solid (TDS)dissolved oxygen (DO), electrical conductivity (EC),biochemical oxygen demand(BDO), chemical oxygen demand(CDO), total hardness ,alkalinity ,chloride, nitrates ,phosphate and sulphate the obtained value wear compared to WHO and BIS guidelines to evaluate water quality

Keywords:-physicochemical parameters, Lake water quality ,pH ,dissolve oxygen ,total dissolve solid

Introduction: Water chemical formula (H2O) is transparent fluid which forms the words streams ,lakes ,oceans and rains ,and is the major constituent of the fluids of organisms A transparent odorless tasteless, liquid compound of hydrogen and oxygen H2O freezing at 32 °F or 0°Cand boiling at 212°For 100°C, that in a more or less impure state constituents rain oceans lakes rivers etc heat contains 11.188% hydrogen and 88.812%oxygen, by weight life is believed to have originated in the aqueous solutions, of the world's oceans ,and living organisms depend on aqueous solutions ,such as blood and digestive juices ,for biological process in small quantities water appears colourless, but water actually has an intrinsic blue colour caused by slide absorption of light at a red wavelength. If there was no water there would be no life on earth. It is most important that the water which people drink and use for other purposes is clean

water .Water makes up a majority of your body weight and is involved in many important functions ,including :

- Flushing out waste from your body
- Regulating body temperature
- Helping your brain functions

Disease -causing germs and chemicals can find their way into water supplies . When this happens the water becomes polluted or contaminated and when people drink it or some in contact with it in other ways they can become very sick. Water that is safe for drinking is called **portable water.** If the water is not safe to drink it is treated. All the action taken to make sure that drinking water is portable is called **water treatment**.

There are two main sources of water :- surface water and groundwater- surfacewater is found in lakes ,rivers ,and reservoirs groundwater lies under the surface of the land ,where it travels through and fields opening in the rocks. the rocks that store and transmit groundwater are called aquifers

Physical and aesthetic aspects

The chemical and physical quality of water may affect its acceptability to consumers, turbidity colour taste and order weather of natural or other origin affect consumer perceptions and behaviour. Also guidelines for drinking water quality are based on the based available public health advice there is no guarantee that consumers will be satisfied or dissatisfied by water supplies that made or fail to meet those guidelines

Turbidity in excess of 5 NTU(5JTU) may be noticeable and consequently objectionable to consumers. Colour in drinking water may be due to the presence of organic matter such as human substances, metals such as iron and manganese or highly coloured industrial wastes .

Chemical aspects

In rural areas of developing countries, the great majority of health - related water quality problems are the result of bacteriological or other biological contamination. A significant number of very serious problems may occur as a result of the chemical contamination of water resources. More health effects of chemical contamination of small community supplies include mithyamethaemoglobinaemia infants due to high levels of nitrate ,and toxicosisdue to accidental and other discharges of solvents and heavy metals from mining activities. If a certain chemical

contaminants are of special local significance, the level should be measured and the result evaluated in the light of the guideline values and others recommendation made in volume(1) drinking water quality standard describe the quality parameters set for drinking water .despite the truth that every human on his planet need drinking water to survive and that water may contain many harmful constituents, there are no universally recognised and accepted international standards for drinking water.(1) Mini developed countries specify standards to be applied in their own country in Europe these includes the European Drinking Water Directive(2) and in the United States the environmental protection Agency(EPA) established standard as a required by the same drinking water at for countries without a leggies relative or administrative framework for search standards the World health organisation publishes guidelines on the standards that should be achieved.(3) China adopted its own drinking water standards GB 3838-2022(Type II) enacted by ministry of environmental protection in 2002.(4) We are drinking water quality standards do exist most are expressed as guidelines for targets rather than requirements and very few water standards have any legal basis or or subjected to enforcement (5) to expressions are the European drinking water directive and the shape drinking water act in the United States which require legal compliance with specific standards.

Review of Literature

A number of water quality parameters are measured to determine water quality days parameters include physical properties like pH colour turbidity suspended solids temperature conductivity order etc chemical properties like COD bod total nitrogen total Phosphorus total pesticides etc.

pH Value : pH is basically a measure of the acidity or basicity of an aqueous solution having pH less equal to 7. Primary pH standard values are found out by using a concentration scale with transparency simply by measuring the potential difference between a standard electrode such as the silver chloride electrode and hydrogen electrode measurement of PH for aqueous solution can be done with a ph meter or glass electrode. Mathematically it can be said that pH is the negative loggery them of the activity of the hydrogen ion.

Importance of PH

The solubility (amount that can be dissolved in the water) and political availability (amount that can be utilised by aquatic life) of chemical constituents search as nutrients (Phosphorus ,nitrogen ,and carbon)and heavy metals (lead ,copper, cadmium, etc) can be determined by pH

of water. Extremely low and high pH can be significant for the use of water. High pH causes a bitter taste ,water pipes and water using applications become encrusted with deposits, and it also depresses the effectiveness of the disinfection of chlorine ,thereby generating the need for additional chlorine when pH is a bit high. Low - pH water might corrode or dissolve metals and other substances.

Electrical conductivity (EC): the major of the ability of an electrolyte solution to conduct electricity is called its conductivity conductivity is also referred to as a specific conductance the SI unit of conductivity is Siemens per meter (S/m). In many industrial and environmental applications conductivity measurements are used as an expensive, reliable and passed way of getting the measure of the ionic content in a solution. Conductivity is directly linked to the total dissolved solid (TDS).

Total Dissolved solids : Amazon of the combined content of all inorganic and organic substances contained in a liquid in molecular ionized or micro-granular suspended form is called Total Dissolved solid (TDS). The solid should be small enough to survive filtration through the filter which has two micrometer (nominal size or smaller) pores. The study of water quality for streams, rivers and lakes is the most important application of TDS. TDS is not a primary pollutant but TDS is used as an indication of aesthetic characteristics of drinking water and as an indicator of the presence of a broad array of chemical contaminants. Agriculture all and presidential turn off our primary sources for TDS in receiving waters and so are leaching of soil contamination and point sources source Water pollution pictures from industrial plants .Calcium ,phosphate ,nitrate ,sodium ,potassium ,sulphate and chloride compressive few of the important chemical constituents.

Significance of total dissolved solids in water:

The total dissolved solids concentration of a good and palatable drinking water should not be more than 500 mg/ L according to general belief. However higher concentration might be consumed without harmful physiological effects and might be even more beneficial indeed this limit was set on the basis of test threshold. Wildlife and livestock might get injured by drinking water that contains total dissolved solids exceeding these limits. Continuous use of such a water causes weakness scoring, reduced production bone degradation and death. However temperately animals can drink high saline water ,but that will be harmful if used continuously.

Total hardness:-hardness is defined as a soap consuming capacity of a water it prevents leathering of soap .Soaps are generally sodium salt of long chain fatty acids like stearic acid that is the sodium stearate (C17H35COO-Na+). Folic acid or palmitic acid are soluble in ordinary water. When soap sodium salt of stearic acid is added to a water in the absence of insoluble calcium and magnesium salts CA + 2 and MG + 2 irons that is the soft water it dissolved and forms leathery and soap is therefore not vested but when soap is added to hard water it reacts with the calcium and magnesium ions present in hard water these forms and insoluble calcium or magnesium period and credit precipitated wish does not have any detergent s and values.

Alkalinity:- the alkalinity of natural waters is due to the salts of weak acids. Water becomes alkaline due to the presence of carbonates by carbonates and hydroxide.
Hydroxides only, carbonates only, hydroxide and carbonates together, carbonates and bicarbonates. Caustic treatment is a type of boiler corrosion caused by using highly alkaline water in the boiler.

Chloride Content:-naturally to rights are found as a salts such as sodium chloride (NaCl), potassium chloride (KCl), and calcium chloride (Cacl2) chloride are leached from different rocks into soil and water due to weathering. Chloride levels in UN polluted waters are generally below 10 mg per litre and sometimes even below 1m super litre chloride in water may be significantly increased by the treatment process in which chlorine or chloride is used.
Manganese content in water
Magnus can be termed as a metal which is one of the most abundant on the earth; it is not found in its natural form; it is actually a component of more than 100 minerals manganese can exist in 11 oxidative states.

Objectives
Hindi Swarg samples of water well collected from three different Lake water sources from immigration for the course of time various parameters regarding the water quality wear analyzed.

Objective of worke carry out in following steps

1.Collecting the water sample from different Lake water sources from umred region.

2.The parameters which were analysed are follows:

- Determination of PH
- Determination of electrical conductivity
- Determination of total dissolved solids
- Determination of total hardness
- Determination of calcium
- Determination of magnesium
- Determination of alkalinity
- Determination of dissolved oxygen
- Determination of chloride.

Experimental section

(A) **Collection of Lake water samples**

Umred is class b kaun se located 45 km south east of the district headquarter that is Nagpur umred is taluka headquarter it is situated on a latitude of the 200-50`hand longitude of 790-19. Umred region has three lakes namelypandhrabodi Lake ,green lake ,and Gandhi Sagar lake .this lake water is used for different purposes for this reason.

Sr.no.	Information	Sample -1 information	Sample -2 information	Sample -3 information
1	Date of collection	03/11/2025	03/11/2025	03/11/2025
2	Sample location	Pandharabodi Lake	Green Lake	Gandhisagar lake
3	Type of source	Lake	Lake	Lake
4	Address	At.postGodhani Ta.UmredDt.N	Manglawaripet hUmred	KawrapethUmr ed

		agpur		
5	Appearance	Clear	Clear	Clear
6	Colour	Colourless	Greenish	Greenish
7	Odour	Odourless	Odourless	Odourless

Details of samples location address

Methodology

Lake Water samples were collected from three different lakes .(pandhrabodiLake ,green lake and Gandhi Sagar lake) in umred region . During the study period using clean pre wash polythene bottles sampling was carried out at a depth of about 30 to 50 cm below the water surface avoid surface contamination prior to collection bottles where is with Lake water at the sampling side the collected samples where properly label and transported to the laboratory in and ice box for analysis. Physico chemical parameter such as temperature pH, turbidity ,total dissolve solid (TDS) electrical conductivity ,dissol oxygen (DO)biochemical oxygen demand(BOD), chemical oxygen demand (COD),total hardness ,alkalinity ,chloride ,sulphate, nitrates and photsphets were analyzed using the standard procedure recommended by and BIS all analysis where carried out in a triplicate to ensure accuracy and results where compared with the limits prescribed for surface water quality.

Physicochemical parameters of three water sample which was collected from different lake of Umred region . The sumrised report of all three samples are given below:

Sr.no.	Parameters	Sample -1	Sample -2	Sample -3
1	Temperature (°C)	29	30	30
2	pH	6.348	7.355	7.127

3	Electrical Conductivity (mS/cm)	0.508	1.04	0.724
4	Total dissolved solid (mg/L)	254	520	362
5	Total hardness (mg/L)	358	650	424
6	Calcium (mg/L)	65	98	76
7	Magnesium (mg/L)	36	67	42
8	• Alkalinity(mg/L)	380	650	530
9	Dissolved Oxygen (mg/L)	6.8	6.1	5.5
10	Chloride (mg/L)	145	175	154

- Temperature is an important physical parameter that is directly related to chemical reaction in aquatic ecosystems. In the present investigation water temperature is changing between 29 to 30° C.
- pH of all the samples was found to be within the range of 6.5 to 8.5 sample 1 is acidic and sample 2 and 3 where alkaline the pH was very rarely found to be around 7.0 the pH limit for drinking water is 7.5 to 9.0 maturity of the samples most of the time so less than 7.5 pH.

- Electrical conductivity of water is determined by the concentration of ions in it the more the concentration of ions in the sample the more is its conductivity hi
- gher AC is the reason behind the problem of scale formation in the study area electrical conductivity of a sample is high.
- EC off water he is also an indirect measure of the total dissolved solids in the same sample linear relationship was found to exist between electrical conductivity and total dissolved solids TDS TDS level are also found to be permiscible limits greenish colour of sample 2 and 3 is due to having some organic impurity and having biological impurities also.
- Hardness in water results in excessive consumption of soap and wastage of fuel total hardness of all the samples was found to be high for sample to and for remaining to sample it is in moderate.
- Calcium is abundant in groundwater because of the presence of its a minerals in the earth crust magnesium is relatively less abundant in groundwater but is extensively found in sea water both sea and magnesium causes hardness to water average calcium and magnesium concentration in most cases are found to be moderately limited. Alkalinity is the capacity of water to neutralize acid; it is a measure of biocarbonates, carbonates and hydroxide present in water. Total alkalinity of all the samples was found to be slightly high for sample 2 and 3 then permiscible values.
- Chloride is one of the major inorganic and ions found in a groundwater but originate in a groundwater from both the natural and anthropogenic sources high chloride contain indicates heavy pollution chloride and drinking water import characteristic taste to eat and average concentration of all the samples was found in the permissible limit.

Conclusion

From the above results and discussion it is found that out of three samples from three different lakes in umred reason most of the parameter of water sample one is within permeable limit for water sample to most of the parameter is not in permissible limit sample 2 and 3 shows the presence of organic matter in the form of waste. Water sample 1 can be used for drinking

purposes on slightly treatment but water sample number 2 and 3 is not suitable to use for drinking.

Hence, the required properties of all the three samples collected from umred reasons were analysed and compared and appropriate measures were suggested wherever required.

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