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STUDIES ON PHYSICOCHEMICAL PARAMETERS TO ASSESS THE GROUND WATER QUALITY FOR DRINKING PURPOSE IN BALLIA DISTRICT

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Abstract

No water, no life, no blue, no green i.e. without water life is impossible. The quality of water change day by day depending upon sources (1). 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**(2).**

Natural water contaminates due to weathering of rocks and leaching of soils, mining processing etc **(3).** 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 also suffers from varied of water borne diseases**(4a-b,5).**

These could have serious heal The availability of good quality 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 color, temperature, acidity, hardness, pH, electrical conductivity (EC) ,total dissolved (solid) ,total dissolved oxygen(DO) ,total hardness (TH) ,calciumCa^{2+}, magneciumMg^{2+},chloride Cl^- ,SO_4^{2-}, chemical oxygen demand (COD), were analyzed for testing of water quality .and compared with maximum permissible limits .

The drinking water recommended by some water analysis reports with physic-chemical parameters have been given for the exploring parameter study. Guidelines of different physic-chemical parameters also have been given for comparing the value of real water sample.

Keyword: Water, Physico - chemical Parameters, TDS,TH, OD, COD, EC.

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Introduction

Water is the world's most natural resource and without it there would be no life on earth. Nature limits our available supply of water **(6)** .Virtually all of human uses require fresh water. 97% of the Earth's water is salt and only 2.5% is fresh water of which over two thirds is frozen in glaciers and polar ice caps. Every organism is made up of water. Water is pumped throughout our bodies to support our organs. Plants and animals cannot exist without it.

Two-thirds of the human body is water. Our bodies are really sacks of water walking around on dry land. Groundwater is fresh water (from rain or melting ice and snow) that soaks into the soil and is stored in the tiny spaces (pores) between rocks and particles of soil. Groundwater accounts for nearly 95 percent of the nation's fresh water resources. It can stay underground for hundreds of thousands of years, or it can come to the surface and help Fill Rivers, streams, lakes, ponds, and wetlands. Groundwater can also come to the surface as a spring or be pumped from a well. Both of these are common ways we get groundwater to drink. About 50 percent of our municipal, domestic, and agricultural water supply is groundwater. Unfortunately, groundwater also becomes contaminated easily, and the more frequently human beings interact with sources of groundwater **Camels and people** organism People can survive for only three or four days without drinking. Camels have found a way around the problem.

The humps on their backs are made of tissues that can store up water. This allows them to survive for long periods without eating or drinking – as much as eight to ten days. Handy when they're crossing the arid desert.**Surviving in areas without water** Some plants and animals can survive hugely long periods of drought because they are so good at keeping moist inside. The thick, leathery exterior of a cactus has hardly any pores. It is almost impossible for the moisture inside it to escape. Lungfish burrow into the river bed just before the river dries up.

They can survive there because the mud stays moist and cool for a long time. The present paper is an attempt to examine the possible impact of the ground water quality of some water sample collected from different locations of Ballia district thus in this paper the physico-chemical parameters of ground water like odour , colour, pH, electrical conductivity (EC),total dissolved solid (TDS), dissolved oxygen (DO),total hardnes(TH),calcium(`Ca^{2+}),magnesium (Mg^{2+} ,chloride (Cl^{-}), sulphate SO_4^{2-} were determined. The analysed data were compared with WHO and BIS **(5,7a-c,8).**

Materials and methods

Five numbers of ground water samples were collected shallow hand pumps. The locations of sampling points are shown in table 1. Prior to sampling, the hand pumps flushed with 40 to 50 Liters of water. The samples were collected in plastic sterilized bottles without any air bubbles for analysis. Before filling the samples, bottles were rinsed for three times with water.

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The samples were collected during in month of October in Ballia. The complete process of methods for examination of water. sample preparation and analysis of physico-chemical properties were adopted based on standard procedures **(9)** .

Table 1: Different analytical water quality parameters with their Physical and chemical parameters exhibit considerable variations sample to sample. All the measurements were carried out at the vicinity 35^0C .

Table-1

S.No.	Area	Colour	Odour
1.	Ballia	Colourless	Odourless
2.	Reoti	Colourless	Odourless
3.	Sikandarpur	Colourless	Odourless
4.	Rasara	Colourless	Odourless
5.	suremanpur	Colourless	Odourless

Result and discussion

The observation of analysis water samples are summarized in table no. 1 and table no. 2 and compared to table 3.

Table-2

S.No.	Parameter	S1	S2	S3	S4	S5
1.	Temperature	31	30	30	32	31
2.	pH	7.5	7.4	8.2	7.7	8.1
3.	TDS mg/l	175	232	285	271	246
4.	EC moh/cm	693	916	1118	1059	954
5.	Ca^{2+} mg/l	116	112	210	165	156
6.	Mg^{2+} mg/l	52	51	121	89	85
7.	TH mg/l	168	163	331	254	241
8.	Cl^- mg/l	123	144	223	220	176
9.	SO_4^{2-} mg/l	40	58	89	88	78
10.	DO mg/l	7.8	5.2	6.9	6.0	6.3
11.	COD mg/l	9.8	15	12	14	15

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Table-3 Different analytical water quality parameters with analytical technique and guideline values as per WHO,BIS and EPA.

S.No.	Parameter	Technique used	WHO Standred	BIS Indian Standred	EPA guideline
1.	Odour	Physiological sense	Acceptable	Acceptable	-
2.	Colour	Visible/Colour kit	-	5 Hazen	-
3.	Temperature(^{0}C)	Thermometer	-	-	-
4.	EC	Conductivity meter/Water analysis kit	-	-	2500 us/cm
5.	pH	pH meter	6.5-9.5	6.5-9.5	6.5-9.5
6.	DO	Redox titration	-	-	-
7.	TH	Complexometric titration	200 ppm	300 ppm	<200 ppm
8.	COD	COD disaster	10	-	40
9.	Chloride(Cl^-)	Argentometric titration	250 ppm	250 ppm	250 ppm
10.	Magnesium(Mg^2)	Complexometric titration	150 ppm	30 ppm	-

Total dissolved solid

Total dissolved solid (TDS) comprises magnesium, calcium ,potassium, sodium, bicarbonates, chloride and sulphate and small amounts of organic matter that are dissolved in water . TDS indicate salinity of groundwater. According to Environmental Protection Agency (PEA), World Health organization (WHO) and bureaw of Indian standard (BIS): guidelines the limiting value of TDS for drinking water is 200 mg/l . Present investigation revealed the good value of TDS 175-285 mg/l there value is acceptable for domestic use and agricultural purposes.

Total hardness (TH)

The results (Table-2) shows that the concentration of calcium is double than that of magnesium. Each of the sample showed a high value of calcium hardness 112 mg/l to 210 mg/l, magnesium hardness range from 51 mg/l to 121 mg/l

Dissolved Oxygen (DO)

Dissolved Oxygen is one of the most important factor in any living ecosystem. The main sources of dissolved oxygen are atmosphere and photosynthetic process of producer organisms. 'The amount of' dissolved oxygen in water depends on area exposed, temperature etc. Dissolved oxygen is an important

factor in assessing water quality and it add taste in drinking water. In this study dissolved oxygen content varied in a limited range of 5.2 to 7.8.

pH

pH is classed as one of the most important water quality parameters. Measurement of pH relates to the acidity or alkalinity of the water. A sample is considered to be acidic if the pH is below 7.0. Meanwhile, it is alkaline if the pH is higher than 7.0. Acidic water can lead to corrosion of metal pipes and plumping system. Meanwhile, alkaline water shows disinfection in water. The normal drinking water pH range mentioned in WHO and BIS guidelines is between 6.5 and 8.5 (Table 1).pH of water at all the study sites showed a narrow range of variation 7.4-8.2 (table- 2) is in guideline limit.

Chemical Oxygen Demand (COD)

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. COD is a key indicator of the environmental health of a Surface water supply e.g. Lakes and river makingCOD IS the useful measure of water quality. According to table 2 and 3 it is found in permissible limit i.e 9.8 -15.

Electrical Conductivity (EC)

Conductivity shows a significant correlation to various parameters such as temperature, pH value, alkalinity, total hardness, calcium, total solids, total dissolved solids, chemical oxygen demand and chloride concentration of water. The quality ground water for drinking can be checked effectively by controlling the conductivity of water. The analyzed water sample results ranging from 693 -1118 moh/cm is in permissible range.

Conclusion

In conclusions, the physico-chemical analysis was carried out to assess the water quality in Ballia District. By observing the result, it can be concluded that the parameters which were taken for study the water quality are showing that, all the pH values above 7.4 and The maximum pH was recorded at 8.2 indicating that the water is in WHO permissible limits. EC values were observed from 693 to1118.Chloride concentration was found in the range of 123 mg/l to 223 mg/l. TDS and TH is in between 176 to285 and 163 to 331,and DO and COD 5.2 to 7.8 and 9.8 to 15. All the physio-chemical parameter WHO ,BIS and EPA guidelines permissible limit

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