

The Case Study of Drinking Water of the Metro City Jaipur

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Abstract:

In this study, the drinking water is collected from different locations of metro city Jaipur, capital of Rajasthan. The study helps to analyzed to assess the physiochemical parameters and the suitability of water for the drinking purpose. The Physiochemical parameters are such as Alkalinity, Hardness, Iron, pH, Calcium, Nitrates, Magnesium, Sulphates, Chloride, and the Electrical Conductivity present in the water, Total Solids (TS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD) and Bio-Chemical Oxygen Demand (BOD) are the parameters determined by this study. The obtained values were compared with the World Health Organization (WHO) water quality standards. By this results and observation we know that the drinking water in Jaipur of some of the areas was polluted and not suitable for drinking purpose. The water should be treated before taking in use for drinking purpose.

Keywords

Physiochemical parameters, Alkalinity, pH value, Electrical conductivity, Nitrates, Magnesium, Chloride, Total Solids (TS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Bio-chemical Oxygen Demand (BOD), World Health Organization (WHO).

1. Introduction

Water is one of the most important constituents for the life or for the healthy living of human society. Drinking water is the basic need for the human beings. In India 50% of population is live in rural areas and depends on ground water for their drinking water requirements and purpose. In that case ground water is the ultimate and most suitable fresh water resource. The quality of water is described by their physiochemical and microbiological characteristics. The water quality monitoring has analysing of the large number of measured parameters.

In recent few years a simple and easier approach based on some statistical correlation, has been developed to analyze the physiochemical parameters in drinking water. The physio-chemical

analysis of drinking water samples was carried by many of the researchers using by the standard methods for analyzing the water quality.

In Jaipur the ground water level is very low and poor in quality. For checking the quality of water in different regions of Jaipur this study was done.

2. Material

The following material are used for performing the experiment.

Dry polythene water sample, PH meter, whatman filter paper number 42, conductivity meter, HCL sample, methyl orange and phenolphthalein indicators, knife for hardness, sulphates, chloride, nitrate calcium etc.

3. Methodology

3.1 pH

pH of water is a degree of quantity of hydrogen ions which are present in water. It determines the nature of water whether the water is acidic or alkalinity in nature. pH stands for ability of hydrogen. According to WHO the pH of the water is from 6.6 to 8.4.

For pH we have to take water sample and determine the water pH from pH meter and first neutralize the pH meter than test the sample and pH varies from 6.3 to 8.7.

3.2 Hardness

Hardness may be defined as the amount of dissolved calcium and magnesium in water sample. Hardness of the water may cause some disease like heart attack and kidney stones. From the sample testing hardness varies in between 400-600 mg/L. But according to WHO the maximum hardness of the water is 500 mg/L.

Hardness may be determined by the EDTA method. Take water sample and first boil it to remove temporary hardness than cool it than titrate it with EDTA method.

3.3 Alkalinity

High amount which is present in water may create the bitter taste to the water. Many types of the ions which create the alkalinity in the water like hydroxide, carbonates, bicarbonates and organic acids. Alkalinity may be created by the natural

process of the water. According to the WHO alkalinity range is up to 250 mg/L. when we carried the test than out of 10 sample 6 sample shows the high value of the alkalinity.

3.4 Dissolved Oxygen

Dissolved oxygen is the amount of oxygen gases (O₂) which is dissolved with in the water. Oxygen enters the water from the atmosphere by direct absorption, by way of speedy motion or as a waste made of plant. Dissolved oxygen tiers that drop underneath 5.0 mg/L motive pressure to aquatic lifestyles.

First take 50 ml water sample and add 3 drops of phenolphthalein indicator and titrate with .02N sulfuric acid to pH 8.3 and estimate alkalinity.

Total alkalinity (in mg/L) = $A \times N \times 50000 / V$

3.5 TDS & TSS

TDS stands for total dissolved solids and represents the full attention of dissolved substances in water. common inorganic salts that may be determined in water consist of calcium and sodium and magnesium which might be all cations.

TSS stands for the total suspended solids is the dry weight of suspended particles, that are not dissolved, in a pattern of water that may be trapped via a filter out that is analyzed using a filtration method.

Process is that take 20 ml water sample and filter it than filter paper will be placed in the oven for 110°C and take weight of that paper.

And for the TDS the burning of the water in the oven take weight of it for measuring total suspended solids which are present in the water.

TDS & TSS =

Weight of the solids * 1000 / volume of water sample

The range of the TDS is the 500 mg/L

3.6 Conductivity

Electrical conductivity is the measurement of the total salts which are soluble in the water. Presence of the higher value of the conductivity in the water is show the higher value of ionized ions.

Conductivity is measured by the conductivity meter. when we dip the rod of the conductivity meter than it show the reading of the conductivity.

Conductivity is measured in to two unit may be siemens per meter or ohm meter. According to WHO for distilled water have a conductivity range from 0.5 µs/cm to 3 µs/cm.

Resistivity = 1/conductivity

4. Experiential Result

4.1 Table No:-1

S.NO.	Sample Location	pH	Alkalinity (mg/L)	Hardness (mg/L)
1	Sitapura	8.8	491	650
2	Sanganer	7.2	214	700
3	Gopalpura	6.6	250	490
4	Ajmerigate	6.7	280	534
5	Mansarover	7.8	350	480
6	Vaishali	7.4	429	496
7	Sindhicamp	7.0	215	515
8	Hasanpura	6.5	315	470
9	Malpura	6.9	398	525
10	Galtaji	7.5	415	600

According to the who criteria the following quality of water can not exceed from these value :-

Table no:- 2

WHO	pH	Alkalinity	Hardness
Sample	6.6-8.4	250	500

Table no:- 3

S.No.	Sample Location	TS (Total Solids)	TDS	TSS	conductivity
1	Sitapura	422	395	27	2009
2	Sanganer	883	830	53	1804
3	Gopalpura	923	890	33	1200
4	Ajmerigate	800	760	40	1158
5	Mansarover	756	700	56	1550
6	Vaishali	1150	1102	48	1259
7	Sindhicamp	1050	1007	43	2109
8	Hasanpura	500	458	42	2019
9	Malpura	890	840	50	1998
10	Galtaji	980	950	30	1800

WHO	TS	TDS	Conductivity
Sample	-	500	1800

5.Conclusion

- 1.The quality of the drinking water should be as comparable to the standard data according to the WHO give the standard quality norms.
2. The quality of drinking water does not affect to the human being who drink the water.
3. pH of all the samples varies between the range.
4. Out of 10 samples 3 samples have the alkalinity is in between or equal to the range according to WHO i.e 250mg/L.
5. Out of 10 samples 4 have desired hardness which is less than 500mg/L.
6. Out of 10 samples 2 have desired TDS which varies according to the range of WHO.
7. Out of 10 samples 5 have the desire conductivity which is less than or equal to the range prescribed according to WHO.

6.References

1. Divya bharadwaj , neetu verma, analyzing impact of various parameters on water quality index, international journal of advanced research in computer science,8(5),may-june2017,2496-2498.
2. Narasimah, bujagendra raju, static analysis of drinking water quality and its impact on human health in chandragiri, dept. of chemical engg., nov.-dec.2011.
3. Nithya, chandramohan, correlation analysis of drinking water quality in and around perur block of combatore district, dept. of chemistry, oct.2010.