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# ASSESSMENT OF PHYSICO-CHEMICAL QUALITY OF MUNICIPAL WATER SAMPLES OF BHITARWAR, GWALIOR, M.P. (INDIA)

**[1]Savita Chauhan , [2]Naveen Kumar Singh & [3]Sandeep Gangrade**
[1]Research Satellite Center in Trace Elements for UNESCO, Jiwaji University Gwalior M.P. (India)
[2, 3] Chemical Laboratory, Malwa Institute of Technology &Management Gwalior, M.P.(India)
E-mail-naveenksinghchauhan@rediffmail.com

**Abstract**
*The natural quality of ground water tends to be degraded by human activities and geo environmental changes. Different parameters of water have been analyzed and assessed the suitability of drinking water in public hygiene scenario. Some parameters are prescribed by ISI and WHO while other are beyond the limits.*

***Key words: -*** *drinking water, water quality and human activities*

## Introduction

Ground water is a good source of fresh water. It is the important renewable resource having several inherent advantages over surface water. On average, the body of an adult human being contains 60% water. Most of the water in the human body is contained inside our cells. In fact, our billions of cells must have water to live. The total amount of water in our body is found in three main locations: within our cells (two-thirds of the water), in the space between our cells and in our blood (one-third of the water). For example, a 70-kg man is made up of about 42L of total water.

- 1L is the transcellular fluid (cerebrospinal fluid, ocular, pleural, peritoneal and synovial fluids)
- 10L is the interstitial fluid (including lymph), which is an aqueous medium surrounding cells. (1)
- 28 litres is intracellular water
- 14L is found in extracellular fluid of which
- 3L is blood plasma,

Actually, the amount of water a body contains varies according to certain contexts: The body of a newborn is composed of more water (75%) than that of an elderly person (50%). Also, the more muscular a body is, the more water it contains. Conversely, the more fat in the body, the less water the body contains – as body fat has little water.

Also, all our vital organs contain different amounts of water: the brain, the lungs, the heart, the liver and the kidneys contain a large quantity of water – between 65 to 85% depending on the organ (2), while bones contain less water (but still 31%!).For all those reasons, water is life**.** This potential source of water is economical essential component of our life, but it is getting deteriorated in major cities and urban centers due to pollution caused by population explosion, urbanization and industrialization. Chemical quality of the surface and ground water is of paramount importance in its utilization for municipal and industrial uses as it is a universal solvent which dissolves almost everything that comes in its contact. Since, water is valuable natural resource it

is important that its quality be maintained for being used by the people and the industry, and consideration should be given to recycle it to the maximum extent. Now day's underground water has become the main source of drinking water supply in almost all villages and town and in number of cities.

**Experiments**

For the analysis of physico-chemical parameters in water Four (04) samples were collected in wide –mouth plastic bottles. pH values of the ground water samples under investigation were measured using systronic pH meter ,type 361.The pH meter standardized by buffer solution of 4.0 pH and 9.2 pH .Total Alkality of the ground water samples were determined by titrating With N/50 $H_2SO_4$ using phenolphthalein and methyl orange as an indicator.

The total hardness of the water samples were determined by complexometric titration with EDTA using eriochrome black-T as an indicator. The calcium hardness of the water

Samples were determined by complexometric titration with EDTA using ammonium parpurate as an indicator. The estimation of chloride ions is generally determined by titrating the water sample against a standard solution of silver nitrate using potassium chromate as an indicator. Sodium and potassium were estimated using flame photometer (128) technique. $NO_3^{2-}$,$SO_4^{2-}$ were estimated using UV-visible spectrophotometer.

**Chemical parameters and their methods used**

| | |
|---|---|
| pH | H+ ion sensitive electrode methods. |
| Total Alkalinity | Phenolphthalein and Methyl Orange Indicator Methods |
| Total Hardness (T.H.) | E.D.T.A. Titrimetric method. |
| Calcium Hardness | E.D.T.A. Titrimetric method. |
| Sodium | Flame Photometric Method |
| Potassium | Flame Photometric Method |
| Chlorides | Argentometric method. |
| Sulphate | UV-visible spectrophotometer Methods |
| Nitrate | UV-visible spectrophotometer Methods |

**Result and discussion**

The pH of the water body indicates the degree of deterioration of wate**r** quality. The desirable pH range necessary for drinking water is from 7.0 to 8.5. The pH value of water sample in the study area ranged from 7.5 to 8.5. The desirable limit for total alkalinity is 200 mg/L. The value of ground water samples were varied from 160 mg/L to 175 mg/L. Hard water is not a health hazards. In fact the National Research Council (National Academy of Science) states that hard drinking water generally contributes a small amount toward. Total calcium and magnesium human dietary needs. They further state that in some instances, where dissolved calcium and

magnesium are very high, water could be a major contributor of calcium and magnesium to the diet. The desirable limit for Total hardness in drinking water according to I.S.I. is 300mg/L. Its values in Ground-water samples varied from 170 mg/L to 195 mg/L.WHO permissible limit of calcium in the ground water is 100 ppm. In the present investigation calcium content ranged from 55 mg/L to 70 mg/L.

Sodium is the primary cation in extracellular fluids in animals and humans. It is very importance for osmoregulation and fluid maintenance within the human body. Human body needs a small amount of sodium to help maintain normal blood pressure. The human body contains approximately 1.3 gm of Sodium. Water samples varied from 57.3 mg/L to 61.1 mg/L. Potassium is an important mineral to the body and plays role at both the cellular and electrical level. It is powerful element in improving health. Potassium values in water samples varied from 1.2 mg/L to 6.1 mg/L. The chloride is troublesome in irrigation water and harmful for aquatic life. Water containing 250 mg chloride per liter may have a detectable salty taste. The values of chloride in water samples were varied from 91.1 mg/L to 94.7 mg/L. Excessive concentrations of nitrate in drinking water may cause blue baby syndrome in small children. Nitrate is good for plant nutrient. Its values in ground water samples varied from 2.8 mg/L to 4.6 mg/L.

| **Parameter** | Sample Point-1 | Sample Point-2 | SamplePoint-3 | Sample Point-4 |
|---|---|---|---|---|
| **pH** | 8.3 | 7.5 | 8.5 | 7.9 |
| **T.A.** | 175 | 160 | 170 | 175 |
| **T.H.** | 195 | 170 | 180 | 175 |
| **$Ca^{H}$** | 55 | 70 | 70 | 65 |
| **$Na^{+}$** | 58.2 | 58.4 | 57.3 | 61.1 |
| **$K^{+}$** | 1.2 | 2.3 | 3.5 | 6.1 |
| **$Cl^{-}$** | 91.2 | 94.7 | 91.1 | 92.3 |
| **$SO_4^{2-}$** | 11.6 | 3.0 | 5.0 | 8.0 |
| **$NO_3^{2-}$** | 3.6 | 2.9 | 2.8 | 4.6 |

All the value are expressed in mg/L except pH

T.A. = total alkalinity, T.H. = total hardness, $Ca^{H}$=Calcium Hardness,

Sample Point-1 Bhitarwar Pani Ki Tanki,Sample Point-2 Dabra Road Bhitarwar,Sample Point-3 Gohinda Road,Sample Point-4 Narwar Road Bhitarwar

**Conclusion**

The above observations in the present study indicate higher values of some parameters of the samples. They minimize the suitability of these sources for drinking purposes without treatment. But, after the filtration and disinfection, naturally present impurities can be removed, which may enhance its suitability for drinking and domestic purposes.

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