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TOTAL HARDNESS CONTENT IN THE PAVAGADA TALUK OF TUMKUR DISTRICT

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ABSTRACT

Hardness of water was understood to be a measure of the capacity of the water for precipitation soap. Soap is precipitated chiefly by the calcium and magnesium ions commonly present in water but also may be precipitated by ions of other polyvalent metals such as aluminium, iron, manganese and zinc. Therefore, determination of total hardness water content present in 16 public bore wells in the Pavagada taluk of Tumkur district, Karnataka State, India have been recorded for their appropriate usage as water quality parameter**.** The results clearly reveal that The obtained values were well within the range of permissible limits (10 mg/L) as per the WHO specification and hence suitable for human consumptions. Out of 16 villages the maximum turbidity value of 570.00 mg/L was found at K. T. Halli.

KEYWORDS: Borewell water, physico-chemical parameters, total hardness.

INTRODUCTION

As we know water is essential system for the survival of any forms of the life on earth, rain water is naturally soft but once it falls on the ground and percolates through rocks it picks up

natural hardness minerals, namely calcium and magnesium. In this context, the determination of hardness in water, whether potable or domestic is of critical importance. Hard water causes scaling, which is the precipitation of minerals to form a deposit called lime scale. Scale can clog pipes and can decrease the life of toilet flushing units, as well as reducing detergent efficiency and thermal efficiency of air conditioners. [1] In industry water hardness contributes to scaling in boilers, cooling towers and other industrial equipment and water hardness is monitored constantly to avoid costly breakdowns. Additionally, these ions along with alkaline ions, are the most important factor in cardiovascular diseases and can potentially affect the health of both humans and animals. [2] And according to a range of studies, from a health point of view, calcium and magnesium are 40–80 mg/L and 20–30 mg/L, respectively, with a total water hardness of 2–4 mmol/L. [3]

Thus, on the light of above, the assessment of ground water quality and its suitability for drinking is the main aim of the Present work which includes the determination of total hardness of water samples were collected from 16 public bore wells villages in the Pavagada taluk of Tumkur district, Karnataka State, in India and comparing the results against drinking water quality standards laid down by world Health organization (W. H. O) and Indian council of medical research (I. C. M. R).

MATERIALS AND METHODS

Total Hardness of water was determined titrimetrically using ethyl diamine tetra acetic acid (EDTA) method. To 50 ml sample taken in a conical flask 1 ml of ammonia buffer and pinch of Erichrome Block-T indicator was added and titrated against (EDTA) at the end point color changes from purple to blue.

STUDY AREA

Ground water samples were collected from 16 public bore wells villages in the Pavagada taluk of Tumkur district, Karnataka State, in India. Pavagada taluk was 170 km from the capital city of Karnataka. About 15 samples from Pavagada Taluk were selected randomly band named as PS1-PS15. Collected samples were analyzed for total hardness content and compared with the permissible limits classified using Indian standards ICMR and WHO.

The samples were collected once in a month using thoroughly washed bottles (the Pyrex glass 250 ml reagent bottles with laboclen liquity soap and two times with distilled water, and then kept in BOD incubator for drying. Before collection of samples, the bottles were rinsed

thoroughly with sample water for getting accurate results) for the study of various physic-chemical parameters. All collections were made between 9.00 AM to 3.00 PM throughout the period of the study.

RESULT AND DISCUSSION

Hardness in water is defined as concentration of multivalent cations. Multivalent cations are greater than 1. They mainly have the charge of 2 and it refers to the total concentration of alkaline earth ions in water.[4, 5] These cations include Ca^{2+} and Mg^{2+}. These ions enter a water supply by leaching from minerals within an aquifer. Common calcium-containing minerals are calcite and gypsum. A common magnesium mineral is dolomite. Rainwater and distilled water are soft water, because they contain few ions.[6] However, as the concentrations of Ca^{2+} and Mg^{2+} are usually much greater than all other ions, it has generally been accepted that hardness can be equated to the sum of calcium and magnesium concentrations, determined by EDTA titrimetric method and expressed in mmol/L (ISO, 1984). [7] or as a $CaCO_3$ equivalent in mgL−1 (standard methods, 1998). [8]

In the present work the information with reference to significant Physico-chemical parameters of 16 different villages of Pavagada taluk's of Tumkur District of Karnataka State, India and their pre monsoon seasonal changes were studied for a period of two years and for convenient purpose, the average values of each parameter were recorded.

Total Hardness

The seasonal variations of total hardness for the two years period of 2009-11 of 16 different villages of Pavagada taluk of Tumkur District were depicted in Figurer 1. The seasonal variation during Pre monsoon season of 2009-10, the total hardness of Pavagada villages varied between 358.33 to 568.33 mg/L from Hosakote to Jajurayanahalli respectively. During the same season of 2010-11, the total hardness varied between 333.34 to 570.00 mg/L from Byadnur to K. T. Halli respectively.

In the present study the total hardness values were well within the permissible limits (600 mg/L)as per ICMR specification [9, 10] .

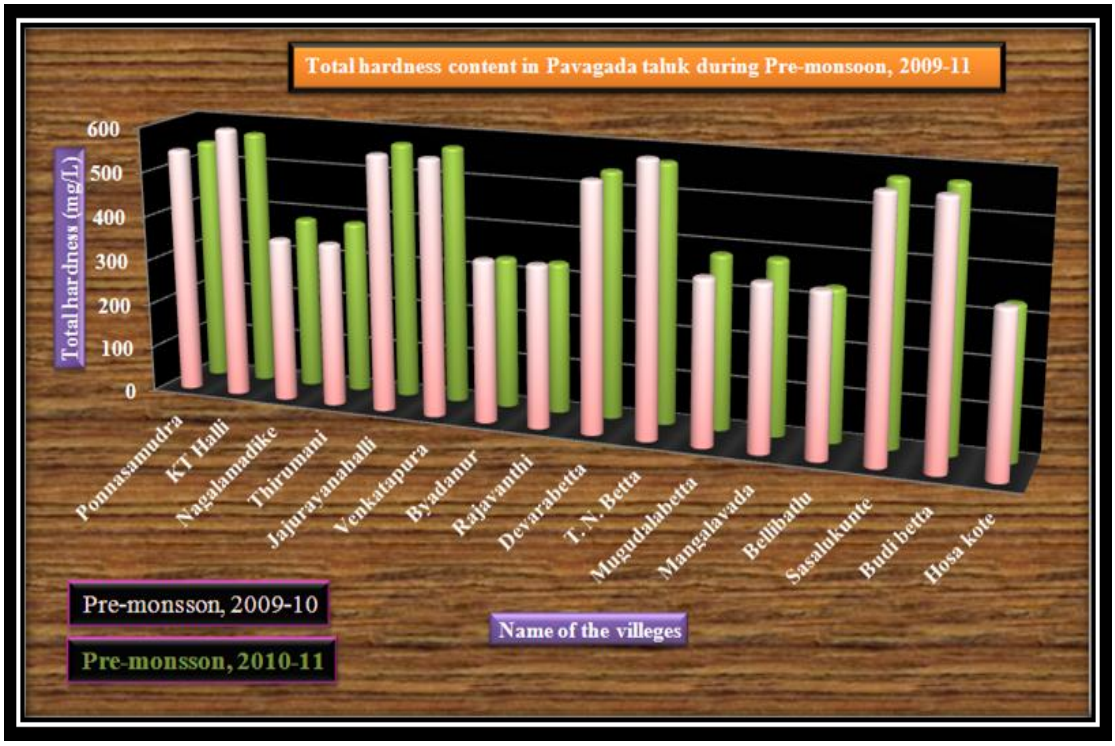

Figure 1: Total Hardness (mg/L) Content of Pavagada taluk for pre monsoon seasons during the year 2009-11.

CONCLUSION

The present study described the determination of the total hardness content in the Pavagada taluk of Tumkur district, Karnataka State, in India. The obtained results were clearly reveal that the minimum total hardness content of 333.34 mg/L was found at Byadnur and the maximum of 570.00 mg/L was found at K. T. Halli for the season of Pre-monsoon during the year of 2009-11were observed. Hence, the values were well within the range of permissible limits (600 mg/L) as per the ICMR specification and hence the water from this area was suitable for potable or domestic Consumptions purpose.

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