

Assessment of Ground Water Quality of Rural Parts of *Kapadwanj* and its Impact on Human Health

S.N. PANDYA*, A. K. RANA¹, D.K. BHOI and F.J. THAKOR

*Department of Chemistry, J & J College of Science, Nadiad - 387 001, India.

¹Department of Biology, Navjivan Science College, Dahod - 389 151, India.

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ABSTRACT

Assessment of ground water quality of rural parts of kapadwanj .Its physico-chemical analysis such as temperature , pH, biological oxygen demand, total dissolved solids, chloride, total alkalinity, calcium and magnesium hardness, sulphate, phosphate, nitrate of ground water was carried out from twenty sampling stations of rural parts of Kapadwanj region are during the February- 2012 and July - 2012 in order to assess water quality index.

Key words: Assessment, Physico-Chemical analysis, ground water, Kapadwanj Human health.

INTRODUCTION

Water is most essential for existence of life on earth and is a major component for all forms of lives, from micro-organism to man .Various physico-chemical parameters have a significant role in determining the potability of water . As Per World Health Organization, safe and wholesome drinking water is a basic need for human development ,health and well being, and it is an internationally accepted human right"Water intended for human consumption must be free from harmful micro organism, toxic substances, excessive amount of minerals and organic matter. Over burden of the population pressure,unplanned urbanization,unrestricted exploration and dumping of the polluted water at inappropriate place enhance the infiltration of harmful compounds to the ground water .In continuation of our earlier analysis on ground water¹⁻³, here we report the Physico-Chemical analysis of ground water of rural parts of *Kapadwanj* region. *Kapadwanj* is located in Kheda District of Gujarat. Ground water is generally used for Drinking and other domestic purposes in this area. The use of fertilizers and pesticides, manure, lime, septic tank, refuse dump, etc. are the main sources of ground water pollution⁴. In the absence of fresh water supply, people residing

in this area forced to use Bore wells water for their domestic and drinking consumption. In order to assess water quality index, we have carried out the Physico-Chemical analysis of ground water.

EXPERIMENTAL

Analysis of water samples was done as per standard procedure¹²³⁴ .In the present study ground water samples from twenty different areas located in and around *Kapadwanj* region were collected in brown glass bottles with necessary precautions.

Physico-chemical analysis

All the chemicals used were of AR grade. Double distilled water was used for the preparation of reagents and solutions. The major water quality parameters considered for the examination in this study are temperature, pH, biological oxygen demand (BOD) , total dissolved solid (T.D.S.), total alkalinity, calcium and magnesium hardness, sulphate, phosphate and nitrate contents⁶.

Temperature, pH, TDS, Phosphate, Nitrate values were measured by water analysis kit and manual methods. Calcium and Magnesium hardness of water was estimated by complexometric

titration methods⁷. Chloride contents were determined volumetrically by silver nitrate titrimetric method using potassium chromate as indicator and was calculated in terms of mg/L. Sulphate contents were determined by volumetric method⁷.

RESULTS AND DISCUSSION

The Physico-chemical data of the ground water samples collected in February-2012 and July-2012 are presented in Table-1 and Table-2 respectively. The results of the samples vary with different collecting places because of the different nature of soil contamination⁷. All metabolic and physiological activities and life processes of aquatic organisms are generally influenced by water temperature.

Temperature

Temperature is one of the most essential parameters in water. It has significant impact on growth and activity of ecological life and is greatly affects the solubility of oxygen in water. In the study temperature ranged from 27.1° C to 33.5° C.

pH

The pH value of drinking water is an important index of acidity, alkalinity and resulting value of the acidic-basic interaction of a number of its mineral and organic components. pH below 6.5 starts corrosion in pipes. Resulting in release of toxic metals. In the study pH ranged from 6.9 to 8.2. The tolerance pH limit is 6.5 to 8.5.

TDS

A large number of solids are found dissolved in natural water the common ones are carbonates, bicarbonates, chloride, sulphate, phosphate, iron, etc. In other words TDS is sum of the cations and anions concentration. A high contents of dissolve solids elevates the density of water, influences solubility of gases (like oxygen) reduces utility of water for drinking irrigation and industrial purpose. In the present study TDS ranged from 210 mg/L to 1300 mg/L. According to WHO⁹ and Indian standards TDS values should be less than 500 mg/L for drinking water. All the sample station except sample station no 2, 10, 12, 13, 15, 18 higher ranged as prescribed by WHO and Indian standard¹⁰⁻¹⁶.

BOD

BOD is the measurement of the amount of biologically oxidizable organic matter present in the waste. The increased levels of BOD indicated that the nature of chemical pollution. BOD of ground water is between 0.8 to 2.1.

Chlorides

Chlorides are common constituents of all natural water. Higher value of it impacts a salty taste of water, making it unacceptable for human consumption. The chlorides contents in the samples between 26.98 mg/L to 215.04 mg/L. Natural water contains low chloride ions. In the present study sample station No. 17 shows 215.04 mg/L chloride. Which is highest value in twenty different sampling station. As per ISI the desirable limit of chloride for drinking water is 250 mg/l and the permissible limit is 1000 mg/l.

Total Alkalinity

Total alkalinity is the quantitative capacity of an aqueous media to react with H⁺ ions. In the study total alkalinity ranged from 148 mg/L to 760 mg/L.

Calcium Hardness

The Calcium hardness ranged from 11.22 to 144.3 mg/L. The tolerance range for calcium hardness is 75 - 200 mg/L. Calcium contents in all samples collected fall within the limit prescribed. Calcium is needed for the body in small quantities, though water provides only a part of total requirements^{11, 18-20}.

Magnesium Hardness

Magnesium hardness ranged from 19.44 - 155.42 mg/L. The tolerance range for Magnesium is 50 - 100 mg/L.

Sulphate

Sulphate ranged from 27.14 mg/L to 384.30 mg/L. The tolerance range for sulphate is 200-400 mg/L. The high concentrations of sulphate may induce diarrhoea and intestinal disorders.

Phosphate

Phosphate in water occurs in the form of orthophosphate, polyphosphate and organic phosphate. In the present study phosphate ranged

from 6.0 mg/L to 42 mg/L. The evaluated value of phosphate in the present study are much higher than the prescribed values^{13,22-23}. The higher value of phosphate is mainly due to use of fertilizers and pesticides by the people residing in this area. If phosphate is consumed in excess, phosphine gas is produced in gastro-intestinal tract on reaction with gastric juice. This could even lead to the death of consumer.

Nitrate

In the study Nitrate ranged from 75 mg/L to 395.0 mg/L. The tolerance range for Nitrate 20-45 mg/L. Nitrate nitrogen is one of the major constituents of organisms along with carbon and hydrogen as amino acids, proteins and organic

compounds present in the bore wells water^{14,22-24}. In the present study nitrate nitrogen levels show higher values than the prescribed values^{14,23,24}. This may be due the excess use of fertilizers and pesticides in this area.

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