

Physico-chemical analysis of ground water quality parameters – A Review

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ABSTRACT

Ground water is highly valued than surface water. Due to rapid growth of population, industrialization and urbanization ground water get polluted. Most of diseases in human being are caused by drinking contaminated ground water, so physico- chemical analysis of ground water samples were essential to determine the quality of ground water. Present research paper focus on review of different research papers related to physico-chemical analysis of ground water used for drinking purpose.

KEY WORDS: Water quality index, Ground water, Physico-chemical status.

1. INTRODUCTION

Water plays an important role for all living organism. Chemical formula of water is H₂O. It exists in the three states namely solid, liquid and gas. Water is universal solvent used as media for bio-chemical as well as chemical reaction. Water is essential for all living organism. Life cannot run without water. On earth 97.2% of water is salty and 2.8% is fresh water from which about 20% constitutes ground water (Rajesh Kumar, 2011). Rapid growth of industrialization, population urbanization spoil the ground water. Once ground water get polluted, it cannot be restored by stopping the pollutants from their source. According to WHO, about 80% diseases in human being are caused by water (Neerja Kalra, 2012). Certain properties which are not possessed by surface water which are possessed by ground water, so ground water is highly valued (Rajesh Kumar, 2011). So study of ground water used for drinking purpose, irrigation purpose becomes important. This review articles is to report the quality of ground water from various study area, used for drinking purpose.

2. MATERIAL AND METHODS

The search terms – water quality index of ground water, physico-chemical analysis of ground water, correlation analysis of ground water, physico-chemical status of ground water were used to search for relevant articles from referred and index journals.

3. RESULT AND DISCUSSION

The review of the finding various research papers demonstrated that various physico-chemical parameters in ground water were analyzed from different study area to determine quality of ground water used for drinking purpose.

Literature Review: We referred several research papers on physico-chemical analysis of ground water as well as surface water of different districts and cities. Different physico-chemical parameters are compared with WHO standards to determine the quality of water suitable or not suitable for drinking purpose, irrigation purpose and domestic purpose.

Yadav (2010), Rasayan, Carried out experimental work on physico-chemical properties of ground water taken from four blocks (Suar, Milak, Bilaspur, Shahabad) of Rampur district, Uttar Pradesh, India from each block fifteen villages are under studied. It has been found that physico-chemical parameters of water indicate considerable variation. Most of ground water samples do not comply with WHO standards for drinking purpose only eight locations shows quality of ground water suitable for drinking water. Rajesh Kumar (2011), Carried out correlation analysis of ground water quality in and around shahzad Nagar block of Rampur district, Uttar Pradesh, India. For present investigation, ground water samples from twenty five locations are selected and analysis of water was carried out using standard methods. Physico-chemical parameters compared with WHO, USPH, European and ICMR Standards shows considerable variation. The statistical analysis showed that E.C. has positive and significant correlation with TDS, TH, Ca²⁺, Na⁺, SO₄²⁻, Mg²⁺, and TA (Makwana, 2012). Carried out work on drinking water collected from fifteen sampling stations of water (bore well, wells and lacks) of Gandhinagar territory area to determine water quality index, physico-chemical analysis shows that parameters of drinking water shows the variation from prescribed value. Shah (2012), report about quality of drinking water samples of kathalal territory, Gujarat from twenty different location bore wells water samples are collected for physico-chemical analysis. Studies shows that on an average, most of water samples in this area was suitable for drinking purpose and a very simple pre-treatment also enough to make the water potable. Neerja Karlar, 2012, carried out work on assessment of ground water in koilwar block of Bhojpur (Bihar) to determine water quality index ground water samples from ten different villages were collected. Physico-chemical parameters such of Temp, P^H, TH, Cl⁻, F⁻, TDS, Ca²⁺, Mg²⁺, SO₄²⁻ and alkalinity were analyze. The WQI for these samples ranges from 40.67 – 69.59, study show that ground water of koilwar block required treatment before to use, also need protection from contamination. Usha (2013), carried out work on to determine water quality index and fitness of urban water bodies in Bilari town of Moradabad (Uttar

Pradesh). Ground water samples in three different months January, June and September 2011 were collected from ten different sites. Analysis of ground water samples were carried out for different physico-chemical parameters. WQI shows that contamination of water increases day by day. So require treatment for purification before to use. Neerja Kalra (2012), carried out work on to determine ground water quality from five blocks (Udwantnagar, Taratu, Chapokhar, Piro, Sahar) of Southern, Bhojpur (Bihar) for that purpose then ground water samples were collected from each block, physico-chemical analysis of different parameters compared with ICMR standards for drinking purpose shows that ground water indicate considerable variation, most of ground water samples do not comply with ICMR standards of drinking purpose, few location from study area shows ground water suitable for drinking purpose. Aher Binano Frontier work was carried out to study physico-chemical parameters of water sample collected from tube well of selected villages in Kalwan Tahsil of Nasik district for present investigation. Water samples were collected randomly from five different stations. Result shows that physico-chemical parameters of collected water samples are within permissible limit in study area so water is suitable for irrigation and drinking purpose. Adhena Ayaliew Werkneh (2015), carried out work on physico-chemical analysis of drinking water quality at Jigjiga city, Ethiopia. For present investigation of tap water samples re shows that potable water is safe enough to be consumed by humans.

For assessment of ground water quality different physico-chemical parameters such 1) pH 2) electrical conductivity 3) Total hardness 4) Total dissolve solids 5) Calcium 6) Magnesium 7) Sulphate 8) Alkalinity 9) Sodium 10) Potassium 11) Chloride 12) Fluoride 13) Nitrate were studied by researcher for different study area. Temperature is measured by thermometer, it affect the rate of photosynthesis by aquatic plant and metabolic rate of aquatic living organism.

P^H is negative logarithm of H^+ ion concentration. P^H of water ranges from 0 to 14. pH value 7 to 14 is alkaline, pH value 0 to 7 is acidic and pH value 7 is neutral. The pH value was measured by pH meter. Electrical conductivity is capacity of water to carry an electrical current and the electrical conductivity depends upon concentration of liquid (water), type of ions, number of ions & their mobility. Solution of inorganic salts, acids and bases are relatively good conductors of heat and electricity. E.C. measured by E.C. meter.

Total hardness is measure of ability of water to cause precipitation of insoluble Calcium and magnesium salts of higher fatty acid from soap solution. Total hardness, calcium, magnesium were measured by EDTA titration method.

Total dissolve solid (TDS) is measure of combined content of all organic, inorganic substances contained in a liquid in ionized, molecular or suspended form. In water sample TDS can be calculated by conductivity measurement and TDS meter.

Alkalinity is sum of total components in water that tends to move P^H of liquid towards the alkaline side. Total alkalinity was determined volumetrically by $AgNO_3$ titration methods using potassium chromate as indicator. Sodium and Potassium were analyzed using flame photometer.

Fluoride were analyzes by ELICO Spectrophotometer. The peoples get affected by dental fluorosis and skeletal fluorosis due to high concentration of fluoride taken from ground water.

Chloride in ground water due to industrial effluent sewage and natural sources. No health base guide line value proposed for chloride in drinking water. Chloride was analyzed volumetrically by $AgNO_3$ by titration method. Sulphate was determine by nephelometrically Inorganic Sulphate, Salts, high concentration of Sulphate in ground water may have laxative effect.

Biological oxygen demand (BOD) is an important parameter for pollution of water pollution of water pollution occurs due to disposal of industrial effluents and domestic sewage. COD is chemical oxygen demand is an important parameter to assess the carbonaceous fraction of organic matter. COD and BOD measured by APHA, Standards method.

4. CONCLUSION

Most of the ground water samples collected from different study area comply with WHO Standards and ICMR Standards of drinking purpose are suitable for drinking purpose. Few ground water samples shows considerable variation, do not comply with WHO Standards, ICMR Standards of drinking purpose if such type of ground water used for drinking purposes cause health hazard, so require simple pre-treatment to become potable for drinking purpose.

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