

Assessment of Drinking-water Quality in and around Moradabad

Abstract

Measurements of Calcium, Magnesium, total hardness, dissolved carbon dioxide, and chloride have been made titrimetrically for drinking water collected from three places (TMU Moradabad, Gajraula and Najibabad). The results obtained have been compared with the standard values provided by Indian standards (BIS), and WHO for drinking water.

Keywords: Titration, calcium, hardness, indicator, WHO.

R.D.Tripathi*

*Corresponding Author Affiliation

NASI Scientist
CSIR-National Botanical
Research Institute, Lucknow, UP.

E- mail: tripathird@gmail.com

Ph.no.: +917376679779

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Introduction

Many regions of India are stricken by water pollution and microbial water-sure impurities. The accelerated demand on water suppliers has regularly lead to water this is not worthy for human consumption, being inadvertently furnished to your faucet. This is regularly the case in lots of smaller towns in the course of India. Where river water is fed on: upstream infection, via sewerage and human use (washing of garments etc.) is a vital consideration for water nice.

Issues approximately non-public and circle of relative's fitness may also lead you to question the protection of the water you are using. Current exposure approximately water pollutants problems and their impact on water used inside the domestic for ingesting, cooking, washing and plenty of other functions. You will be particularly worried about the first-class of your drinking water if you rely upon your borehole or different personal water deliver. With the availability of modern-day water treatment system and the frequently competitive advertising of these gadgets, you could marvel about the need to install such system in your private home and what if something some of these filters do. Agricultural water necessities are frequently unnoticed. Suitable water leads to progressed cattle manufacturing.

In step with principal pollution manage board, ninety% of the water delivered in india to the metropolis and towns is polluted, from which handiest 1.6% receives handled. Consequently, water best control is necessity for the individual wellbeing (Gupta,1991; Madhuri et al.2004).

If water is badly polluted like raw sewage it might be apparent from its look or smell. It might be coloured or opaque (cloudy), or have hard, grease, or foam floating on it. Pretty a few dead fish floating at the surface of a lake could be a clean sign that some element changed into incorrect.

However a lot of dangerous and useful materials in water are unseen and fragrance-free. On the way to move away from the plain to decide what substances are inside the water and how much we require, analysis must be conducted. Evaluation of herbal frame of water tells us how easy or polluted it's far. If there may be harm to

flora and fauna, the size will assist locate the case and the cause? Where water is purified (e.g. a wastewater cure plant), analysis are essential for tracking the effectiveness of the treatment approaches. Within the united nation the smooth waste act required waste water discharge to have permit. These permit set limits on the quantities of specific pollution that may discharge, as well as schedule for monitoring and reporting the result handiest standard analytical manner exact inside the-“code of federal law” can be used in order that the government organizations can feel reasonably assured that end result from distinct laboratories are comparable.

Similar consideration practice to ingesting water. The purity of the water we drink is more problem to the common individual then the excellent of the waste discharge via sewage plant. However we need to now not forget then in lots of places especially alongside a river on, towns waste water discharge may be part of next city’s water supply.

Methods and Sample collection

Estimation of Calcium, Magnesium, total hardness, dissolved carbon dioxide ,and chloride have been made titrimetrically. The samples were taken directly from tap of above mentioned places, with the help of preferred strategies and techniques of sampling (APHA,1995, Merck,1974).Water samples were obtained directly from the tap used for drinking purpose.

Experimental

Titrimetric method

Chemicals used were of moisture free, Analar Reagent grade with stated purities of +99 % . Ethylene diamine tetrachloride salt (Aldrich), potassium iodide (Darmstadt), $\text{Na}_2\text{S}_2\text{O}_3$ (Sarabhai chemical substances co.), sodium hydroxide (Fluka), silver nitrate (SAS chemicals), hydrochloric and sulfuric acid (Qualikem) had been used in the course of analysis. Before use, chemicals were kept in a degassed oven at 120°C for many days and used as such. Stock solutions have been obtained by means of the use of double-distilled, but formerly deionized, water at some point of the experimental analysis. The concentrations have been decided by using density dimension the usage of a densimeter as given elsewhere(patil et.al.1990). The repeatability of the concentration measurements turned into inside 0.28 percent.

Overall hardness became decided by way of measuring 20 cc of consuming water and delivered five ml of buffer solution(pH=10), after which three-four drops of E.B.T. indicator added and titration carried out with 0.01M EDTA solution .At the quit point the answer modifications from wine pink to blue.

For estimation of calcium, 20 ml of water sample with 2-3cc of buffer solution ($\text{NH}_3+\text{NH}_4\text{Cl}$) and added three-four drops of E.B.T. indicator .The whole solution become titrated with 0.01M ethylene diammine tetra acetic acid (EDTA) solution. Ultimately calculated strength of calcium found in water sample. . The solution turns from crimson to blue at the end factor. For estimation of Mg^{+2} , same process is followed as within the estimation of calcium ions)in the water sample. For making ready buffer solutions (pH=10), 3.2 gm of ammonium chloride is blended with 29 ml of ammonia solution and diluted to 50 ml. For finding Cl^- (chloride

ion), 15cc of ingesting water was used and delivered 5 drops of indicator(fluorescein), and the titration is performed with the 0.001 M silver nitrate solution. The AgCl coagulates, and the precipitate obtains a red or purple color on the end point. For dissolved CO₂, water is blended with 3-4 drops of phenolphthalein indicator, and titrated with NaOH solution (N/50).

For getting total hardness, same procedure is adopted as in the estimation of calcium ions in the water sample.

Calculation

The molarity of unknown sample of water (M1) was calculated by means of following formula:

$M_1V_1=M_2V_2$, where V1 and V2 denotes the volume of water and EDTA solution and M2 for molarity of solution used in the burette. Once you have molarity by using titrimetric evaluation, the strength was obtained by means of the use of following formula:

$$\text{Strength} = \text{Mol.weight} \times \text{Molarity(g/l)}$$

In this way strength of Ca, Mg, CO₂, chloride and total hardness are obtained. Molecular weight of calcium, magnesium, carbon dioxide and chloride used were 40, 24.3, 44 and 35.5 respectively. For calculation of strength of total hardness, molecular weight equal to 100 is taken.

Table 1: Physico – chemical parameter*(Carbon dioxide, Ca²⁺, Mg²⁺, Cl⁻ and total hardness) of tapwater samples of three Districts, U.P., India, in July-2021.

Sampling Source	Carbon dioxide	Ca ²⁺	Mg ²⁺	Total Hardness	Cl ⁻
Gajraula	10.31	81.55	17.1	121	12.66
Najibabad	11.66	67.33	16.2	131	25.99
TMU Moradabad	12.04	78.23	24.6	141	26.38

* all parameters are in ppm.

Results and discussion

Table1 contains results calculated for different parameters for tapwater samples. These parameters were compared with the standards in **Table2**.

From these results, it is observed that due to boom in industrialization, quality of drinking water get decreases, and consequently proper analysis of tap-water is required.

Table 2: Comparison of our results of tapwater of three samples of concerned region with intake water quality standards*

Parameter	Sample Range (lowest limit) & (upper limit)	Beaurow of Indian Standard		World Health Organization Limit(ppm)
		lower limit	upper limit	
Total hardness	121 141	300	600	100
Calcium	78.23 81.55	75	200	75
Magnesium	17.1 24.6	30	100	150
Carbon dioxide	10.31 12.04	-	-	-
Chloride	12.66 26.38	250	1000	250

*Unit in ppm.

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