QUALITY ASSESSMENT OF DRINKING WATER BEFORE & AFTER STORED IN COPPER

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ABSTRACT

Water is the country's most abundant natural resource, but water shortages affect more than 40% of people around the world. Water plays an important role in health and 1.5-2 liters of water intake per day must be guaranteed because good hydration is necessary to maintain the body's water balance, although needs may differ from person to person. Water intended for human consumption includes drinking water (treated or untreated) for all domestic uses. The mineral composition makes it possible to classify natural mineral waters. Such as Bicarbonate mineral water, Chlorine mineral water, Sodium rich mineral water. The examination was carries out using the methods of sampling given in IS3025 part 1:1987 for chemical tests ISI622:1981 for bacteriological tests or other applicable standards. Water samples were collected directly from three different sources in a new pot bottle and kept in a 2L copper jar overnight for about 12-13 hours. The analysis was done both in the before and after the copper pot. The physical attributes of the mineral composition of water are under permissible limit as per WHO guidelines

Keywords— Natural resources, Hydration, Domestic uses, Bacteriological, Physical attributes, Mineral composition, Bicarbonate mineral water, Chlorine mineral water, Sodium rich mineral water.

I. INTRODUCTION

a. Water & its properties:

Water is one of the most important substances on Earth and is important for all life forms. It covers about 70% of the planet's surface and is found in oceans, rivers, lakes and groundwater. In this introduction to water, we will explore the properties of water, its importance to life on Earth, and the ways in which people use and affect water resources.

Water is a tasteless and odorless liquid consisting of polar molecules that form hydrogen bonds between themselves and are strongly polar. Thanks to these hydrogen bonds, there are many more unique properties, such as:

Polarity: Water molecules are polar, with a partial positive charge on hydrogen and a partial negative charge on oxygen. This polarity allows water to dissolve ions in salts and bind to other polar substances such as alcohols and acids.

High heat capacity: Water has a high heat capacity, which means it can absorb a lot of heat energy before the temperature rises

High heat of vaporization: Water has a high heat of vaporization, which means that it takes a lot of energy to change from a liquid to a gas.

Cohesion and Adhesion Properties: Water molecules have a strong cohesive force due to their ability to form hydrogen bonds with each other. Cohesive forces are responsible for surface tension, the tendency of the surface of a liquid to tear under stress or tension. It also has adhesive properties, thanks to which it sticks to substances other than itself

Less dense as a solid than as a liquid: Water is less dense as a solid than as a liquid, so ice floats on top of water.
Amphoteric: Water can have the properties of an acid or a base depending on the pH of the solution in which it is
In addition to these properties, water is also an excellent solvent, which means that it can dissolve many substances and is the "universal solvent. It is also the most abundant surface on earth and the only universal substance that exists as a solid, liquid and gas. Of course

b. Water Supply in Hyderabad:

Hyderabad, the capital of the Indian state of Telangana, has suffered from severe water shortages in recent years. With a rapidly growing population and increasing industrialization, the demand for water has outstripped the supply. The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) is responsible for water supply and sanitation services in the city. To meet the water demand, HMWSSB has taken various initiatives such as construction of new reservoirs, distribution networks and water treatment plants. HMWSSB has a network of 11 reservoirs with a total capacity of 1,447 million gallons. These reservoirs are connected through a network of pipelines and pumping stations that supply water to the city. HMWSSB also has several water treatment plants that process raw water from these reservoirs into usable water. In addition to the municipal water supply, many residents of Hyderabad require packaged drinking water for daily consumption. Several private companies have set up packaged drinking water plants in Hyderabad to meet this demand. These plants obtain water from various natural sources such as boreholes, rivers and lakes and purify it using reverse osmosis (RO) technology to remove impurities. RO plants have become a popular choice for water treatment in Hyderabad due to their effective removal of pollutants, such as salts, minerals and bacteria. RO technology works by passing water through a semi-permeable membrane that removes impurities and produces clean drinking water. Several RO plants have been set up in Hyderabad, especially in areas where municipal water supply is inadequate or of poor quality.
HMWSSB has taken several initiatives to improve water supply in Hyderabad. One of these initiatives is the construction of new water treatment plants. HMWSSB recently commissioned a new water treatment plant at Mallannasagar reservoir with a capacity of 10 million gallons per day (MGD). The plant uses advanced technologies such as ozonation, activated carbon filtration and ultrafiltration to treat the raw water in the tank. HMWSSB has also implemented initiatives to reduce water losses in the distribution network. The government launched the AMRUT (Atal Mission for Rejuvenation and Urban Transformation) program to improve water supply infrastructure in Hyderabad. The program includes upgrading old and leaking pipes, installing water meters and using advanced technologies to monitor and manage the water supply. In addition to these initiatives, HMWSSB also promoted rainwater harvesting as a means of conservation. Water the government encouraged households and institutions to install rainwater harvesting systems. These systems collect rainwater from roofs and store it for future use. Rainwater harvesting has become an important source of water for many households, especially during the monsoon season when the city receives a lot of rain.

c. Tap Water:

Tap water, also known as municipal water or drinking water, is an important resource that is the main source of hydration for millions of people worldwide. Understanding its composition, treatment processes and safety aspects is crucial for individuals, communities and policy makers. The purpose of this article is to provide a detailed study of tap water and shed light on its various aspects to ensure informed decision-making and promote public health and environmental well-being.
The composition of tap water contains a wide variety of components, including minerals, metals, organic compounds and microorganisms. Sources of tap water can vary from groundwater to surface water and even treated sewage. Factors such as geographic location and treatment processes can significantly affect the composition of tap water, resulting in the types and amounts of substances.
Municipal water systems use water treatment processes to ensure the safety and quality of tap water. These processes involve several steps, including coagulation and flocculation to remove suspended particles, sedimentation and filtration to remove larger contaminants, disinfection with chemicals such as chlorine or alternative methods such as ozone or UV treatment, and pH control and corrosion control for prevent pipe rupture. And for maintenance. Water safety
Quality assurance and safety standards are important to maintain the integrity of tap water. Regulatory agencies are responsible for monitoring and enforcing these standards. These standards include parameters such as turbidity, pH, dissolved oxygen, residual chlorine, and compliance with guidelines for certain contaminants such as lead, arsenic, and nitrates. Regular testing, monitoring and reporting mechanisms are used to ensure that tap water meets these standards.
Health aspects play a crucial role in the evaluation of tap water. Potential health risks associated with tap water contaminants include microbial pathogens, heavy metals, disinfection byproducts, and agricultural contaminants. Certain populations, such as infants and pregnant women, may be more sensitive to these pollutants. Mitigation

strategies and advanced treatments such as activated carbon filtration and reverse osmosis are used to address these issues and improve the safety of tap water. Durability and environmental impact are important aspects to consider when examining tap water. A comparison of tap water and alternative sources such as bottled water shows the environmental benefits of choosing tap water. Water conservation and efficiency measures in water treatment and

distribution is important for long-term sustainability. Protecting source water and waterways is also essential to maintaining the availability of clean tap water.
Public perceptions and consumer trust play an important role in the use of tap water. The factors affecting public perception are the communication and transparency of water companies. Building consumer confidence and removing misconceptions are important factors in promoting the use of tap water as a safe and sustainable choice.
Emerging challenges and innovations in tap water include monitoring and treating contaminants of emerging concern, such as pharmaceuticals and microplastics. Adaptation to climate change and its water resources is also urgent. Technological advances such as nanotechnology and sensors are constantly improving water treatment and monitoring capabilities. In conclusion, tap water is an essential natural resource that requires extensive research to ensure its safety, quality and sustainability. This article provided a comprehensive overview of tap water, including its composition, purification processes, and safety aspects and emerging challenges. By prioritizing the quality and sustainability of tap water, individuals, communities and decision-makers can promote public health, environmental well-being and informed decision-making.

d. RO Water:

Reverse osmosis (RO) water, a popular water purification method, has received considerable attention for its ability to remove contaminants and provide high-quality drinking water. The purpose of this article is to provide a detailed description of RO water, looking at its principles, benefits, limitations and considerations for its use.
Reverse osmosis is a water purification process that uses a semi-permeable membrane to remove various contaminants from water. It works by applying pressure to the water, pushing it through the membrane, leaving impurities behind. The membrane acts as a barrier, allowing only pure water molecules to pass through and effectively removing substances such as dissolved salts, minerals, heavy metals, bacteria, viruses and other impurities. The benefits of RO water are its ability to provide clean and safe drinking water. By removing a significant portion of impurities, RO systems can improve the taste, smell and appearance of water. This makes it an attractive choice for people who are concerned about the quality of their drinking water or who have special health requirements, such as those with weakened immune systems or certain medical conditions.
However, it is important to note some limitations of RO water. The process is relatively slow and can cause significant wastewater generation. Typically, several gallons of wastewater are generated for each gallon of treated water produced. This can be a problem in areas where water scarcity or sewage treatment is an issue. In addition, RO systems can also remove beneficial minerals from the water, which can be a concern for those who rely on drinking water as a source of essential minerals.
Maintenance and regular replacement of RO system components such as membrane and filters are essential for optimal performance. Regular monitoring of system performance, including checking pressure levels and performing water quality tests, is recommended to maintain RO system efficiency and effectiveness. RO water is commonly used for drinking and cooking in households, as well as in various industries and commercial environments that require high-quality water, such as food and beverage production, pharmaceutical manufacturing, and laboratories. It provides an additional layer of protection against contaminants and can be used as a standalone treatment method or in combination with other treatment technologies for specific water quality needs.
In short, reverse osmosis (RO) water is a purification method that uses a semi-permeable membrane to remove various impurities from the water. Although it offers the advantages of providing clean and safe drinking water, it is important to consider its limitations, such as the production of sewage and the possible removal of useful minerals. Regular maintenance and monitoring are critical to optimal performance of RO systems. In general, RO water has been widely used in various fields where quality water is essential, making it a popular choice for many individuals and industries

e. Packaged Water:

Packaged water, also known as bottled water, refers to water that is packaged and sold in containers for individual consumption. This article aims to give a detailed description of bottled water, looking at its production, types, quality aspects, environmental impact and consumer preferences.
Packaged water is produced through a controlled production process where the water is usually obtained from several natural sources, such as springs, wells, or domestic springs. To ensure water safety and quality, water undergoes treatment processes including filtration, disinfection and often additional steps such as reverse osmosis or UV treatment. After the water is treated, it is packaged in bottles made of materials such as plastic, glass or even

cardboard boxes. Different types of bottled water are available in the market to suit different preferences of consumers. These include purified water that has been treated to remove impurities and meets certain quality standards; mineral water containing naturally occurring minerals and trace elements; spring water, which comes from underground springs and is known for its unique taste and texture; and flavored or infused water, which may contain flavorings, fruits, or herbs to enhance flavor.
When it comes to bottled water, quality considerations are critical. Regulatory agencies enforce standards and guidelines to ensure the safety and quality of bottled water. Parameters such as microbial counts, chemical contaminants, pH levels and labeling requirements are typically monitored to meet these standards. In addition, many manufacturers conduct rigorous testing and quality control procedures to ensure compliance and provide consumers with a reliable product.

The environmental effects of packaged water have raised concerns. The production, transport and disposal of plastic bottles increases the emission of waste and carbon dioxide. Efforts were made to use recycled materials; bottle reuse was promoted and more economical packaging options were developed. Some consumers are also choosing alternatives such as reusable water bottles and filtration systems to reduce their environmental footprint.
Consumer preferences play an important role in the popularity of bottled water. Convenience, portability and a sense of safety and cleanliness are often cited as reasons to choose bottled water. It is commonly consumed in various places such as households, offices, outdoor activities and travel, providing an easily accessible source of hydration.
In summary, packaged water refers to water that is treated, packaged and sold in containers for individual consumption. It undergoes strict quality control procedures to ensure safety and regulatory compliance. Although its convenience and perceived quality appeal to consumers, the environmental impact of plastic bottle waste is a cause for concern. The availability of different packaged waters caters to different preferences and efforts are being made in the industry to promote sustainability. Ultimately, consumer choices and awareness will shape the future of bottled water and its role in meeting hydration needs.

f. Properties of Copper Vessel:

When used with water, copper vessels have unique properties that can affect the water and potentially provide certain benefits. This article examines the properties of copper vessels in contact with water, including their antimicrobial effects, ability to ionize water, and potential health effects.
One of the important features of copper containers is their antimicrobial effect on water. Copper has natural antimicrobial properties that can inhibit the growth and survival of microorganisms, including bacteria, viruses and fungi. When water is stored in a copper vessel, these antimicrobial properties can help prevent the growth of harmful microbes and reduce the risk of waterborne diseases. Research has shown that copper tanks can be particularly effective at minimizing the presence of pathogenic bacteria, making them a valuable choice for water storage.
Another property of copper vessel when used with water is their ability to ionize the water. When water comes into contact with a copper surface, a small amount of copper ions can dissolve in the water. These copper ions give the water certain characteristics, such as a slight metallic taste and a possible change in ph. In addition, copper ions are considered important trace elements that the human body needs in various physiological processes. However, it is important to note that the concentration of copper ions released into water is usually minimal and within safe limits for regular consumption.
The potential health effects of using copper vessels with water is an interesting topic. Copper is an essential mineral for the human body, and small copper ions in water from copper tanks can contribute to total copper intake. Some people believe that drinking water from copper vessels can provide certain health benefits, such as improved digestion, improved immunity and anti-inflammatory effects. However, scientific evidence to support these claims is limited, and the health effects of copper intake are complex and influenced by multiple factors. Certain aspects must be considered when using copper vessels with water. First, it is important to make sure that the copper vessel is made of high-quality, food-grade copper to prevent harmful substances from leaching. Proper cleaning and maintenance of copper vessels is also important to prevent possible impurities or oxidation. In addition, it is recommended to use copper utensils in moderation and as part of a balanced and varied diet, as excessive consumption of copper can be harmful to health.
In summary, copper vessels used with water have specific characteristics that can affect and potentially benefit the water. Copper's antimicrobial properties can help prevent the growth of harmful microorganisms in water, while its ability to ionize water and release small amounts of copper ions can affect taste and potential health effects.
Responsible use, proper care and consideration of individual health needs and preferences are essential when using copper vessels with water.

g. Advantages of Drinking water in copper vessel:

Drinking water from a copper vessel is believed to offer several benefits. Here are the benefits at a glance:
Better digestion: Copper is thought to stimulate the production of digestive enzymes, helping to break down food and promoting better absorption of nutrients.
Enhanced immunity: Copper is an important mineral for the immune system. Drinking water from a copper container can provide small amounts of copper ions, which support a healthy immune response and help fight pathogens.
Potential anti-inflammatory effects: Copper has anti-inflammatory properties. Consuming water stored in a copper vessel is believed to help reduce inflammation in the body and possibly decrease the risk of inflammation-related conditions.
Antioxidant Properties: Copper may have antioxidant properties. Water drunk from copper vessels may contain small amounts of copper ions, which can act as antioxidants and help neutralize harmful free radicals in the body.
Potential health benefits: Some proponents claim that drinking water from a copper vessel may have other health benefits, such as improved joint health, anti-aging effects and potential cardiovascular benefits. However, scientific evidence to support these claims is limited and further research is needed.

h. Disadvantages of Drinking water in copper vessel:

Although there are potential advantages to drinking water from a copper vessel, it is important to consider the potential disadvantages as well. Here's a quick summary of some of the potential drawbacks:
Excessive copper intake: Drinking water from a copper container can increase copper intake, especially if consumed in excess. High levels of copper can be toxic and cause negative health effects such as nausea, vomiting and liver damage. It is important to ensure that the absorption of copper from water remains within safe limits.
Allergic reactions: Some people may be allergic or sensitive to copper. Drinking water from copper vessels can cause allergic reactions such as skin irritation, itching and rash. People with a known copper allergy should avoid using copper vessels for drinking water.
Water quality issues: Although copper containers can prevent the growth of some microorganisms, they may not remove all types of bacteria, viruses or other contaminants from water. To minimize the risk of waterborne diseases, it is important to ensure that the water used in copper cooking comes from a safe and reliable source.
Food Reactivity: Copper can react with acidic or alkaline foods and beverages, resulting in copper leaching into the food or beverage. This can cause a metallic taste and potential health risks. To mitigate this, copper vessels are often lined with non-reactive materials such as stainless steel or tin.
Maintenance and cleaning: Copper vessels require regular cleaning and maintenance to prevent impurities from accumulating or oxidizing. Incorrect cleaning techniques can compromise the hygiene and safety of ships. It is important to follow the manufacturer's instructions and use the correct cleaning methods to ensure proper maintenance. **Environmental impacts:** The production and disposal of copper containers can have an environmental impact. Copper mining and processing has an ecological impact, and the disposal of copper waste can increase pollution. Choosing sustainable options or recycling copper containers can help alleviate these environmental problems.

II. METHODOLOGY

A. Collection of Sample:

Water samples are collected directly from the respective sources and kept in 2-liter copper jug overnight for a period of about 12-13 hours. Both water samples before keeping in copper jug and after keeping in copper jug are collected separately into respective empty packaged water bottle/ new PET water bottle and given to laboratory.

B. Samples for microbiological analysis-

The containers shall withstand a 160°C sterilization and shall not produce or release at this temperature any chemicals which would either inhibit biological activity, induce mortality or encourage growth.
When lower sterilization temperatures are used, polycarbonate and heat resistant polypropylene containers may be used. Caps or other stoppers sha" withstand the same sterilization temperatures as the containers. Glass containers should be cleaned with water and detergent, followed by thorough rinsing with distilled water. Then they should be rinsed with nitric acid (HNO3) followed by thorough rinsing with distilled water in order to remove heavy metals or chromate residues.

A total of 0.1 ml of a 10 percent (m/m) solution of sodium thiosulphate (Na2S2O2) can be added, for every 125 ml of container capacity, before sterilization. This is to eliminate inhibition of bacteria by chlorine

Sample Volume-

A two-liter sample is normally sufficient for most physical and chemical analysis. However, the quantity may be varied depending upon the type of analysis, methods used etc.

Physical & Sensory characteristics:

Color is based on IS3025 P-4 platinum cobalt visual comparison of filtered (by 0.45 membrane) sample: Colourless-0 Platinum Cobalt Units (PCU) also known as Hazen or True Color Units (TCU). Detection limit: IPCU. 2- Odor rating by lab personnel: Odorless. Agreeable or Disagreeable (Unpleasant or Offensive); 3- Turbidity EST, as in 18302SP110, using H198703 Nephelo-Turbidimeter. Detection limit: 0.10NTU.

NTU-Nephelometric Turbidity Unit.

PH value at 25°C estimated as in 153025P11, measured by Hamu 12002-021dge (pt) Instrument. Detection limit: 4 pH value.

5- EC at 25°C estimated as in 183025P114, measured by Hanna H12003-02EdgeEC. Detection limit: 1 µ Siemens/em. The Central Pollution Control Board (CPCB) best use classes A-C, which include drinking water do not specify any guideline value for EC. The CPCB reference value shown here is for a lower class- E, best use case of irrigation water.

https://cpch.nic.in/water-quality-criteria/

C. General chemical characteristic analysis:

1- Total hardness (TH) by EDTA titration, using 50 ml sample, ammonia buffer & EBT indicator as in 183025P121.

Detection limit: 5mg/l...

2- Calcium by EDTA titration using 50 ml sample, NaOH, P&R indicator as in 183025Pt40. Detection limit: 2mg/L.

3- Magnesium estimate is derived from Hardness & Calcium, following 183025P146. Detection limit: 2mg/l...

4-Nitrate by UV spectrophotometric screening as in APHA 4500-NO3B. Detection limit: 0.10mg/L...

5-Chloride by titrating 100 ml sample with 0.014IN AgNO3 soln. & K2CrO4 indicator as in 183025PL32 Detection limit: 2mg/l...

D. Bacteriological analysis

Most probable number (MPN) & 95% Confidence Interval (CI), is estimated by results of 48h incubation of 5 MacConkey broth culture tubes for each of 3 (10, 1 & 0.1 ml) dilutions, using IS1622-1981(RA-2019) App-B. Table-3. Positive culture of total coliforms, from one of the tubes with minimum dilution, cultured in HI Media Brilliant green lactose broth (BGLB) in water bath at 44°C or 24 hours and examined for gas formation to identify Thermo-tolerant coliforms.

Positive culture of total coliforms, from one of the tubes with minimum dilution, is incubated in HI Media tryptone water at 44°C for 24 hours, and examined, after adding Kovac's reagent for pink ring to identify presence of E. coli.

E. PREPRATION OF MEDIUM FOR TOTAL COLIFORMS PRESENT IN THE WATER SAMPLE.

Preparation of Macconkey broth:

This is used as a presumptive medium for the enumeration of coliform bacteria in water sample.

Its composition is given below

1. Peptone- 20g
2. Lactose- 10g
3. Sodium chloride- 5g
4. Bildsalt- 5g
5. Distilled water- 1000ml

Note: In place of bildsalt which is a commercial product sodium taurocholate or sodium tauroglycocholate may be used

Procedure:

Dissolve all the ingredients and adjust pH 7.4 after adjusting the pH, add 1ml of 1% alcoholic solution of Bromocresol purple or 5ml of 1% aqueous solution of neutral red. this will be the single strength medium distribute 10ml of the medium into 150x15mm test tubes and add Durham's tube (25x5mm) in an inverted position. Pluck the tube with non-absorbent cotton and sterilize. Add 115 degrees Celsius for 10minutes in the autoclave. This medium is used for 1 ml and the decimal dilutions of the water sample. For 10ml and larger aliquots a double strength medium is used. For the double strength medium add the above ingredients in double the quantities in 1000ml of distilled water. This medium is dispensed into 10ml quantities in 150 x 18mm test tubes added with Durham's tube and sterilized.

Precaution:

1. Keep the cotton plugs loose during Autoclave.
2. Culture tubes & flasks containing medium should be stored at low temperature & dust free environment.

F. PREPARATION OF MEDIUM FOR THERMOTOLERANT COLIFORMS IN WATER SAMPLES

Preparation of Brilliant green bile lactose broth:

This medium is used as a confirmatory test for coliforms as well as for faecal coliforms. Its composition is as under:

Peptone Lactose: 10 g

Bile salt: 20 g

Distilled water: 1000 ml

Procedure:

Dissolve all the ingredients and adjust the pH to 7.4. Add 133 ml of 1 percent aqueous solution of brilliant green indicator. Distribute 4 ml quantities into 150 x 12 mm test tubes and add a Durham's tube to each.

After plugging with non-absorbent cotton, sterilize at 1.020+/-0.03 kg/cm³ gauge pressure (15±0.5 psi gauge pressure, 120°C temperature approximately) for 15 minutes in the autoclave.

Precautions:

1. See that the medium is not split in the table of floor to avoid contamination.

G. PREPARATION OF MEDIUM TO TEST THE PRESENCE OF E. COLI IN WATER SAMPLE

Preparation of Kovac's reagent:

Kovac's reagent-It is used for indole test. Its composition is as under:

Paradimethyl amino benzaldehyde: 58ml

Amyl alcohol or n-butanol: 75 ml

Concentrated hydrochloric acid: 25 ml

Dissolve Paradimethyl amino benzaldehyde in amyl alcohol and then add 25 ml of Hydro- chloric acid. The reagent shall be yellowish in color. Store in amber colored Glass stoppered bottle.

Procedure:

E. coli is one of the members of faecal coliforms which ferments lactose with the production of gas at 44-5°C within 24 hours, as well as produce indole from tryptophone at 44-5°C within 24 hours. Subculture from all the positive tubes of BGB broth at 44.5°C (faecal coliforms) into tubes of peptone water. Incubate at 44 5°C for 24 2 hours. At the end of the incubation period, test for indole production by adding a few drops of Kovac's reagent. Positive test will give pink color while negative test will give yellow color.

III. RESULTS

A. Sample A (tap water before & after stored in copper vessel): The physical & sensory characteristics i.e., color, odor, turbidity, pH electrical conductivity is under permissible values.

The chemical characteristics such as total hardness before stored in the copper jar is
= 216
The total hardness of water got changed from 216 to 220 after kept in the copper jar overnight.
The calcium levels got reduced from 55.3 mg/lt to 48.0 mg/lt.
The initial levels of magnesium levels got increased from 18.9 mg/lt to 24.3 mg/lt after stored overnight in a copper jar.
Nitrates & chlorides are in acceptable values.
No coliforms are formed.

B. Sample B (RO water before & after storing in copper vessel): The physical & sensory characteristics i.e., color, odor, turbidity, pH electrical conductivity is under permissible values.

The nitrate value was reduced from 2.54 mg/lt to 1.54 mg/lt
Calcium, magnesium total hardness chloride is in acceptable units.
No coliforms are formed.

C. Sample C (packaged water before & after storing in copper vessel): The physical & sensory characteristics i.e., color, odor, turbidity, pH electrical conductivity is under permissible values.

Total hardness got reduced from 38 mg/lt to 20 mg/lt
Also, calcium, magnesium, nitrate, chloride values got reduced when stored overnight.
All the coliforms are absent.

IV. CONCLUSION

Based on the results samples were found to be free from contamination. Compare to the three samples, Sample A (tap water before & after stored in copper vessel) is considered to be best for drinking purpose because it is free from all types of coliforms its physio chemical characters are acceptable for drinking and the mineral content of this water is under permissible unit.
The present results depict that the water quality is appreciable but the regular monitoring and analysis will ensure the quality of supply of the water to humans and livestock in future as well.

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