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To Study Various Parameters of water from different locations in Sam Global University

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ABSTRACT: -

This study investigates the various water quality parameters from different locations within Sam Global University to assess the overall water quality and its suitability for different uses. The research focuses on key parameters such as pH, turbidity, dissolved oxygen, total dissolved solids (TDS), electrical conductivity, and the presence of key ions and contaminants like nitrates and heavy metals. Water samples were collected from diverse sources within the university campus, including groundwater, surface water, and tap water, to understand spatial variations in water quality. Laboratory analysis was conducted following standardized methods to evaluate the physicochemical properties of the water. The findings highlight significant variations in water quality between locations, which are influenced by factors such as source proximity, human activity, and natural environmental conditions. The study concludes with recommendations for water management practices to ensure that water quality within the university remains within acceptable limits for both consumption and other uses.

Key Word: -Parameters measured in pH level, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Turbidityetc.

1. Introduction :

Water ranks as the second most essential requirement for the sustenance of life, following air. Consequently, the quality of water has been thoroughly examined in scientific research. The most widely accepted definition of water quality is that it encompasses the physical, chemical, and biological attributes of water. Water quality serves as an indicator of the state of water in relation to the needs of various living organisms and/or to specific human requirements or objectives..

Water quality observations primarily focus on the concentrations of dissolved substances within the water, assessed through various physical (such as turbidity and conductivity), chemical (including sodium, potassium, and cadmium), and biological parameters (like algae and bacteria). To obtain data on water quality, a water sample must be collected and subsequently analyzed for specific parameters. Certain parameters can be measured directly in the field, referred to as field parameters, while others require laboratory analysis. Laboratories are categorized by their capabilities, with Level I laboratories being smaller facilities situated close to the sampling sites. Initially established for sediment load determination, these laboratories now also assess field parameters related to water quality. In contrast, higher-level laboratories (Levels II and II+) are typically found in major urban areas and possess the analytical capacity to serve a broader region, accommodating more sampling locations.

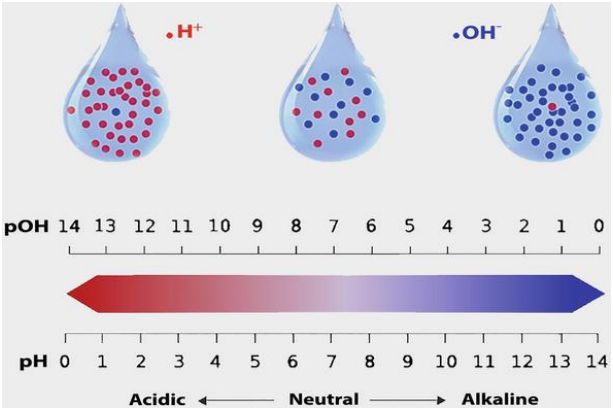

Figure 1: Various parameters of water

Significant parameters in water Quality:-

From all the purposes of water quality assessment, there are various parameters that have to be considered to ensure water is in good quality. Water quality parameters can be classified into three different categories; the physical, chemical and biological parameters. Physical parameters include temperature, pH, color, taste, odor, salinity, hardness, turbidity, conductivity (C), total suspended solids (TSS) and total dissolved solids (TDS). Chemical parameters of water include fluorides, metal irons, organics, nutrients, alkalinity, pesticides, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand(COD) and disinfection by-products (DBP). Biological parameters of water include bacteria, viruses, protozoa and helminths. All these three parameters of water quality need to be measured according to the standard for water quality.

The procedures of water quality used for drinking, domestic purposes and recreational purposes by researchers and governmental departments have been developed by analysis of different parameters. For the assessment of drinking water quality, there was a study that investigated residential and commercial areas of Perak, Malaysia. It was to ensure the continuous clean and safe drinking water for the public health protection [12]. A number of parameters such as pH, turbidity, conductivity (C), total suspended solid (TSS), total dissolved solid (TDS) and heavy metals such as Cu, Zn, Mg, Fe, Cd, Pb, Cr, As, Hg, and Sn were analyzed and compared to the standard values set by World Health Organization (WHO) and local standard of National Drinking Water Quality Standard (NDWQS).

The study indicates the possible source of contamination in drinking water. a total no of 15 samples of groundwater were collected in the month of August-December, and analyzed for physico chemical parameters like, PH, TDS, total alkalinity, total hardness, Dissolved oxygen, turbidity and chloride were analyzed by standard procedure mentioned and then the following result were found, Some groundwater samples are show variation of pH, turbidity, hardness, DO and Chlorides this may be due to different soil texture. The water samples were analyzed for pH. Fluoride (F-), Electrical Conductivity (EC), Total Dissolved Solid (TDS), Calcium (Ca), Magnesium (Mg), Total Hardness (TH), Chloride (Cl-), Carbonate (CO3-2), Bicarbonate (HCO3-), Alkalinity, Sodium (Na+), Potassium (K+) and Nitrate for examination in laboratory.

Literature Review:-

Numerous nations across the globe are currently facing challenges related to water stress, scarcity, and inadequate drinking water quality (Biswas & Tortajada, 2019; Hourieh Fallah et al., 2020; Javid et al., 2020a). In light of the advancements in medical technology that have led to improved public health, it is increasingly important to assess the quality of various drinking water sources, such as well water, tap water, and bottled water, particularly in developing countries (van der Linden, 2015; Hourieh Fallah et al., 2020; Javid et al., 2020b; Ghanbarian et al., 2021). Freshwater resources constitute less than 1% of the world's total water supply (Cooper & Hiscock, 2019). Projections indicate that by 2050, two-thirds of the global population will reside in regions with limited access to freshwater, and by 2100, this number could rise to 11.2 billion (Biswas & Tortajada, 2019; Ridzuan, 2021).

Numerous reports have highlighted the presence of various chemical and microbiological contaminants in well water and even in treated tap water, leading to a daily increase in bottled water consumption (Rani & Prasad, 2012; van der Linden, 2015; Brei, 2018). While bottled water manufacturers adhere to stringent quality standards, some research indicates that the chemical, physical, and microbiological characteristics of certain bottled water brands fail to meet both national and international benchmarks, particularly in developing nations. For instance, a study by Momtaz et al. (2013) assessed the microbiological quality of tap water alongside five bottled water brands in Iran, revealing that 2.63% of the bottled water samples were contaminated with Escherichia coli. Additionally, research by Shams et al. (2012) in Gonabad province, Iran, demonstrated that the storage duration and conditions of bottled water significantly impacted its bacteriological quality, ultimately diminishing the overall water quality.

Material and Methods:-

Sample Collection: Three water samples were collected from different locations within the campus of Sam Global University. The samples were collected in clean, sterilized bottles to prevent contamination. The locations and types of water sampled were as follows:

i. **Tap Water:** Collected directly from the main water supply tap located in the university's laboratory building. The tap was allowed to run for 2 minutes before collecting the sample to ensure a representative sample. (Figure 4.1)

ii. **Borewell Water:** Collected from the borewell located near the university's residential area. The water was pumped for 5 minutes prior to sample collection to obtain a fresh sample from the aquifer.(Figure 4.2)

iii. **Pond Water:** Collected from the pond situated on the university campus. The sample was taken from a depth of approximately 30 cm below the surface to avoid surface contaminants. A clean, sterilized container was used to collect the sample. (Figure 4.3)

1.Tap Water

2. Borewell Water.

3. Pond Water

Sample Storage

We will keep all water samples in clean, sealed containers and store them for 4o Temperature,and Securely transported to Laboratory for analysis as well as for ensuring the accuracy of the results.

Equipment Used

- pH Meter
- Turbidity
- MeterDissolved
- Oxygen MeterConductivity
- MeterTDS Meter

Procedure :

- **pH Measurement:** pH is a critical indicator of water quality, defined as the negative logarithm of the hydrogen ion concentration. It serves as a measure of the acidity or basicity of water. Prior to its application, the pH meter was calibrated using standard buffer solutions to ensure accuracy.
- **Turbidity:** Turbidity was assessed with a turbidity meter, which measures the cloudiness of water. This cloudiness reflects the extent to which light can penetrate the water and is influenced by suspended materials such as clay, silt, organic matter, plankton, and other particulates. Turbidity is an essential parameter for evaluating water quality and determining its safety for consumption, as elevated turbidity levels are linked to the presence of disease-causing microorganisms.
- Electrical Conductivity: The electrical conductivity (EC) of water serves as an indicator of a solution's capacity to transmit electrical current. This conductivity is influenced by the presence of ions in the solution; as the concentration of these ions rises, so does the conductivity. Consequently, it is a critical parameter for assessing the appropriateness of water for applications such as irrigation and firefighting. The readings are calibrated using a KCl standard.
- Total Hardness: The total hardness of the water samples was assessed through the EDTA titration method. During this process, the samples were titrated with a standardized EDTA solution, and the findings were reported in milligrams per liter (mg/L) of $CaCO_3$.
- **Ion Analysis**:-Specific ions such as nitrate and phosphate were analyzed using a spectrophotometer. Standard methods were followed for sample preparation and measurement.
- **Alkalinity**:-Alkalinity was measured using the titration method with standard sulfuric acid, and the results were expressed in mg/L of $CaCO_3$.

RESULTS :

The study aims to examine water parameters in various locations in Sam Global University campus. The Water Quality mainly has 12 Physicochemical parameters TDS (Total Dissolved Solids), color, temperature, acidity, hardness, pH, sulfate, chloride, DO, BOD, COD, alkalinity used for testing of water quality. Heavy metals such as Pb, Cr, Fe, Hg etc. The U.S. The Environmental Protection Agency (EPA) recommends that a drinking water pH is 6.5 to 8.5, whereas a groundwater system pH 6 to 8.5, and also recommends the ideal drinking water pH level for water sources is 6.5 to 9.0.
An pH level of 7.0 is considered as neutral.

- When a water sample is examined, we see that there is impact of environmental activity like rain, pollution in the water source, hence we can see some changes in their pH level, Temperature, water hardness, ect.,
- A Turbidity signifying presence of any kind of pollution in water and help to measure clarity.
- Dissolved Oxygen (DO) can explain aquatic life survival and their condition in such WaterPlace.
- Biochemical Oxygen Demand (BOD) also helps us to find out what the oxygen level in water is and whether it is safe for aquatic life or not.
- Specific ions concentration are helpful to measure water minerals for example their nitrate, phosphate and heavy metal level after the heavy impact of rain, fertilizer used in agricultural fields.

CONCLUSION :

The analysis of water samples from different locations within Sam Global University reveals significant variations in water quality parameters. The study highlights the need for regular monitoring and management of water quality within the university campus to ensure the safety and health of the campus community and the surrounding environment.By analyzing key parameters such as pH, turbidity, dissolved oxygen, hardness, and the presence of contaminants, we can assess the overall suitability of water for different purposes, including drinking, irrigation, and laboratory use.The data collected can serve as a baseline for future studies and help guide water management strategies. By identifying areas with potential water quality issues, this research contributes to the development of a safer and more sustainable water supply system for the university.

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10. National Drinking Water Quality Standard (NDWQS) – Sets local standards for drinking water quality.
11. Perak, Malaysia study – Investigates drinking water quality in residential and commercial areas.
12. PH Measurement Standard Methods – Describes the methods for measuring pH in water.
13. Turbidity Measurement Standards – Explains how turbidity is measured to assess water clarity.
14. Electrical Conductivity Measurement Standards – Details methods for evaluating the conductivity of water.
15. EDTA Titration Method – Used to determine the total hardness of water samples.