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Physico-Chemical Analysis of Water Samples

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Abstract: ***Water samples from Thengoda and Malegaon's urban and rural areas are used to assess the water quality in five blocks. where water samples from each block are examined for the physico-chemical condition of samples of water. Numerous quality parameters are assessed in physico-chemical analysis, including as pH, specific conductivity (SP), total dissolved solids (TDS), total hardness, according to WHO water quality guidelines; also, the current study examined the classification of water samples from five blocks based on TDS, anions, cations, and TH. All of the water samples had nearly neutral pH values. In comparison to rural water, urban water had higher TDS, conductivity, and hardness. Every parameter was within the acceptable range. The findings were presented and discussed.***

Keywords: Total hardness, nutrients, physico-chemical analysis, water samples, TH, TDS, COD, BOD

1. Introduction

A vital component of human life is water. According to WHO figures, over 65% of Indians living in rural areas and 36% of those living in urban areas lacked access to safe drinking water. One of the most vital resources for the survival of all living things is fresh water. Because humans rely on water for food production, industrial processes, waste disposal, and cultural requirements, its significance is even greater. The quality of the surrounding water affects how ground water is used by humans and the environment. The hydrology of watersheds is significantly impacted by human-induced landscape modification. Gurunathan (2006). Groundwater is essential to human existence.

The effects of industrialization and urbanization contaminate water for agricultural use, therefore groundwater is investigated in rural areas, particularly in places where there aren't many other water sources, like as dams, rivers, or canals.

Over the past ten years, it has been noted that increased human activity has resulted in a significant pollution of ground water. As a result, there have been several instances of water-borne illnesses, which pose a risk to public health. The foundation for comprehending the various aspects of aquatic environmental chemistry, which include the origin, makeup, reactions, and movement of water, is an understanding of water chemistry. Water quality is a major concern for humanity since it has a direct impact on human well-being. Water-borne illnesses have historically resulted from drinking water contamination.

2. Materials and Methods

Water samples were taken in polythene bottles from four different locations between 9 and 11 a.m. As soon as possible, the water samples were brought into the laboratory to estimate a number of physico-chemical parameters, such as water temperature and pH, which were measured using a thermometer and a digital pH meter (Systronics). A digital conductivity meter was used to measure particular conductivities. A TDS meter was used to measure the TDS readings. Other parameters, like hardness, potassium, and sodium, are measured using flame photometry.

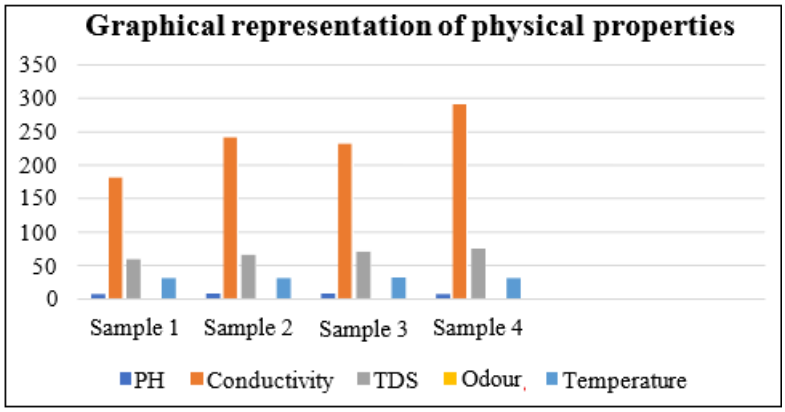
Using standard scientific techniques, manganese, calcium and magnesium chloride, sulphate, and nitrate were estimated in the lab. The current study uses physical-chemical approaches to analyse the quality of the water. (APHA 1985; Trivedy and Goel, 1986)

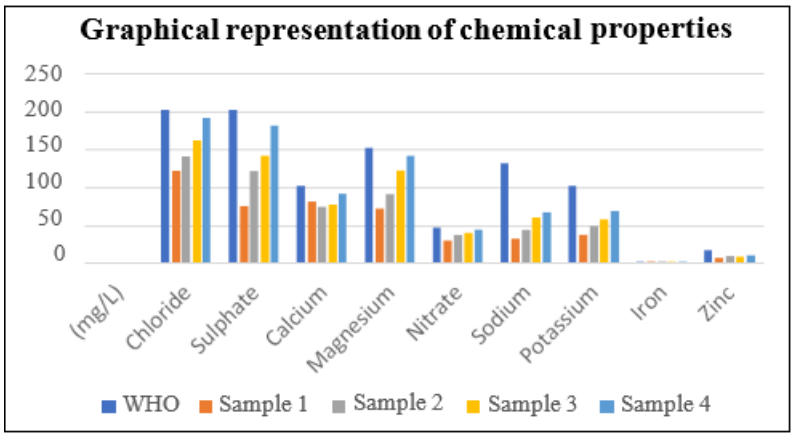
Table 1: Water sample physical characteristics, urban and rural area of Thengoda and Malegaon

	PH	Conductivity	TDS	Odour	Temperature
Sample 1	7.3	181	59	0	30
Sample 2	7.4	241	66	0	30
Sample 3	7.6	231	71	0	31
Sample 4	6.8	291	76	0	30

Table 2: Water sample chemical characteristics, urban and rural area of Thengoda and Malegaon

Chemical property (mg/L)	WHO	Sample 1	Sample 2	Sample 3	Sample 4
Chloride	201	121	141	161	191
Sulphate	201	75	121	141	181
Calcium	101	81	74	76	91
Magnesium	151	71	91	121	141
Nitrate	46	29	36	39	43
Sodium	131	31	43	59	66
Potassium	101	36	48	57	68
Iron	1.1	0.76	0.84	0.86	0.98
Zinc	16	6	8	7.6	9.6





3. Results and Discussion

Throughout the observation period, the pH value did not significantly vary; instead, it was within the range of 6.9 to 7.5. Salinity, conductance, turbidity, and total hardness all rose in the same way, that is, from Sample 1 to Sample 4. For Samples 3 and 4, the concentration of nutrients such as sulphate and chloride was within allowable bounds. In every instance, the BOD stayed below 3, indicating typical microbial activity. Physico-chemical factors influenced primary output in various regions. Water samples from the research area showed no signs of hazardous chemical pollution based on their physico-chemical and chemical characteristics. There were less microgram-positive bacterial activity detected in samples 3 and 4. In the long term, sample -4 is healthier.

4. Conclusion

Mineral levels like Na, Ca, and Mg were below WHO recommendations, but water from urban areas had higher concentrations of these minerals than water from its rural areas. This suggests that the necessary minerals are more readily available in urban supply than in its rural areas. According to research conducted by [5,6,7,8,9,10], the levels of various components in this study were used to characterize the physiochemical properties of water from diverse places in rural and urban areas. Each parameter was evaluated by comparing it to the World Health Organization's (WHO) established desirable limits [11,12,13]. Based on the study's findings on pH, EC, TDS, Ca2+, Mg2+, Na+, K+, Cl-, NO3-SO 2–, Fe_+2, and Zn+2 levels, urban water is safe to drink. However, the overall hardness ranged from 70 to 80 mg/L, indicating that the water in rural areas is somewhat hard. Accordingly, it is proposed that the water in urban areas is frequently softer, as shown by Pandey (14), Trivedy (15), and Kedar (16). Jayabhave (17), Salve (18), Khan (19), and Kamdam (20) have all reported comparable findings. In-depth mapping and hydrological studies for current water sources can be conducted to demonstrate flow lines and conduct a hydro-geochemical survey in that region. Determining the source of contaminants, which can be attributed to different types of soil, is also essential. We learned from this investigation that urban water has more dissolved ions and is less hard. Then, in the Kolar district of Karnataka, India, rural water was gathered.

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