# ANALYSIS OF PHYSICO-CHEMICAL AND BACTERIOLOGICAL STUDIES OF WATER SAMPLES FROM THE SUB-URBAN AREAS OF SANWER TEHSIL, MADHYA PRADESH

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***Abstract*: The present work deals with the physic-chemical and bacteriological testing of the ground water. The sampling station were situated in the different villages of Sanwer Tehsil near Indore District, Madhya Pradesh. Parameters like Hardness, TDS, Turbidity, pH and Electrical conductivity were tested in the collected samples. All the parameters were found to be in permissible limits.**

***Keywords*: Total Hardness, Turbidity, TDS and pH.**

## Introduction

Water cover 71% of the Earth surface [**1**]. People obtained their drinking water from surface and underground sources. These sources could be contaminated by microbial and chemical pollutants come with domestic waste water, sewage, etc. [2]. The continuous biochemical reaction that take place in living things are made possible in the presence of water and without it the cell collapses **[**3**].** The Physico-chemical Parameters of water and the dependence of all life process of these factors make it desirable to take as an environ [4-6]. The WHO reports that approximately 36% of urban and 65% of rural Indian were without access to safe drinking water [7]. According to WHO organization, about 80% of all the diseases in human beings are caused by water [8]. The analysis reveals that the groundwater of the area needs some degree of treatment before consumption. The physico-chemical parameters such as pH, E.C., T.D.S., alkalinity, turbidity, Ca (calcium) and Mg (magnesium) hardness, total hardness, have been tested [9].

## Material and methods

In this analysis physicochemical & bacteriological parameters were tested in the pre-monsoon and post-monsoon season.The samples were collected from different sampling stations situated in the different villages of Sanwer Tehsil District Indore, Madhya Pradesh. Various Physico-chemical Parameters like pH and Electical conductivity was measured by using PH meter. Total hardness due to calcium and magnesium salts was determined complexometric titration method through EDTA. Turbidity and TDS were observed with the help of digital water kit. Physical and chemical parameters like pH, turbidity, hardness and total dissolved solids play important role in the disinfection of water. Turbidity should be less than 0.5 Nephelometric Turbidity Units (NTU) and pH should be less than 7 for effective disinfection. In tubewell water Bacteriological parameters tested were total coliform (T.C) and faecal coliform (F.C). These parameters indicate the possibility of the presence of pathogenic bacteria in the tubewell water. The criteria for sample collection is shown in Table 1.

**Table 1 Sampling Criteria**

| Locations | Before monsoon | | | After monsoon | | |
|---|---|---|---|---|---|---|
| Sanwer Tehsil | 15-5-18 | 25-5-18 | 4-6-18 | 25-8-18 | 1-9-18 | 12-9-18 |

## Sampling, locations and Techniques

Different villages of sanwer tehsil were selected as sampling station for this analysis. The water samples collected from tubewells is situated in small villages like Ajnod, Biju Khedi, Dhaturia, Gawala, LakhanKhedi, Kadwali khurd, Rajoda,Bhawrasla, Lala Kheda and Magar Khedi,

One tubewell (T/W) in each villeges was selected for the purpose of sampling. According to WHO guidelines, one sample per 5000 heads of population should be collected from the sampling stations. The complete details for the sampling locations used is given in Table 1.

**Table 2 Details of Sampling Station used**

| S.No. | Sampling Satation No. | Location of Tube well |
|---|---|---|
| 1 | Sampling Satation 1 | Tubewell in Ajnod |
| 2 | Sampling Satation 2 | Biju Khedi |
| 3 | Sampling Satation 3 | Dhaturia |
| 4 | Sampling Satation 4 | Gawala |
| 5 | Sampling Satation 5 | Lakhan Khedi |
| 6 | Sampling Satation 6 | Kadwali Khurd |
| 7 | Sampling Satation 7 | Rajoda |
| 8 | Sampling Satation 8 | Bhawrasla |
| 9 | Sampling Satation 9 | Lala Kheda |
| 10 | Sampling Satation 10 | Magar Khedi |

From each locations, samples were collected before and after the monsoon. For statistical significance of results, location were sampled three times before and three times after the monsoon on the dates as shown in Table-2. In this way a total of 90 samples were collected and tested during this analysis. Mean values of the obtained results at each sampling stations before and after the monsoon are reported in this paper.

**Results and Discussion**

pH & Turbidity values at all the sampling locations before and after the monsoon have been shown in Fig. No. 1 & 2. It is clear that from Fig. 1 that values of turbidity at all the sampling locations were well below 5 NTU. Electrical conductivity (EC) is the measure of the amount of total dissolved salts present in water sample. EC values of samples indicates the presence of high amount of dissolved inorganic substances in ionized form. The mean values of hardness in the water samples are show in Grain Per Gallon (gpg) unit. Hardness mean value from all the sources are between 1-3.5 gpg. Hardness value slightly increases after monsoon because of absorbed hard element in soil through solid waste & impurities. The mean values of TDS in samples taken at all the locations before and after the monsoon are presented in Fig. 1 & 2. Since TDS higher than 1000 mg/L impart taste to the water, therefore, a desirable value of 1000 mg/L is proposed by WHO. TDS is increased after monsoon in same location. This may be due to the absorption of wastewater into the ground water. The mean value of bacteriological parameters like total Coliform and faecal are found satisfactory and within the permissible limits. Most of the samples are free from contamination before and after the monsoon.

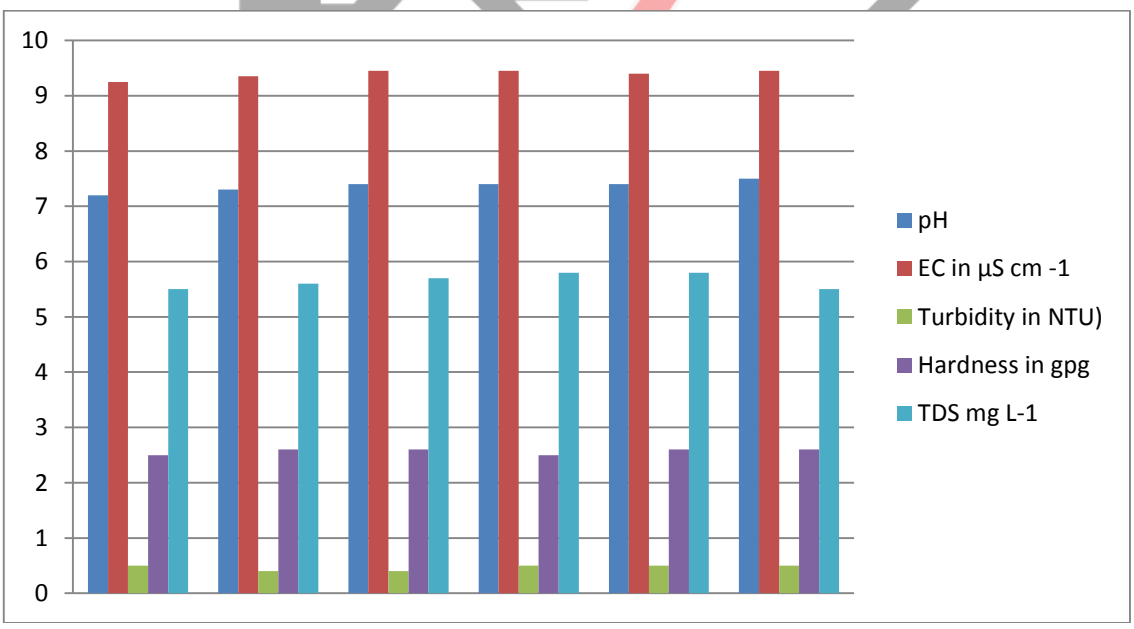


**Fig.1 Mean values of pH, EC, Turbidity, Hardness, TDS before the monsoon at various sampling stations.**

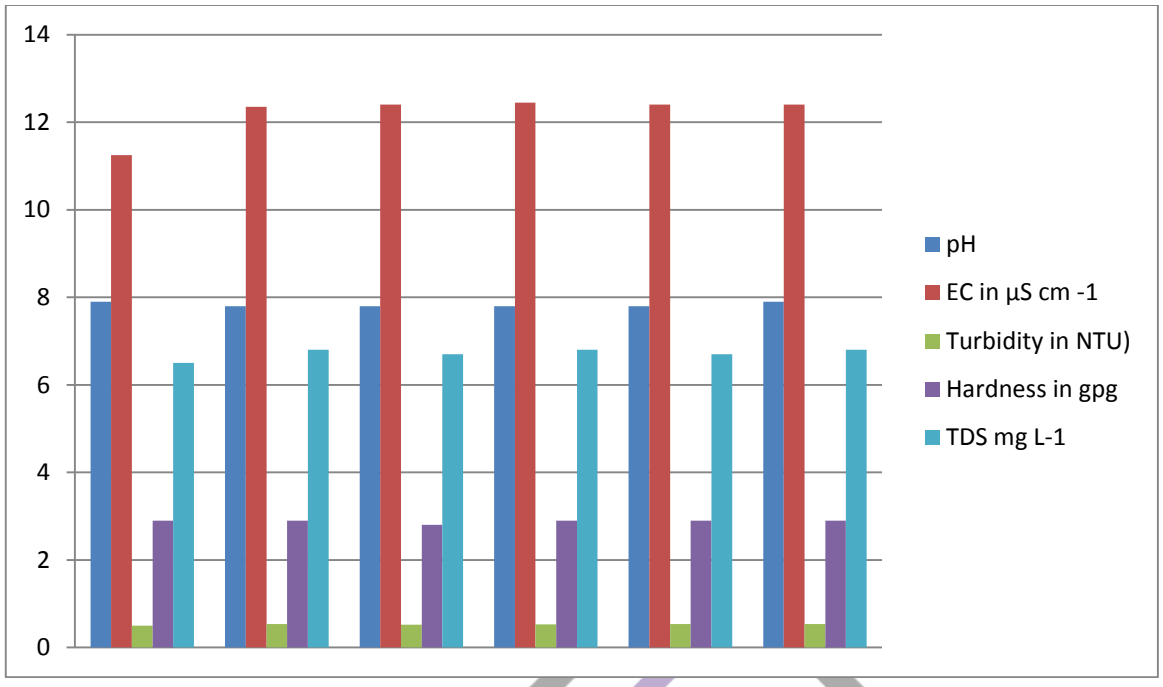


**Fig.2 Mean values of pH, EC, Turbidity, Hardness, TDS after the monsoon at various sampling stations**

**Conclusions**

The Physicochemical parameter pH, turbidity from all locations in the analysis are within the limits prescribed by WHO guidelines for drinking water. Where hardness and TDS values from all the locations are found slightly high as permissible limits. The bacteriological parameters total Coliform and faecal are found satisfactory and within the permissible limits. Most of the samples are free from contamination before and after the monsoon. But the percentage of bacteriological parameters is slightly increased after the monsoon in tubewell water. For removing hardness and bacteriological impurities it is recommended installed filtration & chlorination devices.

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**References**

[1] CIA- The world factbook, Central Intelligence Agency. Retrieved 20 December, 2008
[2] R. Kavitha and K. Elangovan, Ground water quality characteristics at Erode district, (India), of I.J.E.S. 2010; 1(2):145-150.
[3] P. Tyagi, D. Buddhi, R. Chaudlhary and R. L. Sawhney (2002). Degradation of ground water quality in industrial areas of india-A review Ind. V. Environ protect., 20, 174-181.
[4] A. K Pandey, S. Z.Siddiqi and Rama Rao, (1993) : Physico-chemical and biological characteristics of Husain sagar, an industrially polluted lake, Hyderabad. Proc. Acad. Environ. Biol. 2(2), 161-167.
[5] R. K. Trivedy and P. K. Goel (1986): Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.
[6] M. S. Kodarkar (1992): Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderbad; Pub.2: pp. 50.
[7] Kahlown M. A., Tahir M. A., H. Rasheed and K. P. Bhatti, (2006) : Water Quality Status, National Water Quality Monitoring Programme, Fourth Technical Report. Pakistan Council of Research in water Resources, 5.
[8] R. Kavitha and K. Elangovan (2010) : Review article on Ground water quality characteristics at Erode district, (India), of I.J.E.S., 1(2).
[9] Sirajudeen Arul Manikandan J. and Manivel .V, (2013) : Water Quality Index of Ground Water around Ampikapuram area near Uyyakondan channel Tiruchirappalli Tamil Nadu, *Archives of Applied Science Research*, 5(3), 21-26.