

## **Physico-Chemical Analysis of Drinking Water Samples of Different Places in Kadegaon Tahsil, Maharashtra (India)**

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### **ABSTRACT**

*Drinking water has great effects on human health. This research throws light on to the physico-chemical analysis of drinking water in Kadegaon Tahsil, Maharashtra (India). In present study two different scenarios were compared: Well water and bore well water. The parameters such as water temperature, total dissolved solid, hardness, pH, alkalinity, dissolved oxygen, chemical oxygen demand, biological oxygen demand, conductivity and chloride, were analyzed from period of 1 Aug 2016–10 Oct 2016. Our results demonstrated that drinking water collected from different places of Kadegaon Tahsil was not found to be suitable for human health*

**Keywords:** Water samples, Physico-chemical analysis, TDS, COD, BOD

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### **INTRODUCTION**

Water plays an important role in human life. It is necessary for industry, agriculture and human existence. The healthy water ecosystem is depended on the physico-chemical and biological characteristics [1]. Due to increase in industrialization, urbanization, agriculture activity and various human activities has increase the pollution of surface water and ground water [2]. Water is the most widely circulated and abundant substances found in nature. In total, there is 1400 million billion liters of water, but most of this water is not used for drinking purpose, because 97% is sea water and only 3% is fresh water, out of which 2% is ligned in the polar ice caps and glaciers, only 1% water is available for portable use [3]. Use of ground water for human being depends upon ambient water quality [4]. Ground water plays important role in human life. The effect of industrialization and urbanization leads to spoil the water [5] for agricultural purposes ground water is explored in rural especially in those areas where other sources of water like river, dam or a canal is not substantial. During past two decades, it is observed that ground water get polluted significantly due to human activities. Hence, it is necessary to check the quality of well and bore well water at regular time interval, because due to use of infected drinking water, human population suffers from wide-ranging of water borne diseases. It is complicated to comprehend the biological phenomena fully because the chemistry of water revels much about the metabolism of the ecosystem and explain the general hydro -biological relationship.

In this context, paper aims to analyze the physico-chemical and biological properties of well and bore well water collected from different places of Kadegaon Tahsil. This water is basically for drinking agriculture and domestic purpose.

### **EXPERIMENTAL AND MATERIAL DETAILS**

All chemical used for chemicals tests are of analytical grade. In order to determine or investigate the water quality, ten different villages from Kadegaon Tahsil were chosen for sample collection during 1 August 2016–10 October 2016. The samples were collected in polystyrene bottle of 1L capacity. Before sampling, all the bottles were washed thoroughly with the detergent, tap water, ethanol and then distilled water. Chemical parameters were determined by

using standard methods immediately after taking them into the laboratory. Usual preservative techniques were applied to preserve the samples. The samples were analyzed as soon as it was possible. A total of 20 water samples were collected. The locations and sources of water samples are given in Table 1.

#### **Determination of pH and water temperature**

The pH and temperature of water samples were measured at the time of collection. The pH of the water sample was carried out by using HANNA phep (model H 19). The temperature of water samples carried out by using TDS/TEM meter. The readings were taken after the indicated value remains constant for about 1 min.

#### **Total dissolved solids (TDS)**

Solids refer to matter dissolved or suspended in water. Solids may effect on water quality adversely in a number of ways. The TDS of all water samples were carried out at room temperature by using TDS meter. After each measurement, the TDS meter was washed with distilled water and was cleaned with tissue paper.

#### **Electrical conductivity**

The conductivity of the water samples were measured by using pre-calibrated conductivity meter model 611. Before measurement of the conductivity the electrode and beaker must be washed several times with distilled water and the sample under test. The measurement was taken at room temperature. The samples were transferred into beaker in sufficient volume to dip the electrode and then the scale was set before the conductivity of each sample was then noted.

#### **Total hardness**

Total hardness of water samples were carried out by using titration method with EDTA solution.

#### **COD and BOD**

Chemical oxygen demand (COD) of all water samples were carried out by using dichromate refluction method and biochemical oxygen demand (BOD) were carried out by using alkali azide method.

#### **Alkalinity**

Alkalinity is the measure of hydroxide and carbonate ion content of water sample. Water sample is titrated with standard HCl using indicator.

#### **Determination of chlorides and DO**

This test was carried out to evaluate the quantitative determination of chloride ions. This test was carried out by titrating given water sample with silver nitrate solution; end point was yellow to brick red. Dissolved oxygen (DO) of water samples were carried out by using titremetric method.

**Table 1:** Water samples from different places in Kadegaon Tahsil, Maharashtra (India)

Sr. No.	Source	Location
1	Well water	Ambak
	Bore well water	
2	Well water	Chinchani
	Bore well water	
3	Well water	Asad
	Bore well water	
4	Well water	Vadagaon
	Bore well water	
5	Well water	Devrashtre
	Bore well water	
6	Well water	Shirgaon
	Bore well water	
7	Well water	Sonsal
	Bore well water	
8	Well water	Wangi
	Bore well water	
9	Well water	Sonkire
	Bore well water	
10	Well water	Tadsar
	Bore well water	

## 1 Temperature and pH of water

Temperature of water samples taken at the time of collection were in the range of 24 to 26°C. The maximum permitted standard of drinking water is 25°C [3,6]. The pH value of water samples collected from well and bore well water were in the range of 7.3 to 8.4.

## Total dissolved solids (TDS)

The maximum TDS for well water was found to be 473 mg/l and minimum was 192 mg/l and maximum TDS for bore well water was 765 mg/l and minimum was 189 mg/l (Table 2). From the results, it is clear that water samples of studied area are not suitable for drinking in terms of TDS.

## Electrical conductivity

The conductivity of well water and bore well water is shown in Tables 2 and 3. The results reveal that obtained value was not accordance with standard value of drinking water.

## Total hardness

In the present investigation, maximum and minimum total hardness for well water was 250 mg/l and 160 mg/l and for bore well water 700 mg/l and 140 mg/l. The total hardness of bore well water was high in comparison with well water. These high values may be due to the addition of calcium and magnesium salts. Results revealed that bore well water is not suitable for drinking in terms of total hardness.

## COD and BOD

Chemical oxygen demands (COD) and biochemical oxygen demand (BOD) is an important parameters for oxygen required to degradation of organic matter. In this case results of both COD and BOD parameters were not agreement with standard data [7,8].

## Alkalinity

The alkalinity range set by WHO is 500 mg/L. Our results showed that alkalinity of both well and bore well water samples is not accordance with standard data.

Table 2: Results of well water analysis

Place	TDS	EC (ohm <sup>-1</sup> )	TH	COD	BOD	AK	Cl <sup>-</sup>	DO
Ambak	422	1.44 × 10 <sup>-3</sup>	160	480	320	53.2	69.97	3.5
Chinchani	473	1.33 × 10 <sup>-3</sup>	235	370	440	44	84.97	2.9
Asad	315	1.07 × 10 <sup>-3</sup>	180	720	290	40	39.98	1.9
Vadagaon	398	1.02 × 10 <sup>-3</sup>	167	430	360	39.4	69.25	2.3
Devarashtre	393	1.12 × 10 <sup>-3</sup>	201	326	420	44.1	78.22	3.5
Shirgaon	192	1.21 × 10 <sup>-3</sup>	250	480	360	44	24.99	5.2
Sonsal	329	1.18 × 10 <sup>-3</sup>	175	320	410	45.2	24.99	4.5
Wangi	401	1.72 × 10 <sup>-3</sup>	195	422	340	41.2	94.97	2.1
Sonkire	426	1.26 × 10 <sup>-3</sup>	229	220	400	48	44.20	1.8
Tadsar	302	1.01 × 10 <sup>-3</sup>	188	360	280	37.5	52.24	2.7

Table 3: Results of bore well water analysis

Place	TDS	EC (ohm <sup>-1</sup> )	TH	COD	BOD	AK	Cl <sup>-</sup>	DO
Ambak	428	1.76 × 10 <sup>-3</sup>	175	480	660	53.2	94.97	3.7
Chinchani	622	2.03 × 10 <sup>-3</sup>	320	160	800	40.1	99.96	4.8
Asad	589	1.86 × 10 <sup>-3</sup>	265	480	780	57.2	64.97	4.6
Vadagaon	734	1.98 × 10 <sup>-3</sup>	190	640	360	40	44.98	5.2
Devarashtre	765	2.08 × 10 <sup>-3</sup>	700	560	900	46.4	109.96	3.2
Shirgaon	189	1.23 × 10 <sup>-3</sup>	167	380	600	33.2	19.99	3.9
Sonsal	472	1.51 × 10 <sup>-3</sup>	225	400	620	48	39.98	4.2
Wangi	669	1.92 × 10 <sup>-3</sup>	210	620	480	42.3	44.65	3.8
Sonkire	547	1.88 × 10 <sup>-3</sup>	140	460	720	48	37.86	4.7
Tadsar	418	1.44 × 10 <sup>-3</sup>	260	720	440	45.2	44.98	3.0

TDS: Total Dissolved Solids; EC: Electrical Conductivity; TH: Total Hardness; COD: Chemical Oxygen Demand; BOD: Biochemical Oxygen Demand; AK: Alkalinity, Cl: Chloride; DO: Dissolved Oxygen

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### Chlorides and DO

Chloride found high value for both the water samples. In well water it ranges from 24.99 to 94.97 mg/L and for bore well water it ranges from 19.99 to 109.96 mg/L. It is reported that the higher value of chloride is associated with increased level of pollution [9]. Dissolved oxygen is a most important aquatic parameter, whose existence is essential to aquatic fauna. It plays an important role in life process of animals. In this study DO values found from 1.9 to 5.2 mg/L for well water and 3.0 to 5.2 mg/L for bore well water.

### CONCLUSION

From physical and chemical properties of well and bore well water samples collected from different places in Kadegaon Tahsil, Maharashtra (India), following conclusions are recorded.

- Water samples from studied area were not suitable for drinking.
- Both the well and bore well water samples can be quite safe after the boiling.
- X-rays water filter can be used for clarifying water from microorganism.
- Sewerage waste treatment.
- Education of peoples through media about the harmful effect of water on human health.

### ACKNOWLEDGEMENT

The author would like to express their thanks to UGC, New Delhi for financial support through Major Research Project [F. No. 43-233/2014 (SR)].

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