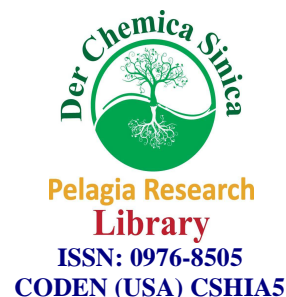




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Studies of physicochemical parameters of bore wells ground water samples

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ABSTRACT

Bore wells underground water samples were collected from different places of Bhusawal, Maharashtra (India). These water samples from six sampling points of Bhusawal, were analyzed for their physicochemical characteristics. Water is a important part of human life, Physicochemical analysis of underground water was carried out in march. All the samples were collected from the different places. People used water for drinking and irrigation purpose these water samples from six different places of Bhusawal, were analyzed for their physicochemical characteristics. Laboratory tests were performed for analysis as Temperature Calcium, Magnesium, hardness, total hardness; pH, Chloride, Alkalinity, TDS, Conductivity, sulphate, phosphate, nitrate & COD were studied. The usefulness of these parameters in predicting ground water quality characteristics was discussed.

Key words: Physicochemical, Conductivity, Hardness

INTRODUCTION

Bore wells underground water samples from six different areas, located in and around Bhusawal were collected in plastic sampling bottles with necessary precautions. Water is essential natural occurring resources for human life and environment that we have always thought to be available in abundance and free god gift of nature [1-3]. The water for the consumption of human beings comes in different forms and from different sources. There were two main sources of drinking water; one is a surface water resources river, lakes. Under ground water mainly from the seepage of surface water and is held in the subsoil and in previous rock. About 94% of total available water all over world is in the form of ground water. In villages the main source of drinking water is under ground water available from wells, bore wells or hand pumps [4-6].

MATERIALS AND METHODS

All the water samples were collected in the month of March. Samples were collected in plastic sampling bottles with necessary precautions. Sampling bottles were of one liter capacity, the places form Bhusawal, S₁ Shanti nagar, S₂ Gajanan maharaj nagar, S₃ Prabhat colony, S₄ Sakagaon, S₅ Datta nagar, S₆ Kheni, samples were collected using the standard method for collection of samples. This water which was being used mainly for the purpose of drinking, cooking and irrigation the villages form Bhusawal taluka, Standard procedure was used for determination of physiochemical parameters. The chemicals used for analysis and determination of certain parameters they were from S. d. Fine chemicals ltd., and Loba Chmie Pvt. Ltd., Mumbai. All reagents were of analytical grade and were used as received and preparation of solutions and reagents in double distilled water. The collected samples were analyzed for different physicochemical parameters such as temperature, pH, Electrical conductivity (EC), total dissolved

solids (TDS), total hardness (TH), Ca^{2+} , Mg^{2+} , SO_4^{2-} and Chloride, Sulphate, nitrate, COD was determined by standard procedure. Total hardness and calcium were measured by EDTA titration method respectively. Chloride was determined by Volhard's method using ferric alum indicator.

RESULTS AND DISCUSSION

Table 1 shows physicochemical parameters of bore wells underground water samples from six sampling places of Bhusawal. The temperature, pH, conductivity and dissolved solids of the water samples were determined by using a thermometer; pH meter, Electrical conductivity was measured using a conductivity meter. The chloride, calcium, magnesium and total hardness were estimated by the standard methods of water. The samples were analyzed using various analytical methods; Total hardness and calcium were measured by EDTA titration method [7-9].

Table 1 shows physicochemical parameters of bore wells water samples from six places of Bhusawal,(Jalgaon District)

Sr No	Parameter	unit	S1	S2	S3	S4	S5	S6
1	Temperature	$^{\circ}\text{C}$	31 $^{\circ}\text{C}$	32 $^{\circ}\text{C}$	32 $^{\circ}\text{C}$	33 $^{\circ}\text{C}$	31 $^{\circ}\text{C}$	32 $^{\circ}\text{C}$
2	pH		7.5	7.4	7.6	7.7	7.8	8.2
3	TDS	mg/L	485	536	615	565	710	590
4	Ca hardness	mg/L	135	155	145	138	149	168
5	Mg hardness	mg/L	75	105	110	112	125	95
6	Total hardness	mg/L	210	260	255	250	274	263
7	Chlorides	mg/L	200	215	195	185	285	245
8	Sulphates	mg/L	54.5	48.5	55.8	60.5	53.8	63.8
9	Nitrate	mg/L	8.5	10.6	11.2	17.2	17.9	18.6
10	Phosphate	mg/L	0.32	0.38	0.52	0.59	0.92	1.25
11	DO	mg/L	7.4	6.8	5.9	6.5	7.3	7.9
12	COD	mg/L	11.8	11.5	12.8	13.2	12.6	12.3
13	EC	mho/cm	930	950	1140	1050	1250	1160

Chloride was determined by Volhard's method using ferric alum indicator. The data revealed that there were minor variations in the examined samples from different sources with respect to their chemical characteristics. The results indicate that the quality of water considerably varies from location to location as well as depth of samples. [10-13].

In the present study physical properties color, temperature ranges from 31 $^{\circ}\text{C}$ to 33 $^{\circ}\text{C}$ from color and appearance of water shows it is suitable for drinking purpose, the taste of water samples was as usual, The pH value of water samples varied in a narrow range from 7.4 to 8.2 which is within the permissible limits in all sources. The pH has showed significant positive relation with electrical conductivity and alkalinity. The variation of pH values are shown in table. In the present study the EC values were found higher at S₅ village (1250 $\mu\text{mhos/cm}$) and very low conductivity was found at S₂ village.(930 $\mu\text{mhos/cm}$).EC values can be used to estimate the dissolved solids concentration which may affect the taste of water and suitability for various uses. Higher the conductivity values indicate higher the dissolved solids concentration in water. Higher the concentration of base and salts in water, more will be the conductivity. [14-18] The BOD indicates the consumption of oxygen by the micro-organism in aerobic degradation of the dissolved organic matter in water. The values observed for BOD of all the samples from all the different sources were all within the permissible range (Table 1). COD is the measure of oxygen consumed during the oxidation of oxidizable organic matter present in the water by strong oxidizing agent. The values of COD were comparatively less indicating that the water was not suitable for the growth of micro-organisms. A number of bases like carbonate phosphate, hydroxide contributes to the alkalinity. It was clear from results basicity of water for all the sources due to contamination of alkaline earth ion. Hardness is the measure of the capacity of water to produce lather with soap or detergent. Hardness is one of the very important properties of ground water from utility point of view for different purposes. Calcium and magnesium are directly related to hardness and hence they are discussed in combined. The acceptable limits for calcium and magnesium for domestic use are 75 mg/L and 30 mg/L, respectively in ground water. [19-24].

CONCLUSION

All the physicochemical parameters of samples which were studied have shown positive and negative correlation between each other. However water from Bhusawal is suitable for drinking purpose. The study of various physicochemical parameters such as hydrogen ion concentration (pH), electrical Conductivity, total alkalinity,

dissolved Oxygen, chloride, total hardness, magnesium, calcium, total dissolved solid, chemical oxygen demand (hereafter COD), was carried out by using various standard methods reported in the literature. Specific representative six sampling places of Bhusawal selected. From the study it was clear that the water of all these sources is suitable for drinking purpose after little treatment,

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