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**Analysis of some physico-chemical parameters of ground water in Gondpipri Region, Chandrapur District (Maharashtra)**

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**ABSTRACT**

*A systematic study has been carried out to explore the water quality of ground water of various villages in Gondpipri region of Chandrapur district. Physico-chemical studies such as temperature, pH, dissolved oxygen, total dissolved solids, chloride, total alkalinity, calcium and magnesium hardness, sulphate, phosphate and nitrate of ground water was carried out from eighteen villages of Gondpipri region and its some interior backward area during the year 2010, in order to assess water quality index. In this study the evaluated values of phosphate and nitrate are higher than prescribed values. Present study recommends that the top priority should be given to water quality monitoring and indigenous technologies should be adopted to make water fit for drinking after treatment.*

**Key words :** Physico-chemical parameter, Ground water, Gondpipri, Maharashtra.

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**INTRODUCTION**

Gondpipri is located in Chandrapur district of Maharashtra state in India. Chandrapur city is called as "Black Gold city". The real coal zone or coal belts are situated in entire Chandrapur district. Chandrapur district is abundantly endowed with rich flora and fauna, water resources and mineral wealth. Wardha is the main river flowing through the district. Rivers Erai, Andheri, Wainganga and the Painganga are its tributaries. The agriculture land in these regions is more fertile for the production of different fruits, vegetables and crops. For getting higher yields farmers use different types of insecticides, pesticides and fertilizers. The yield increases but natural composition of land is continuously changing and the harmful ingredients ultimately come into the water as pollutants to create water pollution as well as soil pollution. Due to

geographical isolation and remoteness people residing in the interior backward area don't have access to safe drinking water. In the absence of regular fresh water supply, people residing in this area are forced to take ground water (well water) for their domestic and drinking consumption. Hence it was thought interesting to carry out an analysis of the physico-chemical parameters such as temperature, pH, dissolved oxygen, total dissolved solids, chloride, total alkalinity, calcium and magnesium hardness, sulphate, phosphate and nitrate of ground water.

### EXPERIMENTAL SECTION

All the chemicals used were of AR grade. Double distilled water was used for the preparation of reagents and solutions. In the present study ground water (wells water) samples from eighteen different areas located around Gondpipri region were collected in brown glass bottles with necessary precautions [1]. Before sampling the bottles were treated with dilute mineral acid solution for two days, and then they were washed with distilled water. Nearly one litre of water sample was collected early in the morning. The major water quality parameters considered for the examination in this study are temperature, pH, dissolved oxygen(D.O.), total dissolved solids(T.D.S.), chloride, total alkalinity, calcium and magnesium hardness, sulphate, phosphate and nitrate contents [2]. Temperature, pH, D.O., T.D.S., phosphate, nitrate values were measured by water analysis kit and manual methods. Calcium and magnesium hardness of water was estimated by complexometric titration methods [3]. Chloride contents were determined volumetrically by silver nitrate titrimetric method using potassium chromate indicator and was calculated in terms of mg/L. Sulphate contents were determined by volumetric method [3].

### RESULTS AND DISCUSSION

The physico-chemical data of the ground water (wells water) samples collected in April 2010 and September 2010 are presented in Table-1 and Table-2. The results of the samples vary with different collecting places because of the different nature of soil contamination [3]. All metabolic and physiological activities and life processes of aquatic organisms are generally influenced by water temperature. In the present study temperature ranged from 25.9-29.7°C.

**Table-1: Analysis results of the samples collected in april-2010**

S.N.	Sample Village	Temp. (°C)	pH	D.O. (mg/L)	T.D.S. (mg/L)	Chloride (mg/L)	Total alkalinity (mg/L)	Ca-Hardness (mg/L)	Mg-Hardness (mg/L)	Sulphate (mg/L)	Phosphate (mg/L)	Nitrate (mg/L)
1	Dhanapur	29.1	6.9	7.8	320	102.3	340.0	87.0	54.4	86.8	0.28	11.0
2	Pellur	28.2	6.8	6.2	390	97.4	356.0	114.0	64.5	114.6	0.24	17.0
3	Borgaon	28.9	6.7	9.2	330	94.8	342.0	78.0	76.6	145.2	0.32	26.0
4	Wadholi	29.7	6.7	5.6	402	89.3	396.0	98.0	53.5	204.6	0.26	16.0
5	Checkberdi	26.1	6.8	8.8	263	87.5	318.0	76.0	58.1	215.8	0.34	25.0
6	Aksapur	27.9	6.7	5.8	290	75.6	294.0	98.0	67.2	94.4	0.18	20.0
7	Ganpur	29.4	6.8	6.2	412	125.2	394.0	74.0	62.8	102.2	0.16	22.0
8	Jogapur	29.3	6.7	7.8	379	125.8	256.0	84.0	55.6	196.4	0.30	25.0
9	Karanji	27.2	6.8	7.8	280	70.1	346.0	76.0	63.5	214.6	0.36	18.0
10	Kemara	26.4	6.7	6.8	410	124.5	298.0	102.0	64.6	149.8	0.38	29.0
11	Surgaon	29.1	6.8	5.8	340	96.5	368.0	78.0	57.9	182.2	0.24	27.0
12	Ganeshpipri	27.6	6.9	7.2	330	126.8	378.0	101.0	53.6	188.6	0.12	14.0
13	Gojoli	29.5	6.7	6.0	320	139.3	218.0	81.0	55.7	134.8	0.42	34.0

14	Dhamangaon	28.1	6.8	5.6	256	113.9	358.0	78.0	64.2	174.2	0.34	16.0
15	Chintaldhabha	29.5	7.0	8.4	360	67.9	262.0	107.0	58.6	106.8	0.32	26.0
16	Dhabha	29.7	6.7	6.6	395	74.4	346.0	86.0	75.2	154.4	0.36	29.0
17	Chimda	28.5	6.7	7.3	380	72.7	276.0	96.0	69.7	89.6	0.38	14.0
18	Gondpipri	28.8	6.9	7.9	330	118.6	282.0	88.0	73.6	139.8	0.22	21.0

**Table-2: analysis results of the samples collected in September-2010**

S.N.	Sample Village	Temp. (°C)	pH	D.O. (mg/L)	T.D.S. (mg/L)	Chloride (mg/L)	Total alkalinity (mg/L)	Ca-Hardness (mg/L)	Mg-Hardness (mg/L)	Sulphate (mg/L)	Phosphate (mg/L)	Nitrate (mg/L)
1	Dhanapur	26.4	6.8	8.2	225	83.8	232.0	89.0	71.6	82.4	0.22	18.0
2	Pellur	26.2	6.9	7.4	328	73.6	302.0	105.0	64.2	102.6	0.18	24.0
3	Borgaon	26.5	6.8	7.8	324	78.4	247.0	85.0	62.7	87.2	0.36	32.0
4	Wadholi	25.9	6.8	6.2	304	86.8	296.0	78.0	53.8	152.4	0.28	24.0
5	Checkberdi	27.1	6.9	6.6	265	66.2	252.0	89.0	51.4	184.2	0.32	32.0
6	Aksapur	25.3	6.8	8.8	256	62.4	306.0	108.0	67.8	144.6	0.28	29.0
7	Ganpur	26.6	6.9	5.6	343	103.6	236.0	88.0	63.4	89.2	0.16	28.0
8	Jogapur	27.7	6.8	5.8	312	56.4	247.0	82.0	69.2	218.2	0.24	17.0
9	Karanji	28.1	6.7	8.2	244	72.6	302.0	102.0	54.6	97.4	0.28	23.0
10	Kemara	26.2	6.8	7.8	324	104.8	288.0	92.0	64.7	145.2	0.34	21.0
11	Surgaon	27.6	6.9	8.8	298	83.2	294.0	59.0	79.2	132.6	0.18	24.0
12	Ganeshpipri	28.7	7.0	7.6	332	64.6	216.0	78.0	53.1	116.8	0.26	18.0
13	Gojoli	26.4	6.8	8.4	292	106.4	256.0	112.0	68.8	158.2	0.38	38.0
14	Dhamangaon	28.2	6.9	4.6	304	94.7	214.0	98.0	61.9	172.6	0.36	24.0
15	Chintaldhabha	26.5	7.1	7.8	288	67.8	305.0	86.0	58.8	117.4	0.22	23.0
16	Dhabha	26.9	6.7	4.8	324	107.6	379.0	67.0	84.4	89.6	0.34	34.0
17	Chimda	28.7	6.8	4.6	364	79.2	232.0	101.0	53.7	122.8	0.22	24.0
18	Gondpipri	26.6	6.9	8.2	314	62.8	313.0	87.0	72.3	93.2	0.14	18.0

The pH values of drinking water is an important index of acidity, alkalinity and resulting values of the acidic-basic interaction of a number of its mineral and organic components. pH below 6.5 starts corrosion in pipes, resulting in release of toxic metals. In the present study pH ranged from 6.7 to 7.1, which lies in the range prescribed by APHA [4]. In the presented study dissolved oxygen ranged from 4.8 to 9.2 mg/L.

According to WHO and Indian standards, TDS values should be less than 500 mg/L for drinking water. In the present study TDS ranged from 225 mg/L to 412 mg/L which lies in the range suggested by WHO and Indian standards [5].

The chloride content in the samples is in between 50 to 150 mg/L. Natural water contains low chloride ions. The findings indicate that all are below the permissible limits of chloride in drinking water, prescribed by Indian Standard Index [5].

In the present study total alkalinity ranged from 214-396 mg/L.

The limits of calcium and magnesium have been prescribed in the range 75-200 mg/l and 50-100 mg/L respectively [6]. Calcium and magnesium contents in all samples collected fall within the limits prescribed. Calcium is needed for the body in small quantities, though water provides only a part of total requirements [6].

The concentration of sulphate in water sample is observed to be within the limit prescribed [7] for sulphate content and it varies from 65 to 210 mg/L. The high concentrations of sulphate may induce diarrhea [7].

In the present study phosphate ranged from 0.14 mg/L to 0.42 mg/L. The evaluated values of phosphate in the present study are higher than prescribed values [5]. The higher values of phosphate are mainly due to the use of fertilizers and pesticides by the people residing in this area. If phosphate is consumed in excess, phosphine gas is produced in gastro-intestinal tract on reaction with gastric juice. This could even lead to the death of consumer [5].

Nitrate nitrogen is one of the major constituents of organism along with carbon and hydrogen as amino acids, protein and organic compounds, in the ground water [8]. In the present study nitrate nitrogen levels show higher values than the prescribed values [8]. This may be attributed to the use of fertilizers and pesticides in this remote backward area.

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### **REFERENCES**

- [1] E. Brown; M. W. Skovgstd; M. J. Fishman. *Methods for Collection and Analysis of water Samples for Dissolved Minerals and Gases*, **1974**; Vol. 5.
- [2] N. Manivasagam. *Physico-Chemical Examination of water, Sewage and Industrial effluents*, Pragati Prakashan, Meerut, **1984**.
- [3] A. I. Vogel. *Text Book of Quantitative Inorganic Analysis*, 4<sup>th</sup> Edition, ELBS, London **1978**.
- [4] *Standard Methods for Examination of Water and Waste Water*, 16<sup>th</sup> Edition, APHA, AWWA and WPCF, Inc., New York, **1985**.
- [5] *The Gazette of India: Extraordinary Part-II*, **1991**; 3, 11.
- [6] A. J. Dhembare; G. M. Podhe; C. R. Singh. *Pollution Research* , **1998**, 17, 87.
- [7] J. E. Mekee; H. W. Wolf. *Water Quality Criteria*, The Resource Agency of California State Water Quality Control board, **1981**.
- [8] D. G. Miller. *Nitrate in Drinking Water Research Centre, Medmemham*, **1981**.