Physico-Chemical Characteristics of Potable Water in Chitrakoot Region District

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Abstract: The chitrakoot is geographically located at coordinated 25.00°N latitude & 80.83°E longitude. The present study is focused on water quality assessment for month of April 2013. The water quality for direct human consumption should be i.e. it should be pure i.e. without impurities. It need not be chemically pure, infect the portable water should essentially have some mineral in order to give it some taste. The Procedures followed to analyze the physico-chemical parameters were from Standard Methods Most of stations were found higher values of hardness. Due to higher hardness values import economic pressure on consumer. Values of total dissolved solid were higher at some stations and other stations samples are under limit. DO and BOD of common studied potable water is also under limit as per prescribed WHO guidelines.

Keywords: Physico-chemical parameters, Potable water, Chitrakoot Region

1. INTRODUCTION

Chitrakoot is atown and a nagar panchayat in satna District in the state madhya pradesh, India. It is a town of religious, cultural, historical and archaeological importance, situated in the Bundelkhand region. The chitrakoot is geographically located at coordinated 25.00°N latitude & 80.83°E longitude. It borders the chitrakoot district in Utter Pradesh, whose headquarters chitrakoot Dham (karwi) is located nearby¹.

Water is one of the basic materials, which is of prime importance for the preservation of life on the surface of the earth. For the resistance of all living being (humans, animals or plants) water we cannot survive almost all-human activities-domestic, agricultural and industrial demand use of water. Although water is nature's most wonderful compound but only less than 15 of the world is water resources are available for ready use. Hence, It is urgently required to use the available water most carefully² The identification of water quality depends on the intended use of the water which may be consumptive (human consumption) and no consumptive (industries, agriculture, irrigation account for more than 2/3rd of the total human use), power generation, recreation etc.), depending upon the purpose uses of water. Certain quality criteria are established and based on these criteria; quality standards are specified by health and other regulating agencies to ensure that the water quality in a resource is suitable for the purposed use. Different type of water use requires different levels of water purity. Drinking water requires the highest standards of purity where as water of relatively lower quality is acceptable for other purposes like agriculture, industries, fisheries, wild life, livestock, recreation, hydro electric power, waste disposal etc.

The water quality for direct human consumption should be i.e. it should be pure i.e. without impurities. It need not be chemically pure, infect the portable water should essentially have some mineral in order to give it some taste. Portable water should conform the water quality standard set for human consumption that are. It should te tasteless and odorless. It should be clear i.e. free of suspended solid and turbidity. It should be free of pathogenic organism. The dissolved inorganic solids should be in moderate quantities. Potable water should be moderately soft (50-100ppm), even slight hardness of 100-150 ppm is substances that may have serious long-term effects. It should be non corrosive to pipe and should not cause any incrustations in the pipes. The pH value should be preferable between 1&8.5. It should be aesthetically pleasant i.e. fresh and cool. It should not stain clothes.³

In India, most of the population is dependent on surface water (damp water) as the only source of drinking water supply. The groundwater is believed to be comparatively much clean and free from pollution than surface water. But prolonged discharge of industrial effluents, domestic sewage and solid waste dump causes the groundwater to become polluted and created health problems ⁴.

The haphazard urbanization coupled with poor disposal practices unhygienic sanitation emphasized further cross section of the local community about observed anomalies further cross section of the local community about observed anomalies in ground water, it was decided to take up a detailed qualitative inter predation of ground water in identified areas of chitrakoot, objective of the parent study are: To identified the potable water quality of study area. To learn various types of instrument related to potable water quality analysis. To find out the current Development in the field of potable water Quality and its impact. To know the experimental method at the area monitoring and analysis technique.⁵

2. MATERIALS AND METHODS

2.1. Sample Collection

The samplings were chosen at different site of the study area. The present study is focused on water quality assessment for month of April 2013. For testing the water samples were collected in different sterile plastic bottles were tightly capped and were immediately transported to the laboratory to avoid any unpredictable changes in the Physico-chemical characteristics.

Samples are taken at regular intervals and it is essential that the collected sample be truly representative of the product of final water. Sample should be collected in clean, dry and Stoppard bottle. The bottle is rinsed thoroughly before collection of sample. Stopper the bottle after collection of the sample. The samples are to be preserved in refrigerators in the analysis is subjected to a delay of more than 24 hover, to avoid any biological activity within the sample. Attach a tag on the sample bottle or other container indicating, date time name of the sample and testes to be carried out. The samples were refrigerated at 4⁰C in the laboratory. The Procedures followed to analyze the physico-chemical parameters were from Standard Methods (APHA 1984).⁵

Table1. List of Sampling Stations

S.No.	Sampling Station with code	Water Source	Depth in fit	Description of sampling location
1	Govt. School Rajola R ₁	Hand Pump	80	Village Rajola Chitrakoot
2	Hanuman JiMandir R ₂	Hand Pump	70	Raja Rajiv Mahal Rajola Chitrakoot
3	University Campus R ₃	Tubal	130	MGCGV Chitrakoot
4	Sphatik Sila Mod R ₄	Hand Pump	70	Sphetik Silas Mod
5	Police Mace R ₅	Hand Pump	70	Police Mace Chitrakoot
6	DRI Campus R ₆	Tubal	140	DRI Campus Chitrakoot
7	Dubay House R ₇	Hand Pump	80	Adarsh Nagar Chitrakoot
8	PHE office R ₈	Tubal	180	PHE Office Arogya Dham Chitrakoot
9	Satna Bus Stand R ₉	Hand Pump	70	Satna Bus Stand Chitrakoot
10	Janki Kund Hospital R ₁₀	Tubal	160	Janki Kund Eye Hospital Chitrakoot Siya Ram Kuti ram Ghat Chitrakoot
11	Siya Ram Kuti R ₁₁	Hand Pump	70	Siya Ram Kuti Ram Ghat Chitrakoot
12	Samaj Bodi Party Office R ₁₂	Hand Pump	80	Bi Pass Road Ram Ghat Chitrakoot
13	Duatiya Mukhar Bindu Kamda Nath R ₁₃	Hand Pump	90	Duatiya Mukharbind Kamda Nath Chitrakoot
14	Nisha Dhar Daram Shala Kamtan Chitrakoot R ₁₄	Tubal	120	Pramukh Mukharbind Kamda Nath Chitrakoot

3. RESULT AND DISCUSSION

The present dissertation work identifies potable water quality of Chitrakoot. The result pf potable water qualities of chitrakoot are given below. The results of study are given in table-1 and standard are given in table-2.

3.1. Temperature

In the present study of potable water is the lowest temperature of potable water is 24⁰C and highest temperature is 32⁰C. All the samples were below the permissible limit prescribed by WHO, 1984. Dwivedi *et al.* 2016, worked the quality assessment of ground water and surface water samples collected from two different zone of central India, Temperature was observed ranged between 10⁰C to 40⁰C.

3.2. pH

The pH Values of drinking water samples are between 8.09- 8.99. Low pH value associated with small amount of mineral acid from chloride source or with organic acid. High pH value associated with small amount of mineral acid from carbonate source or with inorganic acid. Its highest value found 8.99 and lowest value found 8.09. That is present in between limit of value prescribed by WHO, 1984. Tripathi *et al.* 2015 studied multivariate analysis of soil and ground water quality in Sidhi District of Vindhya Pradesh and reported the pH concentrations ranged from 6.20 to 7.57.

3.3. Turbidity

Turbidity of water is also on parameter of potable water quality. In this work the lowest value 1.29 NTU found and highest value 3.98 NTU. All the samples were below the permissible limit prescribed by WHO, (1984). Dwivedi *et al.* 2015, worked the chemistry of soil and ground water in Panna District of Vindhya Pradesh, turbidity of water was found to be 1.5 to 8.0 NTU.

3.4. Total Dissolve Solid

The dissolve solid content of a sample of water is important in deciding whether the water is suitable for drinking purpose or not. In the present study the value of TDS are 200 mg/l. and the highest value of

300 mg/l. Tripathi *et al.* 2016, studied analysis of Physico-chemical Parameters and correlation coefficient of ground water samples in residential area of east zone of central India, detected the TDS ranged between 245.0 to 534 mg/l.

3.5. Total Hardness

In present study of TH highest value found 355 mg/l and lowest value found 249 mg/l. Most of stations were found higher values of hardness. Due to higher hardness values import economic pressure on consumer. Tripathi *etal.*2015, quality and assessment of ground water in Satna, Madhya Pradesh have reported total hardness to be 320 to 760 mg/l.

3.6. Dissolve Oxygen

The DO value range from 4.93 mg/l to 7.01 mg/l the highest DO was observed of P₁₀ as show in table. Values of DO at P₁₀ exceed limit set by WHO as 4.2- 6.0 mg/l. Dwivedi *et al.* 2013 carried out assessment of soil and ground water quality in Rewa District of Vindhya Plateau(India) and DO value was observed ranged between 1.0 to 8.7 mg/l.

3.7. Bio-Chemical Demand

The BOD value range from 4.12 to 7.02 mg/l the highest BOD was observed of P₉ as show in table. Value of BOD at P₉ exceeds limit set by WHO as 6.0 mg/l. Tripathi *et al.*2013, studied the characterization of Diffuse Chemical pollution in Satna District of Vindhya Region, India, BOD value was found ranged between 1.0 to 7.4 mg/l.

Table1. The Physico-chemical Characteristics of Potable water Different Point of Chitrakoot

Sampling station	Temperature	pH	TDS	Turbidity	Total Hardness	DO	BOD
P ₁	24	8.90	220	2.25	325	6.02	6.35
P ₂	29	8.40	235	1.29	340	6.78	6.02
P ₃	24	8.34	300	3.11	286	5.43	5.25
P ₄	32	8.55	245	2.53	260	5.25	4.12
P ₅	31	8.55	240	2.97	249	4.93	5.77
P ₆	28	8.42	220	1.56	325	4.99	5.25
P ₇	30	8.38	215	2.74	290	5.77	5.89
P ₈	29	8.21	210	3.67	288	5.45	4.78
P ₉	28	8.09	230	1.87	335	6.64	7.02
P ₁₀	29	8.42	235	3.98	312	7.01	5.65
P ₁₁	30	8.24	210	2.73	319	6.12	5.77
P ₁₂	32	8.10	205	1.56	339	5.98	5.21
P ₁₃	25	8.92	210	2.12	355	6.10	7.25
P ₁₄	23	8.10	240	2.68	322	5.55	4.65

Table2. WHO Guideline for Drinking Water Quality.1984

Parameter	Standard value
pH	6.5- 8.5
Total Hardness	300 mg/l
TDS	200-250 mg/l
Turbidity	5-10 NTU
DO	4.6 to 6.0 mg/l
BOD	6 mg/l

4. CONCLUSION

For human existence it is essential to have the availability of water supply adequate in term of both quantity and quality. At the beginning of civilization the man recognized the importance of water from a quantity view point and accordingly civilization development around water bodies. They could support agriculture, transportation and provide potable water. Earlier the humans could judge water quality only through the physical sense of sight, taste and smell. Later on the biological chemical and medical sciences developed methods of major water quality and to determine and its effects on human health and well being. Knowledge of the parameter most commonly associated with potable water quality is must. Therefore protection of potable water quality is essential, to effectively regulate potential sources of impurities. We must understand the behavior of impurities in the water. We can predict the environment impact. PH of all stations was under limit. Most of stations were found higher values of hardness. Due to higher hardness values import economic pressure on consumer. Values of total dissolved solid were higher at some stations and other stations samples are under limit. DO and BOD of common studied potable water is also under limit as per prescribed WHO guidelines.

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