

Study of Water Quality Parameters of the ground water of Maihar Tehsil Satna District

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ABSTRACT-

This Paper Present to study of the Physico-chemical Parameters of Ground water of the prime source of fresh water in Maihar Tehsil of Satna district. The water samples are collected from the eleven sites selecting at least one from each ward of that area, first sampling is done in the month of November 2018 and the other in February 2019. The physico -chemical parameters viz., colour, odor, water temperature, transparency, turbidity, electrical conductivity (EC), total dissolved solid (TDS), hardness, alkalinity, chloride, calcium, pH and biochemical oxygen demand (BOD) were analyzed. In the most of the samples, water is colorless and does not impart turbidity. TDS was very high in almost all the samples. The water is moderately hard. The concentration of calcium was within acceptable limit. The pH is above neutral in all the samples hence shows alkalinity. Chloride concentration was very high in the collected samples. The values of BOD were reported to be high in the samples collected from the different sampling stations.

Index Terms – Physico-chemical parameters, total dissolved solids (TDS), BOD, turbidity.

INTRODUCTION –

Maihar is an important town of satna district and located at 24.27°N 80.75°E coordinates. Maihar is a city situated in Satna District of Madhya Pradesh State. Maihar municipality has total population of 40,192. It is best known for the famous temple of Maa Sharda Devi, situated on the top of the Trikoota Hills. Ground water is the prime source of fresh water in this area of satna district. The ground water is generally extracted from ground water aquifers by dug well, hand pumps and tube wells.

During monsoon the flooding of river and consequently percolation of polluted water makes ground water unhygienic [1]. The degree of pollution gets aggravated by seepage of wastes from open drain lines and septic tanks. [2]

All these factors make ground water un-drinkable. It is also getting infected from leakages of solid wastes produced from open discarding. The physico- chemical characters of ground water also has seasonal variability largely due to seepage of surface load by penetration which makes a way for pollutants to enter into ground water aquifers and rainy season revive causes the dilution

of pollutants[3]. For the present study of water quality of Maihar tehsil, eleven sampling station were mark down selecting one sampling station from each ward, and sampling has been done twice once in post monsoon season in the month of November 2018 and other in pre-monsoon season of impending year in the month of February 2019. The physico-chemical properties colour, odor, water temperature, transparency, turbidity, electrical conductivity (EC), total dissolved solid (TDS), hardness, Alkalinity, chloride, calcium, pH and biochemical oxygen demand (BOD) were analyzed.[4]

MATERIALS AND METHODS

The present study was carried out for eleven different sampling stations located in each ward from Maihar tehsil. In the present study the sampling was done during morning hours and samples were collected in prewashed polypropylene bottles of 250ml size [5]. It has eleven wards, one sampling station has been selected from each ward were brought to the laboratory and relevant analysis was performed.[6]

Table 2.1 Details of Sampling Station

S.No.	WARD Number	SAMPLING STATION
1	Maihar Ward No.1	SS-1
2	Maihar Ward No.2	SS-2
3	Maihar Ward No.3	SS-3
4	Maihar Ward No.4	SS-4
5	Maihar Ward No.5	SS-5
6	Maihar Ward No.6	SS-6
7	Maihar Ward No.7	SS-7
8	Maihar Ward No.8	SS-8
9	Maihar Ward No.9	SS-9
10	Maihar Ward No.10	SS-10
11	Maihar Ward No.11	SS-11

The colour of the samples was analyzed by visual comparison with the standard solution of known concentration using Platinum Cobalt comparator [7]. Odor of the samples was determined by sniffing the samples and identifying the smell [8].Turbidity by Turbidity meter[9] and Electrical conductivity was measured by digital conductivity meter (RI 215R)[10]. Rests of the parameters were analyzed by Standard Methods as prescribed in APHA (1995)[11]

Table 2.2- Details Of Water Quality Test

Water quality test	Description	Instrument/ method
Temperature	Temperature exerts a major influence on the biological activities and growth	Thermometer

Colour	The term colour is used to mean the true colour of water from which turbidity has been removed.	Platinum cobalt (visual comparison) method
Odor	Odor is recognized as a quality factor affecting acceptability of drinking water	Wide mouth glass stoppered bottle
Taste	Taste of water ranging from agreeable to disagreeable	By Tasting
pH	The major of acidity (hydronium ion, H ⁺) in the water.	pH meter
Turbidity(NTU)	Turbidity in water is the reduction of transparency.	Turbidity meter
TDS	The measure of the amount of particulate solids that are in the water	TDS meter
Dissolved oxygen	The amount of oxygen available in the water.	Titrimetric method (iodometric)
BOD	The amount of oxygen in the water.	Titrimetric method
Alkalinity	Alkalinity of water is its quantitative capacity to react with a strong acid to a designated pH.	Titrimetric method
Chloride	Measurement of Chloride amount in water	Titrimetric method
Calcium	Measurement of Calcium amount in water	Titrimetric method
Total hardness	Measurement of calcium and magnesium in water.	Titrimetric method (complexometric)
Electrical conductivity(EC)		digital conductivity meter(RI 215R)

RESULT AND DISCUSSION

The electrical conductivity is high in post monsoon as compared to the pre monsoon samples. The total dissolved solids (TDS) values are high in both post monsoon and pre monsoon samples ranging from 300 to 1018 mg/l in November sample and from 260 to 1450 mg/l in February sample. The TDS values were higher in November samples probably due to dissolution of minerals during water percolation in rainy season (.This finding is also supported by the higher electrical conductivity and chloride concentration in the sample. These facts indicates that water is moderately hard to hard. Total hardness is lower in post monsoon sample ranging from 286 to 710 mg/l than pre monsoon sample ranging from 325 to 770 mg/l. The chloride content is also very high in comparison to various standards (WHO, 2004 & ICMR, 1985). The chloride

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content in November sample ranged from 112 to 315 mg/l and in February sample ranged from 210 to 420 mg/l. These data indicate that chloride minerals are getting dissolved in greater concentration in underground conditions. Calcium content ranged from 19 to 265 mg/l in November samples and from 23 to 125 mg/l in February samples. Calcium shows greater degree of stability in concentration and seasonal change, indicating that it is least influenced by rain.

The dilution and dissolution balanced each other results in stable concentration. The value of pH was recorded in the range 7.3 to 8.3 in November samples while it ranges from 7.5 to 8.3 in February samples, as pH is a term used universally to express the intensity of the acid or alkaline condition of a solution. Most of the samples are slightly alkaline due to the presence of carbonates and bicarbonates (Manivaskam, 1996). The value of Biochemical Oxygen Demand (BOD) in November sample ranging from 4.0 to 9.9 (average 5.5 and SD 1.75) and in February sample from 4.1 to 9.8 (average 5.55 and SD 1.19).

The results of present study is summarized in the below tables. The post monsoon samples are given in table-3.1 whereas pre monsoon samples were given in table -3.2

Table –3.1 Physico-chemical parameters in November 2018 (Post Monsoon Samples)

Sampling Station	Colour	Odour	Turbidity	EC (μ siemens cm ⁻¹)	TDS (mg/l)	Total Hardness (mg/l)	Chloride (mg/l)	Calcium (mg/l)	pH	BOD
SS-1	Colourless	Odourless	Clear	2.22	1018	496	283	90	8.0	5.9
SS-2	Colourless	Odourless	Clear	2.64	920	690	276	36	8.0	6.3
SS-3	Colourless	Odourless	Clear	1.18	452	286	116	19	8.2	6.5
SS-4	Colourless	Odourless	Clear	1.68	651	460	158	265	7.3	4.2
SS-5	Colourless	Odourless	Clear	0.68	300	324	112	19	8.3	9.9
SS-6	Colourless	Odourless	Clear	1.91	1690	710	315	114	7.8	4.0
SS-7	Colourless	Odourless	Clear	1.04	820	324	264	36	7.6	4.3
SS-8	Colourless	Odourless	Clear	1.46	740	510	190	31	7.8	4.4
SS-9	Colourless	Odourless	Clear	0.78	684	490	178	28	7.9	4.5

SS-10	Colourless	Odourless	Clear	1.65	594	312	137	21	7.5	5.6
SS-11	Colourless	Odourless	Clear	1.69	790	515	210	34	7.8	5.5

Table (3.2) Physico-chemical parameters in February 2019 (Pre Mansoon Samples)

Sampling Station	Colour	Odour	Turbidity	EC (μ siemens cm-1)	TDS (mg/l)	Total Hardness(mg/l)	Chloride (mg/l)	Calcium (mg/l)	pH	BOD
SS-1	Colourless	Odourless	Clear	1.20	830	570	385	94	7.9	6.5
SS-2	Colourless	Odourless	Clear	1.18	705	725	380	45	8.1	5.9
SS-3	Colourless	Odourless	Clear	1.05	410	325	210	24	8.0	6.3
SS-4	Colourless	Odourless	Clear	1.06	520	530	260	30	7.9	6.5
SS-5	Colourless	Odourless	Clear	0.98	260	380	220	23	7.8	4.1
SS-6	Colourless	Odourless	Clear	1.12	1450	770	420	125	8.2	9.8
SS-7	Colourless	Odourless	Clear	0.88	790	374	375	52	7.8	4.0
SS-8	Colourless	Odourless	Clear	1.01	710	760	305	45	7.7	4.3
SS-9	Colourless	Odourless	Clear	0.85	570	445	230	36	7.5	4.4
SS-11	Colourless	Odourless	Clear	0.98	590	340	320	34	8.0	4.5

CONCLUSION

It is concluded that the underground water of Maihar is less suitable for its potability because most of the parameters were beyond the acceptable limits as prescribed by WHO (2004). However, the limits of physico-chemical parameters were not too high to pose any serious health issue, but one can not rule out its long term effects.

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