

ASSESSMENT OF WATER QUALITY VALUES OF SOHAGPUR TEHSIL, SHAHDOL DISTRICT, MADHAYA PREDESH INDIA

***N. Upadhayay**

Department of chemistry; Pt SNS Govt.PG College Shahdol (M.P)

Article Received on
05 January 2014,

Revised on 30 January 2014,
Accepted on 27 February
2014

***Correspondence for Author**

Dr. Navin upadhayay

Department of chemistry ; Pt
SNS Gov t. PG College
Shahdol (M.P), India.

ABSTRACT

Ground water samples of bore well (BW) ,Open well (OP) , Hand pump (HP) ,Lakes, Falls Collected from different villages of sohagpur tehsil of shahdol district, Madhaya Pradesh .The present study was undertaken to characterize the physicochemical parameter such as Temp, pH, Total Alkalinity (TA), Electrical conductance (EC), calcium hardness (CH), Magnesium hardness (MH), Total hardness (TH), Total dissolved solid (TDS), DO, Fluoride.Each parameter was compared with its standard permissible limit as prescribed by WHO. The study reveals that the ground water of area needs some degree of treatment before consumption it also needs to be protected from the perils of contamination.

Key Words: physicochemical parameter , dental fluorosis.

INTRODUCTION

India is facing a serious problem of natural resource scarcity, especially that of water in view of population growth and economic development ¹. Most of fresh water bodies all over the world are getting polluted , thus decreasing the potability of water ².Ground water is used for irrigation purpose, domestic, and industrial water supply, it is used as potential source of drinking water .Rapid urbanization and industrialization are the major cause which affects the availability and quality of ground water ³⁻⁴ .

According to WHO about 80 % of all the diseases in human being are caused by contaminated water ⁵, so water quality has acquired as much importance as water quantity ⁶ India is heading towards a freshwater crisis mainly due to improper management of water resources and environmental degradation .The fresh water crisis is already evident in many

parts of India⁷. It is vital to regularly monitor the quality of ground water and to devise ways and means to protect it⁸.

The water from the sources viz , falls, lakes, hand pump, open well, and bore well are contaminated with domestic, and industrial waste and likely to cause water related diseases⁹

In this study, physicochemical parameters are determined to draw a conclusion on the quality of water whether it is good or unfit for drinking purpose .

The main objectives of the study are

- Collection of ground water samples from open wells, bore wells, hand pumps, lakes and falls Sohagpur tehsil, Shahdol district .
- Analysis of quality parameter such as pH, Total alkalinity EC , TDS , Hardness Fluoride etc .

Salient features of the study area

Shahdol district is situated in the north-eastern part of Madhya Pradesh, India . It is geographically situated between 22° 38' N latitude to 24° 26' N latitude and 80° 28' E longitude to 82° 12' E longitude. It is surrounded by Anuppur in south-east, Satna & Sidhi in the north, Umaria in the West and Dindori in south-west .

Shahdol district consist of five tehsil, viz – Gohparu, Jaisinghnagar, Beohari, Jaitpur, and Sohagpur . The present study area *Sohagpur* is one of the five tehsil in Shahdol district .

District Shahdol is predominantly hilly district. It is located in the north-eastern part of Deccan plateau, it lies at the trijunction of Maikal ranges of Satpura mountain the foot of the Kymore ranges of the Vindhya mountain and a mass of parallel hills which extend over the Chhota Nagpur plateau in Bihar.

Shahdol district experiences a temperate climate characterized by a hot summer, well distributed rainfall during the south-west monsoon and mild winter. The winter season commences from December and lasts till the end of Feb followed by summer from March to middle of June. The south-west monsoon continues from middle of June to September. The month of May is the hottest month with mean daily maximum temp at 41.4° and daily minimum temp at 26.6°. The normal average rainfall of shahdol district is 1211mm¹⁰.

Experimental

(A) Water sampling

The Water samples were collected from bore well (BW), open well (OW), hand pump (HP), lakes, falls, during August 2013 to November 2013, from nine different location (villages) of *sohagpur* tehsil in shahdol district. The samples were collected in sterilized bottles and were analyzed just after sampling⁹. The temp of the samples were measured in the field at the time of sample collection.

(B) Analytical methods

Analysis was carried out for various water quality parameters, pH meter (systronics digital model) was used to determine the hydrogen ion concentration. Electrical conductivity calculated by using conductivity meter. Total alkalinity (TA) was estimated by neutralizing with standard HCl acid. Salinity and Total dissolved solids (TDS) were estimated using systronics water analyzer. Total hardness (TH) and calcium hardness (CH) as CaCO_3 were determined titrimetrically, using standard EDTA. The calculation of Magnesium hardness (MH) was done by subtracting the CH from TH value. The DO and Fluoride as per standard procedures¹¹

RESULT AND DISCUSSION

For the purpose of revealing the water quality of samples covering the study area the physicochemical parameters have been listed systematically and presented in **Table -1**. The parameters viz, pH and total dissolved solids show the *physical characteristics* of the ground water under the study area. The *chemical characteristics* of the groundwater under the study area are known by the parameters viz, total hardness, calcium hardness, magnesium hardness, fluoride, alkalinity and dissolved oxygen.

Table -1

Palace	Source	Temp	pH	EC	TA	Salinity	CH	MH	TH	TDS	DO	Fluoride
Antara	OW	25	7.39	252	216.3	238.8	76.4	14.6	91	290	1.41	0.59
Antara	HP	30	7.65	268	357.4	169.1	80.2	12.8	93	289	2.03	0.37
Narwar	BW	33	7.48	487	359.2	281.5	100.0	24.0	124	249	2.33	0.18
Narwar	OW	26	7.77	698	141.8	169.3	219.4	144.6	364	317	4.39	0.33
Nawalpur	HP	30	7.89	824	215.7	185.2	151.7	40.3	192	269	1.91	0.35
Nawalpur	Lake	26	7.79	386	233.4	200.0	241	79	320	298	1.79	0.17
Nipaniya	Fall	25	7.40	429	141.9	173.9	89.5	29.5	119	398	2.00	0.24

Nipaniya	HP	30	7.61	544	332.5	212.1	173	57	230	312	2.02	0.33
Jodhpur	BW	32	7.58	721	280.7	263.3	168.2	71.8	240	265	2.17	0.40
Jodhpur	OW	28	7.47	280	204.6	152.1	142.9	38.1	181	354	4.07	0.42
Jugwari	HP	31	7.49	458	278.3	262.4	169.2	42.8	212	317	1.89	0.78
Jugwari	OW	26	7.31	381	202.5	159.6	93.7	44.3	138	363	1.04	0.74
Laphada	Fall	25	7.52	311	151.0	169.5	109.1	35.9	145	421	1.25	0.66
Maiki	HP	29	7.46	621	329.0	262.3	109.2	59.8	169	317	1.0	0.57
Pachgaon	OW	27	7.56	379	201.8	167.1	101.6	15.4	117	426	0.93	0.39

[All the values are expressed in mg/L , temp $^{\circ}\text{C}$, EC ($\mu\text{S}/\text{cm}$),]

The Temp mean value of Sohagpur Tehsil water samples was **28.2 $^{\circ}\text{C}$** . It is obvious that the samples collected from bore well were found to have higher temp than hand pump, open well, lake and falls. The increase in temp decreases to potability of water due to unpleasant taste produced by CO_2 and other gases. Thus the taste of samples differ from place to place.¹² The pH value of water samples was **8.06** this approves that the nature of ground water is slightly alkaline. The mean value of EC **469.266** is an index to represent the total concentration of soluble salt in water. The mean total alkalinity (TA) of the water sample of Sohagpur was **243.07**. The Salinity ranged from **152.1** to **281.5** .

Summary of basic statistics for different water quality parameters is given in **Table -2**

TABLE -2

Parameter	Min	Mean	Max
Temp	25	28.2	33
pH	7.31	8.06	7.89
EC	252	469.26	824
TA	141.8	243.07	359.2
Salinity	152.1	204.41	281.5
CH	76.4	135.0	241
MH	12.8	47.3	144.6
TH	91	182.3	364
TDS	249	325.6	426
DO	0.93	2.01	4.39
Fluoride	0.17	0.43	0.78

Units are in mg/L, except pH and EC ($\mu\text{S}/\text{cm}$), Temp in $^{\circ}\text{C}$

CONCLUSION

In the present investigation , an attempt was made to evaluate the ground water quality of Sohagpur Tehsil, Shahdol district Madhya Pradesh India. The water samples were found to be moderately hard , the hardness of water caused by the presence of Calcium and Magnesium study reveals that all the villages have hardness within the desirable limit prescribed by WHO. The TDS values of water samples of certain villages is higher but overall it is in the permissible range. Fluoride promotes dental health if it is between 0.5-1.5 mg/l but when it exceeds 1.5mg/l it causes dental fluorosis.

In the area where the fluoride content of water is lower than the desirable limit of 0.5mg/l (WHO) the fluoridation has to be done and supplied to the children and public. The water samples are slightly alkaline in nature . The values of various parameter such as EC, TA , Salinity and DO shows the ground water of area needs some degree of treatment before use . The study helps us to understand the quality of the water as well as to develop suitable management practices to protect the ground water resources.

ACKNOWLEDGEMENT

The author is thankful to the principal Pt.SNS Govt. PG college(Autonomous) Shahdol MP (INDIA) for providing necessary laboratory facilities, constant encouragement and support.

REFERENCES

1. Garg R.k ; Rao R j and Sexena D.N. Environ Biology , 2009, 30(5) 909-916
2. Gupta S.k. Dixit S. and Tiwari S. Poll.Res , 2005 , 24(4) 805-808
3. Papatheodorou G. et. Al. Ecological Modelling ; 2006 , 193 , 759-776
4. Shivasharanappa , Srinivas P and Huggi M.S. , Int. J. Environ Sci, 2011 2(2) ; 965-976
5. Abbasi S.A. Water quality Indices ; State of the art , center for pollution control and energy technology , Pondichery University, 1999
6. World Health Organization , Guidelines for drinking water quality ; 3rd Edn WHO ; Geneva, 2006
7. Sundara Kumar K, Sundara Kumar P, Ratnakanth Babu M.J.and Hanumantha Rao C H , Int J.Eng Sci Technol , 2010 2(11) 6035-6046
8. Khalid Hameed Lateef ; Eng J. Sci. Res. 2011 ; 58 (4) , 472-481
9. Aueni A. O. Balogun I I and Songi A.S.O. Res J. Environ Sci, 2011 : 5(1) 21-33
10. Bhatia A. Central ground water board , north central region , Bhopal 2012

11. APHA ; Standards methods for examination of water and waste water , Washigton D C
American Public Health Association .
12. Karuna K. ; Thamilarasu P. and Sharmila R. , E-J Chem., 2009, 156, 307-315