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Pandey Rachana

Department of chemistry,
Dr. C.V. Raman University
Bilaspur (C.G.)

Singh Dhanesh

Department of chemistry,
K.G. Arts & Science College
Raigarh (C.G.)

Kumar Saroj

Department of chemistry,
K.G. Arts & Science College
Raigarh (C.G.)

Kumar Sujata

Department of Chemistry,
Kirodimal Institute of
Technology, Raigarh (C.G.)

Correspondence:

Pandey Rachana

Department of chemistry,
Dr. C.V. Raman University
Bilaspur (C.G.)

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Analysis of ground water of Raigarh coal mining area

Pandey Rachana, Singh Dhanesh, Kumar Saroj, Kumar Sujata

Abstract

The present study is going to centralize around coalmining area Tamnar district- Raigarh located on Coordinates: 22°07'40" N : 83°31'16" E. Water quality index calculates all the parameters and gives an easy decision making output to analyze the quality of water. Change in water temperature, pH, T.D.S., conductivity, total hardness, Ca hardness, Mg hardness, chloride, turbidity, Alkalinity, COD, DO & some heavy metal's were used for the calculation of the index. From the listed data the quality of water was concluded.

Keywords: Hardness, water analysis, Ground water, T.D.S, Tamnar, Heavy metals

1. Introduction

According to present statistical analysis about 75 – 80% human requirements are fulfilled by groundwater. Further groundwater accounts for more than 95% of all liquid fresh water available on the earth at any given movement. Due to the indiscriminate use of surface water as most of these are direct recipient of sewage, industrial effluent, etc. surface water gets unfit for human consumption and in some cases the surface water is not fit for uses like irrigation, fish propagation, industrial purposes, recreational activities etc. Accumulation of inorganic from the high inputs of various chemical industries as a result the groundwater has becoming polluted [1-3].

In recent years, an increasing threat to ground water quality due to human activities has become of great importance. The adverse effects on ground water quality are the results of man's activity at ground surface, unintentionally by agriculture, domestic and industrial effluents, unexpectedly by sub-surface or surface disposal of sewage and industrial wastes.

Water has a decisive role to play in every aspect of our existence. Chhattisgarh state is very fast transgressing from agricultural civilization, the need for water has only increased. Raigarh is thickly populated city, many small & big industries are here. Such big industries are JSPL, NALWA, MONET etc. Day after day, we pour millions of tons of untreated sewage and industrial and Agricultural wastes into the world's water systems. Clean water has become scarce and will become even scarcer with the onset of climate change [4-6].

1.1 Study Area

The present study is going to centralize in and around coalmining area Tamnar district Raigarh in Chhattisgarh. The study area (coalmining field) is a part of Mand Raigarh Coalfields. The area is located in Survey of India Topo sheet No. 64 N/8 & 64 N/12 on 1:50000 scale. Mand-Raigarh coalfield is well connected by National/ State Highways from Bilaspur, and Raigarh with trijunction at Dharamjaygarh, located in the northern part of the coalfield. Bilaspur and Raigarh towns are connected by National Highway No. 200. Dharamjaygarh-Raigarh (State Highway No. 1) and Dharamjaygarh-Kharsia (State Highway No. 23) roads pass through the coalfield. These roads are also connected with each other by Chhal-Ghargoda road. Besides, there are several fair weather roads crisscrossing the coalfield. The nearest town Gharghoda has a Telephone Exchange (STD code 07767) connected to National Network. A Post Office and Telegraph Office is functioning at Gharghoda town about towards 15 km from this coalmining area. The Ground Water of this area is mainly used for the Cattle bathing, washing & other domestic purpose.

The present study aims to weigh up the suitability of water for various human activities.

2. Materials and Methods

White plastic bottle of one liter capacity were used for collecting the samples. Analysis of the water sample has done by according to the standard analytical procedure

2.1 Parameters measured in field

For monitoring purpose, Four Area were selected in Raigarh district Chhattisgarh viz, Hand Pump at village Basanpali, Hand Pump at village Bankheda, Dug well at village Khamaria, & Dug well at village Milupara area. In each area monitored at least five locations covering residential areas,

Industrial areas and municipal waste dumpsites, samples were collected from tube wells, hand pumps in each locations. At each sampling station analysed the samples for temperature, pH, and conductivity. The same samples were taken to the Water testing laboratory P.H.E. department raigarh (C.G.) for analyzing the physico-chemical parameters i.e., Hardness, Chloride, Turbidity, and Heavy metals. The ranges of values for major parameters are as given at the results and discussion. During the visit the following common points were observed. Parameters Hardness, Chlorides Hardness as Ca, Mg as were analysed by titrimetric method and the others are by following:

SN	PARAMETERS	APPARATUS	MODEL NO.
1	pH	Digital pH meter	EuTech instruments S/N781686 Pin-54X002606C
2	Conductivity	Conductivity meter305	EuTech instruments Con 510
3.	Turbidity	turbidity meter	EuTech instruments TN-100
4.	T.D.S.		ECTN100IR 01X35730/ serial no. 869188
5.	Heavy metals(Fe, Cu, Cd)	Spectrophotometer/ cholorimeter	HACH DR- 2800

3. Results and Discussion

Four water samples taken from Raigarh city were collected during March 2015 from various Ground water sources. Collected two samples each in residential, industrial area and near municipal solid waste dumpsites in each city. The details of sampling locations, type of sources and its depth are given in Table 1. pH, temperature, conductivity was analyzed in the field itself and preserved the samples for general parameters and heavy metals analysis as per the norms. The samples were analyzed in water testing laboratory P.H.E. Department Raigarh (C.G.) The physico-chemical analysis data and heavy metal analysis data has been given in the table 2.

It is evident from the data that except chlorides and total hardness, all other parameters are in the permissible range. Chloride concentrations of all four stations are below the desired level and total hardness of SW-4 is higher than the permissible range. It may be concluded that water samples of all four stations may be used safely [7-8].

Table 1: Ground Water Sampling Stations

Code no.	Sampling locations
GW-1	Hand pamp at village Basanpali
GW-2	Hand Pump at village Bankheda
GW-3	Dug well at village Khamaria
GW-4	Drug well at village milupara

Table 2: Physico-chemical and Heavy metal analysis data

SN	Parameters	Units	IS : 10500		SW-1	SW-2	SW-3	SW-4
			Desirable	Permissible				
1	Temperature	°C	-	-	28	28	28	28
2	Colour	Hazen	5	25	CL	CL	CL	CL
3.	Turbidity	N.T.U.	5	10	1.2	8.5	1.0	1.7
4.	pH	pH scale	6.5 – 8.5	NR	6.0	7.1	7.5	7.8
5	Conductivity	Micro mohs/cm	-	--	132.5	162.0	248.0	323.1
6	Chlorides	Mg/l	250	1000	37.2	8.2	15.4	16.2
7	Total hardness	Mg/l	200	600	140	200	140	220
8	Hardness Calcium(as Ca)	Mg/l	75	200	40	100	60	60
9	Hardness Magnesium (as Mg)	Mg/l	30	100	100	100	80	160
10	Iron	Mg/l	0.1	1.0	0.45	0.37	0.49	0.46
11	Copper	Mg/l	0.05	0.05	0.03	0.02	0.02	0.03
12.	chromium	Mg/l		0.05	0.02	0.02	0.03	0.02

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