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ANALYSIS OF GROUND WATER OF DURG DISTRICT

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ABSTRACT

Water is a chemical compound with the chemical formula H_2O. Water molecule contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is a liquid at standard ambient temperature and pressure, but it often co-exists on Earth with its solid state, ice, and gaseous state. Ground water pollution is a type of pollution which occurs when ground water becomes contaminated. Water have many Physical and Chemical characteristics like pH, Temperature, Alkalinity, Acidity, Hardness, Chorine, Phosphate, Nitrate, Nitrite, Arsenic and Fluoride There are several processes to measure to Physico-chemical characteristics like Titrimetric method, Spectrophotomitric method etc.

KEYWORD: Ground water, Physico-chemical parameter, Contaminated, Spectrophotomitric method.

Water molecules are the most important in shaping the land and regulating the climate. Water is one of the most important compounds that influence life (Devendra Dohare *et. al.* 2014). It is essential for all living organism. Ground water is eventual, most suitable fresh water resources with balanced concentration of salt and other parameter (Kolade *et al.*, 1982).

Groundwater is over used due to over population in certain areas where the water supply is limited and due to lack of conservation. An area may have plenty of groundwater below it, however not all of it may be use-able. Groundwater near the surface is more susceptible to anthropogenic pollutants, but deeper groundwater is generally older and may be brine water (Mukul Bishnoi and Shalu Arora,)

Once ground water contaminated, it's very expensive to clean up again, and in some cases, an aquifer may be so contaminated that it has to be abandoned, which can put frightful pressure on community as it attempts to find a new supply of water. There are several different types of groundwater, ranging from water which flows freely through the ground and interacts with surface water to closed aquifers, which are theoretically very hard to contaminate. Groundwater becomes polluted when materials seep through the soil and reach the water, which can happen when rainfall washes contaminants into the ground, when polluted surface water connects with groundwater, and when buried tanks or waste disposal sites start to leach. We all know that water is the life's matter and matrix and without it life cannot exist. It gives us the evolution and functions of universe on the Earth hence water is "Mother of all living world". Majority of water available on the earth is saline in the nature; only small quality exists as fresh water. Fresh water has become scare commode due to over exploitation and pollution (Ghosh *et al.,* 1968; Gupta *et al.,* 2006; Patil and Tijare, 2001; Singh and Mathur, 2005).

MATERIALS AND METHODS

Study Area - Hand pumps of Durg District villages.

Collection of Water Samples

Samples were collected from the hand pumps, bore wells used for domestic or irrigation purpose from the Durg District, Chhattisgarh.

Determination of Phosphate

In to a series of 100ml of standard flask, added phosphate working solution, from 1 to 10ml in each flask and to each flask was added 4.0ml of ammonium molybdate and 0.5ml of $SnCl_2$.Then added distilled water to mark of standard flask. O.D. was taken at 690nm.

Determination of Nitrate Nitrogen (NO_3^{2-})

Into a series of 100ml of standard flask add Nitrate working solution, up to 1ml in each flask. Added 1ml of Brucine sulfanilic acid and 10ml of prepared diluted H_2SO_4, and kept in dark for 10 minutes. This was followed by addition of 30ml distilled and kept again in dark for 30 minutes. Then added distilled water to mark of standard flask. O.D. was taken at 410nm.

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		Samples Collected from and Source of water samples					
S. N	Water Quality Parameter	Bore well (Jamul)	Hand pump (Bhilai)	Tap water (Durg)	Bore well (Rajnandgaon)	Hand pump (Raipur)	WHO range
1	Temperature(°C)	26.5	26.7	26.8	26.8	26.5	20-25°C
2	pH	7.3	6.9	7.4	7.5	7.1	6.5-8.5
3	ES (mS)	1.65	1.07	0.98	5.97	1.38	0.5mS
4	TDS (mg/L)	5.3 ×10-8	3.42 ×10-6	3.24 ×10-7	1.935 ×10-6	4.35 ×10-7	500-1500mg/L
5	Salinity (%)	0.7	1.2	0.6	4.8	1.0	< 0.05%
6	Alkalinity(mg/L)	0.087	0.106	0.073	0.053	0.086	> 20mg/L
7	Total Hardness (mg/L)	0.413	0.406	0.267	0.82	0.553	200mg/L
8	Turbidity (NTU)	50	65	65	65	50	5-20NTU
9	Chloride(mg/L)	10.63	9.39	5.84	15.24	8.15	200mg/L
10	Sulphate (mg/L)	0.9	0.7	0.7	0.7	0.7	200mg/L
11	Phosphate(mg/L)	0.053	0.086	0.062	0.060	0.071	5-10mg/L
12	Nitrite(mg/L)	0.003	0.004	0.001	0.003	0.002	50-100mg/L
13	Nitrate(mg/L)	0.092	0.138	0.071	0.143	0.118	0.5mg/L
14	Chloride (mg/L)	10.63	9.63	5.84	15.24	8.25	200mg/L

Determination of Nitrite Nitrogen (NO_2^-)

Into a series of 100ml of standard flask add Nitrite working solution, up to 1ml in each flask. Then, addition of 4ml NaOH is followed by addition of 2ml sulfanilamide, 0.2ml of H_2O_2 & NEDA each. Optical density reading was taken at 545nm against blank.

Determination of Sulfate

Into a series of 50ml of standard flasks, water samples were taken in amount from 01 to 05ml.Added 10ml of Absorbing solution to each flask. Then, addition of 1ml Formaldehyde is followed by addition of 1ml water samples (taken in 50ml standard flasks), 1ml of Para Rosaline HCl each. Kept in room temperature for 15 minutes. Optical density reading was taken at 540nm against blank.

Determination of Chloride

10ml of water sample was taken, added 1ml of K_2CrO_4 (an indicator) then solution turned in yellow. Titrated against $AgNO_3$. Red-Brown color is appeared in solution or white ppt is found due to the presence of chloride.

Determination of Alkalinity

10ml of sample was taken into a flask. 1drop of sodium thiosulfate was added, and then added two drops of phenolphthalein indicator. The color of the solution became pink. The solution was titrated against sulfuric acid till the color just disappeared, did pen-down the reading. Then addition of two drops of methyl orange was done. Again titrated against sulfuric acid until the color turns orange yellow, noted the readings.

Determination of Hardness

10ml of sample was taken into a flask.1ml of Ammonia buffer solution was added. Then addition of two drops of Eriochrome black T indicator was done until solution turned to wine red color. The solution was then titrated against 0.01M standard EDTA solution with continuous stirring until the last reddish tinge disappeared from the solution.

RESULTS AND DISCUSSION

Physico-Chemical characteristics of the samples are present in table and the comparison is carried out with the WHO guidelines. In the present

study only the temperature, pH and dissolved oxygen of water samples are ranged between or quite close to the range of WHO. The Bore well water from Jamul, have higher values of Total Dissolved Solid, Salinity, Total Hardness, Turbidity, Chloride, Sulphate, Phosphate than WHO values.

So the water samples which is collected from Rajnandgaon district, Chhattisgarh are not fit to use as drinking water because the required amount of Physico-Chemical parameters are not within the range.

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