

Analysis of Physico Chemical Parameters of Underground Water Sample from Selected Area of Satna District (M.P.)

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ABSTRACT - Water is a vital resource for human survival but due to increase population, agricultural practices, industrialization, man-made activities, water is being highly polluted with different contaminants. So that it is necessary to study current status of physico-chemical characteristics of water quality parameters. The complete analysis of drinking water samples were carried out in different areas of satna district. (M.P.)India. The present work is aimed to estimate quality for the ground water of Satna City. Different physico-chemical parameters such as temperature, salinity, alkalinity, Oxidation Reduction Potential (ORD) TDS, EC, hardness, pH, DO, BOD, COD, used for testing of water quality. It seems in the result that physico-chemical parameters of the water were within the permissible limits and was not found to be good for human health.

Keywords: Ground water, water quality parameters, Physico-chemical Parameter.

INTRODUCTION

The quality of water is a vital concern for mankind, since it is directly linked with human welfare. Increase in urbanization, industrialization, agriculture activity and various human activities have increased the pollution of surface water & ground water. As the safe and potable drinking water is needed. Various treatment methods are adopted to raise the quality of drinking water. Pollution of water is a serious problem in India. As almost 70 percent of surface water resources and groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants.

During the past two decades, investigators have taken a serious look at the environmental effects of dumps. As rain water infiltrates through trash in dump, it accumulates an ample assortment of chemical and biological substances. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcity as limits its availability for both human use and for the ecosystem.

Groundwater is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by polluted water. Once the groundwater is contaminated, its quality cannot be restored back easily and means to protect it. Water quality analysis one of the most effective tools to communicate information on the quality of water to the concerned citizens and policy makers.

In this context paper, we aim to analyze the physico-chemical properties of bore well water collected from different areas of Satna district.

MATERIALS AND METHODS

All chemical used for testing are of analytical grade. In order to investigate the water quality different areas from Satna district were chosen for sample collection, during march 2019. The samples were collected in sterile glass bottles, brought to the laboratory, processed within 1-3 hrs and stored at -20°C for further analysis. Before sampling, all the bottles were washed thoroughly with the detergent, tap water and ethanol then distilled water. Chemical parameters were determined by using standard methods immediately after taking them into the laboratory.

The locations and sources of water samples are given in Table 1.

TABLE 1: WATER SAMPLES FROM DIFFERENT PLACES IN SATNA DISTRICT (M.P.)(INDIA)

S.No.	SAMPLE SOURCE	SAMPLE SITE (SATNA District M.P)
1	Bore well water	VIRAT NAGAR
2	Bore well water	ARJUN NAGAR
3	Bore well water	MAHARANA PRATAP NAGAR
4	Bore well water	JIVAN JYOTI COLONY
5	Bore well water	PUSPRAJ COLONY
6	Bore well water	RAJENDRA NAGAR
7	Bore well water	GHANSHYAM VIHAR COLONY
8	Bore well water	JAWAHAR NAGAR
9	Bore well water	SHERGANJ

Determination of pH and water temperature

The pH and temperature of water samples were measured at the time of collection. The pH of all water samples was measured at the time of collection by using portable battery operated pH meter. The calibration was carried out with three standard buffer solution of pH 4.0, 7.0 and 9.2. The pH of the sample should lie between 7.72 to 8.82. The sample temperature was determined at the same time by portable thermometer.

TOTAL DISSOLVED SOLIDS (TDS)

Total dissolved solids describe the amount of inorganic salts of calcium, magnesium, sodium etc. and small proportion of organic matter present in the water. TDS values showed a considerable variability ranging from < 10 ppm to >1500 ppm. During the study relative amount of solutes were high due to decrease in the water level in bore well. Solids may effect on water quality adversely in a number of ways. The TDS of all water samples were carried out at room temperature by using TDS meter.

ELECTRICAL CONDUCTIVITY (EC)

Electrical conductivity usually used for indicating the total concentration of ionized constituents of water. Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions of the solution.

TOTAL HARDNESS

Hardness of water is an important consideration in determining the suitability of water for domestic and industrial uses. Total hardness of water samples were carried out by using titration method with EDTA solution. Water sample with buffer solution (10pH) was followed by the addition of 1 to 2 drops of indicator (EBT). Then, this solution was titrated against EDTA solution from burette, end point reddish to blue color. The degree of hardness of drinking water has been classified in terms of the equivalent CaCO_3 concentration as follows: Soft - 0-60mg/l, Medium - 60-120 mg/l, Hard - 120-180 mg/l, Very hard - >180 mg/l.

DISSOLVED OXYGEN (DO)-

Dissolved oxygen is the most important indicator of the health of water bodies and its capacity to support a balanced aquatic ecosystem of plants and animals. Warm water released from industrial outlets, flowages or storm sewers can also reduce dissolved oxygen levels. Its deficiency directly affects the ecosystem of a river due to bioaccumulation and biomagnifications. This test was carried out to evaluate the quantitative determination of chloride ions. This test was carried out by titrating given water sample with silver nitrate solution; end point was yellow to brick red. Dissolved oxygen (DO) of water samples were carried out by using titrimetric method:

COD AND BOD-

COD is amount of oxygen required for the chemical oxidation of organic matter with the help of strong chemical oxidant .High COD may cause oxygen depletion on account of decomposition of microbes to a level detrimental to aquatic life. The measure of COD determines the quantities of organic matter found in water. This makes COD useful as an indicator of organic pollution in surface water. Chemical oxygen demand (COD) of all water samples were carried out by using dichromate method.

BOD is a measure of the oxygen in the water that is required by the aerobic organisms. The biodegradation of organic materials exerts oxygen tension in the water and increases the biochemical oxygen demand. BOD is a measure of organic material contamination in water, specified in mg/L. Typically the test for BOD is conducted over a five-day period. Biochemical oxygen demand (BOD) was carried out by using alkali azide method.

ALKALINITY-

Alkalinity is the measure of hydroxide and carbonate ion content of water sample. Alkalinity is also a measure of water buffering capacity or its ability to resist changes in pH upon the addition of acids or bases. Bicarbonate represents the major form of alkalinity in natural water. It is measured by titration with standard H_2SO_4 using indicator. Pink color of solution changes to colorless. This is the indication of end point .it is expressed commonly as milligrams per liter as calcium carbonate (mg/l as $CaCO_3$).

TABLE 2: RESULTS OF BORE WELL WATER ANALYSIS

S.No	Sample site	Temperature (° C)	pH	Alkalinity (mg/L)	Hardness (PPM)	ORD (Mv)	TDS (mg/L)	EC (ohm - 1)	Salinity	DO	BOD	COD
1	Virat nagar	19	8.82	210	280	117	223	455	1.0	3.8	48	221
2	Arjun nagar	20	8.73	240	220	110	404	809	1.0	4.1	65	268
3	Maharana pratap nagar	19	8.08	60	240	68	425	875	2.0	4.3	58	301
4	Jivan jyoti colony	19	8.26	80	210	79	545	1092	2.1	4.6	59	155
5	Puspraj colony	20	8.32	130	230	84	415	820	1.5	3.4	63	252
6	Rajendra nagar	20	8.06	190	250	68	475	943	1.8	3.9	51	236
7	Ghanshyam vihar colony	19	8.03	70	240	65	455	915	1.1	4.8	60	294
8	Jawahar nagar	18	8.04	140	270	83	451	902	1.9	4.4	48	245
9	Sherganj	18	7.72	120	280	44	385	773	1.0	4.2	55	210

CONCLUSION

The effects of water pollution are not only devastating to people, but also to destroy aquatic life .Water quality is dependent on the type of the pollutant added and the nature of mineral found at particular zone of bore well. It diminishes the aesthetic quality of water body. Eventually, it is a hazard to human health. Estimation of water quality parameters was done through appropriate method and evaluates the quality of bore well water by quantitative analysis. The present paper undertaken to account to bring an

acute awareness among the people about the quality of water. Result of water quality estimation seems that most of the water quality parameters slightly higher than standard groundwater quality status.

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