

Physico-Chemical Analysis of Ground Water Quality of Narayangaon Area Tal-JunnarDist- Pune Maharashtra

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ABSTRACT

The Bore wells underground water samples were collected from Narayangaon Area in summer and rainy seasons. These sixteen samples were collected from difference places nearby Narayangaon area for analysed their Physico-Chemical characteristics. The water quality were determined from eight area such as, (Warulwadi A1, Anandwadi A2, Kukadi ColonyA3, Thakarwadi A4, Gunjalwadi A5, Manjarwadi A6, Narayanwadi A7 andKhodad A8) In physico-chemical analysis various parameter were studied such as turbidity, alkalinity pH,TDS, COD, OD, sulphate, chloride hardness and temperature. These parameter are useful for determine quality of ground water. The result were compared with the drinking water guidelines of WHO.It was concluded that the water quality in the investigation area is found to be suitable for drinking only in few location.

Keywords: Ground Water, Physico- Chemical, Water Quality Parameters

I. INTRODUCTION

A multiplicity of water characteristics is encountered in nature. This is more significant from a chemical point of view than a physical perspective. Water plays an essential role in human life. An understanding of water chemistry is the bases of the knowledge of the multidimensional aspect of aquatic environmental chemistry which involves the composition, source, transportation and reactions of water[1].Ground water is main source of water for drinking and other purposes of people[2]. Regional, seasonal availability and quality of surface of water and ground water are all highly influenced for the environment, economic growth and development[3]. Water is one of main compound of ecosystem of all living organism and non- living organism therefore necessary that the quality of drinking water should be checked at regular time of interval because contaminated drinking water due to increased human population, industrialisation, use of fertilizer for agriculture purposes and man-made activity [4]. The existence of human society cannot be overemphasized by the importance of groundwater[5]. Vagaries of monsoon, increase in demand for domestic, agricultural and industrial purposes has reached an all-time high in recent decades due to reasons such as unreliable supplies from surface water by the dependability on ground water[6]. Ground water and

surface water is main source of water. Urbanization, industrialization, fertilisation and growing population, the rate of discharge of pollutants into the environment which ultimately finds their way into these water bodies is higher than the rate of purification[7].Generally surface water is more polluted than ground water, hence the use of ground water such as borehole water as the major source of drinking water in many urban and rural areas. Unfortunately ground water can be polluted as various way such as fertilizer from agricultural, vehicle maintenance, sewage disposal and domestic waste. Water is mandatory for the functioning of biological system of entire living and non-living organisms the analysis of its physico chemical parameters such as turbidity, alkalinity PH,TDS, COD, OD, sulphate, chloride and hardness is very essential.

Here we reported the physicochemical analysis of bore wells drinking water of Narayangaon area. Narayangaon is situated in Pune district of Maharashtra. Bore wells water is usually utilize for Drinking and additional household functions in this area. Bore wells water pollution due to use excess of pesticides and fertilizers, lime, septic tank, refuse dump, etc. However, the main objectives of the study were as follows:

- 1) The aim of to evaluate water quality index.

- 2) Carried out the Physico-chemical analysis of bore wells drinking water.

II. Experimental Procedure

Material and methods: The Water Samples from borewell were collected in summer and rainy seasons from eight different stations nearby Narayangaon area in the morning hours between 10am to 12 am in Polythene bottle two times. The Water samples were immediately brought in to Laboratory for the Estimation of various Physico-chemical parameters like as turbidity, alkalinity PH, TDS, COD, OD, sulphate, chloride

hardness and temperature and were estimated in the Laboratory as per methods given in “Guide Manual: Water and Waste Water Analysis” Central Pollution Control Board, Government of India.

Results and Discussion:

Physicochemical parameters of water samples from eight different places nearby Narayangaon area during summer and rainy Seasons are presented in Table 1 and Table 2 respectively.

Observation Table 1. Physico-Chemical Parameters in Summer Season

Sr. No.	Parameter	Permissible limits as per WHO drinking water standards	A1	A2	A3	A4	A5	A6	A7	A8
1	Temperature in °C	30-40	29.5	27.6	28.7	28.2	29.3	28.6	28.5	29.1
2	pH	6.5-8.5	8.07	8.05	8.4	7.5	7.7	8.1	8.3	8.06
3	TDS in mg/L	500-2000	1300	1250	1410	1220	700	830	1120	1020
4	Turbidity	1-5	2.5	2	0.5	3	2.4	3.5	3.4	4.5
5	Alkalinity(mg/L)	200-600	592	612	630	510	650	635	640	570
6	Calcium (mg/L)	75-200	64.45	55	69.23	65.48	58.69	63.52	62.36	70.35
7	Magnesium(mg/L)	30-100	75.66	66.78	68.10	69.10	67.58	59.63	64.96	72.10
8	Total hardness (mg/L)	200-600	440.12	496.45	450.94	448.56	455.23	467.89	447.23	480.15
9	Sulphate(mg/L)	200-400	65.13	62.20	68.44	59.44	67.36	61.89	70.12	65.33
10	Chloride(mg/L)	250-1000	102.23	96.36	132.50	98.96	85.56	97.89	96.14	89.44
11	Dissolved Oxygen(mg/L)	6	5.412	5.300	5.412	4.812	5.023	5.147	4.789	4.652
12	COD (mg/L)	----	5.124	4.986	5.187	4.583	4.843	4.921	4.521	4.256

Observation Table 2. Physico-Chemical Parameters in Rainy Season

Sr. No.	Parameter	Permissible limits as per WHO drinking water standards	A1	A2	A3	A4	A5	A6	A7	A8
1	Temperature in °C	30-40	28.4	26.7	27.5	27.3	28.3	27.2	27.4	28.3
2	pH	6.5-8.5	7.8	7.03	7.2	7.1	6.9	7.09	7.63	7.52
3	TDS in mg/L	500-2000	1380	1350	1480	1340	900	950	1210	1150
4	Turbidity	1-5	4	4.5	6	5	5.6	2.3	4.1	3.6
5	Alkalinity(mg/L)	200-600	550	520	536	492	541	512	523	510
6	Calcium (mg/L)	75-200	66.13	62	70.52	68.23	60.56	65.12	64.56	72.36
7	Magnesium(mg/L)	30-100	80.23	70.66	76.64	72.86	68.22	67.41	68.44	76.56
8	Total hardness (mg/L)	200-600	520.23	514.36	534.66	563.44	542.54	563.45	591.23	524.31
9	Sulphate(mg/L)	200-400	67.56	64.12	75.13	74.12	70.54	69.77	76.64	68.64
10	Chloride(mg/L)	250-1000	106.31	100.63	135.36	102.56	101.54	110.20	100	105.11
11	Dissolved Oxygen(mg/L)	6	5.621	5.436	5.621	5.022	4.993	5.289	4.890	4.894
12	COD (mg/L)	----	5.432	5.269	5.397	4.987	4.798	4.998	4.654	4.623

Temperature

Temperature affects rate of photosynthesis and dissolved oxygen. The average temperature range was 27.6 to 29.5 in summer and 26.7 to 28.4 in rainy seasons for present analysis. During this investigation the temperature was found lower in rainy season than summer season. Temperature change depend on environmental condition.

pH

pH is an important parameter in water. The hydrogen ion concentration is represented by the pH value. pH value rang was 7.5 to 8.4 in summer and 6.9 to 7.8 in rainy seasons. The average value of summer and rainy shows alkaline nature of water. All the sample were in standard limit prescribed by WHO. All these samples were neither acidic nor more alkaline which may be suitable for consumption purpose. pH of water depend upon percentage of carbon dioxide, carbonate and bicarbonate. The partial pressure of carbon dioxide is much higher in ground water than earth's atmosphere. pH of ground water will rise when it expose to atmosphere due to carbon dioxide escape [8].

TDS

The concentration of all dissolved minerals in water means TDS. The range of TDS value was found in the investigation 700 to 1410 in summer and 900 to 1480 in rainy seasons. The study showed the higher value of TDS in rainy season than summer season. The average value of both seasons were in standard limit prescribed

by WHO. The TDS value in rainy season increase due to ground water pollution. Residential and commercial area are polluted by the ground due to discharge of waste water. This waste material mix with rainy water were migrated in ground surface, down to the water[9].

Turbidity

A measure of the extent to which light is either absorbed or scattered by suspended material in water means turbidity of water. Turbidity range from 2 to 4.5 NTU in summer and 2.3 to 6 NTU in rainy Season. In present study turbidity of ground water was higher in rainy season than summer season. In rainy season mud material and dissolved clay were migrated in ground water and water becomes turbid. The average value of both seasons were in standard limit prescribed by WHO. Only area A3 and A5 were out of range in standard limit prescribed by WHO.

Alkalinity

A chemical measurement of water's ability to neutralize acid means alkalinity. The range of alkalinity from 510 to 640 mg/L in summer and 492 to 550 mg/L in rainy seasons were found in present study. During this investigation the value of alkalinity was found higher in summer than rainy seasons. Area A2, A3, A5, A6 and A7 were out of range in standard limit prescribed by WHO. Carbonates, bicarbonates, silicates and hydroxyl ions causes alkalinity in water. Natural water contain more amount of dissolved carbon dioxide which is main source of alkalinity of water [8]. Total alkalinity had

higher in summer seasons was diluted in rainy water in rainy season [10].

Calcium

The mean value of calcium from 55 to 70.35 mg/L in summer and 60 to 72.36 mg/L in rainy seasons were found in investigation. The values of Ca were higher in rainy season than summer season. The average value of both seasons were in standard limit prescribed by WHO. Higher values of calcium in rainy season due to run off municipal sewage, domestic waste and plant nutrients from surrounding of ponds [11].

Magnesium

The average values of magnesium were obtained from 59.63 to 75.66 mg/L in summer and 68.22 to 80.23 mg/L in rainy seasons. The average value of both seasons were in standard limit prescribed by WHO.

Total Hardness

The water hardness is usually due to many minerals dissolved in water. The average range of total hardness from 440.12 to 496.45 mg/L in summer and 520.23 to 591.23 mg/L in rainy seasons. The values of Hardness was higher in rainy season than summer season. The average value of both seasons were in standard limit prescribed by WHO. The organic substance and agricultural waste increases hardness [12].

III. CONCLUSION

In present investigation we describe the study of various Physico-chemical analysis of bore wells water like, temperature, pH, dissolved oxygen, total dissolved solids, chloride, total alkalinity, calcium magnesium hardness, sulphate and chemical oxygen demand. It was concluded that the water quality in the investigation area is found to be suitable for drinking only in few location. TDS, chloride, sulphate, calcium magnesium, and dissolved oxygen these are water quality parameters showed near permissible limit of WHO. The values of Alkalinity and turbidity showed beyond the permissible limits of WHO in some area. Required planning and implementation for drinking water contamination in study area.

Sulphate

The average range of sulphate from 59.44 to 70.12 mg/L in summer and 64.12 to 76.64 mg/L were found in investigation. The average values of sulphate was higher in rainy season than summer season. The average value of both seasons were in standard limit prescribed by WHO.

Chloride

Chloride range from 100.6 to 135.36 mg/L in rainy season and 85.56 to 132.50 mg/L were found in investigation. The average values of chloride was higher in rainy season than summer season. The average value of both seasons were in standard limit prescribed by WHO. High percentage of chloride causes harmful effect on human being like as High blood pressure and salty taste.

Dissolved Oxygen

The average range of dissolved Oxygen from 4.652 to 5.412 mg/L in summer and 4.890 to 5.621 mg/L in rainy seasons.

Chemical Oxygen Demand

The extent of chemical pollution mainly from industrial effluent is indicated by chemical oxygen demand [9]. The average values of chemical oxygen demand from 4.256 to 5.124 mg/L in summer and 4.623 to 5.432 mg/L in rainy seasons. The present study showed higher values in rainy season than summer season.

IV. REFERENCES

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