Journal of Chemical and Pharmaceutical Research, 2018, 10(1):176-179



Research Article

ISSN : 0975-7384 CODEN(USA) : JCPRC5

Analysis of Bore Water in Nagapattinam Area of Tamil Nadu, India

U Gayathri^{*}, T Vimala and S Anbarasi

Department of Chemistry, S.T.E.T.Women's College, Sundarakkottai, Mannargudi, TamilNadu, India

ABSTRACT

To determine the bore water quality from the different water sources. The sample of the bore water were collected from different places and checked how the characters differ from place to place. Environment pollutes the ground water due to so many reasons. So people use such polluted water, it causes many health problems. Hence the present work "Analysis of bore water", the samples were taken from Nagapattinam Area and water samples were investigate qualitative analysis of some physico-chemical parameters of ground water in the study area and the results were compared with standard specification.

Keywords: TDS; TSS; TH; pH; Conductivity and alkalinity

INTRODUCTION

Groundwater is used for agricultural, industrial, household, recreational and environmental activities 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 [1]. The quality of water is vital concern for mankind since it is directly linked with human welfare. In India, most of the population is dependent on groundwater as the only source of drinking water supply. Potable water is the water that is free from disease producing microorganisms and chemical substances that are dangerous to health [2,3], majority of the rural common people do not have access to potable water and therefore, depend on well, stream and river water for domestic use. In India, there are over 20 million private wells in addition to the government tube wells. The story of each city may be different, but the main reasons for the water crisis are common, such as, increasing demand, zonal disparity in distribution of water supply, lack of ethical framework, inadequate knowledge and resources, major land-use changes, long term water level declines, increase in salinity and pollution [4]. Ground water is generally considered as a safe source of fresh drinking water [5]. But the wells are generally considered as the worst type of ground water sources in the term of physio-chemical contamination due to the lack of concrete plinth and surrounding drainage system W.H.O, 1998 [6]. The reason for elucidation of important parameters in water quality assessment may be attributed to the fact that in the overall potability of water, such parameters should not be ignored [3,7].

There are various ways as ground water is contaminated such as use of fertilizer in farming [8], sewage from effluent bearing water body [9]. Once the groundwater is contaminated, its quality cannot be restored by stopping the pollutants from the source. It therefore becomes imperative to regularly monitor the quality of groundwater and to device ways and means to protect it [1]. The objective of this study is to investigate qualitative analysis of some physico- chemical parameters of ground water in study area.

EXPERIMENTAL SECTION

Sampling Techniques

Sample of bore well water collected in high grade plastic bottles of one liter capacity rinsed with distilled water and before collection of sample they were rinsed thrice with the sample water.

Analysis Techniques

Samples were brought to the laboratory and the parameter pH electrical conductivity and total dissolved solids were analyzed within 36 hours standard methods were adopted for the analysis of water sample.

Physical Testing

Common physical tests of water include temperature, solids concentrations (e.g) total suspended solids (TSS) and turbidity.

Chemical Testing

Water sample may be examined using the principle of analytical chemistry. Many published test methods are available for both organic and inorganic compounds. Frequency used methods include pH. TDs, TSS, EC, TH, Calcium, Magnesium, Chloride, Sulphate and Dissolved CO_2 [10-16].

RESULTS AND DISCUSSION

Table 1:	Collection	of samples
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Sample No.	Area
Ι	Vedharnyam
II	Thagattur
III	Karuppampulam
IV	Maruthur
V	Thennampulam
VI	Ayyakkaranpulam
VII	Athanur
VIII	Kariyapattinam
IX	Vaimedu
Х	Velankanni

Table 2: Drinking water standards (concentration in mg/1) (or) ppm

S No	Constituents		WHO	ICMR		
		Desirable	Maximum permissible	Desirable	Maximum permissible	
1	pН	7.0-8.5	6.5-9.2	7.0-8.5	6.5-9.2	
2	TDS	500	1500	500	1500	
3	Alkalinity	10	33	I	_	
4	Hardness	100	900	300	600	
5	Calcium	75	200	75	200	
6	Magnesium	50	150	50	150	
7	Chloride	200	600	250	1000	
8	Sulphate	200	400	200	400	
9	Free chlorine	0.2	-	-	-	

Table 3: Drinking water for US standards

S No	Parameter	US Standard Value				
1	pH	6.0-8.5				
2	TS	550 ppm				
3	TDS	500 ppm				
4	TSS 50 ppm					
5	Total hardness	300 ppm				
6	Calcium	200 ppm				
7	Magnesium	100 ppm				
8	Chloride	250 ppm				
9	Sulphate	250 ppm				
10	Alkalinity	33 ppm				
11	Dissolved Co ₂	Less or more than 10 ppm				
12	Free chloride	0.1-10 ppm				

S.No	Sample No	Color	Odor	pН	Conductivity (m.mhos)
1	Ι	Colorless	Odorless	7.28	0.67
2	II	Colorless	Odorless	7.19	0.56
3	III	Colorless	Odorless	7.25	0.78
4	IV	Colorless	Odorless	7.3	0.75
5	V	Colorless	Odorless	7.34	0.79
6	VI	Colorless	Odorless	8.09	0.65
7	VII	Colorless	Odorless	7.45	1.31
8	VIII	Colorless	Odorless	7.52	0.34
9	IX	Colorless	Odorless	7.41	1.32
10	Х	Colorless	Odorless	8.15	1.5

Table 4: Physical characteristics

Table 5: Chemical characteristics

S No	TS (ppm)	TDS (ppm)	TSS (ppm)	Total hardness (ppm)	Calcium (ppm)	Magnesium (ppm)	Chloride (ppm)	Sulphate (ppm)	Dissolved CO ₂ (ppm)	Alkalinity (ppm)
Ι	154	150	4	220	80	140	251	553	35	310
II	485	455	30	337	73	264	489	785	28	250
III	644	625	19	250	96	154	152	753	24	192
IV	428	415	13	157	123	34	354	886	21	192
V	179	50	129	187	125	62	212	815	5	155
VI	663	552	133	150	70	80	141	728	3	212
VII	628	134	494	87	50	37	177	508	7	150
VIII	282	268	14	152	92	60	170	508	7	340
IX	826	556	270	155	50	105	195	508	21	335
Х	304	173	131	180	63	117	212	315	5	270

- As per Tables 1-5 samples 1, 2, 4, 5, 8 and 10 TDS values were permissible according to the US standard.
- For the samples 3, 5, 7, 9 TDS values were higher than US standard. TSS values for all samples were near to the permissible limit according to WHO and ICMR standard.
- Total hardness of 1, 2, 4, 5, 7 and 8 sample values were near the permissible value US standard. Calcium hardness of all the sample values were near to the permissible limit according to WHO and ICMR standard.
- Magnesium hardness value of sample 4, 5, 6, 7 and 8 near to the permissible limit. Remaining samples values were higher than WHO and ICMR standard. But in US standard, all the sample values are higher.
- Chloride values were samples 3, 5, 6, 7, 8, 9 and 10 are near to the permissible limit. Remaining samples were higher.
- Sulphate values of all the samples were near to the permissible limit, according to WHO, ICMR and US standard.
- Dissolved CO₂ values of the sample 5, 6, 7, 8 and 10 were near to the permissible limit Remaining sample values were higher.
- Alkalinities of all the samples were higher, according to WHO, ICMR and US standard.

CONCLUSION

- In this project the water quality in and around Nagapattinam Area carried out based on various physiochemical characteristics.
- Ten samples of bore water were collected from Nagapattinam Area. Four physical characteristics and 10 chemical characteristics were analyzed.
- Physiochemical activities such as pH, TDS, TSS, TS, alkalinity, conductivity, total hardness, calcium, magnesium, chloride, sulphate, free chlorine and dissolved CO₂ have been using standard procedure.
- The data obtained are compared with standard values for drinking water standard such as WHO, ICMR and US standard.
- Based on the water quality data obtained from this investigation it clear that the 6 samples such as 1, 2, 3, 4, 6 and 8 were used for drinking purpose. Four samples such as 5, 7, 9 and 10 were not used for drinking purpose.

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