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Evaluation and Calculation of Water Quality in Relation to Physico – Chemical Parameters of Groundwater in Selected Areas of Tuticorin District, Tamilnadu, India.

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Abstract: The present study deals with the physic-chemical parameters at selected areas of Tuticorin District, Taminadu, India for the year 2014. Seven different samples were collected from different sampling sites and were analyzed for different physic-chemical parameters. The obtained values were compared with the standard values of ISI, ICMR and WHO.
Keywords: TDS, Chlorides, Total hardness, Physiochemical parameters, drinking water quality etc.

Introduction

Water the elixir, is essential for the survival of all forms of life. Although statistics, the WHO reports that approximately 36% of urban and 65% of rural Indian were without access to safe drinking water [1]. Fresh water is one of the most important resources crucial for the survival of all the living beings. Human and ecological use of groundwater depends upon ambient water quality. Ground water plugs a vital role in human life. The consequences of urbanization and industrialization leads to spoil the water for agricultural purposes. Ground water is explored in rural especially in those areas where other sources of water like dam and river or a canal is not considerable. During last decade, this is observed that ground water get polluted drastically because of increased human activities. Consequently number of cases of water borne diseases has been seen which a cause of health hazards. An understanding of water chemistry is the bases of the knowledge of the multidimensional aspect of aquatic environmental chemistry which involves the source, composition, reactions and transportation of water. The quality of water is of vital concern for the mankind since it is directly linked with human welfare. The present work is an attempt to measure the water quality of various ground water sources of Tuticorin district, Tamilnadu, India.

Materials and Methods

Seven ground water samples were collected from seven bore wells namely Nazareth(Loc.no.1), Srivaikundam (Loc.no.2), Thenthiruperai(Loc.no.3), Neivilai(Loc.no.4), Kurumbur(Loc.no.5), Mukkani (Loc.no.6) and Ammanpuram(Loc.no.7). Standard procedures[2-4] involving flame photometry and volumetric titrations were used for the determination of water quality parameters. All the chemicals used were AR grade.

Table 1: Parameters measured for the water samples

Location	Appearance	Odour	pH	TDS (ppm)	Cl^- (ppm)	Total Alkaliniy (ppm)	Total Hardness (ppm)	Ca^{2+} (ppm)	Na^+ (ppm)
L_1	Clear	None	7.5	1100	322.9	321	460	64.7	61.5
L_2	Clear	None	7.1	680	187	668	449	97	92
L_3	Clear	None	7.0	260	460	642	190	30	28
L_4	Clear	None	7.2	520	912	963	317	96	93
L_5	Clear	None	7.3	350	561	775	227	56	49
L_6	Clear	None	6.7	1360	421	1230	497	158	122
L_7	Clear	None	7.8	1270	365	1043	455	128	108

Result and Discussion

The aim of the present study is to determine the extent of ground water contamination. For this study, physico-chemical analysis were done with the ground water samples collected from seven locations around Tuticorin. The results of both physico-chemical of different ground water samples are presented in Tables (1). These results were compared with values of prescribed standard quality parameters of WHO.

The appearance of ground water sample is clear in all locations except loc. No. 1 and all the observed samples didn't have any odour.

The pH values of water samples varied between 6.6 to 7.8 and were found within the limit prescribed by WHO (6.5-8.5). All the sample shows neutral values.

TDS values varied from 260 to 1360ppm. In the present investigation TDS values are higher than the prescribed limit given by WHO. The TDS concentration was found to be above the permissible limit may be due to the leaching of various pollutants into the ground water which can decrease the potability and may cause gastrointestinal irritation in human and may also have laxative effect. High level of TDS may aesthetically be unsatisfactory for bathing and washing. The accumulation of organic and inorganic solids also contribute to high total dissolved solids [5].

The chloride concentration serves as an indicator of pollution by sewage. In the present analysis, chloride concentration was found in the range of 187 to 912ppm. Some of the valuesare observed higher than the limit WHO (250ppm). Higher chloride concentration in samples from sites may be due to big discharge of sewage near the sampling sites. It imparts a salty taste to water and accelerate corrosion of metals. High concentration of chloride is considered to be an indicator of pollution by organic wastes from industrial and other origin [6].

Alkalinty is due to the presence of carbonate.Alkalinity itself is not harmful to human beings[3]. Alkalinity value in the study area varied between 321 to 1337 ppm. High values of alkalinity shows that it is not fit for domestic purposes.

The hardness values are ranged from 190 to 497ppm. The TH values of some samples are found higher than the prescribed limit WHO (500ppm). This may be mainly due to the contamination by the large quantities of sewage and detergents and the high total hardness would lead to heart disease and kidney stone formation[7]. **C**alcium and Magnesium is directly related to hardness. In the present study TH values are all the within the permissi**b**le limits (WHO) except L_1. The so**d**ium values exceed the desirable limit of WHO in many of the groundwater samples.

Conclusion

The ground water samples were collected from seven different places in and around Tuticorin area. The samples were subjected to physico-chemical analysis. The results showed most of the parameters like TDS, TH, Na^+ and Cl^- are well above the permissible limit prescribed by WHO. The

ground water sample is unfit for drinking and domestic purposes. According to WHO nearly 80% of all the diseases in human beings are caused by water [8-9]. So people should be made aware of the water quality importance onsanitation and economical water treatment methods like filtration and boiling would prove beneficial to avoid waterborne disease. The remedial measure must be taken immediately to safeguard and conserve the precious water resources from pollution for future generation.

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