Pelagia Research Library

Der Chemica Sinica, 2012, 3(5):1272-1275

Pelagia Research Library
ISSN: 0976-8505
CODEN (USA) CSHIA5

Water quality parameters of ground water samples in Tamilnadu, Kerela and Pondicherry

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ABSTRACT

A systematic study has been carried out to explore the Physico-chemical characteristics of groundwater in five different areas in south India. Water sample from open wells in various districts of south India were collected and analyzed for PH, electrical conductivity, dissolved oxygen, total hardness and total alkalinity. Comparative studies of samples in five different district were conducted, it shows Kochi water have low hardness comparatively than Tamilnadu and Kerela districts water. It was also analyzed that electrical conductivity, total dissolved solids, PH, alkalinity. From this, we concluded the Kochi water is best than the many districts of Tamilnadu and Kerela.

Key words: water quality, Ground Water, Physico-Chemical characteristics.

INTRODUCTION

Groundwater is the major source of drinking water in both urban and rural areas[1] Groundwater is the most important source of water supply for drinking, irrigation and industrial purposes. Increasing population and its necessities have lead to the deterioration of surface and sub surface water[2]. The modern civilization and urbanization frequently discharging industrial effluent, domestic sewage and solid waste dump. The cause of ground water gets pollute and create health problems[3]. 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[4]. The objective of this study is to investigate qualitative analysis of some physico-chemical parameters of groundwater in study area. This may be considered as reference for the society to get cautious about the impending deterioration of their environment and health

MATERIALS AND METHODS

Water samples were collected in polyethylene bottles of two liters from different locations of tamilnadu and kerela. The samples were collected deep well and hand pump.

Borosilicate glassware, distilled water and E-Merk reagents were used throughout the testing. Samples were collected in sterilized screw-capped laboratory for their physico-chemical parameters[5-7]. Total alkalinities of the water samples were determined by titrating with N/50 H_2SO_4 using phenolphthalein and methyl orange as indicators. The chloride ions were generally determined by titrating the water samples against a standard solution of $AgNo_3$ using potassium chromate as an indicator. The total hardness of the water samples was determined by complexometric titration with EDTA using Erichrome balck-T as an indicator. Sulphate and fluoride of the water

samples were estimated by UV-visible spectrophotometer. TDS of water sample were measured using gravimetric method. The samples were collected from different districts of tamilnadu and kerela the result were table -1.

RESULTS AND DISSCUSSION

The values of pH was maximum permissible limit in all samples, it was ranging from7.1 to 8.2.the electrical conductivity has been ranging from 750 to 1290µm/cm, but Thirunelveli district water has out of maximum permissible limit. The values of total hardness was ranging from Thirunelveli -310 ppm, Kanchipuram -248 ppm, Kanyakumari -210 ppm, Kerela (Kochi)-35 ppm and Pondichery (Karaikal) – 180 ppm. In these discussions Thirunelveli district has maximum hardness (310 ppm), which accounts Kerela water which having very least amount total hardness only 35 ppm. The values of alkalinity was ranging from all samples of Tamilnadu has been with in maximum permissible limit. But Thirunelveli has ranging Hydroxide alkalinity $[OH^-]^-$ 230ppm, Carbonate alkalinity (CO_3^{2-}) - 290ppm. So that water having more hardness and alkalinity which have been find out in the thorough analysis of this parameters.

Table 1 The values of physico-chemical parameters of the Tamilnadu, Kerela and Pondicery districts

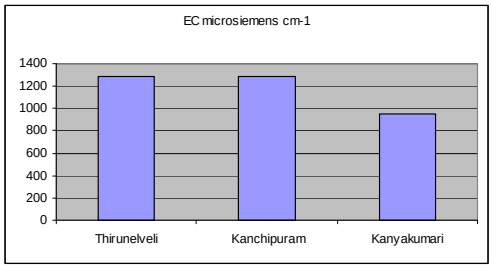
S. No	Parameters	WHO standard	BIS standard	TAMILNADU			KERELA	PONDICHERY
				Thirunelveli	Kanchipuram	Kanyakumari	Kochi	Karaikal
1	Appearance	Clear & Colourless	Clear & Colourless	Clear & Colourless				
2	Colour	Colourless	Colourless	Colourless				
3	Taste	Not objectional	Not objectional	Agreeable				
4	Odour	Odourless	Odourless	Odourless				
5	EC micro siemens cm^{-1}	1000-2000	750-2250	1280	1290	950	750	1020
6	TDS, mg/L	500	500	800	780	650	100	480
7	pH	7-8.5	6.5-8.5	8.2	8.1	7.8	6.8	7.1
8	OH^- ion Alkalinity	100	200	230	200	180	15	120
9	CO_3^{2-} ion Alkalinity	100	200	290	190	210	25	80
10	Total Hardness	300	300	310	305	310	35	180
11	DO	8.0	8.0	8.8	8.5	8.3	8.0	8.0
12	Chloride	200	250	202	200	170	110	150
13	Fluoride	1	1	1	1.1	1.0	0.5	06
14	Sulphate	200	200	180	190	150	120	110

Chloride content of the water samples was low in rainy season. According to WHO, maximum permissible limit for chloride is 500mg/L. The value observed in present study is in the range of permissible limit[8]. The sulphate content varies between110 to 190 mg/L and the fluoride content varies between 0.5 to 1.1 mg/L. The sulphate and fluoride values were also found to be within the prescribed limits.

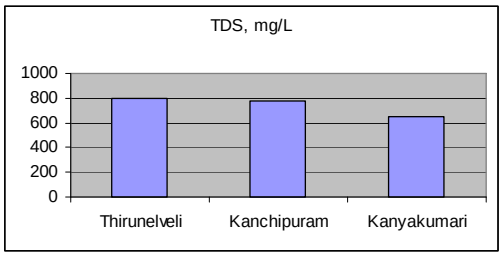
Total dissolved solids (TDS) is a measure of the combined content of all inorganic and organic substances contained in a liquid in molecular, ionized or micro granular suspended form. The permissible limit of TDS of drinking water is 500 mg/l WHO[9]. The observation shows that the TDS is within the permissible range as prescribed by WHO[9]. The values of dissolved oxygen it was found that in Tamilnadu there is no appreciable change in chemical proprieties the samples it is due to the fact that the sedimentation process is not done well in the town area Thirunelveli, Kanchipuram, Kanyakumari and Karaikal. But in rural area more plants , trees and hills area having more flora density so that will make natural sedimentation process happen by the plants trees and soil if water flows across the different stages of earth crust while there will be stopped some impurities dissolved solid and other organic and inorganic impurities the soil will be polluted by the sedimentation and filtration various pollutant such as industrial effluents, agriculture practice, urban area waste, solid waste, and bio- non degradable wastes through by the urban people. So that the sedimentation process is not properly happened due to the above aspects in Tamilnadu and Pondichery. The comparative study between the Tamilnadu, Pondichery and Kerela is carried out by the analysis of the chemical parameters the valuable result have been obtained the hardness, alkalinity, dissolved oxygen, pH, total dissolved solids, chloride, fluoride, sulphate and electrical conductivity values are compared with Kerela, above result of parameters have been very least because Kerela have most of the forest resources and the quality of the land. Also high the sedimentation of water by the natural process is frequently happened, compare to the Tamilnadu and Pondichery the Kerela water having less hardness, alkalinity, dissolved oxygen, total dissolved solids, chloride, fluoride, sulphate and electrical conductivity values. The need for the new industrial economizes approach to deal with the current demand emerging problems become very crucial these problems are industrial and addressed by the various agencies and researches in different states the values seeking proper remediation on the crucial problems on ground water reading.

The flow chart of the range of various parameters of groundwater samples of selected districts of Tamilnadu

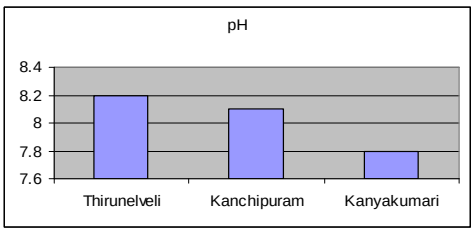
EC (micro siemens cm^{-1})



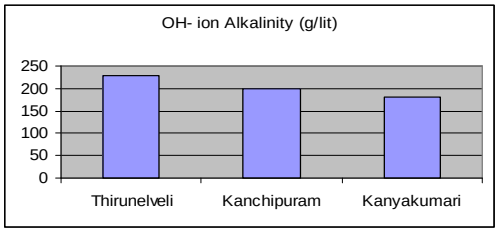
TDS (mg/L)



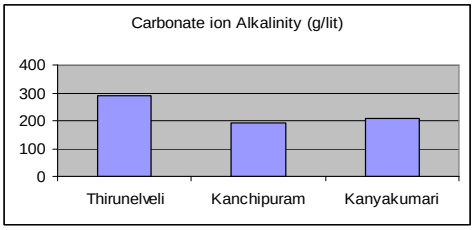
pH



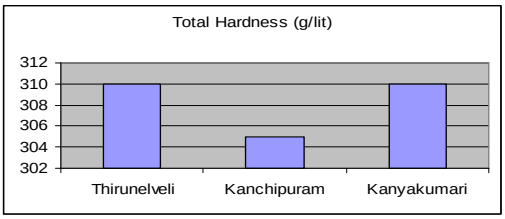
Hydroxide ion Alkalinity (mg/L)



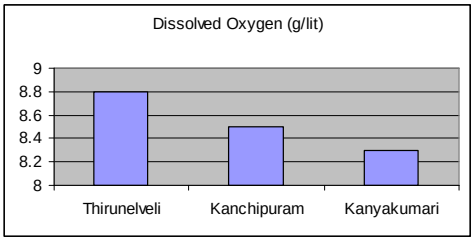
Carbanate ion Alkalinity (mg/L)



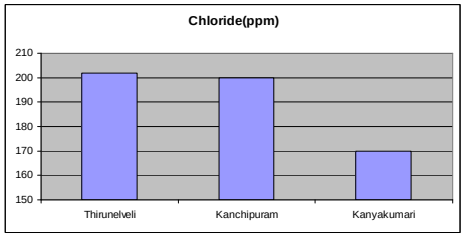
Total Hardness (mg/L)



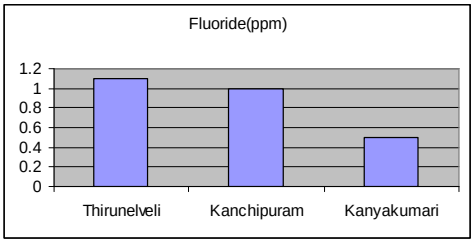
Dissolved oxygen(mg/L)



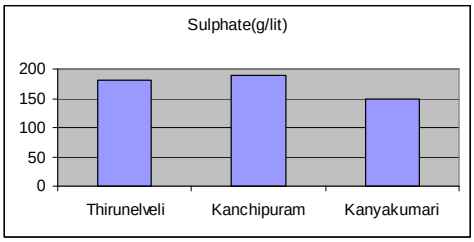
Cholride (mg/L)



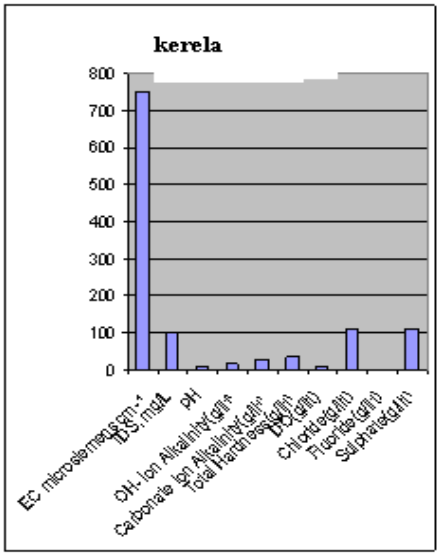
Fluoride (mg/L)

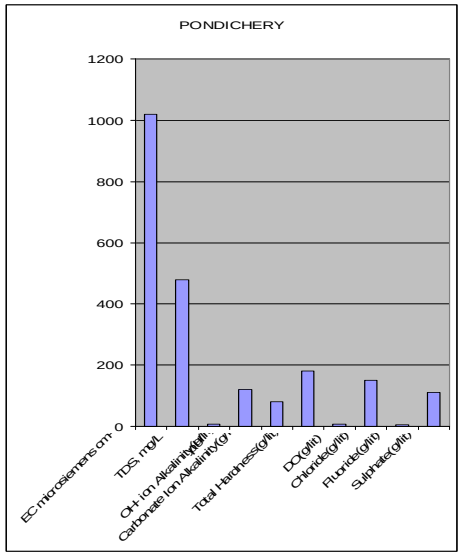


Sulphate (mg/L)



The flow chart of the range of various parameters of groundwater samples of selected district of kerela and pondichery





CONCLUSION

The study has been conducted in the various districts of Tamilnadu, Kerela and Pondichery ground water. The samples conform that the pH of the ground water is been with in limit of the Tamilnadu. And the water sample having almost same conducting property of electrical values which are within limits of maximum permissible. But the Kerela water having lesser E.C. The value of total hardness more than 200 in all the district, but the Kerela state have total harness from 35 ppm which is a better part of natural gift to mankind.

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