Analysis Of Ground Water In Ambajogai.Dist.Beed

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ABSTRACT

We are collecting the samples in three different seasons (summer, winter and rainy season) for the analysis and to know the quality of groundwater which has to be tested in the laboratory of College Of Engineering Ambajogai. The physical, chemical and biological parameters such as pH, electrical conductivity, total dissolved solids, total hardness, total alkalinity as well as sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride are measured. In the light of the above analytical results, we are taking up detailed water quality analysis of groundwater in Ambajogai. From the results of above analysis of three seasons we have given the conclusion.

Keyword - *Chloride , Eelectrical conductivity,Ccarbonates, and Bicarbonates,pH.*

1. Introduction

The physical – chemical parameters of Groundwater from Ambajogai city were studied.Groundwater is particularly important as it accounts for 88% of the drinking water in rural areas. Over the past few decades, the ever growing urbanization, industrialization, population, and unskilled utilisation of water resources have led to degradation of water quality. Due to various ecological factors such as natural or anthropogenic, the ground water is getting polluted because of deep percolation from intensively cultivated fields, liquid and solid wastes from industries and sewage disposal ,disposal of hazardous wastes,. Changes in groundwater quality are due to rock water interaction and oxidation – reduction reactions during the percolation of water through aquifers. These may be added to water either naturally or due to certain activities and therefore it is important to understand their environmental significance. Water quality are classified as physical, chemical and biological nature. The quality of water is judged by given standards. There are standards of drinking water quality but needing review under following reasons. World Health Organization (WHO) has recommended standard values for drinking water for developing countries, which are taken as base for formulating the local values. Due to various ecological factors natural or anthropogenic, pollution of ground water occured because of deep percolation from intensively cultivated ares, disposal of liquid and solid wastes from industries and sewage disposal. Changes in groundwater quality are due to rock water interaction and oxidation – reduction reactions during the percolation of water through aquifers. In the agriculture sector, large quantities of pesticides ,chemical fertilizers and insecticides used to modify the crop field, on leaching enter the aquifer therefore polluting the groundwater. In many areas overuse of irrigation water and chemical fertilisers behind monoculture type of cropping pattern have started that depleting and deteriorating water as well as soil quality. Several studies are done on groundwater quality with respect to irrigation purposes have been carried out in the different parts of the country. Several researches have carried out on groundwater quality for various purposes.

The samples were as follows:

S1 – Ambedkar Nagar	S2 - Shantidut Colony
S3 - Tilak Nagar	S4 - Anand Nagar
S5 - Basaveshwar Nagar	S6 - Chanai
S7 - Panchshil Nagar	S8 - Miyabhai Colony
S9 – Mandi Bazar	S10 –Matth

S11- Mandwa Road S12- Deshpande Colony
S13-SawatamaliChawk S14 –Nagzhari Parisar
S15 –Ambedkar Chawk

2. LITERATURE REVIEW

DISTRICT OF MAHARASHTRA DURING SUMMER SEASON BY A.V. GAIKWAD and S.R. MIRGANE(2010): A systematic physic – chemical study of ground water in 16 different localities in Beed districtof Maharashtra had been taken to check the suitability of drinking water in the year 2008-09.The physical and chemical parameters were studied. In that study water samples were collected monthly for four months during summer from sixteen selected ground water sources. The samples collected during all three months were analyzed for various physico-chemical and bacteriological parameters as TS, DS, TDS, VS, SS, VS, Ph and EC. The hydro-chemical and bacteriological data was analyzed with reference to BIS and WHO standards and hydro-chemical facies were determined and analysis of water was undergone. The quality of the groundwater varies from place to place with the depth of water table.

GROUNDWATER QUALITY RESEARCH DONE BY K.R. AHER IN AURANGABAD(2012) : research has to be done to check the quality of groundwater of Sukhana river sub basin of Aurangabad district, Maharashtra, India for drinking and irrigation purposes. Thirty five samples groundwater were collected from different dug wells and borewells. The quality assessment of pH, EC, TDS, total hardness as CaCO3, Ca2+, Mg2+, Na+, K+, Cl−, CO32−, HCO3− and SO42− is made through the estimation and based on these analyses, parameters like sodium adsorption ratio, residual sodium carbonate, sodium soluble percentage and were calculated. The value of TDS, Cl−and SO4−ion concentration of majority samples are within limit. The correlation of the analytical data has been achieved by plotting different graphical representations such as Wilcox and US Salinity Laboratory for the classification of water, and results clear that most of the samples are safe and fit for Irrigation.

RESEARCH OF GROUNDWATER DUE TO IMPACT OF HUMAN ACTIVITIES, IN SANGAMNER , AHMEDNAGAR DISTRICT, BY KESHAV K. DESHMUKH (2012): Groundwater is liable to contamination through anthropogenic and sources that is use of chemical pesticides, addition of industrial waste, domestic and agricultural waste to the water bodies. During last decades, it has been observed that the groundwater is polluted because of increased human activities. Consequently, the numbers of cases of water-borne diseases have been seen causing health hazard. The research has to be done to assess the effect of groundwater due to human activities on the quality of Sangamner , Ahmednagar district, Maharashtra. Twenty one samples of groundwater were collected along the Pravara River and assessed the physic chemical parameters such as PH, EC, TDS, TH, Ca2+, Mg2+, Na+, K+, HCO3-, SO42-and NO3-. The geochemical characteristics of groundwater have been found to be dominated by Ca+Mg> Na + K –HCO3 +CO3 indicating dominance of cation and anion exchange process. The result shows the contamination of groundwater is due to human activities. Depending upon the TDS, the groundwater is moderately saline in discharge zone are due to anthropogenic activities. Most of samples from ground water are not suitable for drinking purposes as compared with standard limit suggested by W.H.O. This is posing the serious health hazard to the local population. Groundwater salinization, nitrate pollution, changes in hardness, alkalinity of groundwater and due to change in nature of geochemical affect of groundwater has been identified as the impacts of human activities in the area.

GROUNDWATER QUALITY ASSESSMENT FROM PURNA RIVER SUB-BASIN AREA, MAHARASHTRA BY S.P. KHODKE,P.W. DEOTAR: The suitability of water for irrigation should be evaluated on the basis of criteria indicative of its potential to create soil conditions. Irrigated agriculture has resulted in major environmental disturbances such as waterlogging, salinization, groundwater depletion, and pollution of water bodies, ground water has increased the health problems. Most of the problems of water logging and secondary salinization affected in irrigated lands are resulted from excessive use of water for irrigation, inefficient irrigation distribution system, poor on-farm management practices, inappropriate drainage management and the discharge

of spent drainage water into good quality water supplies. Therefore, the need was felt to analyze the ground water samples for irrigation suitability. In the present paper, eleven ground water samples from different location of Purna Valley has been collected and analyzed for various physico-chemical parameters. The data shows that pH ranges between 7.5 and 8.9, whereas the EC varies from 1464 to 4850 micro ohoms /cm. The hardness of groundwater samples ranges between 220 and 800 mg/l. Suitability of groundwater for irrigation was evaluated based on Sodium Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC), US salinity diagram, Kelly's Ratio (KR) and Permeability Index (PI). Based on the results obtained it has been concluded that groundwater quality of Purna river sub basin is not suitable for irrigation due its moderate to high saline/alkaline nature.

3. STUDY AREA

Ambajogai is a city has municipal council tahsil and subdivision in Beed district in the state of Maharashtra; India. Ambajogai is situated at 18.73°N 76.38°E.The Temperature varies from 16° to 22°centigrade in winters and 30° to 40° in summers. But sometimes winter temperature ebbs to ° C and summer temperature shoots up to 42° C. In the summers, which begin from March and last till Mid June the temperature starts rising and sometimes it reaches 42° C. The annual rainfall in the district was between 600 mm to 800mm Humidity in Ambajogai city is 40%.

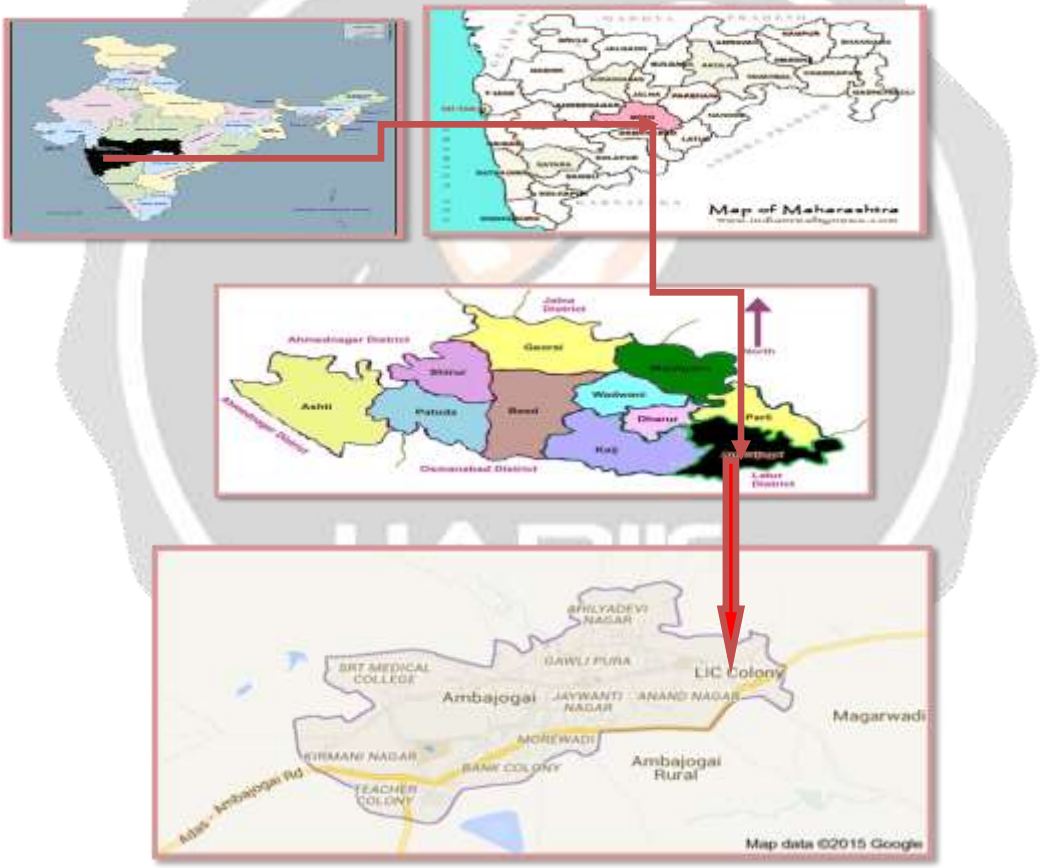

Fig3.1: Location map of study area

4.MATERIALS AND METHODOLOGIES:

Table 4.1: Analytical methods and Equipment used

Sr.No.	Parameter	Method	Equipment

1.	Temperature	-	Thermometer
2.	Colour	By seeing	--
3	Odour	By smelling	--
4	pH	Electrometric & colourometeric	pH meter & pH paper
5	Electrical conductivity	Electrometric	Conductivity meter
6	TDS	Electrometric	TDS Meter
7	TS	Gravimetric	Oven, Muffle Furnace, Weighing Balance, Desiccators
8	DS		
9	VS		
9.	FVS		
10	Chlorides	Titration	Pipette & Burette
11	Temperature	-	Thermometer

4.1 COLLECTION OF WATER SAMPLE:

SAMPLING: The objective of the sampling is to collect the portion of material small enough to be conveniently transported to and handle in the laboratory while still accurately representing the material being sampled. Care should be taken during handling the samples so that no significant change in composition occurs before the tests are performed. During sampling constituents of the water sample may interact with the surface wall of the container and consequently their concentration may be altered. In taking a sample from a tap or pump the nozzle should be examined to see that it appears to be clean. If not, it should be cleaned and water should be allowed to run waste before filling the can , unless it is decided to ascertain whether the water is affected by standing in the main or pump pipe. If such is the case it is better to take the sample first in the morning before anyone is drawn for any purpose. In order to ensure that every sample is clearly and adequately described and labeling of the various samples on each Can. It is necessary therefore to preserve the samples before analysis, to prevent there changes. This is done by keeping the samples in the dark, preservatives, lowering the temperature to retard reactions by freezing.

4.2 PHYSICAL ANALYSIS

The physical analysis includes the following tests.

4.2.1 TEMPERATURE

The test for temperature of water has no practical meaning in the sense that is not possible to give any treatment to control the temperature in any water supply project. The multiplication of bacteria in the water is more rapid at higher temperature than in the water at lower temperature. The temperature of water is measured by means of ordinary thermometer. From the study of temperature, the characteristics of water such as density, viscosity, vapour pressure and surface tension can be determined.

4.2.2 COLOUR :

The colour in the water is usually due to organic matters in colloidal condition, but sometimes it is also due to mineral and dissolved impurities. Before testing the colour of water first of all total suspended matter should be removed from water by hand .The colour of water is not harmfull but is objectionable.

4.2.3 TASTE AND ODOUR

The water possesses taste and odour due to various causes and they make the water unpleasant for drinking. In any event the water to be supplied for public should not contain objectionable taste and odour.

4.3 CHEMICAL ANALYSIS

Following are the chemical tests which are important for our project :

1. Hydrogen- ion concentration (pH value)

2. Chlorides

3. Total solids

4.3.1. pH VALUE

Neutral water has pH value of 7. As pH value becomes less, the water become acidic and when pH value is zero indicates maximum acidity. Similarly the water become alkaline as pH value increases and maximum alkalinity is indicated when pH value is equal to14. For portable water, pH value should be between 7 and 8.50.

Following are the two methods we used for measuring pH value of water.

1. Instrumental method

2. Colorimetric method

INSTRUMENTAL METHOD: In this method, pH meter is used. pH is measured by inserting pH meter into the water sample. Kept it in the water for getting the stable reading.

COLOUROMETRIC METHOD: In this method, we use pH paper. pH is measured by inserting pH paper into the water sample and by comparing with standard pH colour chart pH of the water is noted.

4.3.2 CHLORIDE

The Chloride contents, especially of sodium chloride or salt, are worked out for sample. The excess presence of sodium chloride indicates pollution of water due to sewage, minerals.

Determination of Chloride:

Silver Nitrate when added to neutral or slightly alkaline solution containing chlorides quantitatively precipitation chlorides as AgCl.

Procedure:
1. Take a 100 ml of sample and adjust pH between 7 to 10 using 1N NaOH.
2. Add two or three drops of potassium chromate solution to the sample.
3. Titrate with $AgNO_3$ till brick red colour appears.
4. Carry out blank using 100 ml distilled water calculation:

$$\text{Chloride mg/l} = \frac{(A-B) \times N \times 35450}{\text{ml of sample}}$$

Where,

A = ml of $AgNO_3$ required for sample.

B = ml of $AgNO_3$ required for blank.

4.3.3 TOTAL SOLIDS:

In this test, the amount of dissolved and suspended matter present in water is determined to get the total of solids present in water.

DETERMINATION OF TOTAL SOLIDS :

Apparatus:

1. Crucible

2. Steam bath

3. Desiccators

4. Drying oven

Procedure:

1. Heat clean evaporating crucibles to 103 to 105ºc for an hour. Store them in desiccator.

2. Weight immediately before use.

3. Take 100 ml sample in this preweighed crucible and keep it in oven for 24 hours for

Evaporation for105ºc.

4. Cool crucible in a desiccator to ambient temperature and weight.

5. Repeat the procedure drying, cooling and weighing until a constant weight is obtained.

Calculation:

$$TS = \frac{\text{(weight of crucible after oven)} - \text{(weight of empty crucible)}}{\text{Weight of sample taken}}$$

5.RESULTS& DISCUSSIONS:

The physico-chemical parameters of the above sample station in Ambajogai city can be calculated and it is describe as bellow.

TEMPERATURE (T) IN 0C: Temperature is an important factor,that plays very important role in the metabolic activities of the organism. The temperature was ranging from 29°C to39°C during the study period. Lowest water temperature was observed in Ambajogai was 25°C. A study increase in water temperature in the course of Nagzari parisar was noticed i.e. 35 °C. An increase in temperature was observed from Ambedkar chawk (28.9 °C) to Shantidut colony (38.5 °C). This might be due to presence of the effluents. Property of water is, with change in temperature, its density varies and it becomes less with warming up and more with cooling.

pH: pH is a term used to express the intensity of the acid or alkaline condition of a solution. Most of the water samples are slightly alkaline because of presence of carbonates and bicarbonates. The pH values of water

samples varied between7.6 to 6.5 and were found within the limit prescribed by W.H.O. The higher range of pH indicates higher productivity of water.

ELECTRICAL CONDUCTIVITY (EC) IN MICRO-SIEMENS/CM: Electrical conductivity (EC) is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts. EC values ranges in between 2.7 micro-siemens/cm to 0.8 micro-Siemen's/cm. High EC values were observed for five sampling points namely S11, S12, S6, S13 and S9 indicating the high amount of dissolved inorganic substances are present in ionized form.

TOTAL DISSOLVED SOLIDS (TDS) IN mg/l: Total dissolved solids indicate the salinity behavior of groundwater. Water containing more than 500 mg/L of TDS is not used for drinking water supplies, but in unavoidable cases 1500 mg/L is also allowed. TDS values varied from 600 mg/L to 1900 mg/L. The sampling points S6, S9, S13 and S15 showed higher TDS values than the prescribed limit given by ISI.

5.1GRAPHICAL REPRESENTATION

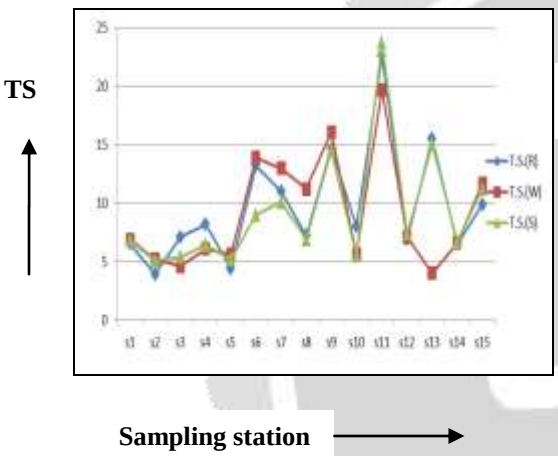

Fig.5.2.1 TS Vs. sampling station:

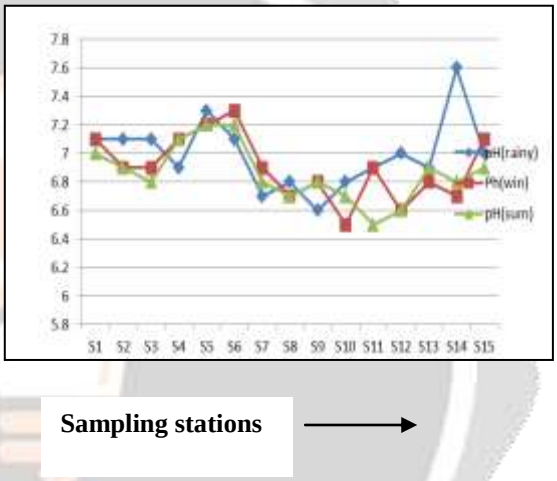

Fig.5.2.2 pH vs. sampling stations:

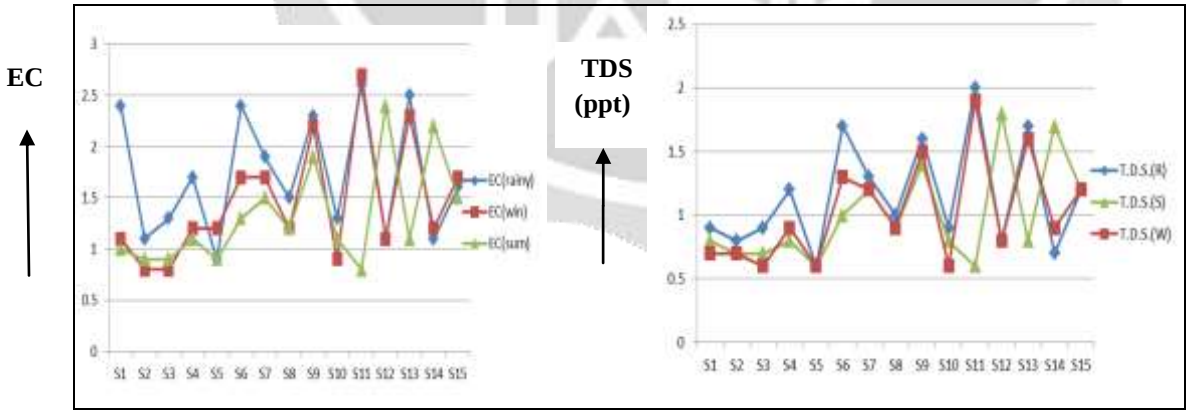

Fig.5.2.3 EC vs. sampling stations:

Fig.5.2.4 TDS VS sampling stations:

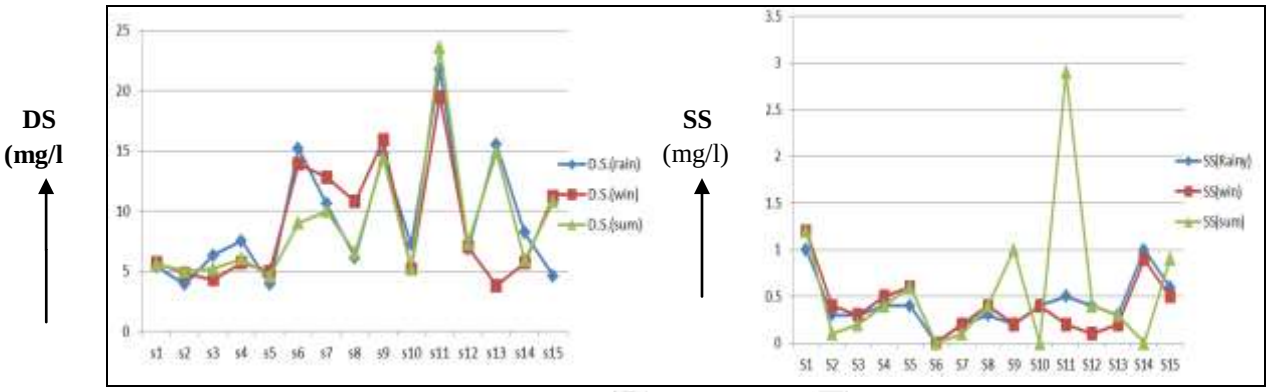

Fig.5.2.5 DS vs Sampling Station

Fig.5.2.6 SS vs. sampling stations :

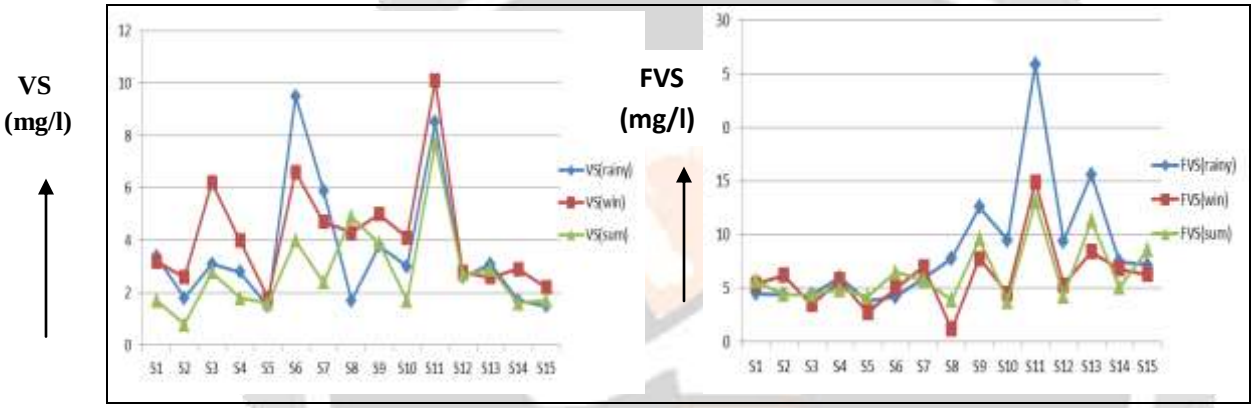

Fig.5.2.7 VS vs. Sampling Stations:

Fig.5.2.8 FVS vs. Sampling Stations:

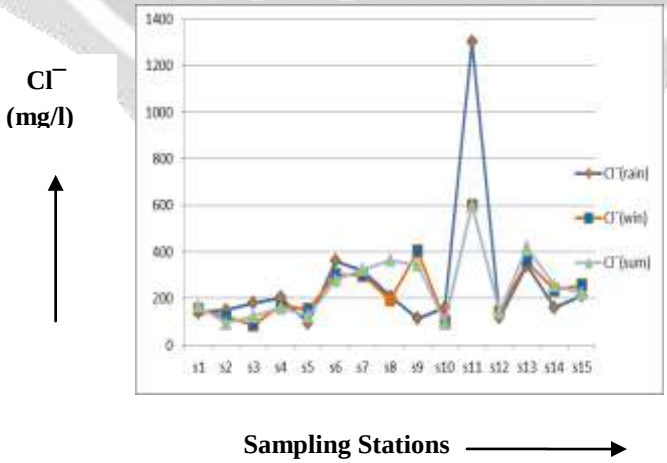

Fig.5.2.9 Cl vs. sampling stations

5.3 COMPARISON OF GROUNDWATER QUALITY AT THE VARIOUS STATIONS UNDER STUDY WITH BIS DRINKING WATER QUALITY STANDARDS

TABLE 5.3.1:

Sr. NO.	Parameter	Values from collected sample			BIS Standard	
		Maximum	Minimum	Average	Acceptable	maximum
1	Colour	Colorless	Colorless	Colorless		
2	Odour	Odorless	Odorless	Odorless		
3	pH	7.6	6.5	7.05	6.5-8.5	7.0-8.5
4	EC(ms/cm)	2.6	0.8	1.7	0.3	-
5	TDS(ppt)	2	0.6	1.3	500 mg/l	1500 mg/l
6	DS(mg/l)	20.8	3.6	12.2	-	-
7	SS(mg/l)	1.2	0.0	0.6	25 mg/l	-
8	VS(mg/l)	10.1	0.9	5.5	-	-
9	FVS(mg/l)	25.9	1.2	13.55	-	-
10	Chloride(mg/l)	752	94	423	250	1000

6.1: CONCLUSIONS AND SUGESSIONS FOR FURTHER STUDY

The forgoing analysis reveals that increased disposal of solid waste and municipality waste water have resulted in deterioration of water quality of Ambajogai city. Physico-chemical parameters like pH, EC, TDS, total alkalinity, chloride are some important parameters for assessing the groundwater quality for irrigation and drinking purposes.

The results of present study concluded that the physico-chemical parameters showed undesirable variation than that of the normal.High pH values are associated with sodium bicarbonate-carbonate waters. Low pH values reflect water containing free acids. From the table no. samples S4 (Anand Nagar), S15 (near Hotel krushnai), have pH more than permissible limit.

Above results shows that chloride contents in samples S7 (Panchshil Nagar),S8 (Miyabhai colony), S9 (Mandi +bazar),S11(Mandwa Road),S13 (Savatamali Chawk) is more than normal limit.It shows that contaminated water is mixed with ground water .This water is not suitable for drinking purposes, it requires suitable water treatment.

Electrical Conductivity is parameter that is a good indicator of the amount of dissolved solids in water and thus can be used to detect contaminants in water. A such electrical conductivity measurement makes it possible to obtain information about the extent of mineralization in the water.

6.2: SUGGESTIONS FOR FURTHER STUDY

1. One year study is not sufficient to give conclusion to this project. We can do further two year study to achieve better conclusion.
2. We can implement this study bydoing analysis of remaining parameters as heavy metals, fluoride sulphide and microbial study etc.
3. In this project we have analyzed only the bore well water samples. You can implement the study by collecting samples from surface water sources.

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