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STUDY OF GROUND WATER QUALITY NEAR THE MUNICIPAL SOLID WASTE DUMPSITE

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Abstract— Ground water pollution is mainly due to the process of industrialization and urbanization that has progressively developed over time without any regard for environmental consequences. The impact of leachate from the Municipal Solid Waste dumpsite on ground water and other water resources has attracted a lot of attention because of its overwhelming environmental significance.The main objective of this study is to carry out tests on various ground water samples collected from domestic areas surrounding the Perungudi Municipal Solid Waste Dumpsite and to evaluate the water quality parameters.The results obtained are compared with the standards prescribed in the Indian Standards Drinking Water Specifications and inferences are made. The effect of dumpsite on groundwater quality is analysed and Recommendations for the use of water by public is given.

Keywords **--** water samples

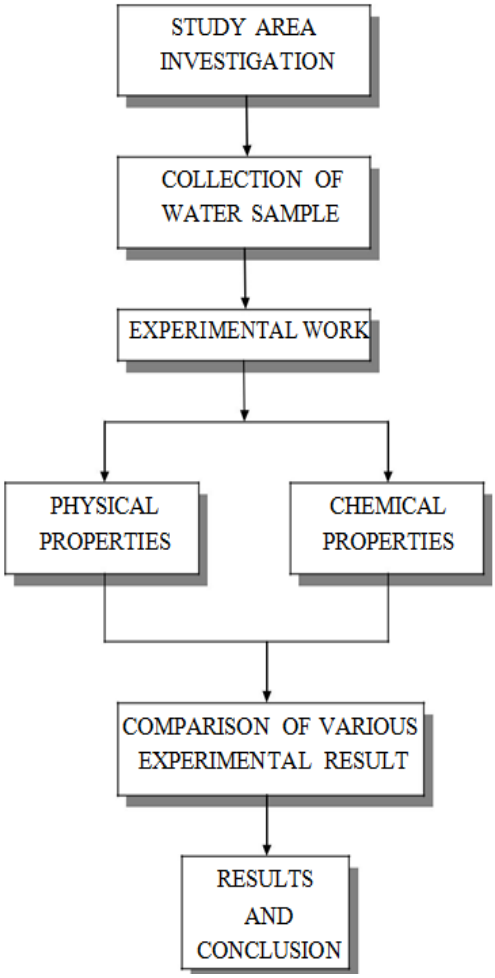
I. INTRODUCTION

Due to increasing urbanization, surface water is getting over contaminated and more stringent treatments would be required to make surface more potable.Therefore, it is required to use additional sources to fulfill the requirement of water. Because the ground water sources are safe and potable for drinking and other useful purposes of human beings. Hence studies of physicochemical characteristics of underground water to find out whether it is fit for drinking or some other beneficial uses is necessary.

II. OBJECTIVE

- To determine the ground water quality parameters near the dumpsite.
- To compare the ground water quality parameters determined with BIS standards.
- To identify the effects of these ground water quality parameters on public health.

III. EXPERIMENTAL PROGRAMME



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IV. RESULTS AND DISSCUSSION

1) Physical Characteristics Of Water Sample

TABLE 1

Sample Number	Appearance	Temperature	Odour	Taste
1	Slightly Turbid	26.7°C	Unobjectionable	Disagreeable
2	Slightly Turbid	23.9°C	Unobjectionable	Disagreeable
3	Slightly Turbid	31.2°C	Unobjectionable	Disagreeable
4	Slightly Turbid	24.4°C	Unobjectionable	Disagreeable
5	Slightly Turbid	25.7°C	Unobjectionable	Disagreeable
6	Slightly Turbid	29.8°C	Objectionable	Disagreeable
7	Slightly Turbid	25.3°C	Objectionable	Disagreeable
8	Colourless	25.8°C	Objectionable	Disagreeable
9	Colourless	24.1°C	Objectionable	Disagreeable

2) pH test:

pH is measured by a pH meter using a glass electrode which generates a potential varying linearly with the pH of the solution in which it is immersed. The basic principle of eletrometric pH measurement is determination of acidity of hydrogen ion by potentiometer by standard hydrogen electrode and a reference electrode.

TABLE 2 : PH CONCENTRATION IN WATER SAMPLE

Sample No.	1	2	3	4	5
pH	8.2	7.79	7.36	7.12	7.1
Sample No.	6	7	8	9	10
pH	6.78	6.7	6.71	6.65	6.4

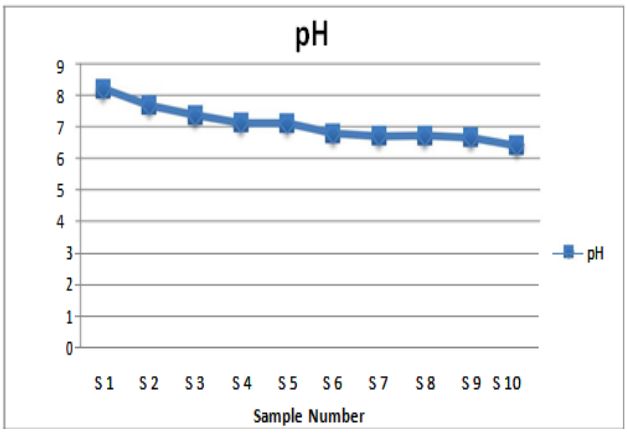

Figure 1 : PH In Water Sample

3)Turbidity:

When light is passed through a sample having suspended particles, the scattering of the light; or absorption of light is generally proportional to the turbidity. The turbidity of the sample is thus measured from the amount of light scattered by the sample taking a reference with standard turbidity suspension.

TABLE 3 : TURBIDITY IN WATER SAMPLE

Sample No.	1	2	3	4	5
Turbidity (NTU)	11.9	11.1	10.6	9.5	9.2
Sample No.	6	7	8	9	10
Turbidity (NTU)	7.6	6.9	5.4	3.1	2.4

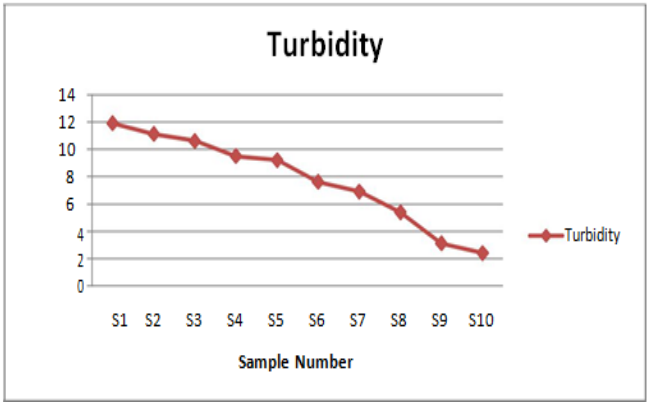

Figure 2 : Turbidity in water sample

4) Alkalinity:

The alkalinity of surface water is due to the carbonate, bicarbonate and hydroxide content and is often interpreted in terms of the concentrations of these constituents. Higher the alkalinity, greater is the capacity of water to neutralize acids. Conversely, the lower the alkalinity, the lesser will be the neutralizing capacity.Alkalinity of sample can be estimated by titration with standard H_2SO_4 or HCI solution. Titration to pH 8.3 or decolourisation of phenolphthalein indicator will indicate complete neutralization of OH^- and 1/2 of CO_3^{2-}, while to pH 4.5 or sharp change from yellow to orange of methyl orange indicator will indicate total alkalinity.

TABLE 4 : ALKALINITY PRESENT IN WATER SAMPLE

Sample No.	1	2	3	4	5
Alkalinity (mg/l)	412	523	392	376	363
Sample No.	6	7	8	9	10
Alkalinity (mg/l)	232	208	139	153	112

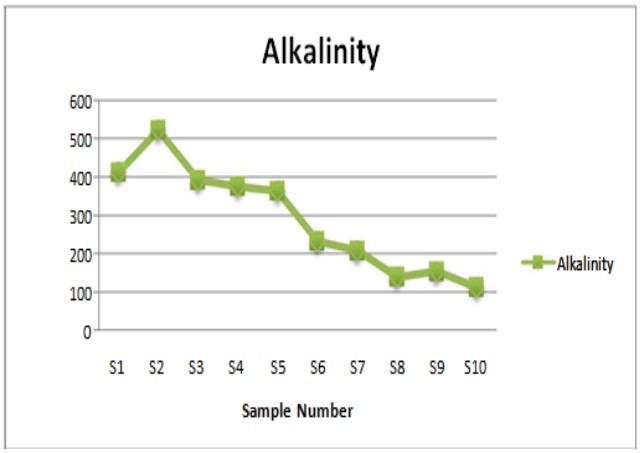

Figure 3 : Alkalinity in water sample

5) Total Hardness:

In alkaline condition, EDTA reacts with Ca and Mg to form a soluble chelated complex. Ca and Mg ions develop wine-red color with Erichrome black T under alkaline condition. When EDTA is added as a titrant, Ca and Mg divalent ions get complexed resulting in sharp change from wine-red to blue, which indicates end point of the reaction.

TABLE 5 : TOTAL HARDNESS PRESENT IN WATER SAMPLE

Sample No.	1	2	3	4	5
Total Hardness (mg/l)	868.42	793.86	687.22	640.35	529.65
Sample No.	6	7	8	9	10
Total Hardness (mg/l)	521.93	462.83	491.23	392.69	236.84

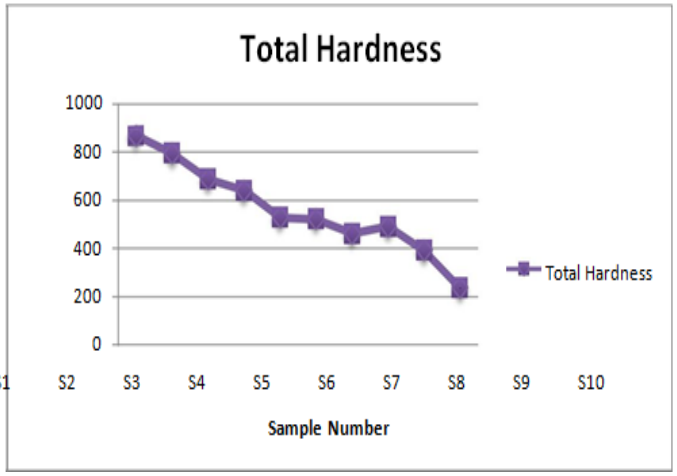

Figure 4 : Total Hardness in water sample

6) Dissolved Oxygen:

In this method ManganousSulphate reacts with the alkali to form a white precipitate of Manganese Hydroxide which in presence of Oxygen gets oxidized to a brown colour compound. In the strong medium, Manganese ions are reduced by Oxide ions which thegets converted into Iodine, equivalent to original concentration of oxygen in sample.End point is change of colour from blue to colourless solution.

TABLE 6 : DISSOLVED OXYGEN IN WATER SAMPLE

Sample No.	1	2	3	4	5
Dissolved Oxygen (mg/l)	0.8	1.6	1.9	2.4	1.8
Sample No.	6	7	8	9	10
Dissolved Oxygen (mg/l)	1.9	3.4	4.7	6.8	9.8

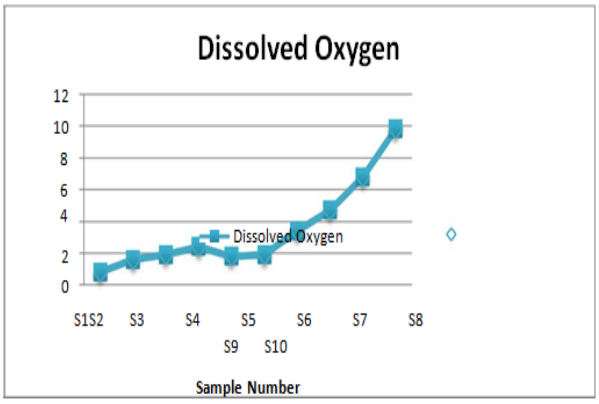

Figure 5 : Dissolved Oxygen in water sample

7) Iron:

A known quantity of sample is taken in a conical flask and a test tube of dilute sulphuric acid is added in the sample. Then the sample is titratated against standard potassium permagnate solution. The permissible limit of iron is 0.3mg/l.

TABLE 7 : IRON CONCENTRATION IN WATER SAMPLE

SampleNo.	1	2	3	4	5
Iron (mg/l)	0.041	0.022	0.03	0.008	0.024
Sample No.	6	7	8	9	10
Iron (mg/l)	0.032	0.040	0.0402	0.0301	0.0303

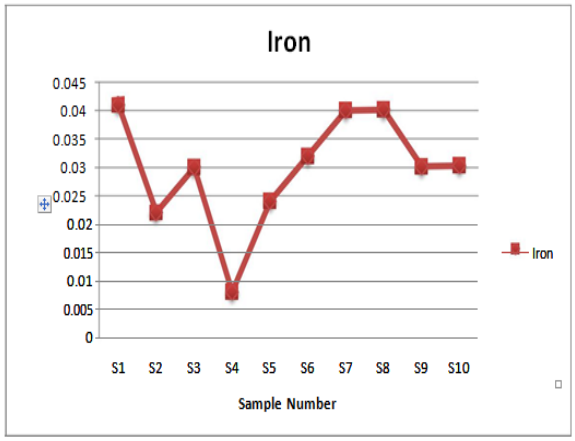

Figure 6 : Iron in water sample

8) Calcium:

When EDTA is added to the water containing calcium and magnesium, it combines first with calcium. Calcium can be determined directly with EDTA when pH is made sufficiently high such that the magnesium is largely precipitated as hydroxyl compound. When murexide indicator is added to the solution containing calcium, all the calcium gets complexed by the EDTA at pH 12-13. The end point is indicated from a colour change from pink to purple.

TABLE 8 : CALCIUM PRESENT IN WATER SAMPLE

Sample No.	1	2	3	4	5
Calcium (mg/l)	137	159	162	103	117
Sample No.	6	7	8	9	10
Calcium (mg/l)	148	123	177	184	169

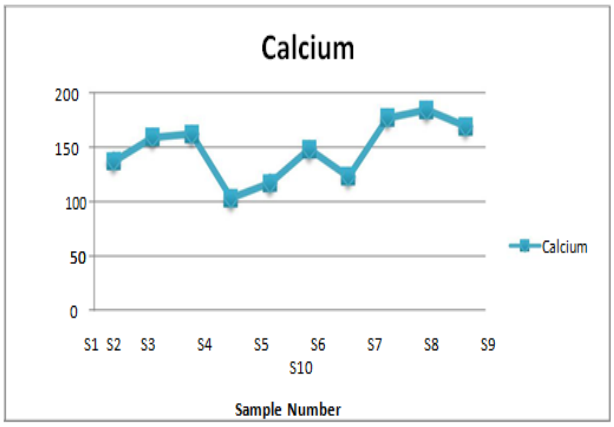

Figure 7 : Calcium in water sample

V. CONCLUSION

Based on the experiments done the following conclusions are drawn:

- The ground water quality analysis carried out in the study are proves that water quality has been degraded the most in samples collected closer to the dumpsite.
- The results showed that the ground water quality parameters were within permissible level prescribed by Bureau of Indian Standards for drinking water for samples collected from the outer periphery of the study area.
- When present above permissible limit as per BIS, Chlorides cause high blood pressure, salty taste, pH causes bitter taste, Hardness causes skin irritation, poor lathering, iron leads to staining of clothes, Sulphate affects taste and causes gastro intestinal irritation.
- The polluted ground water requires certain levels of treatment before use.

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