Analysis of Soil Samples for its Physico-Chemical Parameters from Aurangabad City

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Abstract:
The natural environment is clean, but due to multifarious activities of man, it gets polluted resulting in what is called environmental pollution. In the present study it was preferred to investigate the soil samples for its physico-chemical analysis of some parameters. Fifteen representative samples were obtained and analysed for its alkalinity content, chloride, sulphate, pH, conductivity, sodium and potassium. The value of alkalinity was found to be from 2.2 to 64.0 meq/100 gm, chloride content was ranging from 1.23 to 1.98 g/100g, sulphate was found to be between 0.063 to 0.742 g , conductivity was ranging from 0.4 to 1.9 micro mohs, range of sodium was between 150.6 to 25.4 ppm and potassium from 100.9 to 190.5 ppm.

Keywords: Physico-chemical, soil, analysis

1. Introduction

The soil forms the intermediate zone between the atmosphere and the rock cover of the earth, the lithosphere. It also forms the interface between water bodies (hydrosphere) and the lithosphere and thus forming a part of biosphere. The soil may be defined as the uppermost weathered layer of the earth's crust in which are mixed organisms and products of their death and decay. It may also be defined as the part of the earth's crust in which plants are anchored.

The soil is a complex organization being made up of some six constituents' namely inorganic matter, organic matter, soil organisms, soil moisture, soil solution and soil air. Roughly, the soil contains 50-60% mineral matter, 25-35% water, 15-25% air and little percentage of organic matter (Chatwal et al, 2005).

Soil pollution is caused by the addition of minerals to soils by man, from the use of agriculture chemicals such as herbicides, fungicides and insecticides, from the dustfall and precipitation and use of fertilizers and contaminated water. It is also caused by the industrial waste, agricultural waste, urban waste, biological pathogens, radioactive waste.

The industrial pollution increases the toxicity levels of the soil. The soluble salt given out as pollutants damages the cultivated farms. The soil pollution due to sewage is also very high. Several diseases are inflicted in human beings due to pathogenic forms present in the soil. It is the need of time that we have to study the physico-chemical parameters of soil to know its quality. Fifteen representative samples were collected from various parts of the city and its physico-chemical analysis have been performed to know its different parameters like Colour, alkalinity content, chloride, sulphate, pH, conductivity, sodium and potassium.

2. Material and methods

Fifteen representative soil samples were collected in the depth of 0-20 cm from the surface of soil from different places of the city in the year 2015. Sample no 1 to 5 from central Aurangabad, samples from 6 to 10 numbers from western part of Aurangabad and samples from 11 to 15 from the eastern part of the city were collected for analysis. The soil samples were preserved in polythene bags for further analysis. The chemicals and reagents used for analysis were of A.R. grade from S.D Fine and Merck. Standard instrumental and non instrumental methods were used for estimation of the above mentioned parameters (R.M. Verma, 2000) The methods are as shown in the table 1

Sr. No	Parameter	Method
1	Colour	By viewing
2	Alkalinity	Volumetric method
3	Chloride	Volumetric method
4	Sulphate	Gravimetric method
5	pH	pH metry
6	Conductivity	Conductometry
7	Sodium	Flamephotometry
8	Potassium	Flamephotometry

Table 1: Methods Use for Estimation of Parameters

3. Result and Discussion

The values of physicochemical parameters are presented in table 2. The colour of soil sample was observed visually and it was found to be black for all the samples.

Sample no	Colour	Alkalinity Meq/100gm	Chloride g/100g	Sulphate g	pH	Conductivity X 10^{-3}mʊ	Sodium ppm	Potassium ppm
1	Black	64.0	1.86	0.145	8.33	1.8	50.1	130.8
2	Black	61.6	1.23	0.180	7.98	1.9	100.5	125.6
3	Black	26.2	1.93	0.152	8.30	1.6	121.3	100.9
4	Black	22.4	1.44	0.076	7.98	1.8	128.4	123.5
5	Black	26.8	1.98	0.563	8.42	1.4	144.5	BDL
6	Black	79.0	1.66	0.253	7.31	1.3	150.6	115.6
7	Black	84.0	1.25	0.175	7.45	0.4	100.8	152.8
8	Black	77.4	1.89	0.185	7.53	0.9	BDL	129.6
9	Black	76.8	1.45	0.182	8.11	1.5	BDL	162.8
10	Black	48.2	1.86	0.582	7.98	0.6	BDL	130.5
11	Black	3.4	1.77	0.163	7.30	0.8	25.4	190.5
12	Black	2.2	1.45	0.063	8.41	0.5	85.6	BDL
13	Black	3.4	1.98	0.066	8.36	1.3	52.9	BDL
14	Black	2.8	1.36	0.742	7.15	1.4	30.5	126.5
15	Black	3.5	1.75	0.123	8.95	0.9	58.9	130.5

Table 2: BDL: Below Detectable Limit

Alkalinity is a measure of saline or salt effected soil, the pH of these soils is greater than 7. These soils occur most extensively in aired climates and as the city is aired the alkalinity value is ranging from 2.2 to 84 meq/100gm.

Chloride in the soil samples was found by titratiration method, the chloride content was very variable at all the places, it ranged from 1.23 to 1.98 g/100gm. Sulphate concentration was low in the first five sample, it was medium in the samples from the western part and the highest concentration of 0.742g was found in the eastern part of the city. Samira A. Ben Mussa(2009) has worked on the determination of available nitrate, phosphate and sulfate in Soil Samples by UV spectroscopy. Sulphate may be obtained in soil from the absorption of untreated waste water. pH of the soil sample ranged from 7.1 to 8.95. The values of pH showed that they lie in the alkaline side of the pH scale. Many workers have reported the values of pH in their investigations. Rajesh P. Ganorkar et. al (2013) have investigated in the paper titled Physicochemical Assessment of Soil in Rajura Bazar in Amravati District of Maharashtra (India) have also found pH of soil samples in the alkaline range. Kiran G. Chaudhari (2013) studied the physicochemical parameters of soil samples from Bhusawal (Jalgaon Dist.). The investigation was done for conductivity, pH and also for potassium. The author found pH of all the seven samples out of eight in the alkaline range. The pH range of 6 to 8 is useful for the growth of plants.

The value of conductivity is lying within the range of 0.9 to 1.9 m mohs. The value of conductivity is the measure of ions present in the sample. The conductivity values can vary with the chemical properties of soil, if the soil is contaminated by chemicals or if it is saline, the depth of soil sample. Z. Chik (2011) studied the chemical effects on soil compaction characterizations through electrical conductivity. He showed that if the soil is more acidic it shows electric conductivity value very high.

The presence of potassium in soil is in the form of bonded potassium between the layers of soil. In the present analysis high potassium content was observed in the western part of Aurangabad City, the highest concentration is 190ppm and the lowest is 100 ppm. In some parts it is observed that potassium content is below detectable limit. Wagh et. al (2013) in the paper Physicochemical Analysis of Soils from Eastern Part of Pune City found the level of potassium within the range of from 112 Kg/hectare to 840 Kg/hectare which indicates sufficient K in most of the sample. Yogita Kulkarni et. al (2014) suggested a method of UV- Vis spectroscopy for the determination of potassium in soil samples.

Sodium level ranged from 25.4 ppm to 150.6 ppm in some of the samples it was found to be present below detectable limit. A. Anita Joshi Raj et al (2013) studied Comparitive analysis of some important physicochemical parameters of surface soil and underground water samples of fluorotic areas of Agastheeswaram Union, South India. In this paper also sodium level was found in the soil samples by using flame photometric method.
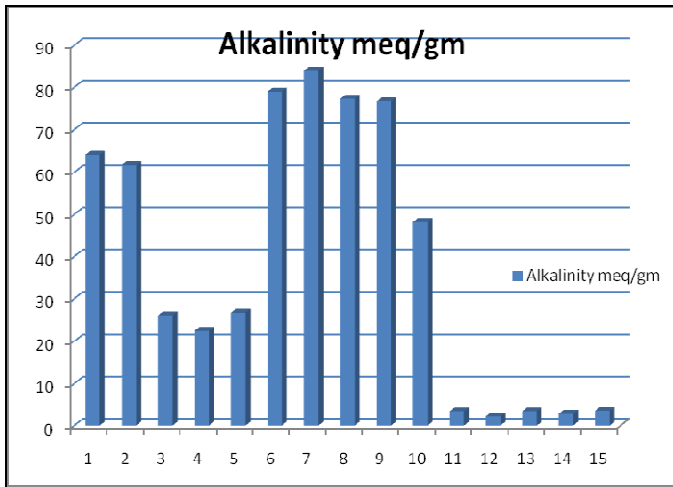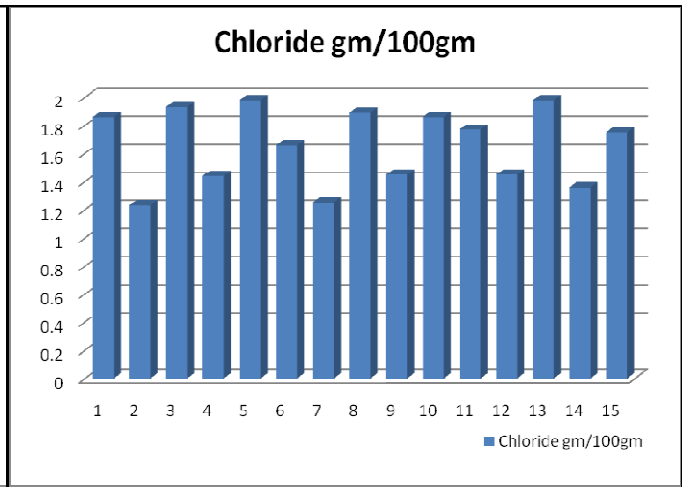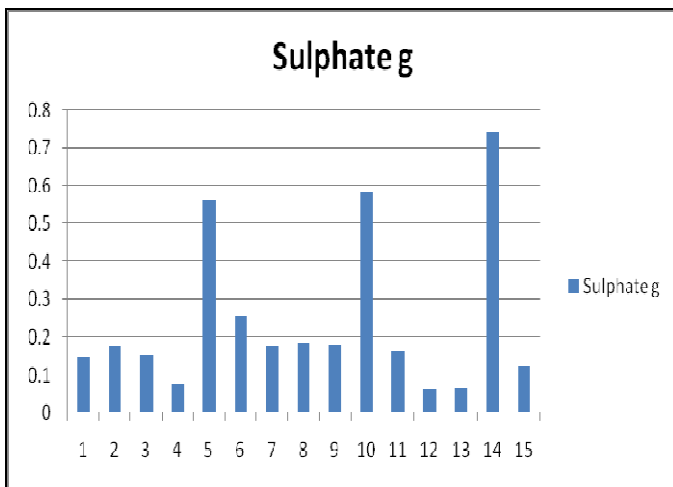
The results of present paper are shown graphically

Figure 1

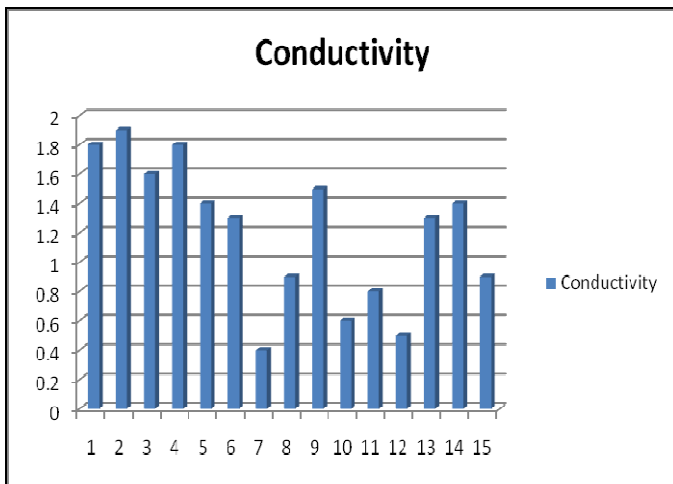

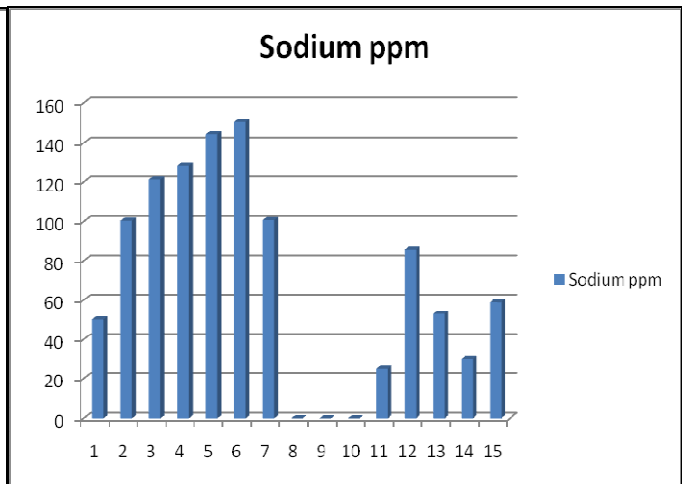*Figure 2*

Figure 3
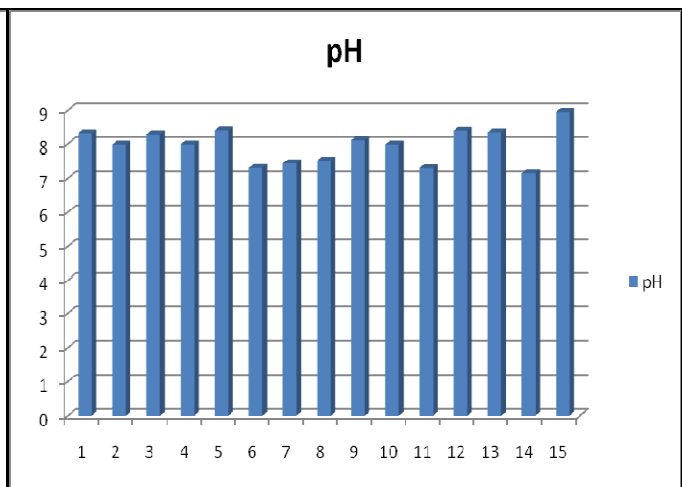
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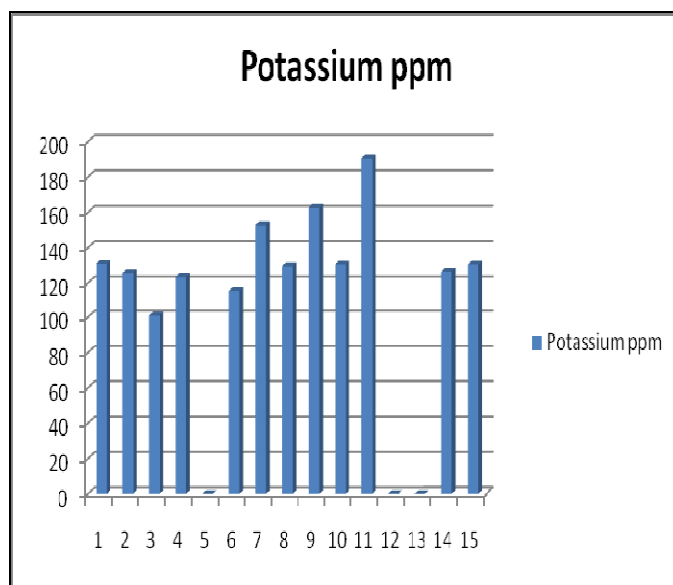

Figure 5

Figure 6

Figure 7

4. Conclusion

The conclusion can be drawn that this study of physicochemical parameters of soil samples showed dissimilar values at different places. This can be due to the irregular distribution of different parameters present in soil. Such type of monitoring of soil samples is beneficial to know the concentrations of various parameters present in soil samples.

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