Characterization of Soil Near Solid Waste Dumping Sites - A Review

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***Abstract*: Disposal of solid wastes has become one of the major problems in urban and semi-urban areas. Inappropriate disposal of solid waste is a huge problem in India. Segregation of waste is not at all practiced in our country. Precipitation that infiltrates through the municipal solid waste. In the present study an attempt has been made to evaluate the repercussion of municipal solid waste on the properties of soil at a landfill sits. Soil profile pits were excavated before and after trash positioning. Soil samples were tested for geotechnical properties such as liquid limit, compaction characteristics, permeability, and UCS and shear strength. Results were compared for their physico-chemical properties of soil. The study implements that disposal of solid wastes has altered the color and texture of the receiving ground soil with gradual increase in physico-chemical and chemical and geotechnical constituents. It was been seen that increase in organic matter content and interactions of the metals with the organic content (adsorption and complex formation) are the reasons for high values of the tested ingredient in soil after the refuse is dumped in soil.**

***Keywords*: Soil sample, Solid waste, Physico-chemical, Geotechnical constituents.**

1. Introduction

Solid Waste has been found as a common problem today scenario; as most of the developed and developing countries are facing a serious task in take the edges off the problems emerge from waste disposal and its management. Municipal solid wastes prefer to non-liquid wastes emerge from residential, Industrial and recreational, treatment plant sites and commercial activities. They consist of different constituents with various compositions. Solid wastes are constituent which are inevitably thrown away owing to human activities; involving either indirect or direct usage of natural matter. Large quantities of municipal solid wastes are being generated on a daily activity they are often thrown away intermittent, and this tends to constitute environmental degradation. The solid waste characteristics generated vary from country to country. In developing countries like India, municipal solid waste management is seen as an issue of great approach. The contamination caused by municipal solid waste dumps are even seen to be more in the developing countries where large amount of solid wastes is dumped indiscriminately and thereby, putting pressure on land and also affecting soil properties. The municipal solid waste generation has been observed to increase periodically in urban areas on account of two high rate of population. The dumping of solid wastes have been changing the color and texture of the receiving soil with their increase in physico-chemical and chemical constituents. It was found that increase in organic matter content and interactions of the metals with the organic content are the reasons for high values of the tested constituents in soil after the refuse is dumped in soil. It also became serious threat to the groundwater re-sources and soil. The pollution of soil by heavy metal can cause unfavorable effects on human health, animals and soil potency. Solid waste pollutants Dish up an external force affecting the physico-chemical characteristics of soil ultimately put up towards the poor production of vegetation. The growing level of solid waste now days became a serious issue in the urban areas of the world. A high rate of growth of population and their increasing per-capita income have been resulted in the generation of enormous solid waste becomes a serious issue to their quality of soil and water, in the case of developing countries where large amount of solid waste was dumped hazardous there by, it has been affecting the geotechnical properties of soil.

2. Literature review

G. VenkataRamaiah and S. Krishnaiah (2014): In their studies they collected soil samplesfrom the Bangalore open dumped site boundary. Soil sample are collected at every 1.5 m interval (top surface, 1.5 m and 3 m depth from top surface) using auger boring. A total number of 12 samples (three samples at each depth from each location) were collected and analysed for, index properties such as specific gravity, moisture content and organic matter of the soil was determined according to IS code. In their studies they found that the study area has highly undulating topography and predominantly consisting of granites and gneisses which are crisscrossed by pegmatite and are highly jointed. The climate in the study area is generally hot and humid and is characterized with seasonal variations of the year and the two general parameters exceeding the limits, hardness and nitrate can be controlled by adopting proper sewage treatment and disposal mechanism.

Sunil Srigirisetty, Thadivala Jayasri, Chitti Netaji(2017): In their studies they collected soil samples from the dumped site, by removing their surface debris and subsurface soil dug to a depth of about 30cm and 1m with a hand auger. Soil sample was taken into the sterile containers and labeled. The soil samples were carried to Andhra university laboratory and analyzed for soil chemical properties. Various Physico-chemical parameters been examined in water samples include, pH, electrical conductivity (EC), total dissolved solids (TDS),

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total alkalinity (TA), total hardness (TH), calcium, magnesium, potassium, iron, chlorides, turbidity, Nitrates. Similarly soil samples were tested for pH, water soluble salts, organic matter, nitrogen, phosphorus, potassium, iron, water soluble chlorides, water soluble sulphates, calcium carbonate. The results were compared with BIS standard limits.

T. Subramani,C . Karthikeyan, S. Priyanka (May 2017): In their studies they collected the soil samples been collected as per standard methods. The sampling of soil been done by using hand augur. The augur was used to bore to hold the desired depth and then withdrawn. CD, PB, ZN, MN, and CU Measurements were done by AAS. Temperature and suspended solids were also been determined by using standard methods. MSW landfills also can be accept contaminated soil from gasoline spills, conditionally exempted hazardous waste from Industries, small quantities of hazardous waste from households, and other toxic wastes including Industrial facilities may utilize their own captive landfill to dispose of non-hazardous waste from their processes, such as sludge from paper mills and wood waste from wood processing facilities.

E. I. UGu, A.C. Ekeleme,P . O .Awatere, H.O.Oszioko, U. Osinachi(oct 2017): In their studies they collected soil sample been collected from municipal solid waste at dumping site. Disturbed soil samples been collected at the site whereas, for the un-contaminated soil, the control trial pit was located with almost precaution so as to be far from leachate emanating and from the decomposition of the municipal solid waste and from the horizontal direction of flow from the leachate. The geotechnical properties tested for their particle size distribution, natural moisture content, consistency limits, maximum dry density, optimum moisture content and specific gravity.

Karthik G (2018): In their studies, Excavation was done for two different locations in the landfill site in order to collect the soil samples. The samples were collected in separate polythene bags that was labelled and transported to the geotechnical laboratory for testing the sample. chemical tests were conducted for determination of pH value, BOD test, COD test Chloride content determination, Alkalinity test and whereas geotechnical tests were conducted to Determine the specific gravity, Grain size analysis, liquid limit and plastic limit, Compaction test, Unconfined Compression Strength Test Permeability test

S.A. Nta, M. J. Ayotamuno, A. H. Igoni, and R. H. Okaparanma (2020): In their studies they collected four soil profile samples been collected at a specified distance (10, 20, 30 and control 100 m away) from the Municipal Solid Waste dumping site and determine the characterized physio-chemical and geotechnical properties of the soil. Analytical methods used for soil samples been chosen based on the parameters of interest. The collected soil samples were air-dried Analytical methods used for soil samples were taken based on the parameters. The collected soil samples were air-dried and their Geotechnical properties of their Attterberg limits, specific gravity and hydraulic conductivity.

S. P. Jeyapriya, M. K. Saseetharan: In their studies they collected the study has been done in Coimbatore situated in Tamilnadu. Soil samples were collected by excavating the pits each pit has been excavated to the depth of 120cm and soil is collected at every 30cm intervals. Then the soil is passed through 2mm sieve which is subjected for determination of physical, physico-chemical, chemical parameters. from this study they have found that soil texture has altered due to decomposition of organic matter, soil colour has changed from pale brown to dark brown, and an increase in the pH value is observed due to the presence of CO3, HCO3, Na, K in the deposited wastes, Electrical conductivity varied from 2.74dS/m to 1.24dS/m this high EC is due to presence of soluble salts in MSW, High cation exchange capacity at the surface and it decreases with increase in depth, carbon content at the top soil was 0.16%before placing solid waste and after placing solid waste it is 1.68% , Total nitrogen content decreases with increase in depth, compared to Mg content cation Ca was more in soil after placing solid waste, concentration of phosphorus was high in the soil after placing the refuse, the metals like Cu, Mn, Fe and Zn shown high concentration at the top surface , Cadmium content although decreased with increase in the depth of the soil.

Evangelin Ramani Sujatha, Gurucharan R, Ramprasad C, Sornakumar V (2013): The study area is located in Ariyamangalam that is 10km within the east direction from Trichy, soil samples were collected from three trial pits at Depth of 0.5m, 1.0m and 1.5m. First two trail pits are located around dump site, third pit is located within the dump site. These samples were analysed for specific gravity test, natural moisture content, partical size analysis, consistency, compaction, permeability, triaxial and consolidation test. The result of this study shows that MSW lowers the specific gravity, increases the natural moisture content, increases the fine particle content, lowers the maximum dry density with the higher optimum moisture content, lowers the cohesion and angle of internal friction, increase the coefficient of permeability, coefficient of consolidation and coefficient of volume Compressibility of the soil.

Utpal Goswami and H. P: Sharma the study has been done in Guwahati which is located in Assam. The soil samples were collected from four different depths viz, 0-15, 15-30, 30-45, 45-60 cm. The preparation and analysis of soil samples were done according to Piper, 1950; AOAC, 1980; Page, 1982.the results of this study were, MSW contains more primary and secondary nutrients than soluble salts, pH of samples were found to be >7, EC value increased from 0.048-0.531dS/m, soil samples shown high content of N, K&P, MSW was found to be in heterogeneous in nature, physic-chemical characters of MSW depends on nature of waste material.

3. Conclusion

From the above literature we can conclude that the soil samples which were collected, Their characterization of the MSW of an area have higher content of organic matter in the waste and their laboratory analysis of the parameter like, specific gravity, MDD, shear strength of the soil and their chemical, physical, physic- chemical characterization of the soil been majorly affected due to the dumping of the waste.

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