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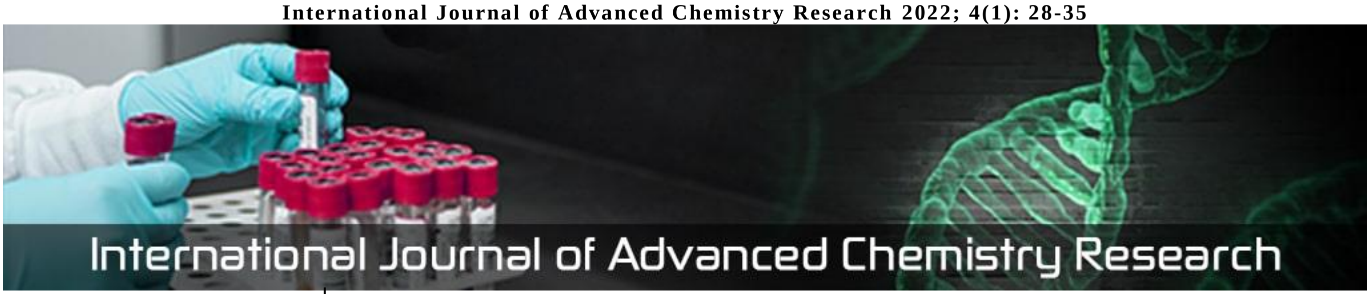

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Physicochemical characteristics of soils used as temporary waste dumpsites in Rukpokwu, Obio/Akpor, Port Harcourt, rivers state, Nigeria

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Abstract
The level of physicochemical properties in temporary dumpsites in Rukpokwu, Obio/Akpor, Port Harcourt, Rivers State, Nigeria was assessed. The physicochemical parameters were analyzed using standard conventional procedures. The average range of values recorded for the physicochemical parameters within the stations for the period of investigation were pH; 5.49±0.11-5.66±0.25, electrical conductivity; 88.67±11.44-90.33±12.23 µs/cm, particle size analysis were silt, 8±1.60-12.001.40%, sand; 80.00±0.82-82.67±0.47%, and clay, 6±0.81-8.33±0.47%, with a textural class ranging from loamy soil to loamy sand, % organic carbon; 6.75±0.45- 6.82±0.51%, %organic matter; 11.75±0.88-11.79±0.96%, total nitrogen; 0.340±0.02-0.359±0.004mg/Kg, nitrates1.54±0.64-1.58±0.67mg/Kg, total phosphorus; 4.22±0.28-4.33±0.25 mg/Kg, phosphates; 12.94±0.86- 13.86±0.82mg/Kg, chlorides; 31.58±3.36-32.80±3.36mg/Kg and salinity; 52.11±5.54-53.624.42mg/Kg. The levels of the physicochemical parameters obtained in the various dumpsites were all higher or lower than those at the control station depending on the minimum or maximum requirement of the parameter in the soil. The results obtained therefore showed that the temporary dumpsites have influence the physicochemical properties of the soils used as dumpsites.

Keywords: Contamination dumpsites, physicochemical parameter, rukpokwu, soil

Introduction
Anthropogenic input and some other factors such as vegetation, parent rocks and altitude of an environment, can alter the physicochemical properties of the soil, like pH, soil texture, particle size, electrical conductivity, total organic carbon, cation exchange capacity and moisture content (Fomenky *et al*., 2018) [20]. The movement and the redistribution of nutrients available within the soil space depends on a large extent on the physicochemical characteristics of the soil. Such properties like pH, organic matter, redox conditions and quantity of clay are responsible for the mobilization and transmission of nutrient elements and water to the plants that occupy such spaces and are being transferred through the food chain to animals and then to humans (Menga *et al*., 2017) [27]. Human actions have brought about untold increase in the contamination of the soil, such contamination and pollution has brought certain challenges in life that is threatening to humans' animals' and plants' life. These anthropogenic activities include the application of pesticides and fertilizers, discharge of industrial wastes, mining, manufacturing, of goods and rupture of storage tanks (Seifi *et al*., 2010) [33] has resulted into changes in the natural physical and chemical nature of the soil of the environments. The changes in the soil nature due to contamination of the soil sometimes results in the blocking of air spaces that provides air to the soil through diffusion from the pores of the soil particles (Sutton *et al*., 2013) and thereby creating changes in the physical characteristics of the soil by changing the permeability and Atterberg limits of the soil (Nazir, 2011; Akunwumi *et al*., 2014; Devatha *et al*., 2019) [44, 4, 15]. The development and growth of plants and other soil organisms are greatly affected which came as a result of the changes in the chemical characteristics of the soil, like pH, total organic carbon and mineral nutrients (Yalin *et al*., 2006; Akugugwo *et al*., 2009; Wang *et al*., 2010) [4, 41]. The incessant deficiency of these physical and chemical requirements is unfavorable and yields grievous consequences which can lead to inappropriateness in soil conditions that can result in poor crop development and growth.

The contamination of soils due to waste dumping has given rise to environmental deterioration and degradation by altering totally the nutrient, biological and chemical content of the natural soil. The resulting effect of waste dumping that is not regulated in the cities has caused serious environmental contamination and has affected the natural/background levels of the physicochemical properties and nature of the soil within the area used as dumpsites. Soil contamination due to unregulated dumping of wastes in the environment has a resultant effect on the food chain and food safety and may prove to be dangerous to human health and overall wellbeing. There lies the likelihood of transfer of these chemical species to crops planted close to or within these areas designated as dumpsites which may ultimately find its way into human beings (D' Mello, 2003; Nwoke and Edori, 2020) [14, 30].

The pollution of the environment arises mainly from anthropogenic activities, which may be either industrial or agricultural. Diverse environmental contaminants and pollutants are discharged as wastes in disregard to lay down rules and regulations into the environment on daily basis (Inobeme et al., 2014) [23]. The major challenges which are in consonant with population increase, urbanization and industrialization amongst low income nations is poor hygienic conditions among the local inhabitants (Musa, 2014) [28]. According to (Ubwa *et al*., 2013) [39], the wastes so produced from diverse human actions may be either useful or detrimental to the environment which may be dangerous to the environment and hazardous to plants, animals and finally man the end user. Contributions from both industrial and human activities are possible sources of irretrievable reactions in the environment and as a result can hinder effective development (Sharma *et al*., 2014). The environment is limited in its capacity to hold these pollutants conditional on other environmental factors. While some ecological systems can hold or carry some pollutants to a considerable level, others can be very susceptible to such adverse consequences.

Temporary and permanent dumpsites abound in Port Harcourt, where refuse from homes, commercial centres, industries and other public places like motor parks, hospitals and schools are dumped on daily basis and the need to adequately document the levels of contamination by chemical species such as physicochemical parameters becomes very necessary. This work therefore is aimed at investigating the levels of some physicochemical parameters in temporary dumpsite situated at Rukpokwu, Obio/Akpor, Port Harcourt, Rivers State, Nigeria.

Materials and Methods Collection of Soil Samples

Soil samples were collected at random from three temporary dumpsites in Rukpokwu Obio/Akpor, Port Harcourt and a control site at the open field of the Community Secondary School Rukpokwu with the aid of soil auger. The samples were collected at three different points at a sampling site or location and then properly mixed together to form a composite sample. After each sampling, the auger was thoroughly washed in water and dried in order that the samples from one location does not influence another location. Polythene bags already labelled were used in preserving the samples before being transported to the laboratory for pretreatment, digestion and further treatments before analysis and determination of the concentration of heavy metals and physicochemical properties of the soil.

Determination of pH and Electrical Conductivity

The method of Bamgbose *et al*., (2000) was used in the determination of the pH of the soil. 10g of soil samples previously air dried was weighed into a 100ml beaker then distilled water of 200ml volume was added to the soil in the beaker. The mixture was stirred with a glass rod and allowed to stand for 30minutes. A pH meter was then inserted into the mixture when it was partially settled and the pH of the soil was then measured.

The electrical conductivity of the soil was measured using a conductivity meter. The conductivity of the soil was determined using a ratio of 1:5 of soil and distilled water solution. The model of the conductivity meter used was WTW model (Fomenky *et al*., 2018) [20].

Percentage Organic Carbon and Organic Matter

The method of Walkey and Black (1934) [40] was used in determining the amount of organic carbon in the soil. About 2g of the already prepared soil sample was weighed into a conical flask, then a standard solution of 10ml $K_2Cr_2O_7$ was added to the sieved soil sample and then 20ml of concentrated H_2SO_4 was added so that chloride ions will not interfere in the process. The solution was then allowed to settle down for a time interval of 30 minutes while stirring was done occasionally. Dilution of the content in the conical flask was performed by the addition of 10ml of distilled water. A ferroin indicator was used as an indicator to determine the excess $K_2Cr_2O_7$ which was titrated with standard 1.0N ferrous sulphate solution.

The percentage organic carbon in the sample was then calculated using the formula

$$\% \text{ Organic Carbon} = ((McK_2Cr_2O_7 - McFeSO_4) \times 0.003 \times 100 \times F)/(\text{weight of soil(g)})$$

Where,

Mc = normality of solution x volume (ml) of solution used F = correlation factor = 1.33

The percentage organic matter was then calculated using the expression

$$\% \text{ Organic Matter} = \% \text{ organic carbon} \times 1.724$$

Particle size determination

The soil particle size determination was performed in accordance to the method used by Bouyoucos (1962). A 50ml solution of cagon was used in soaking 50g of the sieved soil sample overnight. The prepared mixture was put into a measuring cylinder of 1000ml volume. The mixture was then added to the 1000ml mark then shaken and allowed to settle for 40 seconds before the hydrometer was dipped into it for the sandy content determination, the clay and silt contents were determined after an interval of 3 hours (when the mixture have settled down) following the same method. The temperature at 40 seconds and 3 hours intervals were recorded simultaneously with the hydrometer readings and designated T1 and T2, H1 and H2 respectively. The particle size analysis calculations were then made thus,

$$\% \text{ Sand} = 100 – [H1 + 0.2 (T1 – 68) – 2.0]2$$
$$\% \text{ Clay} = [H2 + 0.2 (T2 – 68) – 2.0]2$$
$$\% \text{ Silt} = 100 – (\% \text{ sand} + \% \text{ clay})$$

Determination of nitrogen, nitrates, phosphorus and phosphate: The available nitrogen was determined by alkaline per manganate method (Subbiah and Asija, 1956) [35] while the available phosphorus was determined by the method of colorimetry (Dandwate, 2020) [12]. Nitrates and phosphorus in the soil were analyzed using standard laboratory methods to determine their levels in the soil.

Results and Discussion

The results obtained for the different physicochemical parameters and the various parameters used in assessing the physicochemical properties of the temporary dumpsites and their levels in Rukpokwu, Obio/Akpor, Port Harcourt are provided in Tables 1-3.

Table 1: Levels of Some Physicochemical Parameters of Temporary Dumpsites in Rukpokwu, Obio/Akpor, Port Harcourt in January

Parameters		Stations/Locations			Mean	CSS (Control)
		Sars Road	Elikpokpodi	Checking Point		
pH		5.61	5.50	5.35	5.49±0.11	6.32±0.31
Electrical Conductivity µS/cm		103	88	75	88.67±11.44	125±13.06
Particle Size Analysis	Silt %	10	11	15	12.00±2.16	12±1.40
	Sand %	83	83	82	82.67±0.47	84±1.12
	Clay %	7	6	5	6±0.81	4±0.02
Textural Class		LS	S	LS	-	L
% Total Organic Carbon		6.15	7.25	6.85	6.75±0.45	3.02±0.03
% Total Organic Matter		10.603	12.965	11.809	11.79±0.96	5.206±0.06
Total Nitrogen mg/Kg		0.308	0.367	0.346	0.340±0.02	0.112±0.002
Nitrates (NO_3^-) mg/Kg		0.94	1.24	2.43	1.54±0.64	0.48±0.001
Phosphorus mg/Kg		3.85	4.53	4.28	4.22±0.28	1.60±0.06
Phosphates (PO_4) mg/Kg		11.81	13.90	13.12	12.94±0.86	4.86±0.09
Chlorides mg/Kg		31.52	27.50	35.72	31.58±3.36	13.10±1.07
Salinity mg/Kg		52.01	45.38	58.94	52.11±5.54	20.66±1.55

Table 2: Levels of some physicochemical parameters of temporary dumpsites in Rukpokwu, Obio/Akpor, port-harcourt in April

Parameters		Stations/Locations			Mean	CSS (Control)
		Sars Road	Elikpokpodi	Checking Point		
pH		5.63	5.52	5.37	5.51±0.11	6.30±0.21
Electrical Conductivity µS/cm		107	86	78	90.33±12.23	121±14.36
Particle Size Analysis	Silt %	11	11	14	12.00±1.41	8±1.60
	Sand %	81	82	80	81.00±0.82	85±1.02
	Clay %	8	7	6	7±0.82	2±0.01
Textural Class		LS	S	LS	-	L
% Total Organic Carbon		6.25	7.31	6.91	6.82±0.44	2.42±0.05
% Total Organic Matter		10.78	12.60	11.91	11.79±0.96	4.165±0.08
Total Nitrogen mg/Kg		0.318	0.407	0.351	0.359±0.04	0.107±0.003
Nitrates (NO_3^-) mg/Kg		0.96	1.27	2.51	1.58±0.67	0.46±0.002
Phosphorus mg/Kg		4.04	4.65	4.31	4.33±0.25	1.54±0.04
Phosphates (PO_4) mg/Kg		12.80	14.80	13.99	13.86±0.82	4. 73±0.06
Chlorides mg/Kg		33.32	28.45	36.62	32.80±3.36	11.50±0.97
Salinity mg/Kg		53.06	46.29	60.00	53.12±5.60	18.98±1.23

Table 3: Levels of Some Physicochemical Parameters of Temporary Dumpsites in Rukpokwu, Obio/Akpor, Port Harcourt in July

Parameters		Stations/Locations		Mean	CSS (Control)
Sars Road		Elikpokpodi	Checking Point		
pH	6.01	5.46	5.52	5.66±0.25	6.32±0.11
Electrical Conductivity µS/cm	101	89	79	89.67±8.99	123±11.28

Particle Size Analysis	Silt %	12	11	12	11.67±0.47	9±1.71
	Sand %	80	81	79	80.00±0.82	88±2.10
	Clay %	8	8	9	8.33±0.47	2±0.04
Textural Class		LS	S	LS	-	L
% Total Organic Carbon		6.12	7.34	6.99	6.82±0.51	2.45±0.07
% Total Organic Matter		10.55	12.65	12.05	11.75±0.88	4.243±0.06
Total Nitrogen mg/Kg		0.311	0.378	0.352	0.347±0.03	0.112±0.001
-		0.97	1.28	2.50	1.58±0.66	0.56±0.003
Phosphorus mg/Kg		3.97	4.58	4.37	4.31±0.25	2.05±0.07
3-		12.76	14.10	13.33	13.40±0.55	5.03±0.02
Chlorides mg/Kg		30.99	28.12	36.07	31.73±3.29	14.03±1.01
Salinity mg/Kg		53.31	48.37	59.19	53.62±4.42	19.68±1.53

Soil pH 5.61

The results obtained from the sample locations of the temporary dumpsites showed that the values of pH ranged from 5.35-6.01 with mean value range of 5.49±0.11-5.66±0.25 and a range of 6.30±0.21-6.32±0.31 for the control station within the months of investigation. The results obtained were within the limit approved by World Health Organization (WHO) (2004) of 6.5-8.5. The values of pH in this study were lower than that of Elemile *et al*., (2019) [19] that ranged between 7.19±0.25-7.83±0.02 in a soil impacted by the activities of abattoir, and was also below the range 6.22-7.52 in a study conducted by Ediene and Iren (2017) [17] on the impact of abattoir effluents on the pH of the soil but was within the range of that obtained by Osakwe and Okolie (2015) [32] that had a mean pH value of 5.15±0.48. Soil pH affects the metal dynamics of the soil due to its capability in controlling the adsorption and precipitation that are necessary factors in the retention of metals in the soils. A low pH value makes the metals to be in a more soluble form and in more cationic form which can be easily made available and absorbed by plants (Abdulhamid *et al*., 2015) [1]. Soil pH in the range 6-8.5 shows a normal soil (Kekane *et al*., (2015) [25]. The pH results recorded in this work therefore revealed that the dumpsites have not impacted negatively on the soil pH within the vicinity of the studied area. This might be due to the regular evacuation of the dumped refuse at the various site by the relevant authorities.

Electrical Conductivity

The values obtained from the results in Tables 4.1 showed that the electrical conductivity of the soils in the different locations ranged from 75-107µs/cm with mean value range of 88.67±11.44-90.33±12.23 µs/cm and value range of 121±14.36-125±13.06µs/cm for the control station within the months of investigation. The value of electrical conductivity obtained in this work was far lower than that reported by Edori and Iyama (2017) which was between 269.22-406.86µs/cm in soils from selected abattoirs in Port Harcourt and far higher than that recorded by Fomenky *et al*., (2018) [20] which was between 0.043-0.148ds/m in a research conducted in soil around some rivers in Cameroon. High levels of electrical conductivity show high occurrence of salts which are soluble in the soil (Arais *et al*., 2005). Soil electrical conductivity reveal the occurrence of ions and inorganic materials that are ionizable in the soil (Fuller *et al*., 1995). Electrical conductivity is a significant soil property which is useful in checking the soil quality level and also a valuable check on the soil's health status (Tale and Ingole, 2015) [15].

Percentage Total Organic Carbon and Soil Organic Matter

The results from Tables 1-3 showed that percentage total organic carbon from the study locations of the temporary dumpsites were in the range 6.12-7.44% with mean value range of 6.75±0.45-6.82±0.51%, and value range of 2.42±0.05-3.02±0.03% for the control station within the months of investigation. The values obtained for percentage organic matter within the various dumpsites ranged from 10.603-12.965% with a mean value of 11.75±0.88-11.79±0.96%, and a value of 4.165±0.08-5.206±0.06% for the control station within the months of investigation.

The values of percentage organic carbon recorded in this work was higher than that obtained by Olayinka *et al*., (2017) [31] which had an average value of 4.80±2.65% at a depth of 0-5cm and 2.40±0.29% at a depth of 10-15cm but was also lower than that obtained by Edori and Iyama (2017) in soils used for abattoir within Port Harcourt Metropolis with value range of 12.69-16.97%. The values obtained by Abdulhamid *et al*., (2015) [1] which fell within the range of 0.95-2.25% was also lower than that recorded in this work. The values of percentage organic carbon recorded in this work was lower than that approved for organic soil of 12-18%. The percentage organic matter recorded in this work was higher than the range 1.63-3.87% recorded by Abdulhamid *et al*., (2015) [1] and that obtained by Fomenky *et al*., (2018) [20] with a range of 0.81-3.53% and also that obtained by Martinez-Mera *et al*., (2019) of 2.90-6.45% in an irrigation district in Colombia.

Total organic carbon and total organic matter are valuable instruments and indices in appreciating the level of occurrence of organic materials in the soil and also indicate the level of fertility, moisture content and degree of the soil development and its usefulness for agricultural purposes (Edori and Iyama, 2017). Soil organic matter is a sink and the main source of soil organic carbon and its content vary from location to location (Perie and Quimet, 2008; Abdulhamid *et al*., 2015) [1]. Increase in soil organic matter increases the potential of the soil to retain more water, affects the natural soil structure, the rate at which air and water infiltrates, biological activities and also contributes to the overall nutrients of the soil. Soil organic matter also help in indication of the cation exchange capacity of the soil (Horworth, 2005). The low level of organic carbon and organic matter from the dumpsites was possible due to the fact that the dumped refuse are always evacuated within a reasonable time and there is no room for decay and deposition of organic matter and moreover to that, these dumpsite are situated to close to drainage points and hence rain easily sweep away the organic materials. The control site showed lower which shows that which was an indication that the refuse dumped in these location was the reason behind the higher values obtained.

Particle Size Distribution and Analysis

The results in Tables 4.1 for particle size distribution and analysis from the various locations of the temporary dumpsites were in the range of 79-83% with a mean value range of 80.00±0.82-82.67±0.47% and a value range of 84±1.12-88±2.10% for the control station for sand, 10-15% with mean value range of 11.67±0.47- 12.00±2.16% and a value range of 8±1.60-12.001.40% for the control station for silt and 5-9% with mean value range of 6±0.81-8.33±0.47% and a value range of 2±0.01-4±0.02% for the control station for clay, within the months of investigation.

The observed value of the percentage of sand particles in this work was higher than that observed by Fomenky *et al*., (2018) [20] which was between 44-76%, and higher than that observed in the work of Olayinka *et al*., (2017) [31] that ranged between 48.45±3.31-70.35±15.82% in the soils around abattoirs, filling stations, mechanic workshops and hospital incinerators sites within a depth range of 0-5cm, 5-10cm and 10-15cm, and was also higher than that recorded by Edori and Iyama (2017) with a mean value range of 53.00±0.81-56.50±1.73% in selected abattoirs in Port Harcourt. The percentage of clay obtained in this work were lower than that observed in the work of Edori and Iyama (2017) with an average value of 26.75±1.5-28.75±5±0.96%, but higher than that obtained in the work of Olayinka *et al*., (2017) [31] that had a low range of 2.90±3.48-9.38±1.21% and that of Fomenky *et al*., (2018) [20] that ranged from 2-7%. The observed value of percentage silt in this work were lower than that recorded by Fomenky *et al*., (2018) [20] which ranged from 20-29% and that of Edori and Iyama (2017) that ranged from 14.75±1.6-19. 75±1.71% and also that of Olayinka *et al*., (2017) [31] that was between 20.08 ± 10.66-48.43 ± 4.04%.

The percentages of the various particle sizes of the soils measured in the studied soil, sand, clay and silt is referred to as textural class. The soil texture is a measure of the physical properties of the soil. Such physical properties are the water retention capacity, permeability, soil toughness or ease of tillage, soil plasticity and soil productivity (Amos-Tautua *et al*., 2014) [5]. The sandy nature of the soil observed in this work will allow easy percolation of water and therefore has the high tendency to promote the contamination of the groundwater. Clay particles help in the prevention of water percolation because it is slimy and non-porous in nature and possess closed pore spaces had a low percentage in this work hence the soil under investigation may not have the potential to hold much water. This observation is in agreement with that observed by Brady (1996) [10] and water percolation cannot be easily prevented (Ahn, 1993) [2], for clay acts naturally to filter water and other contaminants (Edori and Iyama, 2017). The clay particles possesses exchange surfaces large enough to stabilize and absorb organic matter in the soil and also heavy metals available within the soil space (Dara, 2000) [13] and to make them useful to plants. The low level of silt obtained in this study was as a result of the regular evacuation of refuse dumped at the various site or locations which does not give quality time for decay and decomposition of deposited materials to form silty particles over the soils of the dumpsites.

Total Nitrogen and Nitrates

The recorded results total nitrogen within the stations of the temporary dumpsites during the period of investigated fell within the range of 0.308-0.407mg/Kg. The average concentration of total nitrogen in the soil was in the range of 0.340±0.02-0.359±0.004mg/Kg at the time the research was conducted with recorded concentration at the control station falling within the range 0.107±0.003-0.112±0.002mg/Kg during the time of investigation. The level of nitrogen recorded in this work was lower than that reported by Dandwate (2020) [12] which ranged between 140.10 to 252.68 kg/ha but was higher than that recorded by Chaudhari (2013) [13] which was in the range of 0.031-0.047. The recorded results for nitrates within the stations of the temporary dumpsites during the period of investigated fell within the range of 0.94-2.51mg/Kg. The average concentration of nitrates in the soil was in the range of 1.54±0.64-1.58±0.67mg/Kg at the time the research was conducted with recorded concentration at the control station as 0.46±0.002-0.56±0.003mg/Kg within the months of investigation. The value of nitrates recorded in this work was higher than that obtained by Edori and Iyama (2017) in selected abattoirs in Port Harcourt which ranged from 0.48±0.03-0.68±0.14mg/Kg.

Nitrogen is a very important plant nutrient, for development and growth of plants. Nitrogen deficiency results in stunted growth and development and shows yellowish green leaves and also causes reduction in protein content and yields. Nitrogen is low in all soil samples. Nitrate is an essential part of the soil environment. Excreted products or wastes of soil dwelling organisms such as nitrogen fixation bacteria usually increases the concentration of nitrate in the soil habitat. This is possible through the high concentration of ammonia in the excreted wastes, which can be further converted to nitrate and then nitrite through the activities of certain microbes. Nitrate is a vital eutrophic agent when it exists in high level in a river. Increased level of nitrates in the soil may cause a resultant decrease in the amount of oxygen that is available in the soil environment. Low concentration of dissolved oxygen negatively affects the effective conversion of ammonia to nitrite and then to nitrate, which ultimately leads to increased level of nitrite and ammonia in the soil thereby creating a more toxic soil environment (Suthar *et al*., 2009).

Total Phosphorus and Phosphates

The recorded results for total phosphorus within the stations of the temporary dumpsites during the period of investigated fell within the range of 3.85-4.58mg/Kg. The average concentration of total phosphorus in the soils of the dumpsites was in the range of 4.22±0.28-4.33±0.25 mg/Kg at the time the research was conducted with recorded concentration at the control station as 1.54±0.04-

2.05±0.07mg/Kg within the months of investigation. The level of phosphorus recorded in this work was lower than that reported by Dandwate (2020) [12] which ranged between 15.11 to 54.13 kg/ha but was higher than that recorded by Chaudhari (2013) [13] which was in the range of 0.021-0.026mg/Kg. While the recorded results for phosphates within the stations of the temporary dumpsites during the period of investigated fell within the range of 11.81-14.80mg/Kg. The average concentration of phosphates in the soils of the different dumpsites was within the range of 12.94±0.86- 13.86±0.82mg/Kg at the time the research was conducted with recorded concentration at the control station as 4.73±0.06-5.03±0.02mg/Kg within the months of investigation.

Phosphorous is termed the principal key element in soil quality. It is a most essential element in every single living cell. It is indispensable for growth, cell division, root development and elongation of seed and fruity growth and early ripening (Kachhave and More 1982). Also, it aids in energy storage and transfer. Much of the phosphate which living organisms uses are being fused into organic compounds. When dead plant constituents return to soil, organic phosphates are then being released slowly as the available inorganic phosphate or are then incorporated into extra stable organic matter and become component of the soil organic materials. Phosphorus is known to be the least mobile of the main plant nutrients.

Chlorides 31.52

The recorded results for chlorides within the stations of the temporary dumpsites during the period of investigated fell within the range of 27.50-36.62mg/Kg. The average concentration of chlorides in the soils of the various dumpsites was in the range 31.58±3.36-32.80±3.36mg/Kg at the time the research was conducted with recorded concentration at the control station was within the range 11.50±0.97-14.03±1.01mg/Kg within the months of investigation. The value of chlorides recorded in this work was lower or within the same range that was obtained by Edori and Iyama (2017) in selected abattoirs in Port Harcourt which ranged from 18.12- 33.67mg/Kg**.** Even though, chlorine in its natural gaseous form is a toxicant, but its ionic form, which is known as chloride ions are significant for life and survival of plants and animals (Duffus, 1996). Increase in chloride ion or high chloride concentrations is indication of contamination/pollution from sewage or waste from industries (Bertram and Balance, 1996). The human body has the ability to adjust to a certain degree or levels of chloride up to 200 mg/L. Salty taste due to chloride ion is observed in water when its concentration exceeds 250 mg/L (Hauser, 2001).

Salinity

The recorded results for salinity within the stations of the temporary dumpsites during the period of investigated fell within the range of 45.38-60.00mg/Kg. The average concentration of salinity in the soils used for temporary dumpsites was within the range 52.11±5.54-53.624.42mg/Kg at the time the research was conducted with recorded concentration at the control station as 18.98±1.23-20.66±1.55mg/Kg. The value of salinity recorded in this work were higher or within the same range with that recorded by Edori and Iyama (2017) in selected abattoirs in Port Harcourt with value range of 25.00-61.07 mg/Kg. Salinity is an important factor when considering ecological conditions. This is due to its effect on the type and species of plants and animals that inhabit or dwell within the environment and also has severe effect on the use to which the soil is put into.

Conclusion

The constant monitoring of the soil environment used as dumpsite is important in the assessment for the regeneration, transformation, safety and protection of the dumpsite environment. This will help to encourage cleanliness and also keeping the reliability of the dumpsite environment and that of plants, animals and humans that are in constant touch with such environments. The observed results of the physicochemical parameters of the temporary dumpsite soil samples showed that all the parameter examined were within the acceptable limits although they were all higher than that of the control site**.** Although the physicochemical parameters concentration in the soils of the studied area have not reached an alarming stage that will pose danger to humans and the ecosystem, effort and proper control measures should be put in place at checkmating the types of refuse dumped and the principle of sorting should be applied to effect easy evacuation of the dumped wastes.

References

1. Abdulhamid Z, Agbaji EB, Gimba CE, Agbaji AS. Physicochemical parameters and heavy metals content of soil samples from farms in Minna. International Letters of Chemistry, Physics and Astronomy,2015:58:154-163.
2. Ahn PM. Tropical soil and fertilizer use. Longman Scientific Technical, UK, 1993.
3. Akubugwo EI, Chinyere GC, Ogbuji GC, Ugbuagu EA. Physicochemical property of enzyme activity in a refined oil contaminated soil in Isuikwato L. G. A., Abia State, Nigeria. Society and Environmental Biology, 2009:2:79-84.
4. Akunwumi II, Diwa D, Obianigwe N. Effects of crude oil contamination on the index properties, strength and permeability of laterite clay. International Journal of Applied Science and Engineering Research,2014:3:816-824.
5. Amos-Tautua BMW, Onigbinde AO, Ere D. Assessment of some heavy metals and physicochemical properties in surface soils of municipal open waste

dumpsite in Yenagoa, Nigeria. African Journal of Science and Technology,2014:8:41-47.
6. Arias ME, Gonzalez-Perez JA, Gonzalez-Villa FJ, Ball AS. Soil health: A new challenge for microbiologists and chemists. International Microbiology,2005:8:13-21.
7. Bamgbose O, Odukoya O, Arowolo TOA. Earthworms as bio-indicator of metal pollution in dumpsites of Abeokuta city, Nigeria. International Journal of Tropical Biology and Conservation,2000:48:229-234.
8. Bertram J, Balance R. A Practical guide to the design and implementation of freshwater, quality studies and monitoring programmes. Published on behalf of United Nations Environmental Programme (UNEP) and World Health Organization (WHO), E & F. N. Spoon Publishers, 1996, 172-177.
9. Bouyoucos GJ. Hydrometer method improved for making particle size analysis of soils. Agronomy Journal,1962:54:464-465.
10. Brady NC. The nature and properties of soils (eds. 11th). McMillan, New York, 1996, 621.
11. Chaudhari KG. Studies of physicochemical parameters of different soil samples. Archives of Applied Science Research, 2013:5(6):72-73.
12. Dandwate SC. Analysis of soil samples for its physicochemical parameters from Sangamner city. *GSC* Biological and Pharmaceutical Sciences, 2020:12(02):123-128.
13. Dara SS. A textbook of Environmental Chemistry and Pollution Control, New Delhi, S. Chand and company limited 7th Revised Edition, 2000, 39-42.
14. D' Mello JPF. Food safety: Contaminants and toxins. Cambridge CABI Publishing, 2003.
15. Devatha CP, Vishal VA, Rao JPC. Investigation of physical and chemical characteristics on soil due to crude oil contamination and its remediation. Applied Water Science,2019:9:89:1-10.
16. Duffus J. Comments to Editor, Chemistry International, News Magazine of International Union of Pure and applied Chemistry (IUPAC),1996:18(6):252-253.
17. Ediene VF, Iren OB. Impact of abattoir effluents on the pH, organic matter, heavy metal levels and microbial composition of surrounding soils in Calabar municipality. Asian Journal of Environment and Technology,2017:2(3):1-10.
18. Edori OS, Iyama WA. Assessment of physicochemical parameters of soils from selected abattoirs in Port Harcourt, Rivers State, Nigeria. Journal of Environmental Analytical Chemistry,2017:4(3):1-5.
19. Elemile OO, Raphael OD, Omole DO, Oluwatuyi OE, Ajayi EO, Umukoro O, et al. Assessment of the impact of abattoir activities on the physico chemical properties of soils within a residential area of Omu-Aran, Nigeria. IOP Conference series: Materials Science and Engineering. 2019;1(9):640-012083.
20. Fomenky NN, Tening AS, Chuyong GB, Mbene K, Asongwe GA, Che VB. Selected physicochemical properties and quality of soils around some rivers of Cameroon. Journal of Soil Science and Environmental Management,2018:9(5):68-80.
21. Horworth WR. The importance of soil organic matter in the fertility of organic production systems. Western Nutrient Management Conference, Salt Lake City, UT,2005:6:244-249.
22. Hauser BA. Drinking water chemistry, A laboratory manual. Turbidity herp II, 2001, Lewis Publishers, A CRC Press Company Florida USA, 2001, 71.
23. Inobeme A, Ajai AI, Iyaka YA, Ndamitso M, Uwem B. Determination of physicochemical and heavy metal content of soil around paint industries in Kaduna. International Journal of Science and Technology Research,2014:3:221-225.
24. Kachhave KG, More SD. Research notes available potassium status in relation to physico–chemical properties of Maharashtra soils. Journal of Maharashtra Agriculture University,1982:7(2):1-178.
25. Kekane SS, Chavan RP, Shinde DN, Patil CL, Sagar SS. A review on physico-chemical properties of soil. International Journal of Chemical Studies,2015:3(4):29-32.
26. Martinez-Mera EA, Torregroza-Espinosa AC, Crissien-Borrero TJ, Marrugo-Negrete JL, Gonzalez-Marquez LC. Evaluation of contaminants in agricultural soils in an irrigation district in Colombia. *Heliyon*,2019:5:1- 9.
27. Menga VE, Neba GN, Suh CE. Environmental geochemistry of mine tailing soils in the artisanal gold mining district of Betare Oya, Cameroon. Environmental Pollution,2017:6(1):52-61.
28. Musa JJ. Effect of Domestic Waste Leachates on Quality Parameters of Groundwater,2014:24:28-38.
29. Baghel KS. Physico-chemical parameter for testing of Hatni river water at Jobat fata dam district–Alirajpur Madhya Pradesh, India. Int. J Biol. Sci. 2020;2(1):16-17. DOI: 10.33545/26649926.2020.v2.i1a.17
30. Nwoke IB, Edori ES. Concentration of heavy metals in vegetables (*Telfaira occidentalis*) from farmlands close to Rumuagholu dumpsite, Rvers State, Niger Delta, Nigeria. Journal of Research and Scientific Innovation,2020:7(5):181-184.
31. Olayinka OO, Akande OO, Bamgbose K, Adetunji MT. Physicochemical Characteristics and heavy metal levels in soil samples obtained from selected anthropogenic sites in Abeokuta, Nigeria. Journal of Applied Science and Environmental Management,2017:21(5):883-891.
32. Osakwe SA, Okolie LP. Physicochemical characteristics and heavy metals content in soils and cassava plants from farmlands along a major highway in Delta State, Nigeria. Journal of Applied Science and Environmental Management,2015:19(4):695-704.
33. Seifi RM, Alimardani R, Sharifi A. How can soil electrical conductivity measurements control soil pollution? Journal of Environmental and Earth Science,2010:2(4):235-238.

34. Sharma MC, Baxi S, Sharma KK, Singh M, Patel S. Heavy metal ions levels and related physicochemical parameters in soils in the vicinity of a paper industry location in Nahan area of Himachal. Journal of Environmental Analytical Toxicology,2014:4:236. Doi 10.4172/216.0525.1000236.
35. Subbiah BV', Asija GL. A rapid procedure for the determination of available nitrogen in soils. Current Science,1956:25:254-260.
36. Suthar S, Bishnoi P, Singh S, Mutiyar PK, Nema AKPatil NS. Nitrate contamination in groundwater of some rural areas of Rajasthan, India. Journal of Hazardous Materials,2009:171(1-3):189-199.
37. Perie C, Quimet R. Organic carbon, organic matter and bulk density relationships in boreal forest soils. *Canadian Journal of Soil Science*,2008:88:315-325.
38. Tale KS, Ingole S. A review on role of physico-chemical properties in soil quality. Chemical Science Review Letters,2015:4(13):57-66.
39. Ubwa ST, Atoo GH, Offem JO, Abah J, Asemave K. Effect of activities at the Gboko abattoir on some physical properties and heavy metals levels of surrounding soil. International Journal of Chemistry,2013:5:47-57.
40. Walkey A, Black AI. An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chronic acid titration method. *Soil Science*,1962:39(1):29-38.
41. Wang XY, Feng J, Zhao JM. Effects of crude oil residuals on soil chemical properties in oil sites, Momoge Wetland, China. Environmental monitoring and Assessment,2010:161:271-280.
42. World Health Organization (WHO). Guidelines for drinking water quality. 3rd Edition, Geneva, 2004, 515 ISBN 92-4-154638-7.
43. Yalin H, Silong W, Shaokui Y. Research advances on the factors influencing the activity and community structure of microorganisms. Chinese Journal of Soil Science,2006:37:170-176.
44. Nazir AK. Effect of motor oil contamination on geochemical properties of over consolidated clay. Alexandrian Engineering Journal,2011:50:331-335.