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EFFECT OF BOILING AND REFLUXING ON THE EXTRACTION OF LEAD IN STREET DUST

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ABSTRACT

The lead concentration in street dust along Pako-Bariga road of Lagos was determined, The Wet oxidation method were used. The methods involved studying the effect of using different glasswares on the determination of lead. Also, the effect of using different types of acids and mixture of acids on the determination of lead at different length of time was studied. The result showed that the lead concentration in this area ranged from 312.5µg/g to 387.5g/g; the kjeldahl flask was better than all other methods tried and the effect of using different types of acid and mixtures of acid showed that aqua regia was the best mixture of acids to use for the extraction of lead from street dust. It was observed that the length of time for digestion of samples did not show any significant differences when longer lengths of time were used for digestion.

Keywords: Wet Oxidation method, Lead, Digestion of Samples, Street Dust

INTRODUCTION

The advent of science and technology brought about the issue of environmental pollution; pollution of water, air, land and vegetation. Pollution started as far back as the Stone Age days. During those days, man learnt the act of bush burning, deforestation etc. Then nature was not allowed to take its cause in man's life. However, with all these, pollution was not really an urgent problem to man but, with geometric population increase coupled with industrialization urbanization, man's most activities then shifted from creating a world of sustenance and hence environmental hazard especially "POLLUTION" was "BORN". Most pollution exists because we demand the benefits of a technology that for the most part, has given little consideration to the long-range effects of the products. Much of the pollution is due to the misapplication of techniques, yet the eradication of most forms of air pollution

is within the capabilities of chemical technology. (Analytical Method Committee,2006) Problems of pollution became more wide spread in the twentieth century. The automobile, a fledging in transportation, at the turn of the century became one of the sources of pollution. Arah, R. O. (2005) reported that transportation by motor vehicles brings about an increase in the rate of pollution in the environment. Incidents like Minamalu (JAPAN 1953-1972), occurred as a result of mercury poisoning. The victims of this fishing community were crippled, deformed and in a number of cases died after the consumption of fish contaminated with methyl mercury. The toxic mercury compound was introduced into the bay by a company which used methyl mercury as a catalyst in their production process. This an example of heavy metal pollution due to the toxicity of such metals which include lead (pb), Arsenic (As), Iron(Fe), Cadium (Cd) etc. Environmental challenges grow in complexity, intensity and severity as a result of increasing ecological disturbance. The air around many cities in the developing countries of the world are laden with dangerous chemicals arising from industrial activities while vast lands have been devastated by indiscriminate dumping of refuse and sewage disposal; pesticides applied on agricultural lands are also endangering the lives of human and other organisms.

All these and other chemical, biological and physical environmental degradation often cause a lot of harm to the populace. Environmental deterioration which has grown to their present state of near uncontrollable stage dates back to the 1890's when a Swedish Chemist, Svante Arrhenius alerted the people around that burning fossil fuel and clear standing forests used for various developmental purposes had released an unusual amount of Carbon IV oxide into the atmosphere resulting in the increased warming of the climate. Consequently, Americans constitute less than 5% of the world's population, but produce roughly 25% of the world's carbon (IV) oxide, and generate approximately 30% of world's waste, China has overtaken the United States as the world's biggest producer of carbon (IV) oxide (Guardian. uk, 2007). About 400 million metric tons of hazardous wastes are generated each year.(Microsoft Encarta 2009). The United States alone produces about 250 million metric tons. Studies conducted by David, Michael, and Caroline (2010) have estimated that the number of people killed annually in the United States of America because of pollution and ecological disturbance could be over 50,000. David, Michael, and Caroline (2010) also indicated that 656,000 people die prematurely each year in China because of air pollution. In India, air pollution is believed to cause 527,700 fatalities a year according to the National Academy of Science (2005).

Overview of main health effects of pollution on humans from some common types of pollution in World Resources Institute (2008 Monthly Update) indicates that adverse air quality can kill many organisms including humans. Lorenz (2007) also indicates that ozone pollution can cause respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion. According to Guardian. uk, 2007, water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries. An estimated 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrhea sickness every day. Nearly 500 million Chinese lack access to safe drinking water. Natural disasters are primarily caused as a result of environmental degradation which tends to have become part of the world's daily experiences as it accounts for the destruction of millions of lives and property worth billions of dollars. Stan Hurricane that occurred in Guatemala, El-Savador and Mexico recorded lowest death toll of 1,598 including the flood in Pakistan that recorded highest death toll of 2million(Wikipedia,2010). Details are presented in chapter two in conceptual framework.

In Africa, recent disasters experienced according to Wikipedia, 2010 include:

- The 2009 West Africa floods that affected close to 1 million people across 12 countries, and caused the deaths of at least 193 people.
- The 2009 Angola, Namibia and Zambia floods affected some 445,000 people across 3 countries and resulted in the deaths of at least 131 people.
- The 2008 Benin floods that affected 150,000 people in Benin.
- The 2008 Namibia floods that affected 250,000 people, killing 42.
- The 2007 Mozambican flood that affected 121,000 people and resulted in 29-40 deaths.
- The 2007 African floods that hit over 14 countries in Africa, affecting 2.5 million people and 250 deaths.
- Ethiopia's worst floods in August 2006.
- The 2000 Mozambique flood, caused by heavy rains followed by a cyclone, covered much of the country for three weeks, killing thousands, leaving the country devastated for years afterwards.

Developing countries such as Nigeria in 1980 started experiencing serious and complex environmental problems which include over-population, pollution, unchecked industrialization, over-use of natural resources, flooding, erosion, solid waste disposal problem, desertification and drought (Ajitoni, 2009). The

biosphere on which all organisms depend for survival are deteriorating rapidly as a result of the activities of human beings (Gbamanja, 2001).The Ogunpa flood disaster that occurred in Ibadan in 1980 due to the incident of the dumping of waste on streams, ditches, rivers brought environmental degradation into limelight, while concerted efforts about the prevention of environmental problem started in 1988 following the unfortunate incident of the dumping of toxic hazardous wastes at Koko Port in the Delta State of Nigeria (Oduwaye, 2009). The worst that had happened to Nigeria was in 2012, thousands of lives were lost in the country through environmental degradation. Other large- scale industries with a high profile pollution load are raw material- oriented industries located in the countryside such as cement and paper manufacturing. Other sources of these environmental problems are from flaring other oil and gas related activities. Natural gas associated with crude oil has been flared in the Niger Delta region of Nigeria for more than four decades. Statistics on crude oil production indicated that about 70 percent of the total gas associated with crude oil was flared in obvious disregard for the country's 1979 Gas Injection Legislation (Atoyebi, 2000). The flaring of gases by oil companies in Nigeria accounted for more than half of the estimated 96.513 million metric tons of carbon (IV) oxide emissions from industrial sources in Nigeria in 1992 (Jaiyeoba, 2002). Action on local, state and Federal levels began in the 1970's to solve problems caused by past disposal and to develop workable methods for future disposal of hazardous wastes. President Richard Nixon of (U.S.A) in response to public demand in 1970, created an EPA (Environmental Protection Agency). Also in the last decade, the Nigerian government introduced FEPA (Federal Environmental Protection Agency), in Decree 58 of 1988. The objectives of these Agencies are

1. To protect people, people's health from environmental hazards.
2. To help protect terrestrial and aquatic life from Industrial waste and waste matter.
3. To abate unacceptable levels of air and water pollutants.

Atmospheric lead can be used as a research tool in studying air pollution. Lead is a heavy metal and is known to be toxic-Heavy metals unlike other air pollutants such as oxides of Nitrogen (Nox) which are present in large concentration, are naturally present in low concentration but they are known to be toxic. Lead is less than 1.0 ppm in the earth crust and also less than 0.03 ppb in sea water. The use of lead over many years has resulted in the pollution of the environment, Benjamin Franklin, (1786) wrote a extensive treatise on lead toxicity to his friend Benjamin Vaughn. In the letter, Frank lamented the fact

that no one seemed to be doing anything to protect people from the known poisonous nature of lead. He ended the letter this way "This my friend, is all 1 can at present recollect on the subject"13 one will see by it that the opinion of this mischievous effort from lead is at least above sixty years old. At present there is some awareness of the problems of lead poisoning (plumbism) but the trade-off among pollution, energy and inflation are far from being settled. Some research works have been done on lead. Pavez *et. al.*, (2008) studied the measurement of hair lead concentration in children of four cities in Saudi Arabia. In the scalp hair of 800 school children aged 6-8 years from four cities namely Makklah, Jedah, Riyadh and Tabuk in Saudi Arabia were found to be 6µg/Pbg, 23.3µg/Pbg, 5.1µng/Pbg, 10.9µg/Pbg respectively. The mean value of lead concentration in hair for Jeddah, Makkah and Tabuk cities are on the high side of the acceptable normal range, indicating an interesting trend in environment, lead pollution, Riyadh, appears to be relatively clean in this respect while the others are not. This is because rapid modernization with increases use of leaded gasoline (transportation). The city roads and highways of Saudi Arabia are witnessing a phenomenal rise in vehicular traffic in the wake of rapid modernization in the last twenty years[9].

The Metrology and Environmental Protection Administration (MEPA), (1985) reported that the number of registered motor vehicles increased from 243,3000 in 1973 to 3.8 million in 1993. Hair was chosen as the analytical tissue for measurement of lead concentration since it is easily collected and serve as an important consideration in studying young children. Hair is advantageous for the analyses of trace metals because hair has bio-Concentrates. It contains more lead per unit weight than blood or any other tissue, with less demand on the sensitivity of the analytical method. Of the four cities reported, Jeddah shows the highest hair lead concentration, followed by Makkah, Tabuk and Riyadh. Jeddah's top position can be attributed to its being one of the most populous cities in Saudi Arabia with a corresponding large number of vehicular traffic using leaded gasoline- It is also situated on the red sea with one of the busiest parts in the Arabian Peninsula. It has a large oil refinery and an ever expanding industrial zone. All these activities (industrialization motor vehicle transportation etc), is responsible for the increase in lead in some of the cities[9].

On the assessment of lead contamination from the analysis of household paints, Ismail *et al.*, in (2012), reported that paint pigment contains lead chromate (red, orange), lead oxide, and lead sulphate (white). These paints are used for both

interior and exterior use and thus act as an insidious source of lead. He also reported that lead is toxic despite its beneficial chemical attribute. The study on the assessment of lead contamination from the analysis of household paint was carried out in Bahrain environment. These paints which are either manufactured in Bahrain or imported, have been used for decorating building but unfortunately, some of the paints have found its way into the stomach of children. It has been a normal practice for many citizens in Bahrain to coat their water reservoir (tanks) with red paint primer which contains an appreciable amount of lead. This dissolves in water and could be hazardous to the health of people who drink such water. Samples were collected from various old building such as houses, school, mosques etc. digestion procedure was carried out using wet oxidation method using nitric acid lead standard solution which is 1000ppm was certified. The solutions were diluted carefully to the required concentration using deionized water. The analysis of each sample was done using an atomic absorption spectrophotometer. The result showed that the concentration of lead in paint were found in the range of 200-5700 mg/kg which are low compared to the limit of 0.5% in U.K, 0.06% in U.S.A. but nevertheless these are hazardous[6].

Robert Sphehar (2008) carried out a research on the toxicity and bio-accumulation of lead and cadmium in aquatic invertebrates. The various invertebrates used for this study were four species of insects, one snail, and an amphipod Cadmium and lead toxicity were determined during a 28 day exposure to water bodies which contains lead and cadmium and it was reported that cadmium and lead concentration increases in these invertebrates, with increasing concentration of these heavy metal in water. He also reported that the sensitivity of invertebrates to cadmium and lead may have been greater if the life cycle of the insects been studied. Wire and water, in (1976) found that immature snails were three times more sensitive to cadmium than mature snails. Similarly insects in the early stages of development wore more sensitive to cadmium than at later stages (Roy, 2007).

Studies and researches carried out on lead have some aims, some of which are:

1. Making known to man, the existence of the toxicity of lead and other heavy metals.
2. The effects of lead toxicity to man, plants, soil, water etc.
3. Measures taken to combat the pollution by lead and other heavy metals.

It is in cognizant of the lead burden in the environment that this study was carried out. Attempts were made to enumerate control measures for lead pollution in the environment.

AIMS AND OBJECTIVES OF STUDY

The present study is aimed at determining the concentration of lead in street dust as a means of monitoring environmental pollution caused by emission of lead particularly by automobile exhaust along Pako Bariga road, Yaba Lagos State. This aim is to study the effect of boiling and refluxing on the determination* of lead in street dust. This is for the first part of the project and involves the use of concentrated nitric acid for digestion. The analysis is carried out by using an atomic absorption spectrophotometer. The effect of using varying lengths of time on the extraction of lead from the dust is also determined. The second part of the project involves a comparison of lead extraction, using concentrated nitric acid and aqua regia respectively as oxidizing agents use for digestion. Therefore, a study on the best method of wet ashing method of extracting lead was studied. Nigeria is not exempted from most of the environmental pollution that are found elsewhere. This is obvious when one remembers the increase in the number of vehicles on our roads. This implies that there is an increase in the amount of emission product from motor vehicles, of which lead is a part.

Sampling and Sample Description

The study involves the use of street (lust as a research tool in monitoring lead pollution in one of the Nigerian cities. The site of this study is along Pako Bariga road, of Mainland Local Government in Lagos State, Nigeria. The street dust was collected from this site on the 24th of December in the year 2014. This was a favourable period for dust collection because as at this period of the year, the weather was sunny and rainfall was not common in the month of December. This period was also the harmattan season when dust is common in the environment. The dust sample was collected from settled dust on top of cars and motor vehicles parked along Pako Bariga road. The road is of a medium traffic density. The dust sample was collected and stored in an air tight bottles and this was kept in a desiccator to prevent air from entering the sample.

SAMPLE PREPARATION

The main aim of sample preparation is to convert the analyze of interest into a measurable form. For this study, the sample was sieved to remove larger particles of dust and also dirt's and a particle size of 0.212mm dust sample was use. The Wet aching technique was used.

Wet Aching Technique

For this study, the wet aching techniques involves the use of two different oxidizing agents namely; concentrated nitric acid and Aqua regia.

In this experiment, two sets of studies were carried out, and these are The extraction of lead from dust sample using concentrated nitric acid. The extraction of lead from dust sample using Aqua regia.

For both studies, four methods were used to destroy the organic matter in the dust sample during digestion. Also, digestion process lasted at the same length of time. The methods and length of time for digestion process of the dust samples are

- Boiling in an open beaker for 15 minuets
- Boiling in an open beaker for 30 minutes
- Boiling in a closed beaker for 15 minutes
- Refluxing in a kjeldahl flask for 15 minutes

For both studies, a duplicate digestion was carried out to serve as a check to the first digestion. Dust sample (0.212mm particle size] of about Ig was weighed into each of the glasswares and a known volume of the oxidizing agent were added. Digestion process lasted for 15 minutes or 30 minutes as shown above, with the use of 20ml and 30ml of oxidizing agent respectively. Evolution of brown fumes of charred organics were observed while heating was on at about 5 to 10 minutes of heating, after which white fumes were given off. After heating was stopped at the required time for digestion in the methods used, the hot mixture was allowed to cool and transferred quantitatively into a 25ml volumetric flask which was made up to the mark using distilled water. The mixture was then filtered to remove the residue and the filtrate which contains dissolved lead was analysed using an atomic absorption spectrophotometer.

Atomic Absorption, Epectrophotometric Assay of Lead

The instrument was switched on and allowed to warm up for 5 minutes with the hollow lamp of lead in place. The operating parameters for the determination of lead are listed below.

Lamp Source:	External
Lamp Current:	15A
Wavelength:	2.17nM
Band Pass:	0.5nM
FLAME DESCRIPTION:	Oxygen acetylene

The samples were aspirated in the flame and the lead concentration, read directly from the instrument one after the other. Lead hollow lamp passes radiation which are absorbed by the sample. The sample is aspirated in the flame and when the sample gain enough energy, absorption occur at the wavelength of lead (217nM) and the absorbance is given by the instrument.

Caliberation Curve

This is a plot of absorbance against concentration. It is obtained by preparing a standard solution of lead. The standing solution is a 1000ppm stock solution and from this, 0.4ml, 0.8ml and 0.12ml were taken and diluted to give 4ppm, 8ppm, 12ppm respectively of the standard solution. The calibration curve is used to check the efficiency of the atomic absorption spectrophotometer in which a straight line graph passing through the origin was obtained and thus, beer Lambert law was obeyed.

Beer Lamberts law states that the absorbance is directly proportional to the concentration

$sA = ECL$

A = Absorbance

C = Concentration

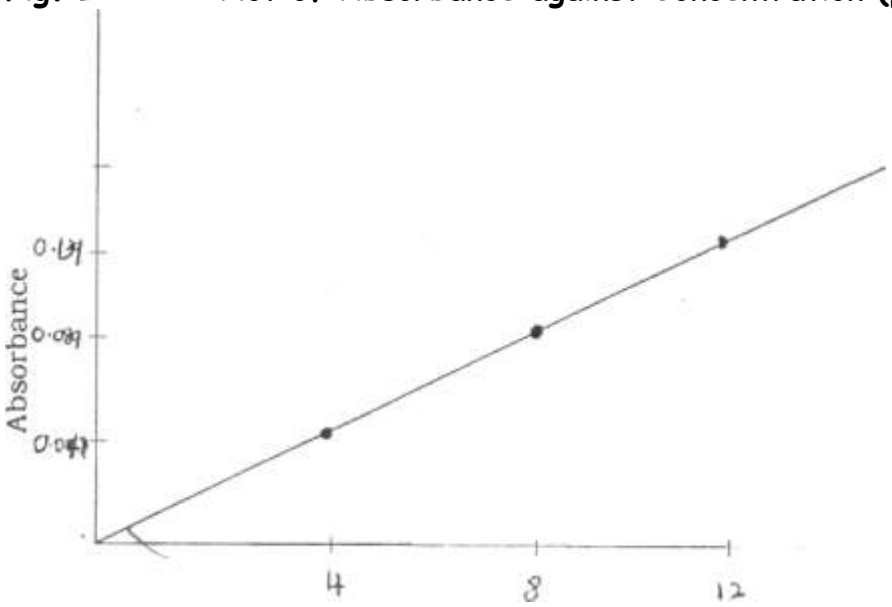
L = Path lenth

E = Molar Absorptivity

Table 1: Standard Solution

Absorbance	Concentration (ppm)
0.000	0
0.047	4
0.089	8
0.139	12

Fig. I: Plot of Absorbance against Concentration (ppm)



From the graph, the absorption spectrophotometer is effective and thus can be used to determine the concentration of lead in the filtrate solution.

RESULTS

From the readings of the atomic absorption spectrophotometer, two readings were obtained; one for the first digested dust sample and the other for a duplicate digestion of the same dust sample carried out under the same condition. The mean results were then obtained as shown in tables.

Table 2: Result of Lead Analysis using Concentrated Nitric Acid and Aqua Regia Respectively

ACID TYPE	GLASS WARE USED	TIME (Min)	RESULT (Hg/g)	DUPLICATE RESULT (Hg/g)	MEAN RESULT (ng/g)
CONCENTRATED NITRIC ACID	OPEN BEAKER	15.00	387.50	357.50	372.50
	OPEN BEAKER	30.00	380.00	375.00	377.50
	CLOSED BEAKER	15.00	320.00	317.50	318.75
	KJELDAHL FLASK	15.00	332.50	327.50	330.00
AQUA REGIA (3 PART OF CONCENTRATED HYDROCHLORIC ACID -»- 1 PART	OPEN BEAKER	15.00	342.50	335.00	338.75
	OPEN BEAKER	30.00	317.50	312.50	315.00
	CLOSED BEAKER	15.00	337.50	340.00	338.75
	KJELDAH FLASK	15.00	335.00	345.00	340.00

Table 3 & 4: Results of Lead Analysis showing the effect of Various Glass Water at the Same Time

GLASS WARE	ACID TYPE	TIME (Min.)	RESULT (Hg/g)	DUPLICATE RESULT(^g/g)	MEAN RESULT (Hg/g)
OPEN BEAKER	CONC. NITRIC ACID	15.00	387.50	357.50	372.50
CLOSED BEAKER	CONC. NITRIC ACID	15.00	320.00	317.50	318.75
KJELDAHL FLASK	CONC. NITRIC ACID	15.00	332.50	327.50	330.00

GLASS WARE	ACID TYPE	TIME (Min.)	RESULT (Mg/g)	DUPLICATE RESULT (M«/g)	MEAN RESULT (f*g/g)
OPEN BEAKER	AQUA REGIA	15.00	342.50	335.00	338.75
CLOSED BEAKER	AQUA REGIA	15.00	337.50	340.00	338.75
KJELDAHL FLASK	AQUA ^EGIA	15.00	335.00	345.00	340.00

Table 5: Result of Lead Analysis Showing the Effect of Different Acid Types At The Same Time Length of Digestion.

ACID TYPES	GLASS WARE USED	TIME (Min.)	RESULT	DUPLICATE RESULT fcg/g)	MEAN RESULT
CONCENTRATED NITRIC ACID	OPEN BEAKER	15.00	387.50	357.50	372.75
	CLOSED BEAKER	15.00	320.00	317.50	318.75
	KJELDAHL FLASK	15.00	332.50	327.50	330.00
AQUA REGIA	OPEN BEAKER	15.00	342.50	335.00	338.75
	CLOSED BEAKER	15.00	337.50	340.00	338.75
	KJELDAHL FLASK	15.00	335.00	345.00	340.00

Table 6: Effect of different Time in the Digestion process of lead determination

ACID TYPE	TIME (MIN.)	VOLUME OF ACID USED (ML)	VOLUME OF HCL Present (Ml)	RESULT (Pg/g)	DUPLICATE RESULT (Pg/g)	MEAN RESULT (Pg/g)
CONCENT	15.00	20.00	0.00	387.50	357.50	372.50
RATED NITRIC ACID	30.00	30.00	0.00	380.00	375.00	377.50
AQUREG	15.00	20.00	15.00	342.50	335.00	338.75
IA	30.00	30.00	22.50	317.50	312.50	315.00

DISCUSSION

The effect of the use of different glasswares in the determination of lead can be explained using the results obtained above,, the mean result shows that the lead value of the open beaker (372.50 (µg/g) is higher than that obtained from Kjeldahl flask (330.00 (µg/g) and that of the closed beaker (318.75 µg/g). Thus from this result the gradation of lead concentration from high to low is Open beaker > kjeldahl flask > closed beaker. This is not to be expected as studies revealed that reflux of lead material in kjeldahl flasks, brings about efficient digestion and also the use of closed beaker is to keep lead from escaping into air and thus a high concentration should be expected[11]. The high value of the open beaker can be accounted for, due to the addition of airborne lead into the open beaker due to an uncovered large surface areas thus, although the lead concentration is high, the open beaker is not a good method. The lead value of the kjeldahl flask is high due to the long narrow tube which allows the condensation of volatilizing lead when heating is on. Also, the lower surface area prevent airborne lead into the heating mixture. The mean result of the closed beaker is low although the addition of air borne lead is prevented because of the fast uncovering and transfer of the fuming mixture into the volumetric flask without allowing the fumes containing volatile lead to cool and condense back into the mixture of dust and the oxidizing agent. This result is in support of the experiment performed by Ismail et al, (2007) and Ireland, (2009) where it was discovered that lead particles were present in the environmental dust.

The result shows the effect of using different glass wares in the determination of lead but from the mean result, a close correlation to the expected value is obtained i.e. kjedahl flask (340.00 µg/z) > closed beaker (338.75 jig/g) = Open beaker (338.75 ng/g). This is due to the type of acid used during digestion. The effect of acid types in the determination of lead is explained as shown in the result. The use of Aqua regia as the oxidising agent gave a higher value when glassware such as kjeldahl flask (340.00 µg/g) and a closed beaker (338.254 j-ig/g) was used, than when concentrated nitric acid was used with the same glass wares i.e. kjeldahl flask (330.00 µg/g) and closed beaker (318.75).µg/g). This differences is expected because is a stronger oxidizing agent than concentrated nitric acid. However, a deviation occurred when an open beaker is used. The value obtained when nitric acid is used i.e. (372.50 jag/g) is higher than that of aqua regia (338.75 µg/g). This is because nitric acid absorb some gasous forms of lead like lead oxides which are soluble in nitric acid thus raising the concentration of lead to be determined. Also, the low value of that of aqua regia digestion in an open beaker is due to the incomplete expulsion of the chloride formed since the volatilization of lead occurs more in the presence of chloride.

The effect of different time lengths in the wet digestion process of lead was checked by using only the open beaker glass ware as shown in The result shows 15 minutes and 30 minutes digestion using concentrated nitric acid and aqua regia as oxidizing agent was compared. In both time lengths i.e. 15 and 30minutes, charging of the organic matter took place with the evolution of brown between 5min-10. After which fuming of the heating mixture occurred with the evolution of white fumes. The main s result obtained when digestion period lasted for 15 minutes and 30 min. When nitric acid is used as oxidizing agent are (372.50µg/g) and 377.50µg/g respectively, this shows that time did not affect the oxidation at increased time length. However, the mean result of Aqua regia for 15 min. 'and 30min. digestion are 338.75µg/g and 315.00µg/g. This discrepancy is not however caused by time but as a result of the amount of hydrochloric acid added. 20ml of Aquaregia which contains 15ml of hydrochloric acid was used for 15 minutes digestion while 30ml of Aquaregia was used for 30 minutes digestion. 30ml of Aquaregia contains 22.5ml of hydrochloric acid and thus more chloride is introduced. As discussed earlier, volatilization of lead occurs more in the presence of chloride thus increase in chloride brings about more volatilization thus , Jow lead is obtained (Rug, (2012).

CONCLUSION

From the result discussed, it can be said that the bet glassware for determining lead is the kjeldhl flask as shown in Fig. II. it has a long narrow tube and a small surface area which condenses volatilizing lead back into the mixture. Also, Aqua regia is a better oxidizing agent that concentrated nitric acid.

Time variation does not play a major role in the determination of lead, since the criterion for complete oxidation are expulsion of white fumes and a colorless filtrate. Thus there is no specific time for complete oxidation to occur. However, our focus should not be removed from the fact that lead is poisonous and this should be taken into consideration even along Pako-Bariga road where the dust sample used in determining lead was taken from. The results shows that the range of lead present along Pako-Bariga road is 312.50μg/g - 387.50μg/g. this is a high value as compared to FEPA standard of lead in dust (1 p.p.m) and high mortality rate is expected to occur from lead poisoning in this area but this has not, probably due to speciation in which lead get into the human body in a form which is not toxic. However, this, should not rule out the eradication of lead poisoning from the environment.

RECOMMENDATION

'Effective decomposition of Organic matter using a kjeldahl flask will take place when an extension is provided to the neck of the flask. The extension serves to condense fumes into an acid fume condenser. With the use of a closed beaker, the transfer of the hot mixture of lead and the oxidizing agent into the volumetric flask should be done only when the mixture is allowed to cool. This will allow the condensation of escaping lead. When Aqua Regia is used as an oxidizing agent the Chloride should be completely expelled by repeated fuming with sulphric acid or low result of lead will be obtained. Careful measuring of lead on the weighing balance should be done as losses in mass of the dust reduces the concentration of lead in the dust sample

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