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DETERMINE THE RADIONUCLIDES IN WATER, ROCKS AND SOIL OF SOME AREAS OF MAIDUGURI METROPOLIS.

E. W. Likta

Department of Physics
University of Maiduguri, Maiduguri, Borno State. Nigeria.
E-Mail Address:emmalikta2014@gmail.com

Abstract: The goal of this article is to determine the radionuclide that has been existing which the people are continuously expose to certain amount of radiation which is called background radiation occurring in our environment, the background radiation come from sources such as rocks, soil, water and stone which is mainly due to the small amount of radioactive isotopes which are present in the sources. The instruments used is Atomic Absorption Spectrometry (AAS), the method employed in the detection of radiation, the sources and sample collections. The result of water is in mg/l, for soil and rock are in percentage (%). It was revealed that Cu and Cr were not detected in Gneiss but were found in Granite and Basalt.

Keyword: Lamp setting, Flame control, Auto Zero, Calibration and Measure Sample

INTRODUCTION

Radiation sources are generally found in the atmosphere, water and ground. That is in our environment we have natural background radiation, the natural background radiation comes from cosmic rays, radiation from terrestrial sources (the rocks, soil of the earth's strata contain small quantities of radiation elements) and we also obtain secondary radiation due to sources found in the body. In the outer space also there is vacuum and on reaching the earth atmosphere they experience obstruction. The background radiation which is found in the air is due to mainly the presence of radon and thoron gas, formed as daughter products element of uranium and thorium series. The decay ^{238}U result in the formation of ^{226}Ra and the decay of ^{226}Ra lead to the formation of radon gas ^{222}Rn than the thorium chain, the decay of ^{226}Ra by alpha results in the product called thoron. Since these are gases attach themselves to dust in the air. The amount of radon and thoron gases in the air depends in the presence of uranium and thorium in a given area. In any given area, the weather conditions will greatly affect the

concentrations of these gases. Sea water contains a large amount of uranium, thorium and radium. Almost all water should be expected to contain certain amounts of radionuclides since rain water will pick up radioactive substance from air and ground water will picked up radionuclides present in rocks and soil. One would expect to find radionuclides in water, rocks and soil throughout the world.

Material and Method

Sample Preparation

Prior to any quantitative or qualitative investigation of material, samples must be prepared. The choice of the type of preparation depended largely on the nature of the sample, element under investigation and the method of analysis to be adopted.

Soil and Sediments

Di acid digestion is commonly employed for element analysis using analytical methods in which samples are presented in solution. Concentrated Nitric acid and Hydrochloric acid, aqua regia . However, samples for X-ray analysis are left in pulverized form (powder) or fused into beads. 0.5 to 2.0g of finely grounded sample dried at 400 ^{0} C is treated with 10-20 ml of the acid mixture in a beaker or digestion flask and carefully transferred into 100 ml or 250 ml volume flask and made to volume with distilled or demonized water. For element with low concentration, solvent extraction technique can be combined with acid digestion procedure. The method employed for the analysis however, has been the di-acid digestion. The samples were pulverized into powdered form. The XRF analysis required the sample to be presented in powder while for minor elements a 100 ml solution were prepared and used for the analysis.

Atomic Absorption Spectrometry

The principle of this method is that analyze solution (sample) is aspirated into a flame of temperature of about of 2800 ^{0} F. A cloud of free excited atoms formed. Light from a hallow cathode lamp is passed through the analyze atom in the flame. The lamp is characteristic to particular elements, therefore for a specific element, there has to be a lamp characteristic to it. The technique however, has high specificity and sensitivity. The basic features of instrument include a light source which emits resonance line radiation, a burning assemblage which include

nebulizer (aspirator), slit and flame (sampling cell) in which the sample is fed in aerosol form, a chopper for even distribution of solution to slit, mono-chromate which isolate the absorbing resonance line from the non-absorbing lines, a detector that measures the amount of absorption signal and a digital display read out. The source of heat in this method is acetylene and compressed air.

Select measure/measure application from the menu bar, identify the sample and click on "measure".

Pull the loading stage forward and view result.

Atomic absorption spectrometry (AAS)

Equipment:	AAS
Model:	Analyst 400
Product:	Perkin elmer
Software:	Winlab 32 for AA

Procedure

Create a Method

A method is created by entering the parameter to be investigated example Na or Ca, I determined the unit of measurement and the linearity. If dilutions are done, then the quantity was clarified. I save the method in order to create a file for and assign a name to it.

Lamp setting

From the toolbar menu software, I opened the lamp window. All the lamps are displayed, I selected the lamp for the element to analyze and click "on" and "set up" bottoms to start the lamp is shown. I used a blank paper to examine the light on top of the slit.

Flame control

I gently turn on the fuel supply (acetylene) and make sure the pressure is up to 15 psi. From the toolbar options, I opened the flame window and click On to start the flame.

Auto Zero

I opened the continuous graph window and adjust the slit so that the list absorption relative to element under study is obtained. I adjust the axis of the graph where necessary and click "apply" icon and close the window.

Calibration

I opened the reference window and enter the identity of the standards and their concentrations, include a blank or a "Zero" solution. From the manual analysis control window, I click on "measure" standard measure each of the standards. A calibration graph is automatically displayed.

Measure Sample

From the manual analysis window, I click the icon "measure sample". The result is displayed in the result window.

UV/V Spectrometry

Equipment: UV spectrophotometer
Product: Perkin elmer
Software: Lamda 35

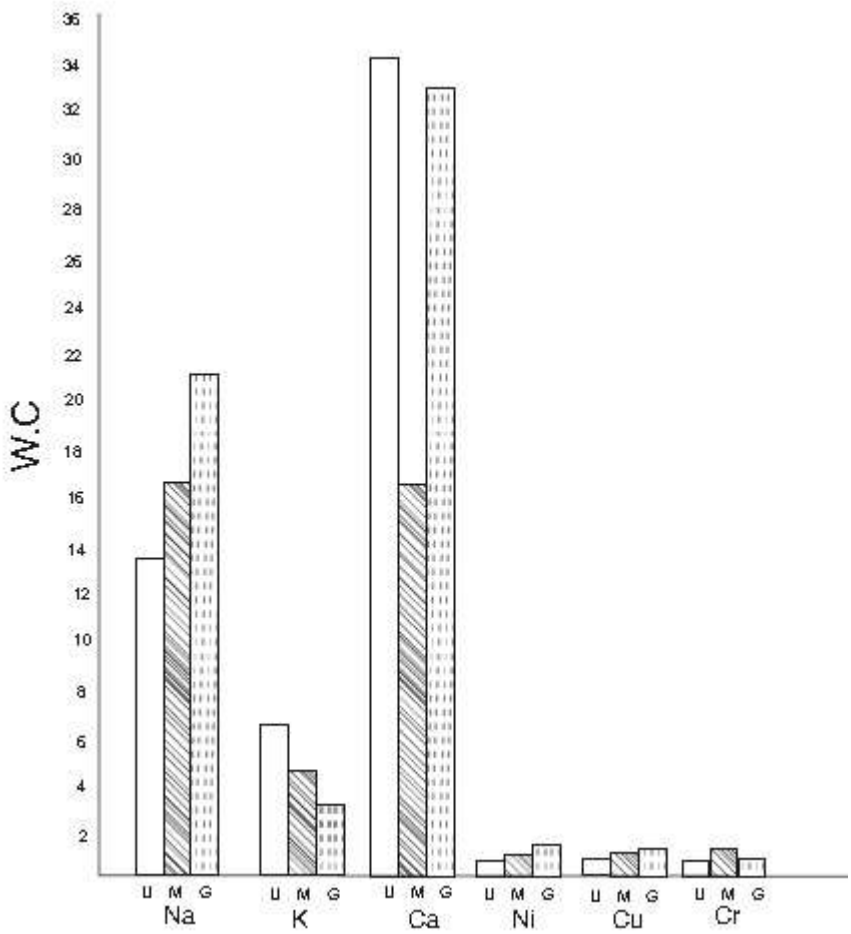
Like other relative method of analysis standards of the element under investigation are prepared of varying concentration, I took a method example Concentration, scanning or wave program. A file is created and wavelength selected. Standards are measured including the blank and a calibration curve is obtained. Sample is then measured and concentrations in the unit selected are displayed, more often in mg/l.

RESULTS AND DISCUSSIONS

From every interpretation and analysis, the results obtained from the determination of radiation using sample of water, soil and rock are presented in tabular form.

Table 1: The table shows the result obtained for the determination of radiation using the sample of water collected from different location (Unimaid, Mairi and Gwange).

Parameter	Location	Water Concentration	Desirable limits	Excessive limits
Na	Unimaid	13.44	<20	200
	Mairi	16.34	Nil	Nil
	Gwange	21.56	Nil	Nil
K	Unimaid	6.29	<80	470
	Mairi	4.33	Nil	Nil
	Gwange	3.84	Nil	Nil
Ca	Unimaid	33.45	<100	500
	Mairi	15.99	Nil	Nil
	Gwange	32.89	Nil	Nil
Ni	Unimaid	0.06	<0.6	50
	Mairi	0.27	Nil	Nil
	Gwange	0.31	Nil	Nil
Cu	Unimaid	0.21	<1.5	100
	Mairi	0.22	Nil	Nil
	Gwange	0.28	Nil	Nil
Cr	Unimaid	0.142	<0.5	120
	Mairi	0.221	Nil	Nil
	Gwange	0.105	Nil	Nil

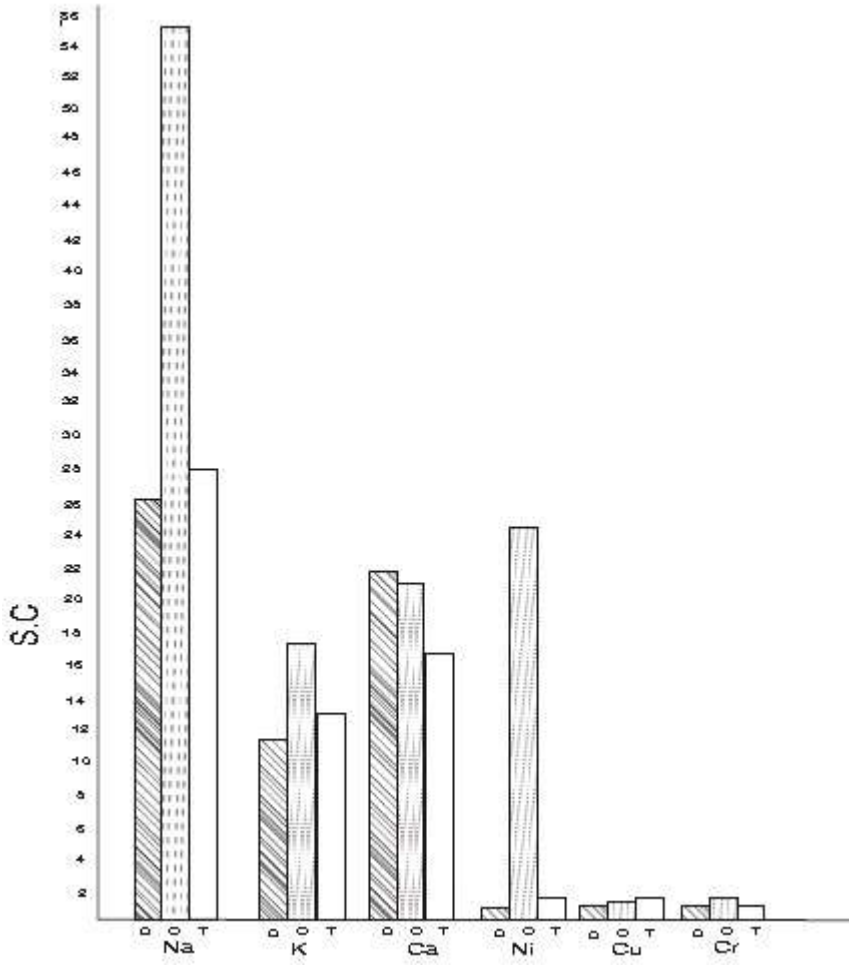


Key: W.C = Water Concentration, U =Unimaid, M = Mairi, G = Gwange, Na = Sodium, K = Potassium, Ca = Calcium, Ni = Nickel, Cu = Copper, Cr = Chromium.

Fig. 1: shows the graph of the result obtained for the determination of radiation using the sample of water collected from different location (Unimaid, Mairi and Gwange).

Table 2: The table shows the result obtained for the determination of radiation using the sample of different soils (Sandstone, Mudstone and Siltstone) collected from Chad Basin.

Parameter	Sample	Soil Concentration
Na	Sandstone	27.82
	Mudstone	55.27
	Siltstone	28.03
K	Sandstone	11.32
	Mudstone	17.34
	Siltstone	13.27
Ca	Sandstone	21.70
	Mudstone	20.39
	Siltstone	16.23
Ni	Sandstone	0.16
	Mudstone	0.24
	Siltstone	0.35
Cu	Sandstone	1.47
	Mudstone	1.55
	Siltstone	1.83
Cr	Sandstone	0.562
	Mudstone	0.743
	Siltstone	0.338

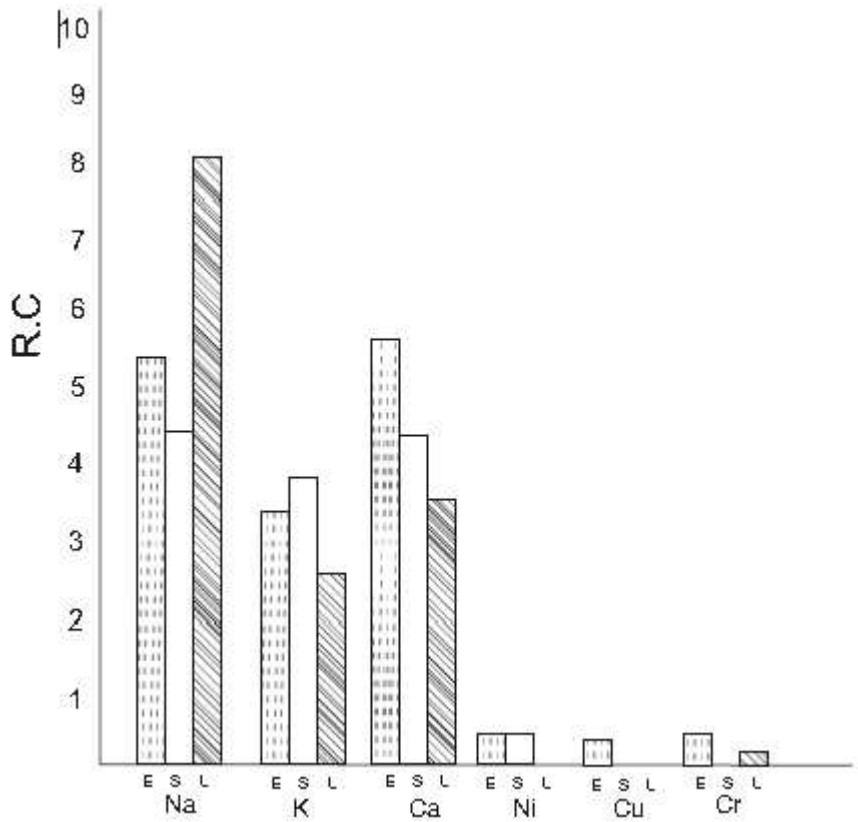


Key: S.C = Soil Concentration, D = Sandstone, O = Mudstone, T = Siltstone, Na = Sodium, K = Potassium, Ca = Calcium, Ni = Nickel, Cu = Copper, Cr = Chromium.

Fig. 2: shows the graph of the result obtained for the determination of radiation using the sample of different soils (Sandstone, Mudstone and Siltstone) collected from Chad Basin.

Table 3: The table shows the result obtained for the determination of radiation using the sample of different rocks (Granite, Gneiss and Basalt) collected from Mandara Hills

Parameter	Sample	Rock Concentration
Na	Granite	5.29
	Gneiss	4.22
	Basalt	8.12
K	Granite	3.28
	Gneiss	3.55
	Basalt	2.69
Ca	Granite	5.11
	Gneiss	4.37
	Basalt	3.26
Ni	Granite	0.05
	Gneiss	0.05
	Basalt	No Discovery
Cu	Granite	0.04
	Gneiss	No Discovery
	Basalt	No Discovery
Cr	Granite	0.04
	Gneiss	No Discovery
	Basalt	0.02



Key: R.C = Rock Concentration, E = Granite, S = Gneiss, L = Basalt, Na = Sodium, K = Potassium, Ca = Calcium, Ni = Nickel, Cu = Copper, Cr = Chromium.

Fig. 3: shows the graph of the result obtained for the determination of radiation using the sample of different rocks (Granite, Gneiss and Basalt) collected from Mandara Hills

It has been detected from the results obtained that a sample of water from Gwange contains the highest radioactive substances than others. Looking at the samples of soil, it also shows that the instruments detected there is more radioactive substances present in the Mudstone when exposed to different parameters such as Na, K, Ca, Ni, Cu and Cr.

From the samples or rocks that Basalt contains more radioactive materials than both Granite and Gneiss. While there was little or no any detection when Ni, Cu and Cr are used as parameters.

DISCUSSIONS

The Figure 1 contained the series of impact of the radiation of the Na, K, Ca, Ni, Cr and Cu water which revealed the various degrees of concentrations of each element in sample (water). The result was

interpreted based on the concentration. The sample of water collected from Gwange has more of the following radioactive substances Na, Ni and Cu respectively. And for the water collected in University of Maiduguri, the radioactive substances were of Potassium and Calcium when compared with other locations. Also in Figure 2: is the radioactive substances in the soil concentration shows that the sample of soil collected from all locations (Sandstone, Mudstone and Siltstone) has less radioactive substances of Ni and Cr. The Mudstone has Na as the highest radioactive substance when compared with the other soil samples.
In Figure 3: the rock sample Na, K, Ca, Ni, Cr and Cu were the expected elements. Which were found to be in existence in the rocks (Granite, Gneiss and Basalt). But it was revealed that Cu and Cr were no discovery in Gneiss but were found in Granite and Basalt.

CONCLUSION

It has been detected from the results obtained that the sample of water from Gwange contains the highest radioactive substance than others. The sample of the soil, there is radioactive substances present in the mudstone when exposed to different parameters such as Na, K, Ca, Ni, Cr and Cu. From the sample of rocks, it also shows that Basalt contains more radioactive materials than both Granite and Gneiss. While there was no Ni, Cr and Cu detected in the sample and are used as parameters.

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