QUALITY OF SOLID MINERALS IN ROCKS OF MICHIKA LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA

[1]Alexander P [2]Maina H.M, [2]Barminas J.T and [1]Zira S. P.
[1]Department of Chemistry, Adamawa State University, Mubi, Nigeria
[2]Department of Chemistry, Federal University of Technology, Yola, Nigeria

ABSTRACT
The quality of solid materials in rocks of Michika local government area of Adamawa state, was studied and the results of the chemical analysis shows that all the areas sampled are silicate rocks, because of their high silica contents ranging from 59.359$\pm$0.02% to 93.761$\pm$0.002%. Based on the silica content classification scheme all the sampled areas are felsic rocks except Futuless B that is intermediate rock with 59.359$\pm$0.02%, the results of the analysis indicates the presence of quartz, mica and feldspar. Most of the sampled areas contained appreciable value of Al_2O_3, Fe_2O_3, Na_2O and K_2O from the comparative analysis between rocks of these areas and similar rocks elsewhere shows that they compares favourably with respect to their chemical composition. Base on this analysis, the principal rocks commonly found in the sampled areas are granite and rhyohite.
Keywords: Solid minerals, Quality, Michika L.G.A

INTRODUCTION
Solid minerals are defined as naturally, occurring inorganic crystalline substances, each with a narrow range of chemical compositions and characteristic physical properties (Pipkin and Trent, 2001). The knowledge of major and trace elemental abundances in various rock samples is of vital importance to study specific types of minerals and chemical composition of rocks (Plumer *et al*, 2003). There are specific elements or combination of elements which are known to be associated with specific types of minerals, therefore it is possible to evaluate the potential for the existence of certain types of minerals by evaluating which elements are found in a given area. The most common and important minerals are the silicate which are composed of combination of oxygen and silicon with or without metallic elements (Monroe and Wicandar, 2001). Nigeria's solid mineral resources cover wide range of varieties which are widely distributed in almost all the state of the federation including Adamawa State and Michika Local Government Area which is situated in Mubi Region. Mubi region is located within the North East Basement complex of Nigeria. The rocks are pre-Pan African organic rocks (gneiss migmatite rocks) or pan African granitoids (older granites) (Adebayo, 2004). The geological structures predominate in the area are dykes, quartz veins, folds, sheer, zones etc. Many of these minerals are of considerable economic value (Adebayo & Tukur,1997).
The aim of this study was to assess the quality of solid minerals in rocks and determined the elemental composition of these minerals in rocks of Michika local government area of Admawa state, Nigeria.

EXPERIMENTAL
Ten rock samples were collected from Michika Local Government area of Adamawa State. Rock samples were collected from Garta south, Garta North, Futuless B, Futuless A, Moda A,

Moda B, Michika south, Michika north and Bazza. Hammer and chisel were used to extract rock samples and break to a manageable size. Only samples of fresh or unweathered rocks collected for analysis (Swason and Huffman, 1976). Composite rock samples were randomly collected from ten places at the sampling site at a distance interval of 2m from each other. Hand lense was used to identify the mineral structure of the rocks. The collected rock samples were dried on an oven at 32^{o}C and at about 30% relative humidity in an air-circulating oven, for 82 hours to dry thoroughly. The dried rock samples were crushed with a jaw crusher and then ground in a vertical pulverize simatic C_7 – 621 model into fine powder and sieved through 120 British mesh sieve. The major elements such as SiO_2, Al, Fe, Ca, Mg, S, K and Na in their oxides forms were determined using X-Ray Fluorescence (XRF) spectroscopy Axios cement Pananalytical model.

RESULTS AND DISCUSSION

The results of the major elements in Rocks of Michika local government area are tabulated in Table 1. The results of the analysis shows that the SiO_2 content from michika ranged from 59.359 $\pm$0.020% to 93.761$\pm$0.020%, with the highest value from Garta south (93.761% $\pm$0.020) and least content in Futuless B (59.359 $\pm$ 0.020%). The results shows that samples from Garta areas have a high percentage of SiO_2 content. However, all the rocks in Michika are generally, rich in silicate. Silica sand (SiO_2) is usually found as reverbed or beach deposits and quarried for construction purposes while some with appropriate grain sizes and high degree of purity are used in glass manufacture. The presence of quartz in rock indicates that the magma was enriched in silica SiO_2. The Al_2O_3 content ranged from 4.234 $\pm$0.004% to 12.912$\pm$0.002%. with the highest value (12.912$\pm$0.002%) recorded in Futuless B and the least value (4.234$\pm$0.004%) recorded in Garta south. The results show that areas like Futuless A&B, Michika south and north, have high Al_2O_3 content compared to Garta North and South. Fe_2O_3 contents of the samples ranged from 1.187$\pm$0.002% to 9.241$\pm$0.001%. The highest value (9.241$\pm$0.001) was recorded in Futuless B and lowest value (1.187$\pm$0.002%) was recorded in Moda A. The results show that Bazza and Futuless B have high percentage of Fe_2O_3 as compared to the other areas.

The CaO content ranged from 0.379$\pm$0.007% to 7.414$\pm$0.006%. The highest value of 7.414$\pm$0.006% was recorded in Futuless B and the lowest value 0.379$\pm$0.007% was recorded in Garta south. The result shows that the CaO content in Futuless A, & Futuless B and Bazza are higher compared to the other sample area. The MgO content ranged from 0.025$\pm$0.002% to 2.629$\pm$0.004%. The highest value of 2.629$\pm$0.004% was recorded in Futuless B and the lowest 0.025$\pm$0.002 in Garta south. The results show that most of the sampling areas have lower percentage of MgO. The SO_3 content ranged between 0.004$\pm$0.001% to 0.192$\pm$0.002% the highest value of 0.192$\pm$0.002% was recorded in Garte south and lowest value 0.004$\pm$0.001% was recorded in Moda A. The results of the analysis shows that all the a rock samples have low percentage of SO_3. The K_2O and Na_2O contents varies between ND to 7.616$\pm$0.002% and 0.052$\pm$0.001% to 3.991$\pm$0.002% respectively. The analysis shows that K_2O was not detected in Garta South. While the highest percentage of 7.616$\pm$0.002% was recorded in Moda B. The highest value 3.991$\pm$0.002 of

Na_2O was recorded in Moda A, and the lowest value of 0.052±0.001% was recorded Garta south. The result of the analysis shows that most of the studied areas contained an appreciable percentage of K_2O and Na_2O. The loss of ignition (L.O.I) varies from 0.324 to 8.710 with highest value recorded in Futuless B.

CONCLUSION

From the results of the chemical analysis of all the sampled areas analyzed. the rocks are silicate because of their high silica contents, and also most of the sampled areas contained, appreciable value of Al_2O_3 (Aluminum oxide), Potassium oxide and Sodium oxide. These rocks are classified into felsic and intermediate using the silica content classification scheme. Rocks with more than 65 percent silica are called felsic, those with between 55 and 65% silica are intermediate, those with between 45 and 55% silica are mafic and those with less than 45 percent are ultramafic. Based on this classification, the rock sampled from Garta south, Garta North, Moda A, Moda B, Madzi Michika South, Michika North, Bazza and Futuless A are felsic rocks indicating the presence of quartz, mica and feldspar except futuless B that is intermediate rock (Quinn, 1991). The principal rock type commonly found in almost all the sampled areas are granite and rhyohite.

Locations	S_1O_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	K_2O	Na_2O	L.O.I
Garta South	93.761±0.020	4.234±0.004	1.484±0.002	0.379±0.007	0.025±0.002	0.192±0.002	ND	0.052±0.001	0.324
Futuless B	59.359±0.002	12.912±0.002	9.241±0.001	7.414±0.006	2.629±0.004	0.040±0.001	4.029±0.003	3.875±0.008	8.710
Garta North	84.577±0.06	8.078±0.005	3.291±0.001	1.240±0.005	1.315±0.012	0.011±0.001	0.285±0.004	0.703±0.005	2.420
Moda A	75.708±0.07	12.597±0.006	1.187±0.002	0.877±0.005	0.117±0.001	0.004±0.001	5.019±0.002	3.991±0.002	0.817
Moda B	74.102±0.03	11.530±0.005	2.824±0.004	0.619±0.008	0.153±0.002	0.014±0.004	7.616±0.002	2.642±0.003	0.653
Michika South	75.049±0.02	12.449±0.002	1.404±0.006	1.137±0.010	0.134±0.004	0.027±0.003	6.025±0.005	3.275±0.005	1.040
Michika North	75.201±0.08	12.330±0.001	1.533±0.005	1.084±0.008	0.198±0.005	0.019±0.002	5.407±0.002	3.728±0.005	1.068
Bazza	68.507±0.07	12.011±0.002	6.613±0.003	2.428±0.004	0.578±0.002	0.020±0.021	6.561±0.002	2.781±0.005	2.541
Futuless A	70.916±0.05	12.817±0.002	4.295±0.002	2.028±0.001	0.402±0.004	0.036±0.003	5.606±0.003	3.399±0.006	2.034
Range	59.359±0.02-93.761±0.02	4.234±0.004-12.912±0.002	1.187±0.002-9.241±0.001	0.379±0.007-7.414±0.006	0.025±0.002-2.629±0.004	0.004±0.001-0.192±0.002	ND-7.616±0.002	0.052±0.001-3.991±0.002	0.324-8.710

CHEMICAL ANALYSIS OF ROCK SAMPLES FROM MICHIKA

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