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*Article*

# Mineralogical and Geochemical Characterization of Migmatites in Wonu-Apomu, Southwestern Nigeria

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## Abstract

The outcrops of migmatites occur in the western part of Wonu-Apomu area, which were studied to unravel the petrogenetic affinity of the migmatite and determine its petrotectonic setting using its petrography, geochemical data. Samples of the migmatites were collected and prepared into thin sections for petrographic analysis and also pulverized for geochemical analyses. Major and trace element was carried out, using X-ray Fluorescence Spectrometry. The petrographic analysis revealed the presence of microcline, plagioclase feldspar, quartz, biotite, and hornblende as the main minerals and muscovite (≤5 %) occurs in minor amount, while zircon, rutile, titanite, ilmenite and magnetite are accessory phases. The geochemical data revealed high concentrations of $SiO_2$ (67.48 - 70.29 wt.%), $Al_2O_3$ (14.15 - 16.95 wt.%), $Fe_2O_3$ (2.72 – 4.03% wt.%), CaO (2.02 – 3.01 wt.%), $K_2O$ (2.40 - 3.96 wt.%) and $Na_2O$ and (3.77 – 5.54 wt.%) while MgO (0.73% wt.%), MnO (0.06 wt.%), $TiO_2$ (0.56 wt.%) are generally low, The plot of $Na_2O/Al_2O_3$ vs. $K_2O/Al_2O_3$ revealed the protoliths of the migmatite are both sedimentary and igneous. The chemical classification of the protolith using the sum alkalinity plot ($Na_2O+K_2O$) vs. $SiO_2$ diagram indicated that the migmatite has subalkaline granite affinity. The $K_2O$ vs. $SiO_2$ diagram evidently showed the influence of oceanic crustal material in the generation of the migmatite protolith. The geochemical results revealed the ancestry of the migmatites in Wonu-Apomu to be of calc-alkaline magmatic suite in contact with oceanic crustal material in a syn-collisional tectonic setting.

**Keywords:** Migmatites, calc-alkaline affinity, syn-collisional granite setting, simatic material, Wonu-Apomu, Southwest Nigeria.

## 1. Introduction

The Wonu-Apomu area forms part of the Basement Complex of southwestern Nigeria and lies within the southern part of the Iseyin-Oyan Schist Belt and to the west of the Ilesha Schist Belt[1; 2]. It is characterized by gneissic-migmatite, low-medium grade metasedimentary and metavolcanics and granitic suites (Fig.1) namely: the migmatites and gneiss, amphibolites, talc and talc schists, biotite granites and pegmatites. The area has been reported to be the consequence of three significant orogenic cycles of deformation metamorphism and granitic activities [3]. The earlier three cycles were identified by intense deformation and isoclinal folding, accompanied by regional metamorphism, which was closely followed by extensive migmatisation [4; 5].

The origin and tectonic setting of migmatites in Nigeria, have been speculative due to inadequate compositioal data and also because of its structural complexity, polycyclic nature, and intangible economic potentials. Migmatite-gneiss form the most widespread rock type in the Nigeria basement [6], covering about 50% of the Nigeria Precambrian domain [7]and approximately three tenth of the total surface area of Nigeria [3]. Despite the fact that migmatite forms an integral part of the basement complex of Nigeria, its origin and pretectonnic setting hasn't been articulately characterised, while a few researchers, adduced to its sedimentary origin, others believed it is igneous.

Earlier works on Ibadan granite gneiss by Grant [8] described it as igneous origin, while Freeth [9]; Burke and Dewey [10], believed they were derived from isochemical metamorphism of shale greywacke. Elueze [11] supports sedimentary origin for the Ilesha granite gneiss. However, Onyeagocha [12] proposed igneous origin by partial melting of crustal rocks for the granite gneiss of north-central Nigeria. Other supporters of the igneous origin include Ekwere and Ekwueme [13] and Imeokparia and Emofurieta [14]. Bolarinwa, [15] reported that granite-gneiss from Abeokuta area has igneous parentage but with minor sedimentary input. Rahaman [3] believed that the available geochemical data were insufficient to equivocally distinguish the granite gneiss as either sedimentary or igneous gneisses. However, in this current study on Wonu-Apomu area, southwestern Nigeria, the migmatites were studied with a view to to unravel the petrogenetic affinity of the migmatite and determine its petrotectonic setting using the petrography and geochemical data.

The migmatites outcrops occur in the western part of the study area. Some of the migmatites occur as low-lying outcrops around Elewa, Ogunniran and Akanran in the western and southeastern part (Figure 1). The migmatites are trending northwest-southeast and are commonly banded and folded. (Figure 2). The quartzofeldspathic bands alternates mafic (biotite)-rich bands and are trending northwest-southeast. They are commonly banded and show minor folds, with outcrops characterized by the mafic and leucoratic components being intimately intermingled. They also exhibit kink folds and mafic cumulates (Figure 2).

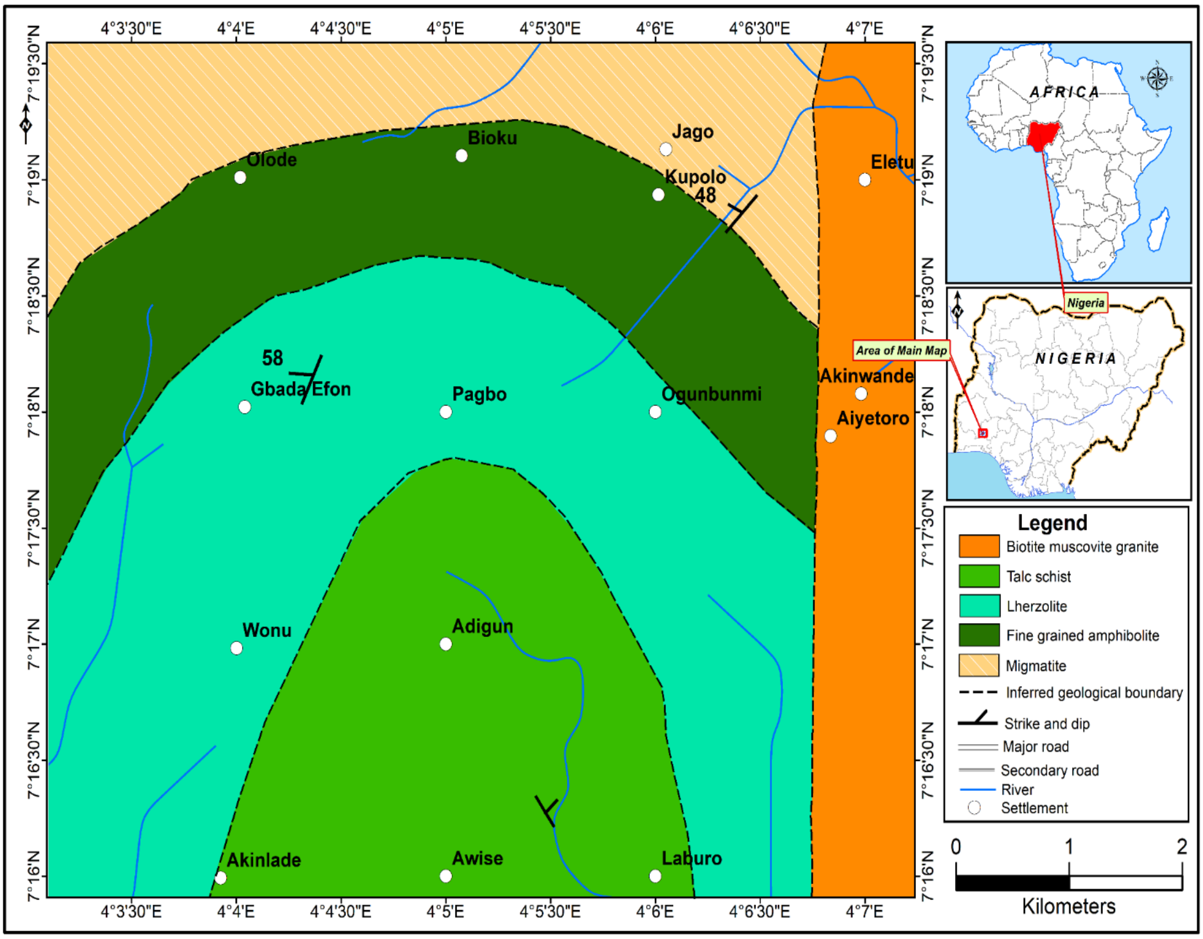


**Figure 1:** Geological Map of Wonu-Apomu area (Modified after Adeleye, [16]).

Apart from the main N-S structural lineaments observed, several N-S trending joints, fractures and rock boundaries were recorded on the migmatite (Figure 2). Also, there were NW-SE, NNE-SSW and W-E trending cross-cutting joints, fractures, pegmatite and quartz veins showing evidence of displacement.


**Figure 2:** Outcrops of migmatite in Wonu-Ibadan-Apomu area (a) showing kink folds and (b) mafic cumulates.

## 2. Methodology

The area lies between latitudes 7°15′ and 7°30′ N and longitude 4°00′ and 4°15′ E. Geological field mapping was undertaken on a scale of 1:25,000 to determine the field relationships and identify the migmatite rock samples in the study area. Ten (10) migmatite rock samples were collected and prepared into thin sections for petrographic analysis; while some migmatite grab samples were powdered subsequently subjected to geochemical analysis, using X-ray Fluorescence Spectrometry for the determination of major and trace elements at the Department of Geology, University of Johannesburg, South Africa.

## 3. Results and Discussion

### *3.1 Petrography*

In thin section, quartz (27-30 %), plagioclase feldspar (28-33 %), microcline (6-10 %), biotite (10-15 %) and hornblende (8-12 %) are essential minerals in the migmatite; while and the muscovite is generally less than 5 % (Table 1). Accessory minerals present include zircon, rutile, titanite, sphene, ilmenite and magnetite.

**Table 1:** Average composition of the migmatite of Wonu-Apomu area

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Quartz | 27 | 28 | 30 | 29 | 30 | 30 | 29 | 28 | 28 |
| Plagioclase | 30 | 28 | 29 | 28 | 31 | 32 | 33 | 30 | 31 |
| Microcline | 9 | 10 | 9 | 7 | 8 | 10 | 10 | 10 | 6 |
| Biotite | 12 | 10 | 11 | 15 | 11 | 12 | 12 | 15 | 12 |
| Hornblende | 10 | 10 | 9 | 10 | 9 | 8 | 10 | 12 | 12 |
| Muscovite | 4 | 5 | 3 | 2 | 1 | 3 | 4 | 1 | 2 |
| Zircon | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 3 |
| Rutile | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sphene | 1 | 1 | 1 | 1 | 1 | - | 1 | 1 | 1 |
| Ilmenite | 3 | 2 | 3 | 2 | 3 | 1 | 2 | 3 | 2 |
| Magnetite | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 |
| **Total** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** |

### *3.2 Geochemistry*

The major and trace element results are given in the Table 2. The migmatites are highly siliceous, with average $SO_2$ contents greater than 68.87 wt.%. The alumina abundances ranges between 14.15 and 16.95 wt.%. The values of the $Fe_2O_3$ range from 2.72 to 4.03 wt.%. Also the MgO has values between 0.04 and 0.91 wt.%. The MnO value ranges between 0.04 and 0.85 wt.%. $TiO_2$ levels range between 0.32 and 0.58 wt.%. The values of CaO ranges between 2.02 and 3.01 wt.%. These values are comparable to those of the granites in the study area.

The $K_2O$ values, which ranged between 3.77 and 5.54 wt.% are higher than $Na_2O$ values which ranged from 2.40 to 3.96 wt.%, suggesting contributions from K-feldspars, biotite and muscovite. The $P_2O_5$ content is considerably low, ranging from 0.12 to 0.21 wt.%. The average LOI values of 0.56 – 1.25 wt.% indicated very mild alteration of the magmatites. The trace elements composition of the whole-rock magmatites (Table 2) revealed mean rare-alkali contents of Rb (122 ppm), Sr (473 ppm), Y (13 ppm), Zr (360 ppm), Cs (2 ppm), Ba (873 ppm) Th (12 ppm) and U (1 ppm) were obtained. The bulk chemical data of the magmatites in the Wonu, Ibadan – Apomu area are slightly enriched in lithophille traces.

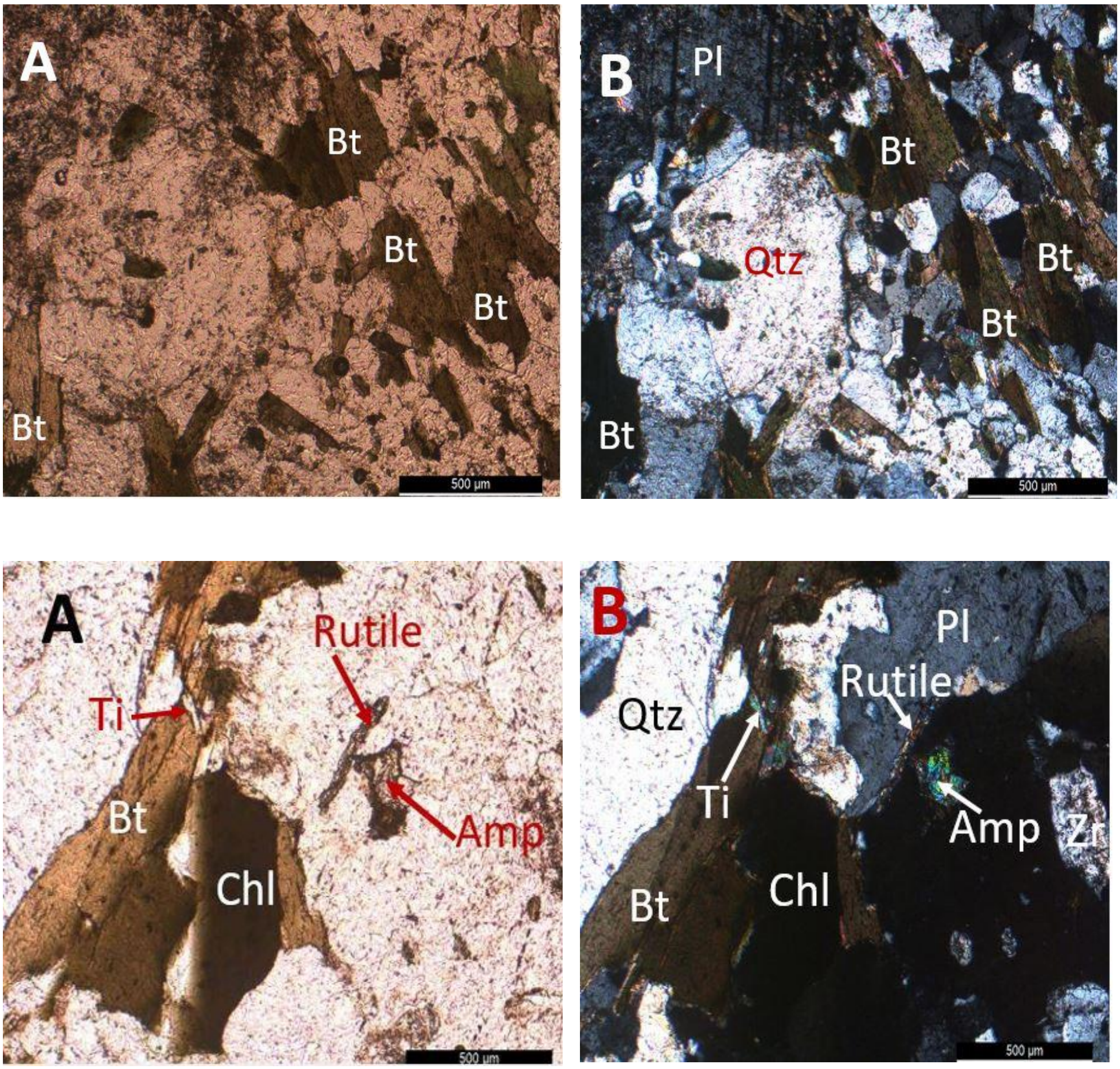


**Figure 3:** Photomicrographs of migmatite from Wonu-Apomu area showing preferred alignment of biotite laths, alternating with quartzofeldspathic minerals in: (A) plane-polarized light and (B) cross-polarized light. Quartz (Q), Plagioclase (P) (Oligoclase), Microcline (M), Biotite (B), Hornblende (H), Titanite (T).

### 3.3 Interpretation of the tectonic environment based on geochemical analysis of the Migmatite

The plot of the $Na_2O/Al_2O_3$ vs. $K_2O/Al_2O_3$ of the migmatite on the Garrels and McKenzie (1971) [17] diagram (Fig. 4) showed that the protoliths of the migmatite are both sedimentary and igneous. An attempt at chemical classification of the protolith using the sum alkalinity plot ($Na_2O$+$K_2O$) vs. $SiO_2$ diagram adapted after Middlemost (1994) [18] for plutonic rocks showed that the migmatite has subalkaline granite affinity (Fig. 5). The calc-alkaline nature of the magmatic protolith was further reinforced by the ($Na_2O$+$K_2O$) - $Fe_2O_3$– MgO (AFM) ternary diagram, [19]. (Fig. 6). The $K_2O$ vs. $SiO_2$ diagram of Coleman and Peterman (1975) [20] (Fig. 7) clearly showed the influence of oceanic crustal material in the generation of the migmatite protolith. The migmatite is peraluminous, as shown by the chemical composition of the rock and the mineral constituents, originated from calc-alkaline magmatic suite in contact with oceanic crustal material in a syn-collisional (syn-COLG), [21], tectonic setting (Fig. 8).

**Table 2:** Major oxides (%), trace elements (ppm) composition in migmatite

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Average | Range | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $SiO_2$ | 70.29 | 69.73 | 68.06 | 69.25 | 67.48 | 67.88 | 69.75 | 68.87 | 67.75 | 69.64 | 68.87 | 70.29 | 67.48 |
| $TiO_2$ | 0.35 | 0.52 | 0.55 | 0.53 | 0.56 | 0.53 | 0.32 | 0.53 | 0.45 | 0.58 | 0.49 | 0.58 | 0.32 |
| $Al_2O_3$ | 14.15 | 14.69 | 15.09 | 14.73 | 16.95 | 14.93 | 15.01 | 15.95 | 14.98 | 15.86 | 15.23 | 16.95 | 14.15 |
| $Fe_2O_3$ | 2.91 | 2.72 | 3.55 | 3.01 | 3.44 | 3.82 | 3.03 | 2.85 | 4.03 | 3.54 | 3.29 | 4.03 | 2.72 |
| MnO | 0.05 | 0.05 | 0.04 | 0.06 | 0.06 | 0.05 | 0.85 | 0.06 | 0.07 | 0.05 | 0.13 | 0.85 | 0.04 |
| MgO | 0.91 | 0.30 | 0.51 | 0.82 | 0.60 | 0.45 | 0.04 | 0.71 | 0.09 | 0.13 | 0.45 | 0.91 | 0.04 |
| CaO | 2.05 | 2.73 | 3.01 | 2.91 | 2.31 | 2.77 | 2.53 | 2.44 | 2.89 | 2.02 | 2.57 | 3.01 | 2.02 |
| $Na_2O$ | 2.40 | 2.71 | 2.53 | 3.70 | 3.00 | 3.96 | 2.55 | 3.90 | 3.31 | 3.28 | 3.13 | 3.96 | 2.40 |
| $K_2O$ | 5.23 | 4.86 | 4.57 | 4.63 | 4.49 | 4.65 | 5.54 | 4.56 | 4.45 | 3.77 | 4.67 | 5.54 | 3.77 |
| $P_2O_5$ | 0.15 | 0.21 | 0.16 | 0.18 | 0.15 | 0.13 | 0.14 | 0.12 | 0.16 | 0.14 | 0.15 | 0.21 | 0.12 |
| LOI | 1.00 | 1.25 | 1.00 | 0.73 | 0.85 | 0.62 | 0.56 | 0.74 | 1.01 | 0.66 | 0.84 | 1.25 | 0.56 |
| **Total** | 99.49 | 99.77 | 99.07 | 100.55 | 99.89 | 99.79 | 100.24 | 100.73 | 99.19 | 99.67 | | | |
| **Trace elements (ppm)** | | | | | | | | | | | | | |
| Ba | 705 | 949 | 722 | 856 | 727 | 1069 | 1127 | 1009 | 907 | 662 | 873.3 | 1127 | 662 |
| Nb | 5.3 | 4.8 | 9 | 9 | 11 | 16 | 12 | 17 | 14 | 20 | 11.81 | 20 | 4.8 |
| Rb | 68.2 | 66.2 | 112 | 130 | 122 | 141 | 113 | 194 | 122 | 150 | 121.8 | 194 | 66.2 |
| Sr | 596.6 | 610.5 | 551 | 626 | 323 | 420 | 370 | 338 | 472 | 421 | 472.8 | 626 | 323 |
| Y | 7.8 | 8.9 | 6.9 | 8.2 | 9.1 | 10 | 26 | 22 | 11 | 25 | 13.5 | 26 | 6.9 |
| Zr | 226.7 | 285.1 | 385 | 430 | 311 | 355 | 450 | 375 | 368 | 412 | 359.8 | 450 | 226.7 |
| Co | 10.3 | 10.1 | 12 | 15 | 9 | 18 | 16 | 13 | 12 | 12 | 12.74 | 18 | 9 |
| Ni | 2.5 | 3.0 | 5.4 | 2.4 | 2.5 | 3.7 | 3.0 | 3.1 | 4.3 | 4.6 | 3.45 | 5.4 | 2.4 |
| Cu | 5.0 | 8.1 | 6.6 | 4.3 | 5.4 | 3.8 | 4.1 | 2.3 | 1.7 | 6.2 | 4.75 | 8.1 | 1.7 |
| Pb | 1.4 | 1.7 | 1.5 | 2.1 | 3.5 | 2.3 | 2.2 | 1.4 | 2.0 | 3.1 | 2.12 | 3.5 | 1.4 |
| Zn | 20 | 22 | 25 | 19 | 18 | 26 | 32 | 21 | 20 | 10 | 21.3 | 32 | 10 |
| Cs | 0.8 | 0.9 | 1.7 | 3.2 | 1.5 | 1.8 | 1.5 | 3.0 | 2.5 | 3.1 | 2 | 3.2 | 0.8 |
| Ga | 23.7 | 22.6 | 18 | 16 | 18 | 21 | 17 | 26 | 22 | 25 | 20.9 | 26 | 16 |
| Sc | 5 | 4 | 9 | 8 | 5 | 4 | 9 | 10 | 12 | 6 | 7.2 | 12 | 4 |
| Hf | 5.6 | 7.3 | 10 | 12 | 8 | 6 | 10 | 12 | 9 | 7 | 8.69 | 12 | 5.6 |
| Th | 4.8 | 3.1 | 18 | 8 | 9 | 16 | 20 | 15 | 10 | 13 | 11.7 | 20 | 3.1 |
| U | 0.4 | 0.8 | 1.3 | 1.2 | 1.4 | 0.9 | 1.5 | 1.3 | 1.1 | 0.6 | 1.05 | 1.5 | 0.4 |
| V | 45 | 49 | 26 | 32 | 31 | 55 | 26 | 42 | 33 | 82 | 42.1 | 82 | 26 |

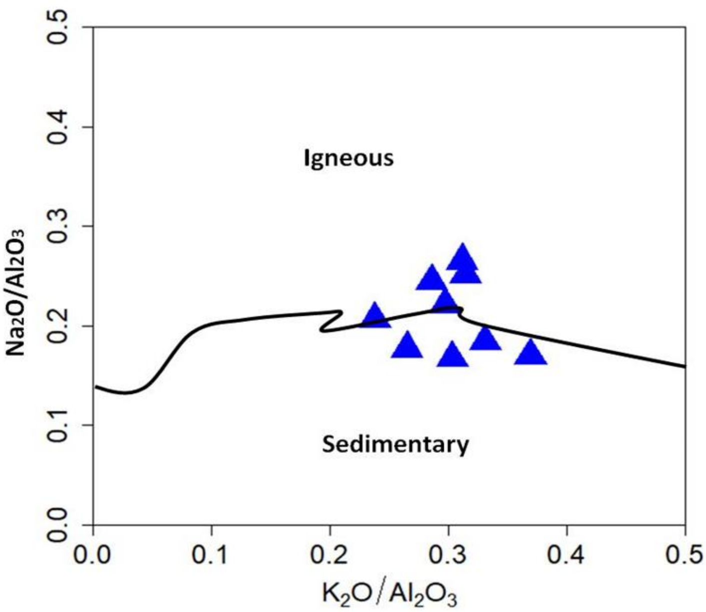


**Figure 4:** The $Na_2O/Al_2O_3$ vs. $K_2O/Al_2O_3$ diagram in migmatite (after Garrels and McKenzie, [17]) showing both sedimentary and igneous protolith for the migmatite.

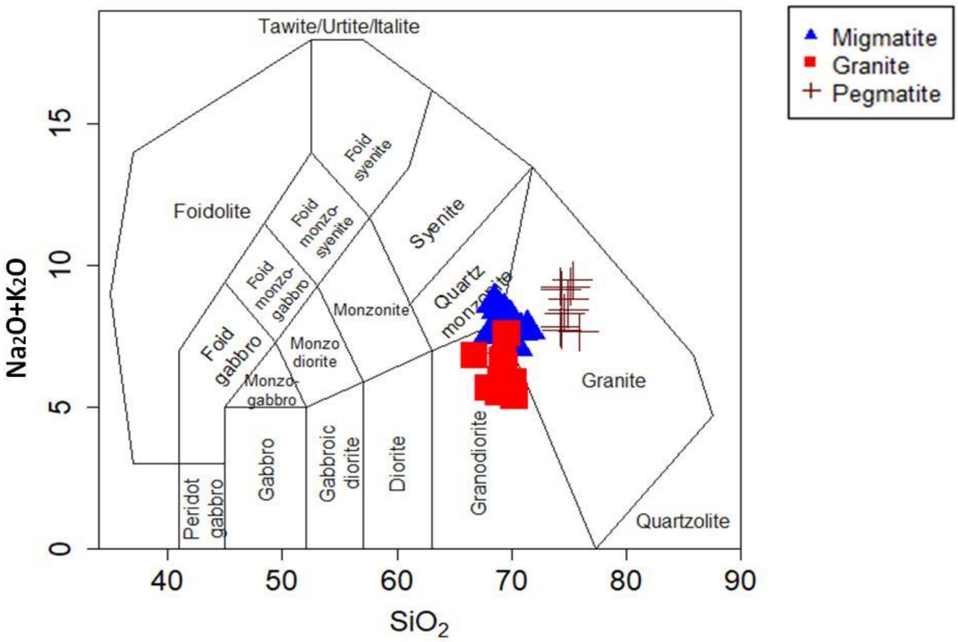


**Figure 5:** Sum Alkalinity plot ($Na_2O+K_2O$) vs. $SiO_2$ diagram showing compositional ranges of the migmatite and granitic rocks from Wonu-Ibadan-Apomu area (after Middlemost [18]). Note that the migmatite has a compositional range similar to the granitoids in the area.

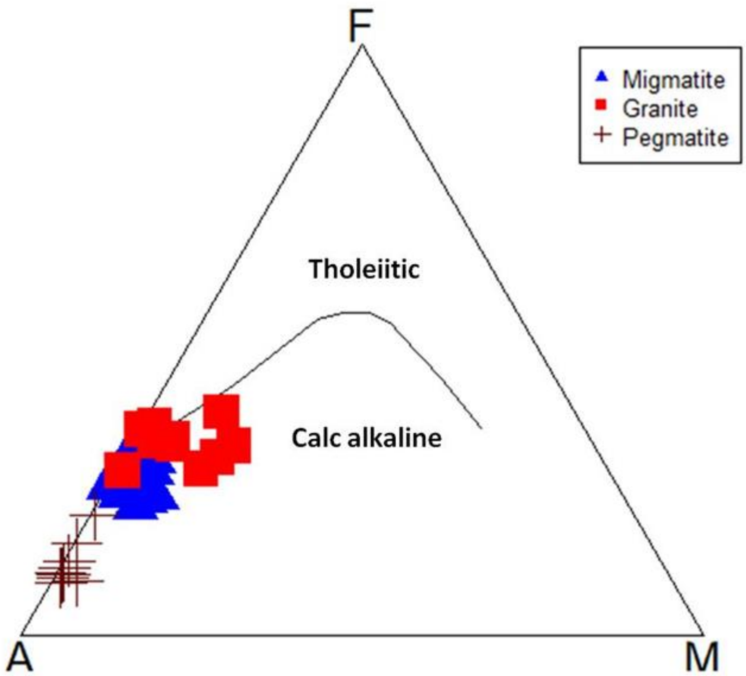


**Figure 6:** The calc-alkaline nature of the magmatic protolith as revealed on the ($Na_2O+K_2O$) - $Fe_2O_3$–MgO (AFM) ternary diagram. (after Irvine and Baragar [19]).

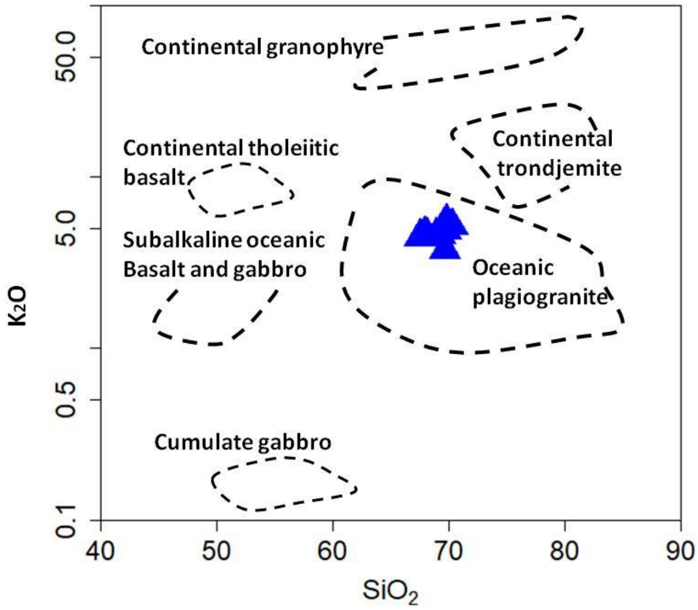


**Figure 7:** The $K_2O$ vs. $SiO_2$ diagram of Coleman and Peterman [20] showing the influence of oceanic simatic material in the development of the parental melt of the migmatite.

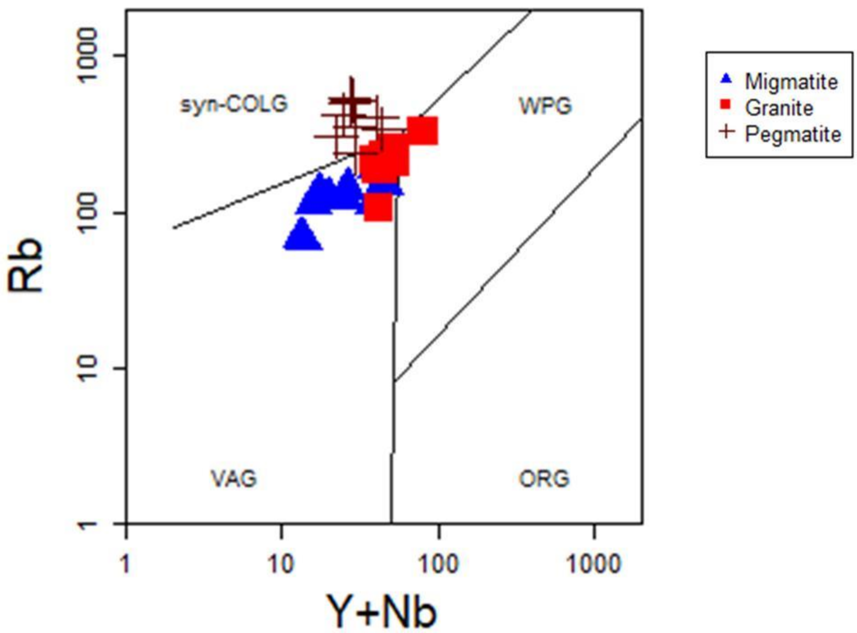


**Figure 8:** The Rb vs. Y+Nb discrimination plot of granitic rocks of Wonu-Ibadan-Apomu area (adapted after Pearce *et al*. [21]. Syn-COLG - syn-collisional granites. WPG - within plate granites, ORG - ocean ridge granites, VAG volcanic arc granites

The calc-alkaline nature of the magmatic protolith was further reinforced by the ($Na_2O$+$K_2O$) - $Fe_2O_3$–MgO (AFM) ternary diagram (Figure 6). The $K_2O$ versus $SiO_2$ diagram of Coleman and Peterman [20] (Figure 7) clearly showed the influence of oceanic crustal material in the generation of the migmatite protolith. The migmatite is peraluminous as shown by the chemical composition of the rock and the mineral constituents, reflecting origin from calc-alkaline magmatic suites in contact with oceanic crustal material in a syn-collisional (syn-COLG), [21], tectonic setting (Figure 8).

## 4. Conclusion

The geochemical data revealed that the protoliths of the Wonu-Apomu migmatites are both sedimentary and igneous using the plot of the $Na_2O/Al_2O_3$ vs. $K_2O/Al_2O_3$. The migmatites have subalkaline granite affinity based on the chemical classification of the protolith using the sum alkalinity plot ($Na_2O+K_2O$) vs. $SiO_2$ diagram for plutonic rocks. The calc-alkaline nature of the magmatic protolith was further reinforced by the ($Na_2O+K_2O$) - $Fe_2O_3$– MgO (AFM) ternary diagram. There was evidence of influence of oceanic crustal material in the formation (generation) of the migmatite protolith from the plot of $K_2O$ vs. $SiO_2$ diagram. These geochemical patterns showed that the ancestry of the migmatites in Wonu-Apomu area is of calc-alkaline magmatic suites having contact with oceanic crustal materials in a syn-collisional tectonic setting.

## References


1. Bolarinwa, A.T. and Adeleye, M.A. (2015a). Nature and origin of the amphibolites in the Precambrian basement complex of Iseyin and Ilesha Schist belts, southwestern Nigeria. *Journal of Geography and Geology* 7 (2): 6-17.
2. Bolarinwa, A.T. and Adepoju, A.A. (2017). Geochemical characteristics and tectonic setting of Ifewara area, Ife-Ilesha Schist Belt, southwestern Nigeria. *Earth Sciences Resources*, 6(1):43-54.
3. Rahaman, M. A., (1988). Recent Advances in the Study of the Basement Complex of Nigeria," In: P. O. Oluyide, W. C. Mbonu, A. E. Ogezi, I. G. Egbuniwe, A. C. Ajibade and A. C. Umeji, Eds., Precambrian Geology of Nigeria, Geological Survey of Nigeria, Kaduna, p. 11-41.
4. Ajibade, A.C., Rahaman, M.A. and Woakes, M., (1987). Proterozoic crustal development in the Pan-African regime of Nigeria. In Proterozoic lithospheric evolution (Kroner, A.,), *American Geophysical Union* 17: 259-271.
5. Phillips, O.O. (1991). Compositional variations within lateritic profiles over mafic and ultramafic rock units of Ilesha Schist Belt, Southwestern Nigeria. Unpublished Ph..D thesis, University of Ibadan, Nigeria, 201
6. Ogezi, A. E. O., (1988). Geochemistry and origin of Ensialic Alpines - type serpentine Associations from Mallam Tanko (Shemi) and Ribah Northern Nigeria. In Prec. Geo. of Nigeria, GSN, Esho Pub. Kaduna. 46p
7. Ajibade A. C., Woakes, M. R., and Rahaman, M. A., (1988). Proterozoic crustal development in the Pan-African regime of Nigeria. In: Precambrian Geology of Nigeria, GSN, Esho Pub. Kaduna. 56p
8. Grant, N. K., (1970). The Geochronology of Precambrian Basement Rocks from Ibadan, Southwestern Nigeria, *Earth and Planetary Science Letters*, 10: 28-38.
9. Freeth, S. (1971). Geochemical and related studies of West African Igneous and metamorphic rock. Unpublished (Doctoral dissertation, Ph. D. Thesis, University of Ibadan, Nigeria, 68p.
10. Burke, K. C., Dewey, J. F. (1972). Orogeny in African geology in Dessauvagie T. F. J and Whiteman A. J. (eds.), African Geology, University of Ibadan, Geol. Dept. 1970, p.583-608.
11. Elueze, A. A., (1982). Geochemistry of the Ilesha granite gneiss in the basement complex of southwestern Nigeria. *Prec. Res*., 19: 167-177.
12. Onyeagocha, A. C. (1984). Petrology and geologic history of NW Akwanga area in Northern Nigeria. *Journal of African Earth Sciences* 2: 41-50.
13. Ekwere, S. J., and Ekwueme, B. N. (1991). Geochemistry of Precambrian gneisses in the eastern part of the Oban massif, south eastern Nigeria. *Geologie Mijnbouw*, 70: 105– 114.
14. Imeokparia, E. G., and Emofurieta, W. O. (1991). Protoliths and petrogenesis of Precambrian gneisses from the Igbeti area, SW Nigeria. *Chemie der Erde*, 511: 39-54.
15. Bolarinwa, A. T. (2004), Petrochemistry of opaque minerals in biotite granite gneiss of Abeokuta area Southwestern Nigeria. *Global Journal of Geological Sciences* 2: 163-170.
16. Adeleye, M.A. (2021). Geology, tectonic setting and genesis of talc around Wonu, Ibadan- Apomu area, southwestern Nigeria. Unpublished Ph.D. thesis, University of Ibadan, 357p
17. Garrels, R. M., and McKenzie, F. T. (1971). Evolution of sedimentary rocks. W.W. Norton & co. Inc. New York. p.243, p.394.
18. Middlemost, E.A.K. (1994). Naming materials in magma/igneous rock system. *Earth Science Review* 37: 215-224.
19. Irvine, T. N. and Baragar, W.R. A. (1971). A guide to the chemical classification of the common volcanic rocks. *Canadian Journal of Earth Sciences* 8: 523-548.
20. Coleman, R.G. and Peterman, Z.E. (1975). Oceanic plagiogranite. Journal of Geophysical Research (1896-1977)
21. Pearce, J.A., Harris, N.B.W., and Tindle, A.G. 1984. Trace element discrimination diagrams for tectonic interpretation of granitic rocks. *Journal of Petrology* 25, 956-983


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