The Petrographic of Basalts in northeast of Darood – Neyshaboor, NE Iran

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Abstract
The studied basalt rocks are located at Northeast of Darood city - Neyshabour Northeast of Iran and are bounded between longitudes of 59°8’ to 59°16’ East and latitude of 36°7’ to 36°11’ North. The age of these rocks is Silurian and they have a various petrographical component such as normal basalt, olivine-bearing basalt, trachy basalt, basaltic andesite, basaltic trachy andesite, dolerite. The geological map of Torghabeh reports these rocks as pillow lavas, but because the studied area is tectonised and these rocks are fragmented, pillow structures not found at the studied area. Since coral fossils in the carbonate-sand stone facies of the area belong to Devonian, it can be concluded that volcanic rocks erupted at a shallow water depth environment during Caledonian phase.

Key words: basalt, Alkali basalt, Petrographic, Northeast Iran, Neyshabour, Caledonian.

1- Introduction
This studied area are being located in northeastern of Darood – Neyshaboor in NE of Iran and have coordinate between 59°8’ to 59°16’ east longitude and 36°7’ to 36°11’ north latitude. Geographical position and accessible roads in this studied area has been shown in Fig1. The purposes of this study are lithology and Petrographic study of basaltic rocks' area for presenting geodynamical model and prepare a geological map for this studied area.

Fig 1- Geographic position and accessible roads in studied area
2- Geology Setting
The studied area is located in Binalood zone (Nabavi, 1355). The main strike of rocks layer and existence formation in this studied area have been stroke NW-SE which adopted with alpine orogenic phase. The most faults which are being seen are Dizbad – Khav reverse fault in north and central part of this area and Binalood reverse fault in south of this area. The main formations of this area are Sibzar, Bahram, Padha and Neivar. The geological map of this studied area accompanied which are shown in Fig 2.

2-1- Geomorphology
In NE of this region based on the geological map, there are a lot of faults which due to their movement the rocks have brittle rocks and majority of them are talus. In central and NW part of region the brittle rocks are less than others and these rocks have mainly porosity and joint which have been developed by water erosion.
3- Petrography of Basalts and naming them based on Modal mineralogy

The study of thin section under polarize microscope include spatial mineral relationship. Determining minerals and study of size and texture of grain cause the classification and naming the rocks, in addition, the study of volcanic rocks petrography can arranged us the petrogenic value data. The area massive of basalts in area is 12 km length and 1km width. The age of these basalts are being determined Silurian (Pourlatifi, 1381).

The mineralogy of these basalts is as follows:
- The majority texture of these rocks is more porfiric microlite and some of these samples have mesh texture.
- Plagioclase: the majority component of these rocks, show the automorp coarse grain crystals with polysynthetic cleavage and some which porcelain cleavage. Plagioclases are labradorite (An>50). In some samples plagioclases are sericitization. Plagioclases are seen microlith in matrix.
- Pyroxene: the prism and coarse crystals, monoclinic pyroxene with colorless violet maybe titanic augite and sometimes seen hypresten. In some samples maybe pyroxene are transferred to carbonate.
- Olivine: are seen automorp and subhedral and about 15 percent of these rocks. In some samples olivine are mainly metamorph and replaced by secondary mineral calcite and opaque minerals are the main filling mineral in olivine mold and are seen lesser in chlorite and zoisite.
- Zircon: With fine and coarse automorph crystals, which have prominence and high birefringence which are seen face inclusion inside of plagioclase.
- Calcite: are seen in face of filling intra mineral accompanied with zeolite.
- The matrixes of these rocks are included plagioclase, pyroxene, opaque and crystal. Ferro magnesium is seen in rocks matrix which are totally chloritization.
4- The geochemical model suggested for studying area
In order to this issue that igneous rocks of this studied area are intracraton alkaline basalts and reported as a pillow lava in 1:100000 geological map of Torghabeh, also they are depend on Silurian and in order to existence of coral fossils in carbonate and sandstone facieses of these area confirm that eruption of these rocks were in hypabyssal water and their basalts with submarine basalts of Gholi formation (Silurian), the lower part of basalts in Nivar formation, Soltan meidan basalts in Mighan valley in shahrood and Masooleh basalts in western of Alborz, it can be considered these rocks related to tension activities of Caledonian phase in Iran.

5- Conclusion
- Basaltic rocks are more diversify based on petrogrphy which are included: basaltic andesite, trachy andesite basalt, trachy basalt, normal basalt, olivine basalt and dolerite.
In some samples sericitization of the plagioclases show the increasing of $\text{H}_2\text{O}$ and $\text{K}^+$ in area which $\text{K}^+$ because of the chloritization, biotite are free and transfer Anorthite to sercite which $\text{Ca}^{++}$ are free and in forme of calcite are seen on the plagioclases.

- Epidote is related to plagioclase metamorphism which caused the sieve texture, the residual plagioclase is albite type accompanied with epidote and albite, calcite and sercite

- Due to zircon cannot growing and make large crystals, in rocks area replacing them within plagioclase show that the forms of them are before lithification of the plagioclase.

- Calcite are most replacing mineral in these rocks which reached from alternation of plagioclase and pyroxene, but in some cases calcite located among other minerals probably originated from dolomite and lime formation inside to basaltic rocks which have been studied.

- Subhedral to unhedral plagioclases in these rocks area show the solution in plagioclases mineral in residual magma because of reduction pressure carry on magma during raise them on low depth (Shelly, 1993).

- In some samples border of plagioclases have been eroded and zonizing are iefected by crustal purify in these rocks (Conly et al, 2005).

- In order to determine the age of these studied area formation by geological survey organization, we can considered them with Caledonian phase.

6- References


2- Ghasabian,n, 1388. garineh geological map 1:25000, Iranian geological survey.

3- Nababvi,m, 1355. The geologe of iran, Iranian geological survey pub.

4- Pourlatifi and et all, 1380. torgabeh geological map 1:100000, Iranian geological survey.


Fig 1- Geographic position and accessible roads in studied area

Fig2- Geological map of this studied area

Fig 3- rocks talus in east

Fig4- Combination coarse vague in area during erosion process (A) – the existence of joint in area(B)

Fig5- The microscopic thin section image of basaltic rocks area