

Petrology and Geochemistry of basic intrusions North Khomein

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Abstract

Intrusive rocks outcropped in the North Khomein as a part of Tertiary magmatic zone and sanandaj-sirjan.rocks of the study area namely basic,ie. Gabbro and gabbro- diorite .The texture for rocks of study area are granular to ophitic.The rocks contain plagioclase , Cpx (augite,diopside), amphibole(termolite-actinolite).Geochemically, rocks mostly belong to the alkaline serie and mostly have calc- alkaline trend , that shows relative enrichment of Ba/ Rb, Sr/Rb , LILE/HFSE , negative anomalies of Nb, Ta,Ba and positive anomaly of Pb.It also exhibits high Mg# and low Na₂O content.Geodynamic diagram shows they are whitin plate basalt.According to spider diagram, the occurrences of the astenospheric melts,and probability the occurrences are magma mixing with continental crust.

Keywords: *Gabbro; Geodynamic; Magma mixing; Khomein; Sanandaj- Sirjan; continental*

Introduction

Intrusive rocks outcropped in the North Khomein and have several small and scattered intrusions (Figure 1). Very little research is done on this area. Only geological studies [1, 3] can be cited on the Golpayegan square. In this paper care has been taken to study the geochemistry and petrology of the intrusive rocks based on the chemical composition of minerals of pyroxen and plagioclase.

Regional of Geology

Intrusive rocks outcropped in the North Khomein as a part of Tertiary magmatic zone and sanandaj- sirjan.rocks [3] which have infiltrated between Cretaceous calcareous shale (Figure 1). The size of these intrusive rocks are small and limited. Some intrusive rocks often had changed by the effect of hydrothermal activity, therefore these intrusive rocks are more likely to be distinguished with greenish-gray and the presence of relatively large crystals in the desert (Figure 2).

Material and methods

Field studies and intrusive rocks sample was done in North Khomein in the summer of 1387. After the preparation of thin sections and polarizing microscope study, a total of 14 samples were selected for chemical analysis by ICP-MS method, and microprobe studies. In the research center laboratory of mineral processing of Iran a number of healthy pyroxen minerals, and plagioclase and opace samples were point selected with microprobe of SX100 of France Cameca company and conditions of 20kev 30na, 20kev 10na, 20kev, 20na.

Petrography

Based on microscopic studies, the rock forming are more grayish to dark green melanocerat with medium to coarse grains. The composition of medal minerals of North Khomein

intrusive rocks are gabbro and gabbro diorite. The most important forming minerals are pyroxen, plagioclase, Cpx (augite, diopside), amphibole (ferrosilite-actinolite). Pyroxen and plagioclase are the most frequent minerals of intrusive rocks.

Plagioclases have shapes mostly (Figure 3 - B) and rarely have a mackle. Chemically plagioclases have a range of 49.55%. anortite changes. North intrusive rocks of plagioclase are in the limitations of labradorite and andezin (Figure 4-A).

Clinopyroxen are both shapeless and shaped. (Figure 3 - B) These Clinopyroxen are of calcic diopside and augite rich in Ti (Fig. 4 - B & j). and their composition is in the limitation of Wo 45.17, Fs 11.06, En 43.77. Formula calculated for North Khomein intrusive rocks are: $(\text{SiO}_2 1.87 \text{Al}_{\text{IV}} 0.013) \text{O}_6 (\text{Ca} 0.87, \text{Na} 0.03, \text{Mn} 0.1) (\text{Fe}^{+2} 0.15, \text{Mg} 0.69, \text{Ti} 0.05, \text{Cr}^{+3} 0.002, \text{Fe}^{+3} 0.12)$

In fact, the amount of aluminum and clinopyroxen titan varies according to molten silicate, by which crystallization takes place are the rate of these elements increase from tolleite magma to alkaline.

This tissues under study in this paper are intersertal, intergranular, and sub ophitic. (Figure 5 - A and B)

Geochemistry

To conduct geochemical studies, 8 samples of the North Khomein intrusive rocks method were analyzed by ICP-MS. As it can be seen, the amount of SiO_2 in the rocks to 46.4 to 50.2 percent rate and MgO is varied from 5.87 to 8.62 percent the amount of K_2O Value is between 0.39 to 2.55 percent.

According to the geochemical diagram naming method of rocks [10] North Khomein intrusive rocks is Gabbro. (Figure 6 - a) and by placing samples in the diagram Zr and Ti / V * 1000 [7] All samples are placed within plate basalte (Figure 6-b).

The normalising pattern of HFS and LIL elements shows primary mantle enrichment in source rocks for LIL elements which can be the enriched mantle or can be evolved. [8] It has been suggested that the deplete of HFS in magma reflects the interaction between magma and Peridotite and in Gabbros show negative anomalies of Nb, Ta, Ba and positive anomalies. Opinion [9] loss in Nb diagram Spider secondary element caused two minor can cause, or due to magma mixing with continental crust is or the reason their relationship is Subduction. opinion According to [9] Nb index decline in spider curve of side elements may be because of two reasons: magmatic combinations with oceanic crust or their relations with movements. According to [9] Nb anomaly indicates continental rocks and can be a sign of the participation of the crust in magmatization. Pb positive anomaly to the mantle wedge by fluids from the sinking oceanic crust material or magma pollution with continental crust mass. The accuracy is defined according to tectonic diagrams Positions of North Khomein intrusive rocks (Figure 7).

Conclusion

1. Intrusive rocks outcropped in the North Khomein as a part of Tertiary magmatic zone has cut Cretaceous lime chiles.
2. The most important constituent minerals include clinopyroxen, plagioclase, Cpx (augite, diopside), and modal rock forming of gabbro diorite and gabbro rock.

3. plagioclase crystals are often shaped and in minor cases have mackle carlsbad. The range of its composition is Labradorite.
4. Clinopyroxene of this intrusive rocks is of calcic augite and diopside.
5. The rocks forming this intrusive rocks are intersertal, intergranular, ophitic and sub ophitic.
6. North Khomein intrusive rocks are in the zone of Sanandaj Sirjan within plate alkaline type according to the tectonic location.

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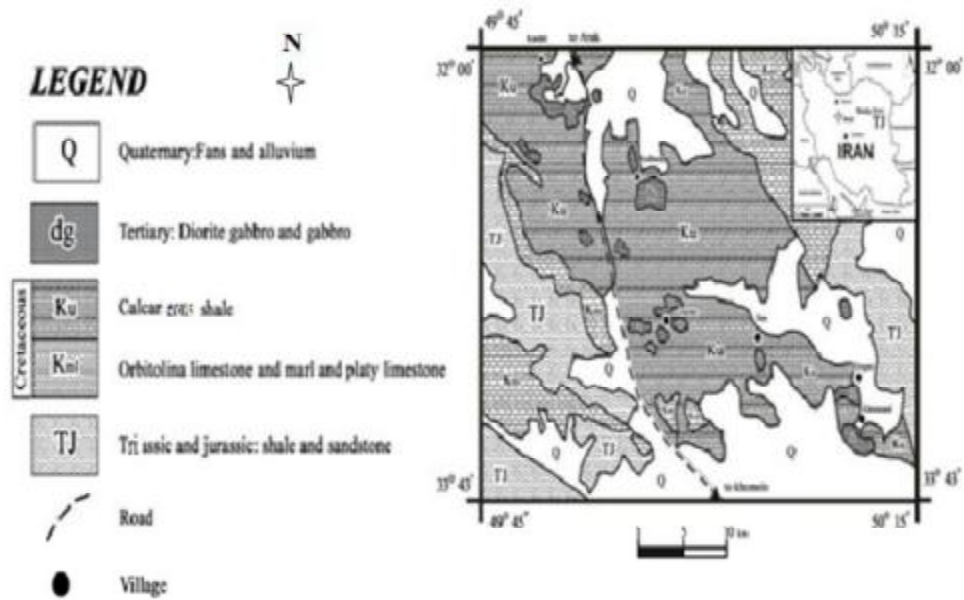


Figure 1: Geology map of the study area based on 1:250000 Golpayegan with slight modifications[3]

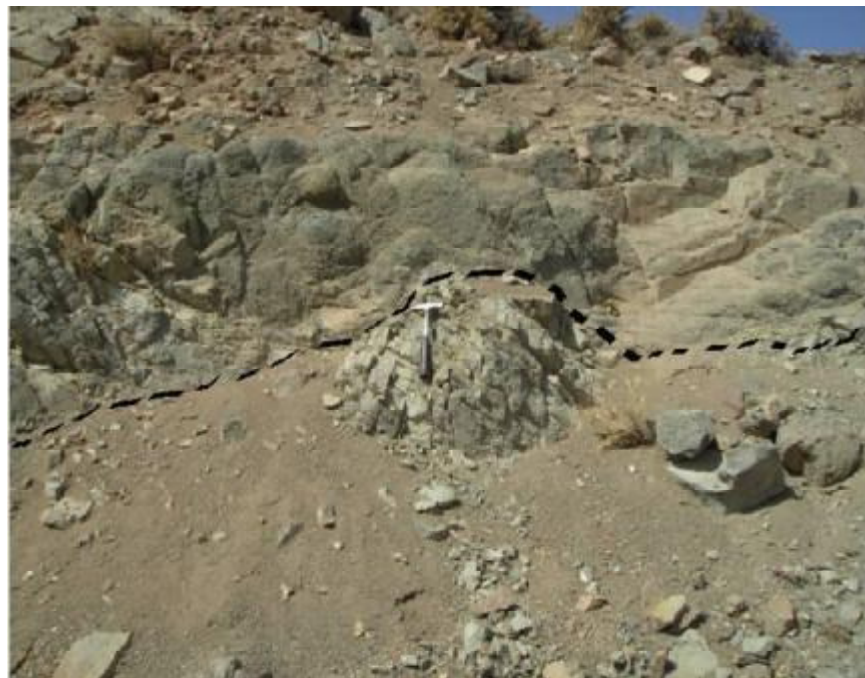


Figure 2: Outcrops of intrusive rocks in North Khomein

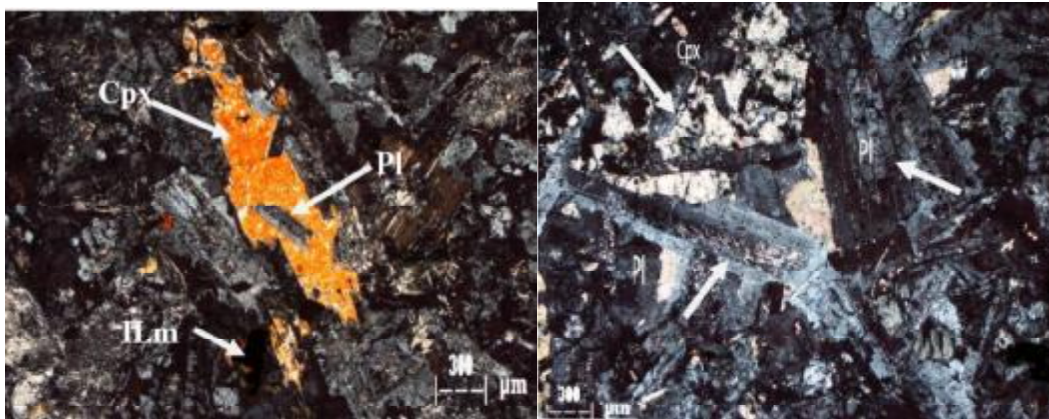


Figure 3: (A) Clinopyroxene with plagioclase combinations CPx(Clinopyroxen)Ilm(Ilmenite)
 (B) plagioclase at the time of surritisation(Pl) plagioclase Cpx (Clinopyroxen)

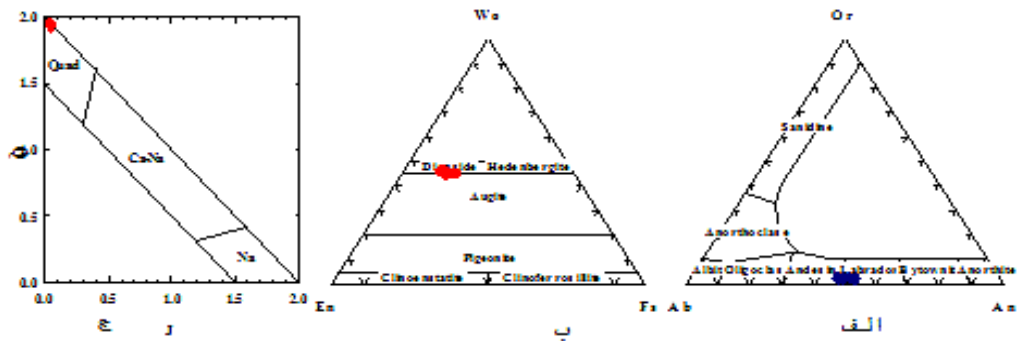


Figure4:(A)Classification of North Khomein intrusive rocks s influence[4]
 (B)Determination of the chemical compositions of Clinopyroxene based on classifications[5]
 (C) Determination of the chemical composition Clinopyroxene based classification [5]

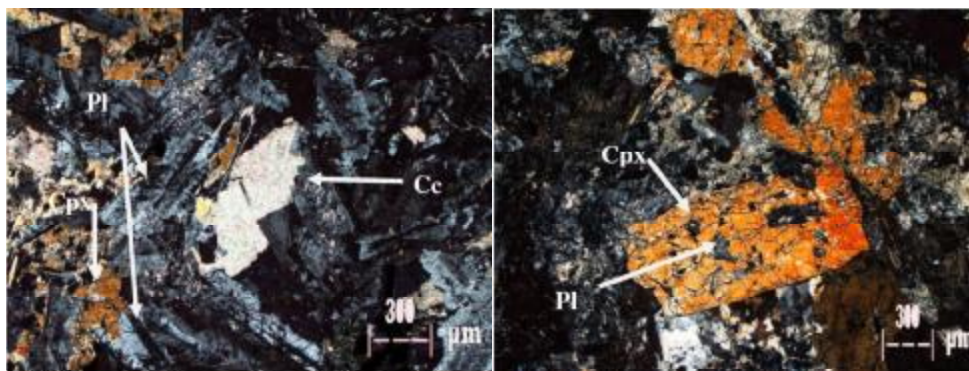


Figure 5: (A) View of the Sub ophitic tissue of (light XPL)
 (B) View of the intergranular and intersertal tissue (light XPL)

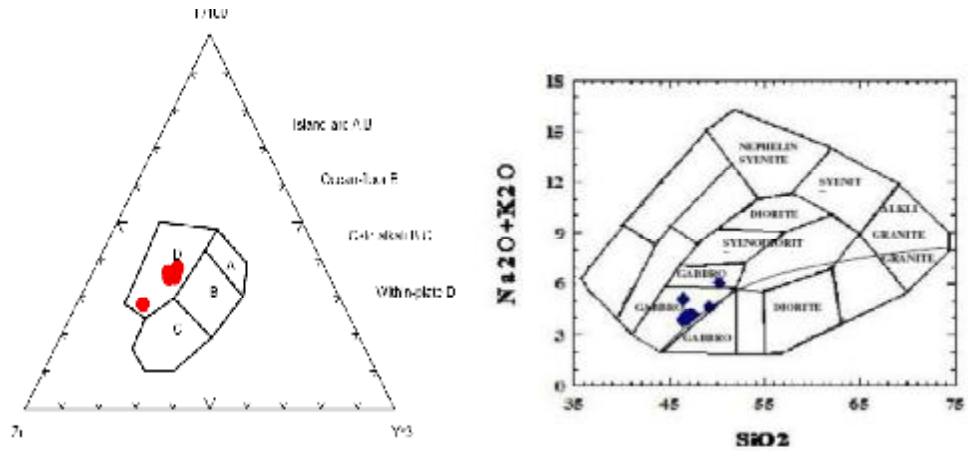


Figure 6: (A) Chemical naming of the intrusive rocks using alkaline cure against SiO₂ [10]
 (B) Distinguishing figures $Zr-Ti / 100-Y * 3$ for basalts [7]. D Within plate basalts

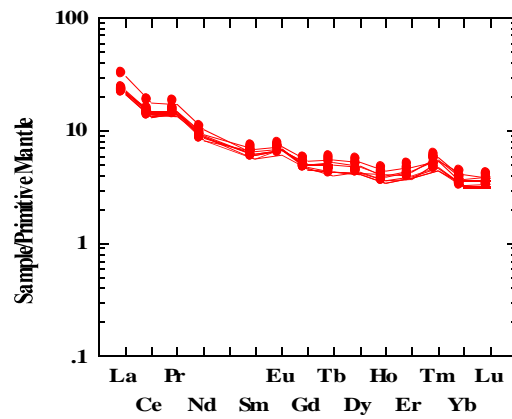


Figure 7: Multi-element gabbro Samples compared with primary mantle on to the spider diagram.