The comparison of the petrography and petrogenesis mass granitoid of Dehgheybi in Mashhad and Seyed Morteza in Kashmar

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Abstract

The study areas are located in the North East of Iran, 10 Km. from South West of Mashhad and 6 Km. from North of Kashmar. Granitoids of Dehgheybi of Mashhad is located in eastern Alborz, Binalood zone. Plutonic body of Seyed Morteza of Kashmar introduce as Loot block, Sabzevar zone and Taknar zone in divisions of structure geology unites of Iran. The volcanic rocks of granitoid and monzogranite outcrop in Dehgheybi of Mashhad. Plutons of Seyed Morteza of Kashmar have variety of composition include of monzogranite, granodiorite and quartz diorite. Field observations, petrography and especially geochemistry data shows all of them are calc alkaline and per aluminous essence. Further observations show that this granite created from melting of sedimentary rocks and has S type. Different diagrams of tectonical difference show that tectonically environment of this granitoid plutons depended on continental contact tectonically environment (CCG).

Key words: *S type, Dehgheybi, Seyed Morteza, Calc alkaline, Granitoid.*

1. Introduction

Mass granitoid of dehgheybi is located on east southern at a distance of 10 Km from Mashhad between geographical longitudes 59° 28′ - 59° 36′ East and latitudes 36° 9′ - 36° 15′ North (fig. 1) [Army geographical organization 1982] which based on Iran structural – geology units divide is located on East Alborz zone in Binalood area [Alavi, 1991]. Penetration mass of Seyed Morteza in Kashmar between is located on North at a distance of 6Km from Kashmar between geographical longitudes 57° 30′ – 58° 30′ East and latitudes 35° – 36° North (fig. 1) [Army geographical organization, 1963], which in Iran structural units dividing introduce under the name of Loot block, Sabzevar zone and Taknar zone. Penetration mass of Dehgheybi area is a kind of granitoid stones which are calling G_1 and G_2 [Majidie 1978] in North of it, there are transformation stone units with direction of West North – East South that its kind is phyilite, schist, slate and meta volcanic belongs to upper Paleozoic (Permian-Carbonifer) (fig. 2) [Aalaminia 2007]. From stone units which are existed in Kashmar, Seyed Morteza area, we can refer to penetration mass of granodiorite, granite, quartz diorite. Penetration mass of dacite and andesite quartz also could be seen in Penetration mass of Seyed Morteza, Kashmar. In West of study area of seyed Morteza, sedimentary units belongs to Paleogene are seen (fig. 2) [fazel Valipour 1992].

2. Method

Geology researches almost are done in a similar and general pattern including laboratory and desert studies. At first, with using of air pictures and desert walking, geology map of regions under study were provided with 1:20000 scale. After field studies, thin sections were prepared from stone samples. These sections were studied by petrography. From collected samples,

intact samples were analyzed and according to XRF style, tectono magma studies of regions were done by this analysis.

3. Discussion

3.1. Petrography

Petrography, field studies of penetration masses of Dehgheybi shows that this mass is composed of monzogranite, granodiorite and granite. Granular text often could be seen in these stones. Their major minerals including formed plagioclases which transformed to phyllo silicate minerals (clay and mica minerals) as a result of considerable decomposition, that this has done mostly from feldspar's central parts which shows zone mode (Fig. 3-L). Further more, there are feldspar alkali of microcline, quartz, brown biotite and muscovite kind. In some regions, alkali feldspar shows poekilitik text by having fored crystals. Brown biotite is like wide blades and they often have zircon seeds and its surrounding hols. In some samples, biotite transformed to chlorite. Apatite and opaque minerals are minor minerals in these masses. These masses also cut by aplite and even orthoclase veins which some times have quartz in some parts. Some times, aplite veins are wrinkle and cut by other veins (Aalaminia, 2007) .This case shows different aplite production in region which are different in their combination, as basically secondary veins have less feldspar and more tourmaline (Fig. 3-M & 3-N) and it matches with rules of penetration mass in Seyed Morteza Kashmar, have a combination of granite, porphyry granite, granodiorite and quartz diorite which granite stones almost are more than others. Very little restricted area is full of porphyry granite. These stones are extremely altered and grinding are extreme in them. Porphyry granites are usually exclusive for penetration masses with little bulk or margin stones of large masses; in Seyed Morteza region, the first made occurs. Granodiorites are expanded in the region like granites and in some parts of region; they are in the form of dyke. Diorite quartz masses are less expanded than granites and granodiorites (Fig. 2) (Fazel Valipour 1992). These stones are mostly hipidiomorph granular, poikilitic, microgranular and graphical texture (Figure 3-a, 3-b, 3-c, 3-d). Their maker minerals are quartz, plagioclase of albite till oligoclase kind, Orthoclase, biotite and Hornblende. Metamorphic production minerals are of serisite, chlorite, clay minerals, Epidot, zoizite kind (Fig. 3-R) and minor minerals i.e. Apatite and Zircon also can be seen in them (Fig. 3-z).

3.2. Geochemistry

Collected samples analyzed by XRF style in order to geochemistry analysis of penetration stones of under study regions, then result were processed by minpet 2.02 software and they were used in different charts to examine characteristics of intrusive rocks of region. Regarding to shtrakizen (1976) categorization, collected samples of Dehgheybi region were monzogranite, granodiorite and collected samples of Seyed Morteza, Kashmar region were granite, granodirite and quartz diorite.

1-Magma series

1-1- Limet-Alkalin index

SiO_2-$NaO+K_2O$ chart (Pakook, 1931) was used in order to determine of this index in penetration stories of both regions and according to this chart penetration stories of under study areas called sub Alkaline.

2-1- AFM chart:

Regarding AFM chart, penetration stories of Dehgheybi region has no iron enrichment and they trend to A pole and their limitation is Calc Alkaline (Figure 6). However, in Seyed Morteza Kashmar, collected samples observed in two forms of iron enrichment and non-enrichment. Anyway, all samples placed on Calc Alkaline limitation.

3-3- Saturation coefficient of Albumin or Shand index:

A/NK – A/CNK chart used to determine saturation coefficient of Albumin for penetration stories of both areas which regarding that both of them placed in Per Aluminous limitation (Fig. 7).

3.3. Tectonic environment

Variety of data like geochemistry of major and rare elements, field geology and petrography were used to analyze magmatism tectonic environment of both regions and in order to present a proper tectnomagma sample and model. For this purpose, it was tried to use geochemistry evident as assisted and supplementary with field geology and Petrography evident.

2-1- presenting tectono magma model of study regions according to geochemistry of major elements:

Maniar and Picoolie chart (1984) was used to analyze tectono magma sample of under study region according to main element's chemistry (figure 8) above mentioned chart shows ration Mw% - Fw%, and has three limits:

a- IAG+CAG+CCG limit which involves clashing environments.

b- RRG+CEUG limit which involves internal plate environments.

c- POC limit

Recording this chart, samples of Dehgheybi placed on a (IAG+CAG+CCG) which present clashing environment. collected samples from Seyed Morteza also placed in a limitation (Fig. 8). Since this chart doesn't determine clashing environment type, other evidence like geochemistry of rare elements were used to analyze more and to determine type of clashing environment.

2-2- presenting model of limitation tectono magma based on rare elements geochemistry:

Different charts were used to determine sample of granitoid masses tectono magma based on rare elements geochemistry, in following section, we present charts which are used for presenting model of granitoid rocks of under study limitation.

Bachelor and Boden (1985) state some measures and metrics for granites that based on current chart, intrusive rocks of both regions placed on syn-collision limitation (Fig. 9). Regarding to chart of Pierce and colleagues (1984) which state first new categorization of samples according to Log Nb with regard to Log y of granitoid rocks of under study region placed on VAG+Syn-COLG zone (Fig. 10). In order to exact separation, Log Rb ration to Y+Nb chart was used (Pierce and Colleagues, 1984) that according to this, granitoid rocks of region are placed on Syn-COLG domain (figure 11).

3.4. Granitoids type

According to granite categorization by Chapel and White (1974) that they categorize them to I and S type, any petrologist who study granites, tried to check granites of his under study region with Chappel and White findings and possibly expanel them. Geochemist try, field and

petrography studies show that granites of both regions are S type and they produced by upper crust melting of sedimentary materials which must have pert alumine magma.

4. Conclusions

Granitoids mass of Dehgheybi are monzogranite and granodiorite that they crossed by veins of Aplite and Pegmatite in the most part of granitoids mass of Seyed Morteza, Kashmar rocks are granite and granodiorite and there is a little quartz diorite. Based on petrography, field studies and geochemistry data, granitoids rocks of both study regions are calc alkaline type. according to mentioned data, garanite collection of both study regions show characteristics of S type granites. Also, diagrams of tectonic environment differential show that these granites belongs to continent collision granites (CCG).

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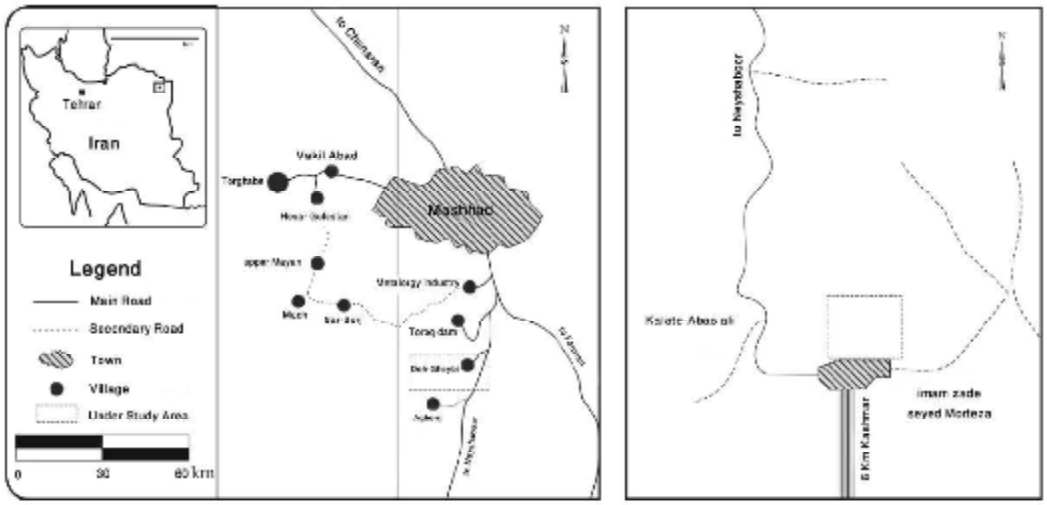


Fig. 1- Geographical situation and communication routes of regions which are under study [Army geographical organization 1963, 1982], Right: study limitation situation of Seyed Morteza, Kashmar, Left: Study limitation situation of Dehgheybi, Mashhad.

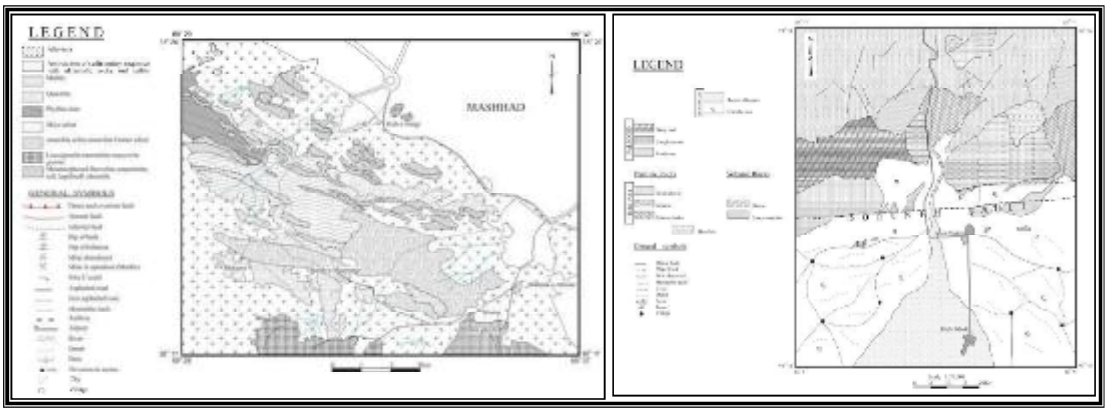


Fig. 2- Geology map of stone unites in regions which are under study [Fazel Valipour 1992, Aalaminia, 2007]. Right: Geology map of Seyed Morteza Kashmar. Left: Geology map of Dehgheybi Mashhad.

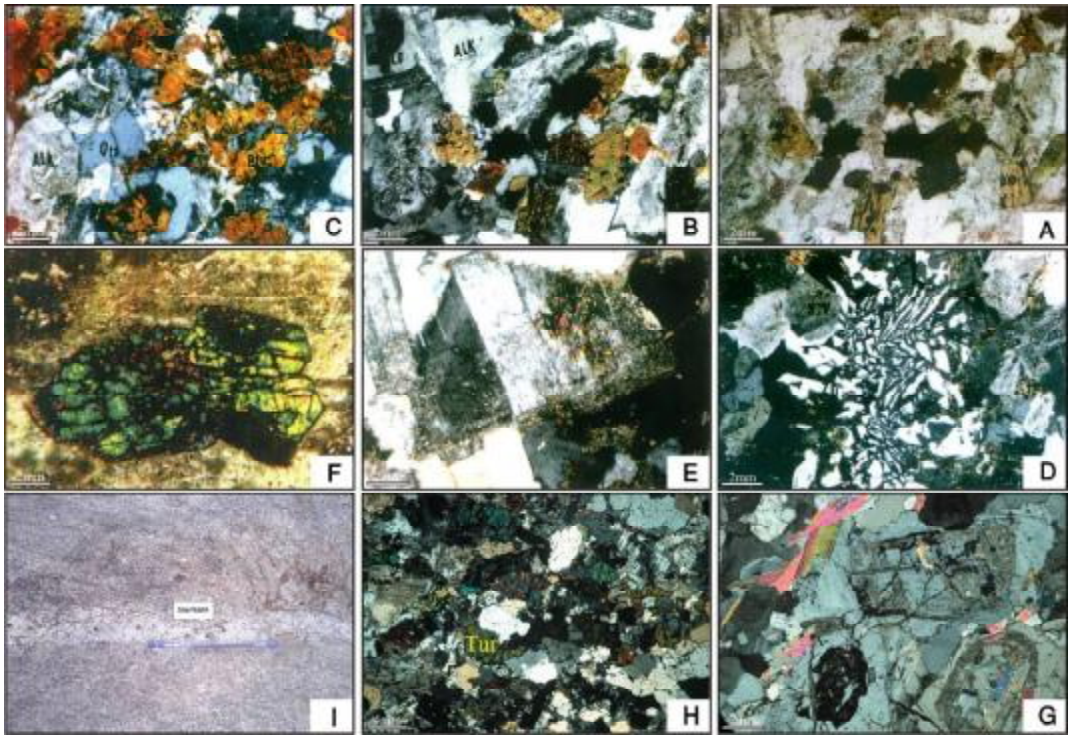
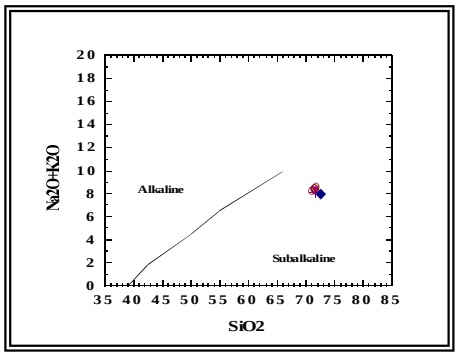


Fig. 3-a and 3-b: Poikilitic texture in granites. Biotite-zirconia minerals, plagioclase and feldspare in context of quartz .
A: in PPL, (Seyed Morteza region, Kashmar).
B: in XPL, (Seyed Morteza region, Kashmar).
C: Granular hepidomorph texture (Seyed Morteza region, Kashmar)
D: Graphic texture (XPL light, Seyed Morteza region, Kashmar).
E: A picture of plagioclase transformation to Epidot and Carbonate (XPL light, S yed Morteza region, Kashmar).
F: Quartz Diorite aggregation of minor crystals of Zirconia in Sersitic Plagioclase (XPL light, Seyed Morteza region, Kashmar).
G: Granite Plagioclase decomposition started from internal parts (XPL light, Dehgheybi region, Mashhad).
H: Granite that has tourmaline. Tourmaline can be seen in picture (XPL light, Dehgheybi region, Mashhad).
I: Aplite vein that has Tourmaline and penetrate in Granites (Dehgheybi region, Mashhad).



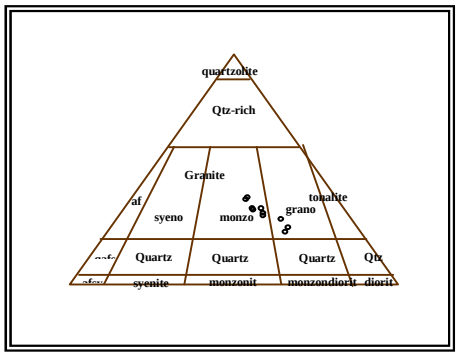
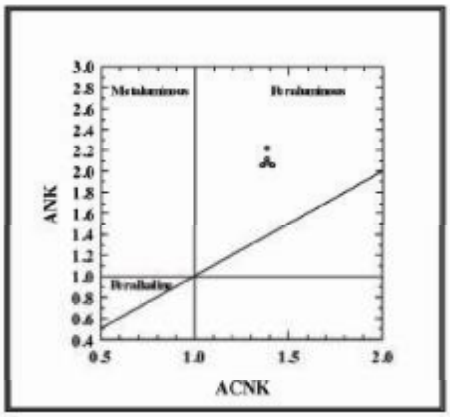


Fig. 4. (Right). Categorization for penetration stones of under study regions (using Shtrakizen, 1976).
Fig. 5. (Left). Ratio of Alkaline to Silica chart for determining Magma serie of Granitoide stones in region (using Pakock, 1931).



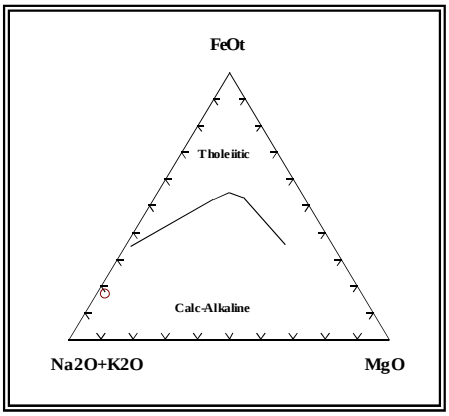
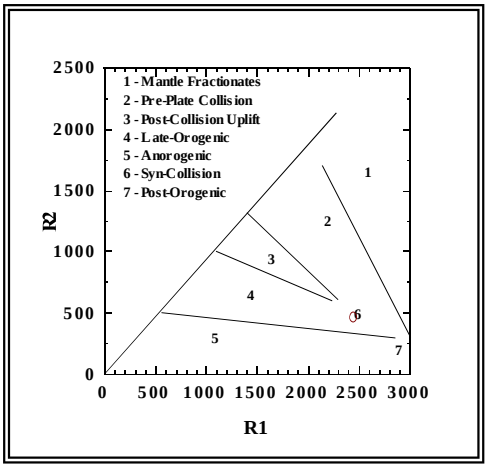


Fig 6. (Right). AFM chart, for separation Calc Alkaline series from to litie for Granitoide stones of region (Arvin & Baragara, 1971)
Fig 7. (Left). Ratio of ANK/CANK for Granitoid stones in region (Manir and Picoolie, 1989).



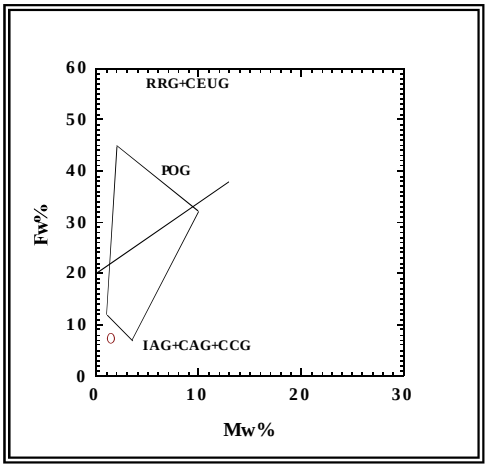
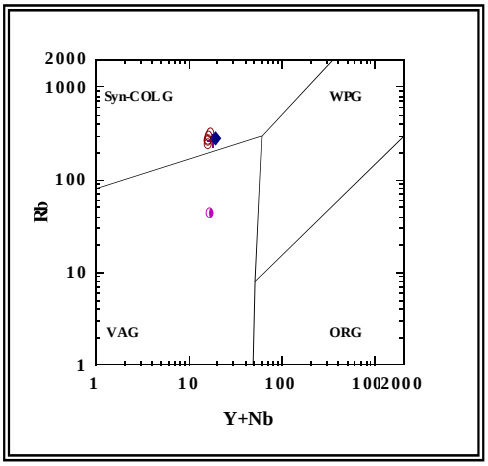


Fig 8. Tectno magma environment of granitoide mass in under studied region (Maniar and Picoolie, 1984).
Fig 9. Tectno magma environment of granitoid mass under studied region (Bachelor and Booden, 1985).



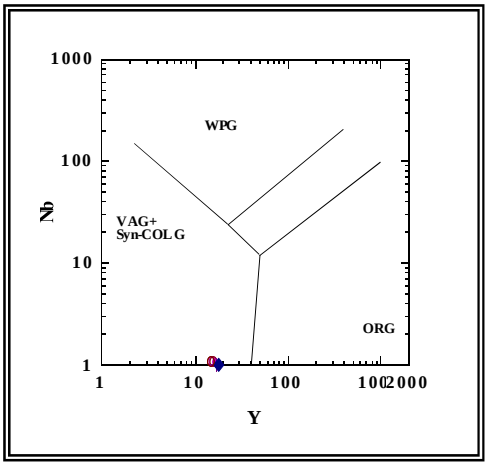


Fig. 10. Tectno magma environment of granitoid mass in under studied region (Pierce and Colleagues, 1984).
Fig. 11. Tectno magma situation of granitoid mass in under studied region (Pierce and Colleagues, 1984).