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The study of changing Rare Earth and Trace Elements to determine the origin of Borujerd migmatites

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Abstract: Migmatites have formed an important part of high-grade metamorphism in the Boroujerd area aureole. Leucosome of migmatites are mainly composed of plagioclase, quartz, potassium feldspar and biotite. Migmatites mesosome are mainly composed of plagioclase, quartz, potassium feldspar, biotite, garnet, andalusite, sillimanite, spinel, corundum and cordierite. Geochemical studies of migmatites show that composition of old meta-sedimentary rocks (source of migmatites) are shale and pelitic. Discrimination diagrams indicate an active continental margin tectonic setting for the source of Boroujerd migmatites. Sources of Boroujerd migmatites are intermediate and felsic igneous rocks (andesite –dasite and ryodacite) based on geochemistry of immobile elements. Field observations, microscope and geochemical data show that the migmatites are composed of the metaplites partial melting. Decreasing and increasing trace and rare earth elements in the metaelites and migmatites were resulted of stability or instability in the metamorphic minerals during peak of the metamorphism, which caused migmatization. Based on the partition coefficients of elements in different minerals, light rare earth elements and high rare earth elements (LREE, HREE) were mostly controlled by garnet and apatite (but not a lot) during the partial melting of the metaelites. Related to the LREE, heavy rare earth elements (HREE) and Y were controlled by garnet. Elements with high field strength (HFSE), such as Zr, Nb, Ta and Th were controlled and distributed by biotite and ilmenite. Large ionic lithophile elements (LILE) such as Sr, Ba and Rb showed that plagioclase and biotite are the main minerals that control and distribution the elements. Based on the P–T pseudosection, Crd+Kfs+Spl+Crn minerals paragenesis, the maximum temperature and pressure for metamorphism estimated approximately 750 ° C and 2.7 kbar respectively. Therefore, the intrusion of mafic intrusions in the metapelite caused the formation of pelitic hornfels and partial melting derived migmatites.

Keywords: *pseudosection; partition coefficient; metaelites; partial melting; migmatite; Boroujerd.*

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