Chemistry and formation conditions of garnet and clinopyroxene of the Seranjic skarn deposit, Ghorveh, Kurdistan province

Z. Alaminia*, S. M. h. Razavi, B. Mehrabi

Department of Geochemistry, Faculty of Earth Sciences, Kharazmi University, Tehran, Iran

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Abstract: The Seranjic skarn occurs as invading of Late Jurassic intrusive body with granite composition within impure carbonate rocks. Field observation and mineralogical investigations show the exoskarn is the most widespread skarn in the Seranjic skarn and is mostly calcic skarn together with magnesium skarn as a narrow marginal zone. The mineral assemblages indicate two stages of evolutions: the prograde and the retrograde stages. The prograde stage is characterized by garnet and clinopyroxene. The texture evidences and EPMA chemical analysis of clinopyroxene and garnet show two types of clinopyroxene and three types of garnet in various zones during the prograde skarn. Type 1 clinopyroxene show salitic (Hd 27-40 Di 58-51 Jo 8-14) and ferrosalitic (Hd 58-75 Di 27-16 Jo 8-13) compositions in the forsterite- clinopyroxene and garnet- vesuvianite- clinopyroxene zones respectively. Type 2 clinopyroxene has the intermediate compositions of salitic and ferrosalitic (Hd 36-48 Di 43-51 Jo 7-12) in the garnet- vesuvianite- clinopyroxene zone, which is accompanied by scheelite crystallization. Garnet mostly occurred in the center near the exoskarn zones to the plutonic body. Type 1 garnet is characterized by grossular-rich granditic composition (Gr 65 And 25 to Gr 45 And 40) with pyralspite< 10 mol percent, and the textural evidences show coexisting type 1 garnet and type 1 clinopyroxene that is widespread in the prograde skarn. Type 2 garnet (Gr 50 And 25 Pyr 25 to Gr 45 And 20 Pyr 35) and type 3 garnet (Gr 70 Pyr 30 to Gr 60 Pyr 40) have the highly pyralspite and occurs as proximal zones from the plutonic bodies. Based on mineral assemblages, the formation of type 1 garnet, comparative to type 2 and type 3 garnet, is in more oxidized condition in the distal zones of the skarn. Moreover, garnet/clinopyroxene ratios observed at the skarn is affected by the F high volume of magma-fluid. Also, the abundance of F in the volatile phase is probably largely responsible for the abundance of F-bearing minerals, such as vesuvianite, and the scarcity of pyroxene in the skarn. Composition of the variation types of clinopyroxene and garnet show the prograde skarn can be stable at relatively oxidized to relatively reduced and Log fO2 = -18 to -30.

Keywords: Chemical composition; garnet; clinopyroxene; Seranjic skarn; Ghorveh; Kurdistan.

*Corresponding author, Tel: 09122092956, Fax: (021)880021674, Email: Zoalaminia@gmail.com