Geophysical Research Abstracts
Vol. 12, EGU2010-1264-1, 2010
EGU General Assembly 2010

Mineral assemblages in different alteration haloes: evidence for physico-chemical conditions and temperatures of skarnification, a case study, Mohammad-Abad district, SW Yazd Province,Iran

Reza Sharifi (1) and Farid Moore (2)

(1) shiraz university, science, shiraz, Islamic Republic Of Iran (sharifi.reza@yahoo.com), (2) shiraz university, science, shiraz, Islamic Republic Of Iran

The study area is located 60 km Southwest of Yazd city, between Central Iranian Zone and Orumieh – Dokhtar tectonomagmatic belt. Skarn–type metasomatic alteration and mineralization in the Mohammad-Abad district occurs along the contact between Jamal limestone Formation and an Oligo-Miocene Fe-Cu bearing granitoid stock. Both endoskarn and exoskarn are developed along the contact. Mineralogical and geochemical investigations indicate two general stages of skarnification i.e, prograde and retrograde stages in this area. Metasomatic skarn (Prograde stage) occurred with precipitation of anhydrous calc-silicate mineral assemblages (andradite and diopside-hedenbergite) within the temperature ranges of 470 to 550 ºC.

During the retrograde stage (<470 ºC) considerable amounts of anhydrous calc-silicates were altered and replaced by a series of hydrous calc-silicates (epidote, tremolite–actinolite). Finally, both anhydrous and hydrous calc-silicates were altered to fine aggregates of chlorite, calcite, quartz and clay minerals at temperatures lower than 300 ºC.

The absence of wollastonite among the calc-silicate assemblages may suggest that andradite and hedenbergite were crystallized from metasomatizing fluids at lower than 550 ºC in the Mohammad-Abad skarn. The presence of intergrowth texture and non-replacive crystal boundaries between garnets and pyroxenes suggest that they were formed contemporaneously within the temperature and fO_2 ranges of 430–550 ºC and 10^{-26}–10^{-23}, respectively. Andradite converted to quartz, calcite and magnetite below 470 ºC and $fO_2 = 10^{-24}$–10^{-21}. Since, both magnetite and pyrite along with quartz and calcite are present in mineral assemblages of sub-stage III, it can be reasoned that the metasomatizing fluids probably had an approximate $fS_2 = 10^{-6.5}$ and a temperature of about 430 ºC.