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Origin of olivine in Molataleb ultramafic rocks and the role of olivine on magma evolution

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Abstract: Granitoid rocks of the central segment of Sanandaj-Sirjan zone, occurring in Lorestan Province, are parts of a continental arc setting intruded during Mid Jurassic time. Ultramafic rocks are adjacent to this felsic rocks with olivine, orthopyroxene, clinopyroxene and amphibole as their major rock forming minerals. Microscopic observations revealed rounded shape and occurrence of embayments in the olivines attesting different degree of olivine assimilation. By applying electron microprobe analyzes, the chemical compositions of the melts in equilibrium with minerals were calculated. It was revealed that Mg# of the melt is linearly increased as the minerals crystallized. In addition to magmatic origin of the olivine, this trend clearly shows an uncommon behavior of Mg# in the magma that increased during fractional crystallization. Two different possibilities are examined to explain the Mg# increasing. 1- high oxygen fugacity of the magma that led to early crystallization of Fe-oxides; 2- olivine assimilation during fractional crystallization. The results obtained by geochemical modeling and the increase of Ni during fractional crystallization revealed that olivine assimilation during fractional crystallization is the factor that increased Mg# and Ni content of the magma.

Keywords: *ultramafic; geochemistry; olivine; assimilation and fractional crystallization; Sanandaj-Sirjan.*

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