

Apatite as a main source of REE during crystallization of monazite mineral in Esfordi Fe-Apatite deposit, northeast of Bafq

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(Received: 24/10/2018, in revised form: 27/1/2019)

Abstract: The Esfordi deposit is located at northeastern Bafq and is one of the well-known magnetite-apatite deposits in the area which consists of ore minerals hosted REE. Among the various ore minerals, apatite is one of the unique minerals because of its significant properties such as providing a budget of elements (especially in the case of REE), stability over widespread temperature and pressure domains and exclusively ionic interchanges as a respond to re-equilibrium with new environment. All of which can fit the apatite as a main source feeding the new mineral nucleation like monazite during a hydrothermal alteration. Based on petrography and geochemistry studies, mineralization of four generation apatite accompanied with dropping of REE amount in each stages and increasing of residual Ca and P in the next generations. In contrast, culminating amount of REE beside Na, F and limited Cl reached in nucleolus monazite and led to the formation of two generation of monazites. On the BSE images of apatite, the depleted areas are associated with micro-channels and micro-pores containing monazite. Consequently dissolution of nucleolus monazites provides a well chance to form the second generation of monazite as bigger grain than the first ones.

Keywords: *Apatite; monazite; rare earth elements; Esfordi Fe-Apatite deposit; hydrothermal alteration.*

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