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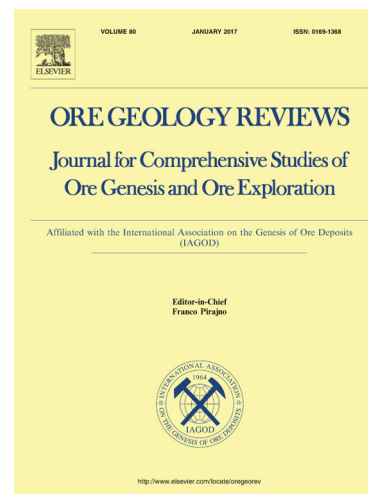
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Geological, geochemical and fluid inclusion studies on the evolution of barite mineralization in the Badroud area of Iran

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ABSTRACT

A sequence of andesitic to dacitic volcanic and volcano-sedimentary rocks from the Late Eocene in the central part of the Urumieh–Dokhtar Magmatic Arc (UDMA) hosts a number of barite occurrences. The Badroud barite deposit is economically important deposit in the study area. The petro-geochemical characteristics of the deposit indicate that the least-altered volcanic host rock was produced as orogenic volcanic rock in the continental margin arc setting. It displays characteristics of a high-K and calc-alkaline series. Mineralized host rock mostly consists of barite crystals, and subordinate quartz, calcite, gypsum, fluorite and rare pyrite, chalcopyrite, galena, stibnite and cinnabar minerals. Petrographic studies revealed three types of barite. The early stage barite occurs as stockworks of large tabular and bladed crystals trending NW-SE in dextral strike-slip faults. The second stage barite precipitated as thick lensoid veins (50 × 3 m) of medium tabular crystals extending in a N-S direction. The third stage of barite mineralization occurs as thin acicular veins trending in a NW-SE direction. Chemically, the barite deposit is characterized by the low amounts of Sr, K, Ca and low Sr/Ba ratio. Fluid inclusion studies, applied to the first stage of bladed crystals of barite veinlets, show a high homogenization temperature of 256 to 338 °C and 8% to 13% (wt.) NaCl eq. salinity. Fluid inclusions in the second stage of barite mineralization are characterized by low salinity of 1% to 9% (wt.) NaCl eq. at a 160 to 214 °C homogenization temperature. The fluid inclusions occurring in the third stage of thin barite veins revealed high salinity of 19% (wt.) NaCl eq. with a 166 to 212 °C homogenization temperature. The fluid inclusion characteristics of the first stage barite show a hydrothermal origin with a deeper-seated source on the seafloor associated with a lower sequence of the Late Eocene felsic rock. The second stage barite, exposed beneath the upper sequence of Late Eocene andesite, was formed due to increased dilution, possibly with seawater. The third stage barite mineralization is associated with saline water and the interaction of fluid with volcanic and conglomerate host rocks. The obtained data show that the mineralization at Badroud barite deposit is similar to the Kuroko-type massive sulfide deposits in an arc setting.

Keywords: barite geochemistry; fluid inclusion; Urumieh–Dokhtar Magmatic Arc; Iran.

1. Introduction

There are two major metallogenic belts of barite mineralization on both sides of the Urumieh–Dokhtar magmatic arc (UDMA) in Isfahan province of Iran. They are named as Malayer-Isfahan and Qom-Kashan belts, and respectively located in the western and the eastern parts of the UDMA (Fig. 1a).

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