Talkhabvand barite mine, east of Bajestan, Khorasan Razavi Province: Mineralogy, REE geochemistry and fluids inclusion studies

J. Maasoumi¹, A. Malekzadeh Shafaroudi²*, S. Zirjanizadeh³

¹-Department of Geology, Faculty of science, Ferdowsi University of Mashhad, Mashhad, Iran
²-Department of Geology and Research Center for Ore deposit of Eastern Iran, Faculty of science, Ferdowsi University of Mashhad, Mashhad, Iran
³-University of Gonabad, Gonabad, Iran

(Received: 16/1/2019, in revised form: 13/4/2019)

Abstract: Talkhabvand mine is located east of Bajestan, Khorasan Razavi Province, and northwest of Lut Block. Geology of the area includes Jurassic metamorphic rocks, Cretaceous limestone, intrusive rocks, and skarn unit and Eocene volcanic rocks. Barite mineralization as vein, with mainly NW-SE trening has cut all rock units. Minerals consist of barite, quartz and calcite associated with minor oxidized pyrite and galena and secondary minerals such as goethite, limonite, covellite, malachite and anglesite. Positive anomaly of La and Gd, high negative anomaly of Ce (-0.5 to -1.27), and Ce/La <1 (0.05 to 0.55) reveal that barites have formed in marine environment. Although, field evidences reject this issue. LREE/HREE enrichment of barites indicates that the ore-fluid was Cl-rich. Formation temperature of different minerals of Talkhabvand deposit ranges between 138 to 390°C and is occurred from NaCl-, and CaCl₂-bearing fluid with 7.5 to 15.8 wt. % NaCl equivalent salinity. The results indicate that barium- and silica-rich solutions originate from magmatic water. Increasing the salinity of the ore fluid in the final stages is due to the addition of basinal saline waters to the environment. Based on geology, mineralization, geochemistry of major oxides and REE, and fluid inclusion studies, Talkhabvand deposit can be hydrothermal barite.

Keywords: Barite; Rare Earth Elements; Fluid inclusion; Bajestan; Lut block.

*Corresponding author, Tel: 05138805488, Fax: 05138796416, E-mail: shafaroudi@um.ac.ir