Evidence of hydrothermal barite in Mashkan area, northeastern Sabzevar: mineralogy, geochemistry, and fluid inclusion

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Abstract: Mashkan barite prospect area is located in the northeastern Sabzevar, Khorasan Razavi Province. Geology of the area includes sedimentary rocks of conglomerate, sandstone, limestone with interbeds of shale and shale with interbeds of sandstone and Eocene volcanic units of andesite and trachyandesite. Barite with open space filling, massive, radial, and planar textures occurs as vein-type with mostly northwest-southeast trend. Mineralogy of deposit includes barite, quartz, and calcite and secondary minerals are malachite, azurite, goethite and hematite. The vein mineralization was formed in two stages, including: 1. main stage (barite+quartz) and 2. late stage (calcite). Fluid inclusions in the quartz and barite samples are anhedral to subhedral forms (conical and rod) with a size of about 4 to 12 microns. Maximum geochemical anomalies in veins are 394 ppm Zn, 52 ppm Sb, and 90 Pb ppm. Based on fluid inclusion studies of quartz and barite samples of the main stage, minimum formation temperature of mineralization is about 181 to 370°C and with salinity of 6.5 to 13.6 NaCl wt. % equivalent. Based on evidence such as structural control (fault) of mineralization, geology, mineralogy, geochemistry, and fluid inclusion, veins are hydrothermal type. Temperature decreasing and mixing with high salinity fluid during the evolution of hydrothermal fluids are effective during the formation of vein.

Keywords: Mineralogy; geochemistry; fluid inclusion; barite; Mashkan; Khorasan Razavi

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