

Origin of the Joumand fluorite and barite(Pb-Zn) veins of northwest Gonabad, Iran. Evidence from trace-element and stable (S) isotope data

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Introduction

The Joumand fluorite deposit is located 15 Km northwest of Gonabad, Eastern Iran. The fluorite mineralization mainly occurs within metasedimentary rocks (Shemshak formation). The intrusive rocks consist of dykes with porphyry texture and granitic composition crosscutting the Shemshak formation [1]. These dykes outcrop near the deposit. Fluorite veins are controlled by fractures and faults.

The most common primary (hypogene) minerals are fluorite, barite, galena, and quartz, with minor amounts of other sulfide minerals (chalcopyrite and pyrite).

Discussion of Results

The samples show a pattern characterized by an increase from the LREE to the HREE. Fluorites exhibit high Y contents, strong positive Y anomalies, slightly positive Ce and negative Eu anomalies.

³⁴δ measurement (-2.7 to +0.25‰), are an evidence for a primary source of sulphur derived from magmas (Table 1).

| Mineral | $\delta^{34}\text{S}$ | T C | Calculation | $\delta^{34}\text{S}_{\text{H}_2\text{S}}$ |
|--------------|-----------------------|-----|---|--|
| Chalcopyrite | 0.4 | 300 | $\delta^{34}\text{S}_{\text{cp}} - \delta^{34}\text{S}_{\text{H}_2\text{S}} = 0.15$ | 0.25 |
| Galena | -4.6 | 168 | $\delta^{34}\text{S}_{\text{Ga}} - \delta^{34}\text{S}_{\text{H}_2\text{S}} = 3.75$ | -2.2 |

Table 1. Sulphur isotope data for sulphide minerals

Microthermometric measurement, geological and mineralogical evidence (for example Mn oxide crusts) indicate epithermal environment of fluorite.

[1] Zirjanizadeh et al. (2015) Econ. Geol 5, 355-360.