Characterization of Fluorite mineralization in North Hameimet by fluid inclusions and stable isotopes

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The Mineralization of North Hameimat is a link of 1700 m long and 600 m wide, oriented NW-SE. It is located 17 km NNW of the city of Tebessa and 13 km south of Morsott village. The sedimentary lands that outcrop in this massif are of Cretaceous and Triassic ages. They consist mainly of reef limestones and fried marls that are in contact with the multicolored marl of the Triassic formations located on the southern flank of the massif which is characterized by the mineralization of Fluorite, Barite and Galena. The Triassic formations consist of a chaotic set composed of breccia with dolomite elements, very silicified with sometimes small fragments of eruptive rocks which are probably brought to the surface during the ascent of the diapir.

Mineralization appears mainly in two types: 1) a first type of mineralization with breccia appearance rich in barite, fluorite and incidentally in galena. It is outcropping in the western part of the massif. It is related to the Trias-cover contact; 2) a second type of vein mineralization outcropping in the eastern part of the massif, in the abnormal contact between the Albo-Aptian and the Vraconian.

The study of fluid inclusions focused on fluorite. Inclusions are essentially two-phase primary inclusions (Aqueous + Vapor). However, the brownish fluorite type in North Hameimat shows two-phase primary inclusions containing (Hydrocarbons + Vapor) and three-phase inclusions (Hydrocarbons + Vapor + Aqueous).

The microthermometric studies carried out on the fluid inclusions contained in the Fluorites shows a ternary system composed mainly of H_2O-NaCl-$CaCl_2$. Homogenization temperature "Th" ranges between 104°C and 152°C with almost the same range of salinity from 20 to 25 wt % eq. NaCl.

Stable Isotopes study of O, C and S performed in two samples of calcite galena shows that $\delta^{13}C$ ‰ vs. VPDB is -1; $\delta^{18}O$ ‰ vs. VSMOW: 17 and $\delta^{34}S$ ‰ vs VCDT: 2.2 to 10 which is in perfect correlation with the results presented recently by Laouar et al. (2016) studying Mesloula district: "sulphide and sulphur were likely derived from Triassic sulphates through thermochemical sulphate reduction and residual sulphate in such a system would have been enriched in ^{34}S; this is reflected in the barite deposition. The $\delta^{13}C$ VPDB values of calcite minerals, indicate an inorganic carbon origin which is the case too for Hameimet North".

The mineralizing fluid would be a hot water high salinity fluid that would have undergone a dilution phenomenon during its evolution. The origin of the mineralization deposition that replaced the limestone and filled the open spaces was hydrothermal fluids which were conducted by diapir intrusion at the favour of various tectonic accidents.

The genetic model for the emplacement of polymetallic mineralization of North Hameimat is similar to the model of the Mississippi Valley Type Formation (MVT)

Keywords: North Hameimet, Stable Isotopes, Microthermometry, Fluorite, Diapir Triassic, Mississippi Valley Type

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