Geology and Hydrothermal Alteration at the Hercynian Koudiat Aïcha Massive Sulphide Deposit (Zn, Pb, Cu), Central Jebilet, Morocco

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The Koudiat Aïcha polymetallic deposit (Zn-Pb-Cu) is located in the southern part of the Moroccan meseta, 32 km to the NW of Marrakech and 7 km to the SW of the old pyrrhotine mine of Kettara in the central part of the massive Hercynian of Jebilet in Morocco. It is enclosed in the visean Saghlef volcanosedimentary series composed mainly of mudstones and occupying the central part of Jebilet which enclose several sulphide deposits.

The study of hydrothermal alteration effects showed a mineralogical zonation well pronounced in relation to the ore body. This zonation is marked by a net change in terms of modal proportions of secondary alteration minerals (sericite, chlorite, quartz and carbonates). This alteration is illustrated by the development of an envelope of local alteration (5-20 m) around mineralization, materialized by a strong chlorititization of proximal sedimentary facies.

The chemical changes are accompanied by hydrothermal alteration and the deposition of the ore body. They are shown in the Koudiat Aïcha deposit by a band of maximum chemical weathering of approximately 60 m in thickness in the lower part of the ore body. This band illustrates a gain (addition) and loss (scrubbing) in chemical elements. It is materialized by a mass increase of ?FeOt, ?MnO, ?MgO, provided by a corresponding reduction in ?CaO, ?K_2O, ?Na_2O. This enrichment in Fe-Mg- Mn as well as the loss of K-Ca-Na well indicates the reduction in sericite and a substantial enrichment in chlorite, associated with albititization of plagioclases. This type of alteration suggests high temperatures and the high wather/rock ratio in the discharge zone, with almost maximum scrubbing of K_2O, Na_2O, CaO and moderated in SiO_2 and the precipitation of FeOtotal, MgO and MnO.

Keywords : Massive sulfide, Koudiat Aïcha, Hercynian, Hydrothermal Alteration, Central Jebilet.