MINERALOGY AND GEOCHEMISTRY OF MASSIVE SULPHIDE ORES FROM TURKEY; IMPLICATION FOR AMBIENT ENVIRONMENT AND GENESIS

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Massive sulphide ores similar to Kuroko type ones, associated with Upper Cretaceous felsic lavas and pyroclastic rocks with clay and carbonate zones occur along the northeas-tern coast of the Black-sea. The ores are composed generally of pyrite, chalcopyrite, sphalerite, bornite, covellite, chalcocite, galena, tetrahedrite with some bornite, covellite and chalcocite possibly of later supergene products, in addition to barite and or gypsum as gangue minerals. Associated alteration minerals include gypsum, calcite, kaolinite, illite, chlorite and sericite.

The d34S data give 2.6-6.0 for pyrite and 6.3-7.3 for some other associated sulphide minerals, which are both significantly enriched in heavy isotope with respect to the meteoric reference. The values for gypsum comprise two distinct groups, 14.5 -19.9 and 8.4 -9.4. The former is similar to the values of contemporaneous evaporites, suggesting the possible incorporation of seawater sulphate in the mineralization. The latter is close to the values of the sulphide minerals, being likely due to the oxidation of sulphate ores in the post-mineralization stage. It appears that either microbial or thermochemical reduction of seawater sulphate was essential to the formation of the massive sulphide ores. REE data of ore dacite and dacitic tuff indicate moderate negative Eu anomalies with small enrichment of LREE. Sphalerite has low SREE, high positive Eu anomaly with high enrichment of LREE. Pyrite shows high positive Eu anomaly, low enrichment of LREE and negative Ce anomaly. The occurrence of Ce anomaly together with Eu anomaly in the ore minerals may imply the significance of a hydrothermal fluid in the mineralization system.