

The Certej hydrothermal ore deposit (Apuseni Mts., Romania): fluid inclusions, types and age of the related hydrothermal alteration

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An important low sulphidation type epithermal Au deposit occurs at Certej in the southeastern part of the Apuseni Mts., Romania in a small Neogene intramountain basin (Brad-Săcărâmb).

The ore bodies are hosted in Miocene amphibole andesite and Cretaceous and Neogene sandstone, micro-conglomerate and black claystone as well as in their brecciated counterparts. K-Ar ages for the magmatic rocks in the region are between 12.58 – 10.27 Ma. The characteristic mineral association of the studied ore deposit is pyrite, sphalerite, galena, chalcopyrite, tetraedrite-tennantite series minerals, bournonite, arsenopyrite, boulangerite, pyrrotite and mackinawite accompanied by quartz, calcite and barite. Two ore-forming stages have been distinguished based on ²⁰⁴Pb/²⁰⁶Pb isotope data: 1) syngenetic disseminated Pb-Zn ore in Cretaceous sedimentary rocks, and 2) the main breccia pipe hosted gold-polymetallic ore bodies formed during the Neogene volcanic activity. Hydrothermal alteration products were analyzed by optical microscopy, while selected hydrothermal minerals were determined using XRPD.

Pyritization, silicification, adularization, carbonatization and sericitization are the prevailing hydrothermal alteration types in relation to the main mineralization stage. The XRD study revealed the presence of the following hydrothermal phase minerals: illite, smectite, kaolinite, adularia, barite. Based on K-Ar dating of illite and adularia, the hydrothermal alteration in the Certej occurred between 11.86 (+/-0.52) and 12.29 (+/-1.56) Ma, within the time interval of magmatic activity.

Primary and secondary fluid inclusions in quartz and sphalerite were trapped from a heterogeneous (boiling) fluid. Homogenization temperatures range between 186 – 355.4°C, however, due to the occurrence of heterogeneous entrapment, the temperature of ore forming processes is most probably around 180 – 200°C. The determined eutectic temperatures of the fluid inclusion brines range between -19.3 – -24.4 °C, while freezing point depressions from -4.1 to -0.1°C. The final melting temperature mostly occur between -0.2 and -3.3°C and thus fluid inclusion salinities are in the range 0.35–5.41 eq. wt. % NaCl.

Depth zones of the Dead Sea rift as a possible source of hydrocarbons

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Interest to deep sources of hydrocarbons has appeared after the finding of oil/gas fields in magmatic rocks. For research of oil/gas bearing deep layers, the Polycyclic Aromatic Hydrocarbons (PAH) in basalt rocks of Dead Sea Rift have been studied. The samples were selected both to the north and south from Kinneret Lake in a few ten kilometers distance from