PHYSICO-CHEMICAL CONDITIONS OF QUARTZ AND CARBONATE VEIN FORMATION FROM THE CALDERA OF THE KELCHEY VOLCANO (TRANSCARPATHIANS, UKRAINE)

LAZARENKO, He., BLAZHKO, V. & KULIBABA, V.

Institute of Environmental Geochemistry, National Academy of Sciences, Kyiv, Ukraine.
E-mail: vsm@svitonline.com

Zonal veins of 3–5 cm thickness cut andesite which fills up the caldera of the Kelchey volcano (Kvasovo ore field).

The main minerals of the veins are "quartz I", "quartz II" (amethyst) and "quartz III" (amethyst similar to quartz I) and carbonates (calcite and rhodochrosite) crystallized in the sequence listed.

On the basis of homogenisation temperature and gas-phase content the following generations of fluid inclusions may be distinguished: in "quartz I": 375 °C (60% gas), 230–205 °C (20% gas); in "quartz III": 300 °C (25–30% gas); in "quartz II": 225–180 °C (20% gas) and 170–165 °C (10% gas). Fluid inclusions are not present in carbonates.

By gas chromatography the following components of the gas-liquid inclusions have been determined: $Ar + O_2$, N_2, CH_4, CO, CO_2, C_2H_6, and H_2S.

CO and H_2S contents (in cm^3/kg) are different: in "quartz I" (CO 0.6, H_2S 1.7) are less than in "quartz II" (CO 85, H_2S 87).

Cl ion, F-hydrocarbon are determined in "quartz I" and "quartz II" by the water-extract method. These components are absent in carbonates.

A large temperature range (375–165 °C) of "quartz I" and "quartz II" crystallisation shows an unbroken evolution process of hydrothermal solution. The gas phase is prevailing at the high temperature stage (>300 °C).

The increase of reduced gases in the later stage of mineral formation ("quartz II") shows that at low temperatures the oxygen fugacity was lower. The bulk crystallisation of rhodochrosite suggests that Mn^{2+} was stable under these conditions.

The high homogenisation temperature of the gas inclusions indicates that mineral formation in early stages occurred within pneumatolytic conditions. The composition of this phase may reflect the volcanic gas composition.