FLUID INCLUSION STUDIES FROM THE WESTERN PART OF POLISH TATRA MOUNTAINS, TATRIC UNIT

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The Tatra Mountains located in the Central Western Carpathians are the highest part of the Carpathian Mountains. Together with 7 other massifs from Slovakia their crystalline core is built with Tatric Unit (ANDRÁŠ & CHOVAN, 2005). In all of them the hydrothermal ore mineralization with similar origin occurs.

In the western Polish part of the Tatra Mountains hydrothermal ore mineralization was an object of interest for mining industry during 16th to 18th centuries. It is connected with crystalline rocks (magmatic and metamorphic) and occurs as a copper and silver mineralization of the abundant polyphase carbonate-quartz and carbonate-quartz-sulphide-barite veins. The hydrothermal ore mineralization was formed at the last stage of granitic magma crystallization from hydrothermal solutions circulating in shear zones and connected to tectonic deformation (GAWĘDA *et al*., 2007). The most common sulphosalt is tetrahedrite, which usually forms massive impregnation, even up to 1–2 cm. Analysis made by WDS showed antimony varieties with substituted As for Sb. Trace elements detected by LA-ICP-MS showed the highest partly substitution for bismuth (up to 1500 ppm), mercury (up to 1845 ppm), cobalt (up to 500 ppm) and cadmium (up to 150 ppm). Concentrations of other trace elements were not significant. Content of Ge, Ga, Mo and Sn are less than 10 ppm and content of Au, In are less than 1 ppm.

In order to determine the origin and composition of hydrothermal mineralization the fluid inclusion studies from quartz were conducted. Research focused in the Polish part of the Western Tatra Mountains in three main locations: Pyszniańska Valley, Pod Banie Gully and Baniste Gully. Phase transitions have been measured using Linkam HFS 91 freezing-heating stage mounted on Nikon Optiphot-2 microscope. Composition of fluids was examined by Raman spectroscopy, which was carried out using Witec Alpha 300 M+ spectrometer with 488 nm diode laser, 600 gratting and 100x Zeiss objective. The size of the observed inclusions closed in the range of 2–6 micrometres. Optical studies of collected quartz samples indicated dominant presence of secondary fluid inclusions, the same as in the High Tatras (JUREWICZ & KOZŁOWSKI, 2003). Measured homogenization temperatures allowed to determine two generations of fluid inclusions: primary with the temperature in the range of 120–170 °C and secondary inclusions in the range of 97–110 °C. The salinity was calculated from the melting temperatures by means of AqSo5e programme. The results showed that the salinity varies between 4.9 and 17.81 wt.% NaCl eq. Due to the small size of the inclusions it was difficult to determine eutectic temperature and estimate the composition of the solutions. However, recent microthermometric studies from similar quartz veins from High Tatra Mountains shows that inclusions are filled with aqueous solutions of salts, mainly NaCl, KCl and $CaCl_2$, and gas or liquid CO_2 (e.g., JUREWICZ & KOZŁOWSKI, 2003).

Results obtained from fluid inclusions present in hydrothermal ore veins from Western Tatra Mountains are similar to data from fluid inclusions occurring in post-mylonitic quartz veins from High Tatra Mts. (JUREWICZ & KOZŁOWSKI, 2003). Mineralizations mentioned above formed due to hydrothermal activity which was probably connected with Variscan stage of the granitoid crystallization. Microthermometric data from Western Tatra Mts. are also comparable with results from other massifs with similar mineralization occurring in Tatric Unit (MAJZLAN *et al*., 2020). Parental fluids are interpreted as basinal brines with a contribution of seawater and/or meteoric water components.

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