

CARBON AND OXYGEN ISOTOPIC COMPOSITION OF CARBONATE MINERALS FROM THE JÍLOVÉ AND LIBČICE GOLD DEPOSITS, CZECH REPUBLIC

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Most of the gold occurrences in central Bohemia are located in the vicinity of the Central Bohemian Plutonic Complex (CBPC), especially along its north-western margin.

The Jílové mining district is located in the northern part of the Jílové Belt (JB), that is 70 km long and 1–7 km wide. This belt is formed mainly by Upper Proterozoic metaigneous rocks (metabasalts and metaandesites > metadacites and metarhyolites >> volcanosedimentary rocks) and has a form of a shallow dipping (10–20° to the NNE) anticlinal structure. The rocks of JB were intruded by numerous sets of basic and intermediate dykes during the Cadomian and Variscan orogenies. The gold mineralization is younger than the Variscan rocks of CBPC. Three types of Au-quartz lodes are present (reverse faults-related veins and two types of stockworks). Quartz is the main gangue mineral, carbonates (Ca, Fe, Mg) are relatively minor (0–10 vol. %).

The Libčice deposit is located in the exocontact of CBPC (20 km SW of the Jílové deposit). Upper Proterozoic tuffitic shales and (Palaeozoic?) palaeodacites represent the main host rocks. Quartz veins are spatially related to lamprophyre dykes, but are younger. Both lamprophyre dykes and quartz veins are cross-cut by younger aplitic dykes associated with CBPC. Quartz is the main gangue mineral and shows recrystallization due to the thermal effects of CBPC. The assemblage quartz–calcite–pyroxene–garnet–wollastonite is probably of the same origin. Most of the analyzed carbonate samples represent fracture fillings of fault zones.

Data on carbonate minerals from the Jílové and Libčice deposits (Tab. 1) show a much larger scatter than those from Pb–Zn vein-type or U-type deposits in the Příbram district (Žák & Dobeš, 1991). The C and O isotope compositions of hydrothermal carbonates are influenced by variable carbon sources and complex host lithology, and $\text{H}_2\text{CO}_3 \rightarrow \text{HCO}_3^-$ transitions during the latest stages of mineralization. Fluid inclusion data on scheelites (Jílové) indicate fluid immiscibility in the $\text{H}_2\text{O}-\text{CO}_2$ -salts system. Estimated fluid compositions (Tab. 1) do not take such processes into account.

Based on our data we assume increasing influence of fluid mixing during the main stages of gold deposition (5th stage at the Jílové deposit), with possible transitions from H_2CO_3 to HCO_3^- types of fluids during the final stages of Bi–Te deposition as well as the final carbonate stages.

| Tab. 1 Mineral stage (assemblage) | Measured (carbonates) | | Estimated fluid composition | | |
|--------------------------------------|---|--|--|---|---------|
| | $\delta^{18}\text{O}_{\text{cc}}$ ‰ (SMOW) | $\delta^{13}\text{C}_{\text{cc}}$ ‰ (PDB) | $\delta^{18}\text{O}_{\text{f}}$ ‰ (SMOW) | $\delta^{13}\text{C}_{\text{f}}$ ‰ (PDB) | T (°C) |
| Jílové deposit | | | | | |
| 1-2. Dolomite, Q | no data | no data | | | |
| 3. Q–Scheelite–CC–sulph. | +10 to +13 | -13 to -11 | +4 to +6 | -11 to -9 | 250–300 |
| 4. Q–polymetallic ± CC | no data | no data | | | |
| 5. CC + Au + Bi–Te | +9 to +17 | -15 to -10 | +0 to +8 | -13 to -10 | 200 |
| 6. CC | +19 to +24 | -12 to -4 | -4 to +6 | -10 to -6 | < 100 |
| Libčice deposit | | | | | |
| Q–CC–Px–Gar–Woll | +9 to +12 | -13 to -11 | +4 to +7 | -11 to -9 | > 300 |
| CC | +10 to +23 | -10 to -6 | -15 to -5 | -12 to -8 | < 100 |

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