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RESULTS OF THERMOMETRIC STUDIES OF IZERA VEIN QUARTZ

INTRODUCTION

Hydrothermal quartz from veins and quartz-mineralised zones from the Sudetes is mainly developed as coarse and medium crystalline (locally it exhibits a mosaic granulation), light-grey or "milky", rarely light-violet or in other colours. Several quartz generations were often observed, registering the pulsating inflow or re-mobilisation of silica. Individual generations differ with various content and distribution of inclusions as well as with differentiated cathodoluminescence effects (Wołkowicz, 2000). Fluid inclusions are considered as hermetic relicts of primary environment, trapped within crystals. Results of thermometric studies enable determination of temperature intervals responsible for formation of individual mineral generations.

MATERIALS AND METHODOLOGY

Samples for study were taken from the quarries Stanisław and Nadzieja, located at Izerskie Garby. Quartz infilled there the major tectonic fracture and several minor fractures parallel to the contact of shales and Izera gneisses. Other quarries at Nowa Kamienica, Barcinek and Maciejowiec, exploiting the quartz veins dissecting the Izera granite-gneisses, were also sampled.

Fluid inclusions were studied in one- or double-sided polished thin sections, using the heating stage Leitz 1350 and heating-freezing equipment Fluid Inc. System. Temperature data were statistically processed with "Statistica" software.

RESULTS

Quartz rocks, which prevail in the Izera region, are commonly of variable cystal sizes and consist of aggregates of xenomorphic interfingering crystals or become a mosaic of hypautomorphic and automorphic, highly intergrown crystals. Occurrence of druses and highly mylonitised zones is typical of the studied rocks. Crystals exhibit evidences of deformations as wavy or mosaic light extinction and numerous fractures. Except for mineral inclusions, mainly micas and quartz, very common are fluid inclusions and voids after destroyed fluid inclusions.

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Differentiation of number of such component determinates highly quartz transparency. Together with the clear zones, almost without inclusions, the areas filled with very fine inclusions (size of the largest ones is up to 0,025 mm) are visible. Fluid inclusions are oval, irregular, regular and polygonal in shape and occur separately or as commonly elongated groups, consisted of various numbers of inclusions. They concentrate mainly within a single crystal, rarely continue in the adjacent ones. The dominant are two-phase, liquid inclusions, with ca. 10% of gas, and a homogenisation process evolves to the liquid phase.

In walls of the Stanisław quarry, within the studied quartz rock, were noticed the joints infilled with the druse quartz and halloysite (Kozłowski, 1978). Quartz crystals, "milky" in colour, with transparent rhombohedric edges, are several cm long. In thin sections are visible numerous zones of "clear" quartz and areas with inclusions, located mainly in the white, non-transparent part of column and in the scarred zone of former fine internal fractures. Size of fluid inclusions is various, the largest ones achieve 0,1 mm, and they are commonly irregular but also oval, rhombohedric and regular in shape were observed. The two-phase liquid inclusions prevail, containing ca. 5% of gas and a homogenisation process evolves to the liquid phase.

Separate histograms of measured temperatures of inclusion homogenisation for a quartz rock, formed by multiphase processes of quartz generation and hydrothermal crystallisation and for samples of druse quartz, were taken from the youngest quartz veins. After Kozłowski (1978) the hydrothermal veins in the Izera zone and the Karkonosze massif have formed in the following temperature intervals: 120 - 230, 210 – 370 and 390 - 440^{o}C. With the first studied case corresponds the polymodal diagram, indicating occurrence of three mineral populations, which could be attributed to various quartz generations and processes, which later modificated them. Two first populations locate in temperature intervals: 100-160^{o}C (mode - 120-140^{o}C), 160-240^{o}C (mode - 160-180^{o}C), and the third one, defined by over 40% of measures, and limited by temperatures: 240-360^{o}C, with the mode situated with relatively large temperature interval, from 300 to 340^{o}C.

On histograms referred within two crystals taken from druses, the measured homogenisation temperatures located in two temperature intervals: 115 – 160 and 130 – 175^{o}C.

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