POLSKIE TOWARZYSTWO MINERALOGICZNE – PRACE SPECJALNE
MINERALOGICAL SOCIETY OF POLAND – SPECIAL PAPERS
Zeszyt 23, 2003; Volume 23, 2003

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LITHIUM IN QUARTZ IN THE ROCKS OF THE LOG ŚWIERADÓW – MROCZKOWICE ALONG THE KWISA RIVER, IZERA AREA, SW POLAND

INTRODUCTION

The investigated log in the bed of the Kwisa River is located in Izera area, the northern part of the metamorphic cover of the Variscan Karkonosze granitoid massif in Sudetes (Mazur 2002). This cover consists of the so-called Izera gneisses and granite-gneisses (Kozłowska-Koch 1965) of the age ca. 500 Ma (Borkowska et al. 1980), embedding four W–E zones of the epidote-albite-amphibolite facies (acc. to Turner 1948) metapelites and intercalations of amphibolites and leptinite gneiss, probably metamorphosed tuffs (Kozłowski1974). The gneisses are altered in many places to albite metasomatites (called leucogranites) and to quartz-topaz-mica-tourmaline greisens (Karwowski 1976). The investigated log extends from the point located ca. 1.5 km to the south of the town of Świeradów to the point ca. 1 km to the north of the village of Mroczkowice; its total length is ca. 6.7 km.

SAMPLES

The study has been performed on the rock samples collected in 62 points (24 points in gneisses, 16 – in leucogranites (albite metasomatites), 15 – in mica-chlorite schists, 4 – in greisens and 3 – in amphibolites) taken along a log located in the Kwisa River bed from above Świeradów to below Mroczkowice. From each specimen two separate analytical portions have been obtained.

LABORATORY PROCEDURES

The rock samples have been cut to 0.5 mm thick slices. After thorough selection under microscope the quartz grains not containing solid inclusions have been picked from the slices by use of a corundum blade. The grains have been washed in acetone, methanol, hot aqua regia and next rinsed in hot water of high purity. The 124 analytical quartz samples of the weight of 1–5 mg have been placed in carbon electrodes and decomposed with HF of special purity in an air-tight plastic box, and then lithium has been determined with use of the spectro-graphical emission procedure (Walenczak 1969); the analytical error was ±9%.

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LITHIUM IN QUARTZ

Lithium contents in quartz and the mode of its distribution in the Izera area, which is generally poor in this element, were discussed else-where (Smulikowski, Walenczak 1966, Walenczak 1969). Quartz in the Karkonosze granitoids has high contents of Li (10 to 20 ppm), whereas in quartz from the Izera gneisses – from 0.1 to 1 ppm (op. cit.). The high ability of lithium to migrate was evidenced in the Karkonosze-Izera exocontact quartz (Kozłowski 2002).

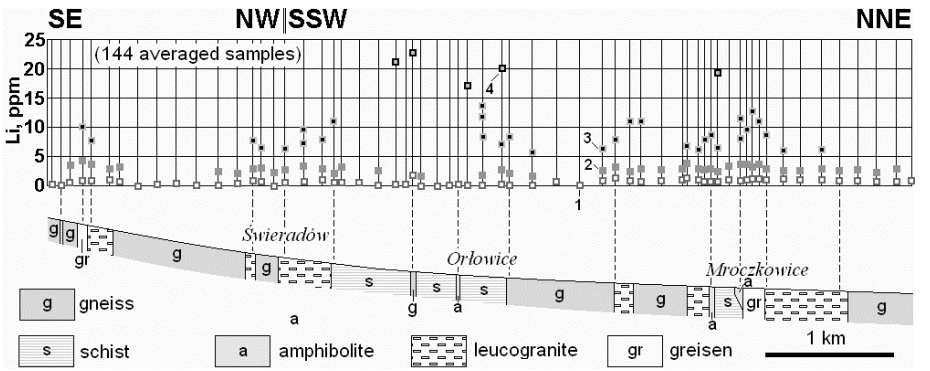

Fig. 1. Lithium contents in quartz from the rocks of the log in the Kwisa River bed, the distance from Świeradów to Mroczkowice, the symbols 1 – 4 are explained in the text.

The samples of quartz from the Kwisa log had four ranges of lithium concentrations (Fig. 1). Bluish metamorphic quartz in Izera gneisses and its relics in albite metasomatites and greisens contained Li concentrations from <1 to 2 ppm (symbols 1 in Fig. 1). The aggregates of the younger gray quartz, especially in albite metasomatites and greisens yielded Li contents 2–4 ppm (symbols 2 in Fig. 1), and quartz of the next generation from thin veinlets – 5–10 ppm (symbols 3 in Fig. 1). The quartz segregations, rarely occurring in leptinite gneiss and in amphibolite, had high contents of lithium, from 17 to 23 ppm (symbols 4 in Fig. 1).

CONCLUSIONS

The data, obtained by the studies of the lithium contents in the rock-forming quartz in the Kwisa log confirmed the original low concentrations of lithium (<2 ppm) in the metamorphic Izera complex. However, the quartz aggregates, formed due to the metasomatic processes, contained distinctly higher Li concentrations (2–4 ppm), what may be related to the influence of the external source of this element like e.g. lithium-rich Karkonosze granitoid. The hydrothermal process of metasomatosis in its final stage, when thin quartz veinlets were formed, caused crystallization of quartz rich in lithium (5–10 ppm). The enrichment of hydrothermal-metasomatic quartz in lithium is consistent with the relatively high concentrations of this element in hydrothermal

solutions (0.1–1.8 wt. %), found by the leachate method in fluid inclusions by Karwowski (1976).

The study was financed by the grant of the Faculty of Geology of the Warsaw University No. BW1567/18.

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