

„PRENATAL“ AND „POSTHUMOUS“ FLUID INCLUSIONS OF METASOMATIZING SOLUTIONS

by

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Metasomatic phenomena affect minerals, causing their partial or complete alteration or removal. On the other hand, some types of metasomatizing fluids remain certain minerals, e.g. quartz, partly or completely unaffected. Fluid inclusions offer a chance to investigate metasomatizing fluids from the very early stages of the process to its last signs. The recent study was performed in the Izera area.

Gneissic-schistose complex of the Izera area in Lower Silesia hosts metasomatic rocks of the origin, usually bound to the neighbouring Karkonosze granitoid of Variscan age (KARWOWSKI, 1977; KOZŁOWSKI 1978). The metasomatites comprise albitites and greisens. Moreover, small patches of so-called tourmaline- and fluorite quartzites associate with the above listed metasomatites. The „quartzites“ formed from fine-grained gneiss („leptinite“) by dissolution of all components but quartz from the parent rock. Presently the quartz grains „float“ in tourmaline or fluorite cement, which replaced the removed rock components. „Fluorite quartzite“ was cut by at least two generations of fluorite veinlets c. 1 - 5 mm thick.

Metasomatizing solutions were investigated by means of fluid inclusion methods (heating and freezing) in the minerals of the albitite, greisens and in the „fluorite quartzite“ cement. Fluorite bears three kinds of primary fluid inclusions: 1) two-phase aqueous, 2) two-phase carbon dioxide, 3) three-phase aqueous solution + carbon dioxide + gas bubble. The fluorite „cement“ contains type (1) inclusions that homogenized in liquid phase at 306 - 211°C, the filling is a solution of 4.1 - 9.9 wt.% NaCl, 0.0 - 3.5 wt.% KCl and 0.0 - 3.8 wt.% CaCl₂; type (2) inclusions in the „cement“ homogenized in gas phase at 30.8 - 31.0°C. Type (1) inclusions in the earlier veinlets yielded homogenization temperatures (T_h) 232 - 178°C and in the later ones -183 - 132°C, the solution compositions (in wt.%) 9.9 - 5.4 NaCl, 3.9 - 2.0 CaCl₂ and 5.7 - 3.9 NaCl, 0.0 CaCl₂, respectively; KCl was not found, T_h of the type (2) inclusions were in the veinlets 30.9 - 30.0°C in gas phase. The type (3) inclusions were either of heterogeneous or homogeneous trapping and they yielded data consistent with the data obtained from the first two types. Quartz grains bear secondary inclusions typical of fluorite, but also high-temperature inclusions (T_h 380 - 370°C, filling of essentially sodium chloride solution) that are characteristic for albitite minerals. Thus, „fluorite quartzite“ passed the stage of albitization before metasomatic removal of feldspars by the parent solutions of fluorite. The latter inclusions are the only „posthumous“ signs of this process. Respectively, similar set of inclusions was found in some „tourmaline quartzites“.

Gneiss quartz in the zones surrounding albitites bears inclusions of T_h 380 - 360°C, filled with sodic solution, thus typical of albitization, although any albitization was not observed in these zones. These are the remnants of the first infiltration stage of the metasomatizing solutions ("pre-natal") that did not cause changes of the mineral compositions yet.

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References

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