PŮVODNÍ PRÁCE/ORIGINAL PAPER

Polohy bohaté almandinem v klastických sedimentech sedlových vrstev (česká část hornoslezské pánve)

Almandine-rich layers in the clastic sediments of the Saddle Member (Czech part of the Upper Silesian Basin)

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Abstract

Layers rich in garnets were recognized in the prospecting boreholes of working districts Lazy and Doubrava near Karviná (Czech part of the Upper Silesian Basin). They are situated in the fine-grained conglomerates, sandy conglomerates, and sandstones of the Saddle Member of the Karviná Formation (Namurian). Single garnet grains can reach size up to 4 mm in diameter and in some cases form up to 20 % of layers. Their stratigraphic distribution is highly irregular. An SEM investigation revealed that all garnets are faceted, with prevailing rhombic dodecahedral over cubic crystal habit. Unetched or slightly etched garnets are not present. Skeletal structures and cubic etch pits are frequent. An empty space 10 to 50 μm wide is situated around all garnets. Sometimes it is filled by secondary mineralization, namely microcrystals of quartz, fibrous clay mineral (possibly illite), mineral from the chlorite group, and dolomite-ankerite. Some etch pits are also filled by possible illite. Electron probe microanalysis shows that most of garnets are homogenous almandines with significant admixture of pyrope component, prevailing pyrope component is rare. Spessartine and grossular content is highly variable, content of Cr_2O_3 is < 0.1 % and TiO_2 content is below the detection limit. Chemical variability of end-member composition is as follows: almandine 27.7 to 80.3 %, pyrope 5.1 to 56.5 %, spessartine 0.8 to 25.7 %, grossular 1.6 to 20.2 %, and andradite < 2 %. Other heavy minerals (apatite, FeS_2, REE and Y phosphates, galena, TiO_2, sphalerite, and zircon) are present in insignificant quantities and their size is one order of magnitude smaller than the one of garnets. None of above-mentioned heavy minerals is affected by significant surface alteration. Quartz, ilmenite, apatite, TiO_2, and zircon were recognized as inclusions in garnets. Quartz is most abundant in almandine-spessartine types, ilmenite in almandine-pyrope types. We consider faceted garnets to be polycyclic ones. Supporting evidence for chemical corrosion is: 1. presence of empty space around faceted garnets, sometimes partly filled by secondary minerals; 2. there are no differences between the chemical composition of inner parts and surface parts of garnets with crystal facets, rare inhomogenous parts do not correspond to crystal facets; 3. presence of organic acids and brines in a Carboniferous strata, which are known as important factors for garnet corrosion; 4. mineral association with authigenic quartz, illite, and dolomite-ankerite, together with stable apatite, indicate pH values ranging from 7.5 to 9. Such situation, burial depth of 2 to 3 km, and temperatures around 200 °C should not be favorable for authigenic garnet crystallization.

Key words: *Karviná Formation, Upper Silesian Basin, Late Carboniferous, heavy minerals, almandine, garnet*
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