THE PECTOLITE SKARN FROM MIĘDZYRZECZE (BIELSKO-BIAŁA REGION) IN THE POLISH CARPATHIANS

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In the western part of the Outer Polish Carpathians, between Bielsko-Biała and Cieszyn, the occurrence of teschenite sills and related rocks (diabase, picrite and lamprophyre) were observed. They are widely distributed in the flysch sediments of the Cieszyn Subnappe (Cieszyn beds, Upper Kimmeridgian to Hauterivian).

In Międzyrzecze Górne near Bielsko-Biała, close to the top of the picrite sill, the presence of a pectolite skarn was stated. The pectolite endoskarn forms a lenticular body that is up to 2 m thick, 5 m wide and 12 m long. Abundant carbonate veins (up to 30 cm thick) intersect the central part of the skarn filling the tectonic fissures and cracks. The pectolite skarn consists mainly of elongated (up to 2 mm long and to 0.5 mm wide) pectolite crystals which poikilitically enclose abundant inclusions of Ti-garnets, diopside, analcime and aegirine. Poikilitic biotite crystals with inclusions of Ti-garnets sometimes coexist with other minerals such as natrolite, calcite, apatite and titanite. Veins cutting the skarn body contain calcite, pectolite, natrolite, analcime, datolite, Ti-garnet and apophyllite. The spatial relationships between the above mentioned minerals suggest that natrolite and analcime were the first to crystallize forming the vein margins, being followed by calcite. Pectolite, likewise datolite and apophyllite always formed after calcite had filled open spaces in the vein centres.

Datolite from Międzyrzecze occurs mainly as granular aggregate, rarely as automorphic crystals up to 1 cm in size, pale green in colour. Three morphological types of datolite crystals were distinguished: pseudo-bipyramidal, prismatic and pinacoidal. Most of the datolite crystals are 0.5–0.8 cm in size and belong to the second type. They crystallized on the walls of miarolitic cavities within calcite. On basal pinacoid faces of datolite numerous fluorapophyllite crystals appear. Its chemical composition follows the crystallochemical formula $(K_{0.86}Na_{0.03})_{0.89}$ $Ca_{4.03}$ $(Si_{7.91}Al_{0.04}P_{0.03})_{7.98}$ $(F_{0.83}$ $OH_{0.17})_{1.00}O_{19.92} \cdot 8.08\ H_2O$. The datolite habit changes from pseudo-bipyramidal through prismatic to pinacoidal with pH decrease. In the Międzyrzecze skarn, in individual cavities, datolite crystals of different habit coexisted. This situation may reflect the local, labile conditions of datolite crystallization in the open system. The studied datolite has monoclinic symmetry with the following lattice parameters: a = 4.8316 Å, b = 7.6054 Å, c = 9.6287 Å and β = 90.143°. Its chemical composition is close to the theoretical one, among trace elements barium and strontium predominate. Datolite from Międzyrzecze is similar in composition to those from Žermanice and Řepiště (Northen Moravia) (KUDĚLÁSEK *et al.*, 1987).

There are two genetic types of pectolite: open-space filling and metasomatic. Pectolite, like datolite, can crystallize only from solutions with very low concentrations of CO_2, i.e. in zones of reduced pressure, where degassing of CO_2 takes place. In the veins intersecting the skarn body pectolite forms irregular massive aggregates of radial or fan-arranged crystals with size between a few millimeters and 12 cm. Large, up to 6 cm long, fibrous (with diameter below 0.01 mm) or needle-shaped (up to 0.03 mm) crystals are white and silky. The second, metasomatic type of pectolite forms the endoskarn body. The formula of the fibrous pectolite from the centres of vein in endoskarn is $Na_{0.98}Ca_{2.00}H_{1.01}Si_{2.99}P_{0.01}O_9$. There are small chemical differences between two genetic types of pectolite. The metasomatic type is enriched in Al_2O_3, FeO, MnO, and MgO compared to the open-spaces filling type. Pectolite from the Międzyrzecze sill is triclinic with the following lattice parameters: a = 7.986 Å, b = 7.017 Å, c = 7.021 Å and α = 90.399°, β = 95.208°, γ = 102.554°.

In the pectolite skarn, two types of Ti-bearing garnet can be distinguished:

1. Brown-black euhedral crystals (<0.02 mm) forming inclusions in pectolite, biotite, titanite and diopside or filling open spaces in veins.

2. Larger (up to 0.7 mm across) atoll-shaped garnets showing narrow black-light brown rims completely distinct from cores consisting of spicular aegirine and a cryptocrystalline mixture of natrolite and analcime. These garnets are clearly metasomatic type Ti-garnets. Both types of garnet from the pectolite skarn show very restricted changes in TiO_2 content (12–15 wt%). Textural and chemical evidence shows that the atoll garnets reflect replacement, mainly by analcime and natrolite, progressing from the garnet interior towards the garnet margins. The garnet compositions plotted on the schorlomite ($2R^{4+}$) – andradite ($2R^{3+}$) – morimotoite ($R^{2+}R^{4+}$) diagram show that they are titanian andradites according to the nomenclature of DEER *et al.* (1982). The data obtained support the conclusion that the schorlomite substitution was the major factor in the formation of Ti-bearing garnet in the skarn from the Międzyrzecze sill.

References

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