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PIEMONTITE AND SPESSARTINE IN LOWER PALEOZOIC METASEDIMENTS OF THE INNER WESTERN CARPATHIANS

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In the Lower Palaeozoic of the Inner Western Carpathians (Rakovec group, Gemericum) a 22 m thick layer of manganese enriched metasediments has been encountered by borehole RHV-1 south of Rudňany. During epigenetic processes the increased Mn content in the original lithofacies gave rise to manganese nodules (concretions). In the subsequent greenschists facies regional metamorphic recrystallization process, the Mn nodules were altered into an anchimonomineralic aggregate of garnet of spessartine composition. Simultaneously, they were partly disintegrated and folded jointly with the country rocks, i.e. the chlorite-sericite-quartz schists.

Garnet is the basic mineral of nodules (isometric grains – approx. 0.2 mm in size). The spessartine nodules are encompassed by a 1–20 mm broad rim, intensely coloured in red to violet-red, formed dominantly of piemontite and Fe oxides, which passes gradually into the adjacent rocks. The schists also contain sporadic garnets of microscopic size (0.02 mm) and epidote.

The analyses of garnets from different parts of nodules have shown that they have practically identical composition and azonal structure. They contain 80–87 % spessartine, 0.2–0.4 % pyrope, 3–8 % almandine, 7–11 % grossular components. The piemontites form short prismatic crystals (below 0.03 mm) and/or irregularly shaped pink coloured grains with strong pleochroism. Piemontites are zonal and contain 6–16 % piemontite component (Mn^{3+}) (selected analysis: SiO_2 – 36.70, TiO_2 – 0.12, Al_2O_3 – 22.86, Fe_2O_3 total – 7.94, $Mn_2O_3^*$ – 8.00, MnO^* – 2.52, MgO – 0.04, CaO – 20.52, Na_2O – 0.00, K_2O – 0.03, * – recalculated). Piemontites occur only in rocks with a high oxidation ratio and rather high MnO content (chlorite-sericite-quartz schist with piemontite and spessartine: SiO_2 – 55.58, TiO_2 – 0.72, Al_2O_3 – 16.74, Fe_2O_3 – 7.87, FeO – 0.53, MnO – 1.48, MgO – 2.07, CaO – 1.81, Na_2O – 2.75, K_2O – 4.41, LOI – 2.69, oxidation ratio – 94).

The rocks studied presumably represent pelagic sediments enriched in manganese. The increased Mn content in primary sediments was due to the presence of the products of basic volcanism, possibly also to the exhalation and hydrothermal activity associated with this volcanism.