

Wollastonite-2M from Cerboia Valley, Măgureaua Vaței (Metaliferi Massif, Apuseni Mountains, Romania): Structure and vibrational behavior of “parawollastonite”

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The gehlenite-bearing, high-temperature skarn from Măgureaua Vaței occur at the contact of a shallow-level monzodioritic to quartz-monzodioritic pluton of Upper Cretaceous age with Tithonic - Kimmeridgian reef limestones. The preserved peak metamorphic assemblage includes gehlenite, wollastonite, monticellite, Ti-poor calcic garnet, perovskite, and Ca-Tschermak diopside. Wollastonite is the main component of the outer skarn zone. The mineral occurs as almost monomineralic aggregates of long-prismatic or acicular crystals of 1 to 10 cm in length. A cathodoluminescence zoning of some individual crystals could be observed, but no solid evidence of correlation with the chemical zoning of the mineral was found. Wollastonite from Măgureaua Vaței exhibit only relatively small deviations from the ideal composition: the substitutions for Ca in the six-fold coordinated sites are minor, with Mn < 0.004 *apfu*, Fe²⁺ < 0.107 *apfu* (generally much lower) and Mg < 0.043 *apfu* (on the basis of 18 oxygen atoms). The average composition, based on 102 EMP point analyzes: (K_{0.002}Na_{0.004}Ca_{5.959}Mn_{0.004}Mg_{0.026}Fe²⁺_{0.018})(Si_{15.984}Ti_{0.003}Al_{0.011})O₁₈. The mineral can be satisfactorily refined as monoclinic, space group *P2₁/c* (with R = 0.0387), and have as cell parameters: *a* = 7.0684(3) Å, *b* = 7.3228(3) Å, *c* = 15.4206(7) Å, β = 95.34°. All the bands that can be assigned to (SiO₄)⁴⁻ vibrations in the FTIR spectrum are triple degenerate, reflecting the number of three tetrahedrons in the chain repeat unit. Bands assumable to Si-O-Si antisymmetric stretching were recorded at 1085, 1060, and 1018 cm⁻¹, and to the symmetric stretching at 681, 645 and 565 cm⁻¹. Three other bands recorded at 967, 926 and 902 cm⁻¹ are apparently due to O-Si-O antisymmetric and symmetric stretching, whereas bands at lower frequencies (509, 472 and 453 cm⁻¹) express Si-O-Si bending vibrations and Ca-O lattice vibrations. The intensities of the bands expressing the stretching vibrations of wollastonite-2M from Măgureaua Vaței are higher than those of the homologue bands recorded from wollastonite-3T from Băița Bihor, which express a superior structural ordering. In the Raman spectrum the Si-O-Si antisymmetric stretching seems double degenerate (bands at 1057 and 1042 cm⁻¹) as well as the symmetric stretching (688 and 637 cm⁻¹). The Si-O-Si bending was recorded at 585 cm⁻¹.