MONTICELLITE AND HYDROXYLELLESTADITE IN HIGH-TEMPERATURE SKARNS FROM ROMANIA

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The occurrences of high-temperature, gehlenite-bearing skarns are quite exotic: fewer than forty such occurrences were reported so far in the world. Four of them are known in the Banatitic Magmatic and Metallogenetic Belt (BMMB) from Romania (BERZA *et al.*, 1998). These occurrences are those at Cornet Hill, Măgureaua Vaţei (Upper Cerboaia Valley), Ciclova (Ciclova and Ţiganilor valleys) and Oravița (Ogaşul Crişenilor). A very rich mineral association characterizes the high-temperature skarn areas in Romania: gehlenite, wollastonite, calcic garnet, vesuvianite and locally spurrite and tilleyite are the most representative species (MARINCEA & DUMITRAŞ, 2001; PASCAL *et al.*, 2002; MARINCEA *et al.*, 2002).

Monticellite and hydroxylellestadite were also identified, but they are scarce. Due to their scarcity, their minute grain size and the mixture with other mineral phases, very few data are available on these mineral species. The purpose of the present paper is to gain additional data on the chemistry, physical and crystallographic parameters and mineral associations of these mineral species.

Monticellite occurs as accessory mineral in the endoskarn zones from all the four occurrences, being characteristically included by the gehlenite mass. The crystals are subhedral, with prismatic habit; they average 0.5 mm in length and have up to 0.2 mm in width. In all cases, the mineral does not show any significant chemical or optical zoning pattern.

The scattering of the analytical points at the scale of the same thin section is minor, so that the microprobe analyses were averaged and taken as mean compositions. The mineral has average compositions ranging from 8.53 to 11.66 mol% kirschsteinite and from 0.91 to 2.52 mol% glaucochroite in solid solution in the samples from Oravița, from 4.55 to 10.86 mol% kirschsteinite and from 0.62 to 1.01 mol% glaucochroite in the samples from Ciclova and from 13.01 to 13.29 mol% kirschsteinite and from 1.51 to 2.05 mol% glaucochroite in the samples from Măgureaua Vaţei.

The refraction indices, measured and calculated densities and cell parameters, as measured for representative samples from Oravița and Măgureaua Vaţei approaching the mean compositions are listed in Table 1.

Hydroxylellestadite must occur as scattered at random grains throughout the tinsleyite mass (at Cornet Hill), but also as sparingly, randomly oriented inclusions in gehlenite (at Oravița and Măgureaua Vaţei). In both cases, the mineral has an euhedral to subhedral, equant to short prismatic habit. Grains have an average diameter of 0.1 mm with a maximum length of about 0.2 mm. No chemical or optical zoning was observed.

The average chemical composition recorded for the tinsleyite-included hydroxylellestadite from the exoskarn zone from Cornet Hill (mean of 47 microprobe point analyses) leads to the crystal-chemical formula:
$(Ca_{4.916}Mg_{0.001}Mn_{0.002}Fe^{2+}_{0.004}Na_{0.069}K_{0.002})(Si_{1.492}S_{1.354}P_{0.154})$
$[O_{12.180}(OH)_{0.651}F_{0.121}Cl_{0.048}]$.

This formula does not differ essentially from that established for the gehlenite-included hydroxylellestadite in the inner skarn zone from Oravița, which is, as calculated for an average composition taken as mean of 6 point analyses:
$(Ca_{4.975}Mg_{0.004}Mn_{0.001}Fe^{2+}_{0.004}Na_{0.057}K_{0.005})(Si_{1.572}S_{1.346}P_{0.082})$
$[O_{11.787}(OH)_{1.164}F_{0.031}Cl_{0.018}]$.

A P-rich, Si-poor hydroxylellestadite was identified in the inner skarn zone at Ciclova. It has the same morphology and occurs in the same mineral association as the hydroxylellestadite from Oravița, being engulfed by vesuvianite or gehlenite. The crystal-chemical formula, established for a representative sample on the basis of 6 point analyses is:
$(Ca_{4.972}Mg_{0.001}Fe^{2+}_{0.005}Na_{0.041})(Si_{0.786}S_{1.253}P_{0.961})[O_{12.464}$
$(OH)_{0.297}F_{0.213}Cl_{0.026}]$.

References

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Table 1.

Occurrence	α	β (1)	γ	$D_{meas.}$ (2)	D_x (2)	*a* (Å)	*b* (Å)	*c* (Å)
Oravița	1.645(2)	1.653(2)	1.659(2)	3.17(2)	3.177	4.817(2)	10.948(5)	6.314(3)
Măgureaua	1.646(2)	1.653(2)	1.661(2)	3.13(1)	3.127	4.822(2)	11.130(5)	6.384(3)

(1) calculated from the measured value of the optical angle ($2V_\alpha = 80°$); (2) expressed in g/cm^3; D_x calculated from the chemical composition and the cell volume for Z = 4 unit cells per formula.