Zn-rich magnetoplumbite from Nežilovo, Macedonia

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Abstract: The second world known occurrence of magnetoplumbite is described in dolomitic marbles from Nežilovo (Macedonia). According to electron microprobe analyses and thermogravimetric data the chemical formula is (Pb0.99Ca0.01)(Fe612Mn253Zn18.9Al0.3Ti0.41Mg0.02)(O17.75OH0.94); this magnetoplumbite is therefore a Zn-rich variety. The cell dimensions refined from X-ray powder diffraction data are: \(a = 5.854(1) \text{ Å}\) and \(c = 22.882(6) \text{ Å}\).

Key-words: Zn-rich magnetoplumbite, X-ray powder diffraction data, microprobe analysis, Nežilovo, Macedonia.

Introduction

Magnetoplumbite belongs to the group of ferrites with general formula \(AB_3O_9\); \(A^{XII}\) represents a larger cation (with diameter close to \(O^{2-}\)) as Pb, Ba, K but also Ca and Ce as minor constituents; \(B^{IV,V,VI}\) represents a smaller cation, mainly Fe, Mn, Al, Cr, Ti, Zn, with subordinate Mg, Si and Nb. This mineral group includes: magnetoplumbite with Pb as dominant large cation, hibbonite with Ca and Ce (Curien et al., 1956), yimengite with K (Dong Zhenxin et al., 1983), and Hawthorneite with Ba (Grey et al., 1987; Haggerty et al., 1989), on the \(A\) position. Magnetoplumbite was first found in Långban, Sweden, in a skarn paragenesis, which is the only known occurrence until now. It occurs as crystals with simple dipyramidal habit. Aminoff (1925) determined the space group \((P63/mmc)\) and unit-cell dimensions. Blix (1937) reanalyzed magnetoplumbite and indicated the trivalent nature of most of the manganese. Adelsköld (1938) confirmed the space group, determined the crystal structure of PbO6Fe2O3, a synthetic magnetoplumbite phase, and discussed its relationship to "beta-alumina". In addition, Berry (1951) recalculated the chemical formula and gave an indexed diffraction powder pattern.

Crystal structures of magnetoplumbite and similar synthetic ferrites were investigated by Mountvala & Ravitz (1962), Kohn & Eckart (1964, 1965), Townes et al. (1967), Obradors et al. (1985) and recently by Moore et al. (1989). Rouse & Peacor (1968) demonstrated that magnetoplumbite, senaite, plumboferrite and davidite form a related group of complex multiple oxides of iron and other small cations with a small number of large metal ions. The crystal structures in this group are based on distorted oxygen closest-packing (both hexagonal and cubic) with the large cations substituting, in an ordered fashion, some oxygens in the packing.

Occurrence

The Nežilovo locality is situated around 40 km SW from Veles (Macedonia) in the central part of the Pelagonian massif. There, a complex polymetamorphic series of Precambrian rocks can be roughly divided into an upper and a lower part. The upper part consists of massive mostly dolomitic rocks which are approx. 1600 m thick. The lower schistose part (so called "mixed series"), which is approx. 500 m thick, consist of gneisses, mica schists, barite-bearing schists, quartz-cymrite schists and pink dolomitic marbles (Baric & Ivanov, 1960; Stojanov, 1960). There is a strong positive geochemical anomaly.

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