

The mineralogy of väyrynenite, $(\text{Mn,Fe})\text{Be}(\text{PO}_4)(\text{OH})^*$

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Auszug

Es wird über eine neue chemische Analyse und über die kristallographische Untersuchung an Einzelkristallen des Väyrynenits von Eräjärvi im zentralen Finnland berichtet. Die Analyse ergab: MnO 34,01, FeO 5,92, CaO 0,53, BeO 13,85, Na_2O 0,20, K_2O 0,04, Al_2O_3 0,40, P_2O_5 39,98, $\text{H}_2\text{O} +$ 4,93, $\text{H}_2\text{O} -$ 0,19, unlösl. 0,06. Die Raumgruppe ist $P2_1/a - C_{2h}^5$; die Gitterkonstanten sind $a = 5,41_1 \pm 0,005 \text{ \AA}$, $b = 14,49 \pm 0,02 \text{ \AA}$, $c = 4,73_0 \text{ \AA} \pm 0,005 \text{ \AA}$, $\beta = 102^\circ 45' \pm 5'$. Die Zelle enthält 4 Formeleinheiten $(\text{Mn,Fe})\text{Be}(\text{PO}_4)\text{OH}$. Die nahe Strukturverwandtschaft des Väyrynenits mit dem Euklas $\text{AlBe}(\text{SiO}_4)\text{OH}$ wird diskutiert.

Abstract

A new chemical analysis and x-ray single-crystal study are reported for väyrynenite, originally described by VOLBORTH (1954) from Eräjärvi in central Finland. The analysis gave: MnO 34.01, FeO 5.92, CaO 0.53, BeO 13.85, Na_2O 0.20, K_2O 0.04, Al_2O_3 0.40, P_2O_5 39.98, $\text{H}_2\text{O} +$ 4.93, $\text{H}_2\text{O} -$ 0.19, insol. 0.06; total 100.11. X-ray crystallographic data are: monoclinic, space group $P2_1/a - C_{2h}^5$; $a = 5.41_1 \pm 0.005 \text{ \AA}$, $b = 14.49 \pm 0.02$, $c = 4.73_0 \pm 0.005$, $\beta = 102^\circ 45' \pm 05'$; cell contents, 4 formula units. The first indexed x-ray powder data and new mineralogical observations on the physical properties are given. The close structural relation between väyrynenite, $(\text{Mn,Fe})\text{Be}(\text{PO}_4)(\text{OH})$, and euclase, $\text{AlBe}(\text{SiO}_4)(\text{OH})$, is discussed.

Introduction

The complex granite-pegmatite occurrence at Viitaniemi in the parish of Eräjärvi in central Finland shows a remarkable assemblage of phosphate minerals. There occur here particularly the rare beryllium phosphates, beryllonite $\text{NaBe}(\text{PO}_4)$, hurlbutite $\text{CaBe}_2(\text{PO}_4)_2$, herderite

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$\text{CaBe}(\text{PO}_4)(\text{F},\text{OH})$, and väyrynenite $(\text{Mn},\text{Fe})\text{Be}(\text{PO}_4)(\text{OH})$, all of which have been described recently in great detail by VOLBORTH (1954a, 1954b, 1954c, 1954d). This paper gives additional mineralogical data and a new chemical analysis for väyrynenite (vi'-ri-në-nite) from this same locality. In addition to the phosphate minerals listed by VOLBORTH as occurring at Eräjärvi, eosphorite, fairfieldite, and moraesite have been found and identified by the authors.

The existence of this manganese-iron beryllium phosphate was known to VON KNORRING as early as 1939 when he recognized it as a possible new mineral in several specimens collected by him at that time. In these specimens väyrynenite occurs in the following characteristic associations: 1) pink crystal aggregates up to 5 cm long, resembling rubellite, in a matrix of finely divided greenish-yellow muscovite (gilbertite) with microcline, amblygonite, apatite, and quartz; 2) brownish-pink crystals 1–3 mm long, enclosed in massive pink eosphorite with amblygonite, dark-green tourmaline, topaz, muscovite, cassiterite, and quartz; 3) pale gray crystal aggregates up to 3 cm long, intimately associated with massive pale gray apatite; and 4) partly replacing beryllonite crystals, in wedge-like pockets of quartz with amblygonite, microcline, and muscovite.

X-ray crystallography

A single-crystal x-ray study was made with a euhedral crystal of väyrynenite (about $0.5 \times 0.5 \times 0.75$ mm), mounted at the end of a glass fiber so that the crystallographic c axis was parallel with the fiber length. Zero-level patterns of the $h0l$ and $0kl$ nets as well as first-level patterns of the $h1l$ and $1kl$ nets were taken with a quartz-calibrated Buerger precession camera, using Mo/Zr radiation ($\lambda = 0.7107 \text{ \AA}$) to establish the lattice type and symmetry. These films were measured and corrected for film shrinkage. Systematic extinctions were observed to be of the type $h0l$, with $h \neq 2n$, and $0k0$ with $k \neq 2n$. These criteria led unequivocally to the space group $P2_1/a-C_{2h}^5$.

Complete x-ray crystallographic data for väyrynenite are summarized in Table 1; they are compared with those originally cited by STRADNER in VOLBORTH (1954d). The value for a obtained in the present study differs considerably from that reported by STRADNER. STRADNER's value is almost twice that we obtained in our study. She does not indicate the method by which her crystallographic data were

