POLYTYPISM OF CRONSTEDTITE FROM CHVALETICE AND LITOŠICE, ŽELEZNÉ HORY MTS., CZECH REPUBLIC

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About 30 specimens of cronstedtite from Chvaletice and Litošice were examined by single-crystal X-ray diffraction using the precession method. Lattice parameters of identified polytypes 3T (from Chvaletice) and 1T (from both localities) are summarized in table 1.

INTRODUCTION

Cronstedtite, general formula $(Fe^{2+}_{3-x}\ Fe^{3+}_{x})\ [Si_{2-x}\ Fe^{3+}_{x}\ O_5](OH)_4$ (where $0 < x < 1$) is a trioctahedral 1:1 layer silicate of the serpentine group. It occurs in low- and medium temperature hydrothermal deposits as black triangular platelets, needles, truncated pyramids or cones. All crystals, irrespective on their shape, show an excellent cleavage along the basal plane. This mineral is particularly interesting because of its structural relationship to dioctahedral 1:1 layer silicates of the kaolinite group. Inasmuch as cronstedtite provides a large variety of different ordered and disordered single crystals for X-ray study, it can serve as a surrogate material for investigation of this kind of silicates.

Polytypism of cronstedtite is recently receiving an increasing attention, and some older identifications and structure determinations had to be revised. Therefore, new crystals suitable for structure refinements were sought. This paper deals with cronstedtite from two occurrences in the Železné hory Mountains, Eastern Bohemia, Czech Republic. Both localities are abandoned pyrite-manganese deposits.

Polytypes of 1:1 layer silicates can be conveniently identified by Buerger's [1] precession method. Each polytype belongs to one of the four so-called subfamilies (denoted as A, B, C or D), which can be determined from the intensity distribution along the $11l$ (hexagonal indices) reciprocal lattice row. For a further identification of a periodic polytype within its subfamily serves the intensity distribution of the $10l$ row of diffraction spots. Therefore, at least two photographs (*hhl* and *h0l*) containing the above-mentioned reciprocal lattice rows have to be taken. The full description of the determinative procedure is given *e.g.* by Ďurovič [2] and is also reported by Hybler [3]. More about polytypism of 1:1 layer silicates and about subfamilies see [4, 5, 6].

EXPERIMENTAL PART

Cronstedtite crystals were separated under a stereo microscope, glued on a glass fibre parallel with [001] (perpendicular to the cleavage plane). Then, orientation and eventually precession photographs of *hhl* and *h0l* reciprocal lattice planes were taken. Typically, about 10 fragments from each sample were checked. Most of the fragments had a form of a triangle or a rounded triangle. For the *hhl* photographs, the edge of the triangle was set parallel with, and for the *h0l* perpendicular to, the primary beam. Usually, orientation photographs with a somewhat larger precession angle ($\mu \approx 15°$ for *hhl*, $\mu \approx 17°$ for *h0l*) were sufficient for the subfamily and polytype determination. The *hhl* and *h0l* precession photographs of at least one crystal from each sample were used for the measurement of lattice parameters. The MoK_α radiation, unfiltered for orientation or Nb-filtered for precession photographs, was used throughout.

Table 1. Lattice parameters of cronstedtites from Chvaletice and Litošice (10^{-10} m).

parameter	cronstedtite-3*T* Chvaletice	cronstedtite-1*T* Chvaletice	cronstedtite-1*T* Litošice
a	5.51(2)	5.51(1)	5.52(3)
c	21.32(8)	7.13(2)	7.14(3)
space group	$P3_1$	$P31m$	$P31m$

RESULTS AND DISCUSSION

There were two samples from Chvaletice, both provided by Mr. Z. Doubek, a mineral collector from Hradec Králové. In one sample, triangular tabular crystals of several tenths of millimetres in size lined the internal

face of the cavity in a slate. Among them, acicular crystals were relatively less abundant. The diffraction study revealed that both kinds of crystals belong to the polytype 3*T*, subfamily A. The second sample was represented by triangular platy crystals less than 1mm in size, almost filling an about 2 mm thick vein in a quartzified slate. These crystals were identified as 1*T* polytype, subfamily C. For some crystals, the 10*l* rows were diffuse or even missing; such specimens probably represented disordered polytypes of subfamilies A or C.

The occurrence of cronstedtite at Litošice was first described by Novák & Hoffman in 1956 [7]. The sample studied was collected by Prof. L. Žák in 1955 on the dump of shaft No. 10, approximately 1200 meters south of the village. Cronstedtite forms radial aggregates of imperfectly developed conical crystals of millimetre size in a quartz vein, about 1 cm thick, in association with pyrite and rhodochrosite. Most of the cones were truncated. These crystals were determined as polytype 1*T*. There were also some disordered crystals of subfamily C.

Lattice parameters of cronstedtite crystals measured from the *hhl* precession photographs are listed in the table 1.

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Vybrané monokrystaly minerálu cronstedtitu z Chvaletic a Litošic byly studovány rentgenovou difrakcí s použitím precesní metody. Mřížkové parametry polytypu 3*T* z Chvaletic a 1*T* z obou lokalit jsou uvedeny v tabulce 1.