

Mixed-layer minerals Niksergievite

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Spouses G. Donney and J. Donney in the 1950s in the study of rare earth fluorine carbonates (parisite, bastnaesite, synchysite) revealed that the crystal lattices of these minerals consist of differently alternating two identical blocks. They called this phenomenon a syntaxy. Later, it was called polysomatism or fragmentarity. Examples of such structures: sulphate-carbonates, sulphate-phosphates, carbonate-borates, borate-silicates, silicate-carbonates (etc.) and also complex structures: uranium-phosphates with sulfate anions, carbonate-boron-silicates and others.

We examined in more detail a group of silicate carbonates, namely, layered silicate carbonates. Previously, phyllosilicates were known among mineralogists for clay minerals under the term mixed-layer minerals. Examples of them: corrensite, rectorite, tosudite, etc. But we are interested in layered silicate-carbonates with different mineral layers. Among them: surite (alternation of carbonate - cerussite with silicate - smectite), ferrisurite, niksergievite (2002 - barium-calcium-aluminum carbonate and mica sheets).

Mineral niksergievite, found for the first time in Kazakhstan, was studied in detail by our mineralogists and approved by the Commission on New Minerals and Mineral Names (CNMMN) at the International Mineralogical Association (IMA).

Niksergievite was discovered in one of the mines of the lead-zinc deposit Tekeli (Dzungarian Alatau) at a depth of 500 m. In appearance, it practically does not differ from talc. The color of the mineral is light green. Lustre matte with a pearly gleam. System - monoclinic. Hardness - 1-1,5. Density - 3.21 g / cm³. Very fragile.

Crystallo chemical formula: $(\text{Ba}, \text{Ca})_2 \text{Al}_3(\text{Si}, \text{Al})_4 \text{O}_{10}(\text{CO}_3)(\text{OH})_6 \cdot n\text{H}_2\text{O}$ ($n < 1$). The formula is calculated from the chemical analysis of the mineral performed on the electron probe microanalyzer JXA 733 and refined in accordance with the data of thermal analysis and infrared spectroscopy.

The mineral forms splices - "rosettes" with a diameter of up to 5 mm of lamellar excretions 1-2 mm thick. The size of clusters reaches 5 cm. The shape of the grains is curved lamellar. Cleavage along the (001) plane is eminent. Associates with kleofan, galena, pyrite, barite, dolomite, celsian in quartz-calcite veins crosscutting a highly metamorphosed limestone.

The study by electron microscopy and electron diffraction showed an unusual structure of silicate. Microdiffraction patterns from lamellar crystals formed by a hexagonal grid of point-like reflexes, and annular electron diffraction patterns from polycrystalline preparations confirm the belonging of niksergievite to phyllosilicates.

The structural information transmitted by diffraction characteristics on the electronogram from oblique texture of niksergievite, allowed to identify the syngony, the space group, the unit cell parameters of the mineral and draw conclusions about its structural model.

The structural model proposed by S. Britvin, an employee of the St. Petersburg University, was used as a basis for the crystalline structure of mineral: Niksergievite belongs to phyllosilicates with mixed-layer structure with the participation of barium- and aluminium-carbonate and mica sheets.

The mineral is named in honor of Corresponding Member of the Academy of Sciences of the Kazakh SSR, Honored Worker of Science and Technology of the Kazakh SSR, Professor Nikolai Grigoryevich Sergiev (1901-1960) - geologist of the Leningrad school, who made a great contribution to the study of geology and mineralogy in Kazakhstan and raised a generation of Kazakhstan geologists.

Biography:

Medeo Timur graduated from Physics and Mathematics Lyceum № 24 two and a half years ago. Now he is a student of geological faculty of Kazakh national research technical university named after K.I.Satpaev. He chose Geology specifically, last summer he took part in a geological expedition during the summer university practice in the mountains of Karatau in the south of Kazakhstan. He usually visit lectures by highly qualified professors of geologists outside the university.