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ULLMANNITE FROM NOWA RUDA

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A b s t r a c t. Ullmannite has been found among pholerites occurring in the Carboniferous sandstones near Nowa Ruda in the Sudetes. It forms idiomorphic cubic crystals with an edge up to 3 mm. The X-ray data are in agreement with the standard. The parameter a_0 is 5.925 Å. The composition of ullmannite is: 27.3% Ni, 56.5% Sb, 1.3% As, 15.1% S.

Ullmannite has been found in the borehole W-3 located in the vicinity of Zdrojowisko near Nowa Ruda. It occurs at a depth of 1090.4 m in the fine-grained Carboniferous sandstones cross-cut by pholerite veinlets several mm in thickness (I. Lipiarski — pers. comm.). Ullmannite appears in pholerite in the form of single crystals surrounded by dickite-kaolinite substance or crystals growing on sandstone.

The hexahedra edges are 0.05—3.00 mm long. Smaller crystals form only (*100*) faces whereas larger ones, $>$ 0.5 mm, show a combination of (*100*) and (*110*). In reflected light ullmannite is white, isotropic, with a reflectance of 53% (Leitz MPV-II apparatus, 545 μm). At higher magnifications, numerous elongated inclusions of an unidentified mineral are visible. The presence of that mineral made a determination of specific gravity impossible. The average specific gravity of an ullmannite crystal together with the inclusions is 6.12 g/cm^3. Microhardness determinations were carried out with a PMT-3 tester for a load of 100 g. In its internal parts ullmannite showed a hardness of 474 kG/mm^2 while in the external parts and on the surface of an uncut crystal a value of 537 kG/mm^2 was obtained.

The X-ray data are in agreement with Harcourt's standard. The parameter a_0 of the unit cell was determined by Nelson-Riley function as being 5.925 Å. This value is higher than those given for natural ullmannite but slightly lower than the cell dimension of pure NiSbS which, according to Bayliss (1969), is 5.935 Å. The latter author has demonstrated that the unit

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cell diminishes with an increase in isomorphous admixtures of Co, Fe or As and Bi.

Electron microprobe data have shown that the composition of ullmannite is: 27.3% Ni, 56.5% Sb, 1.3% As, 15.1% S, which corresponds to the formula $Ni_{0.98}Sb_{0.98}As_{0.04}S_{1.00}$. The analysis was carried out at an accelerating voltage of 25 kV for Fe, Ni and As and 15 kV for Sb and S. Pure metals were used as standards and pyrite for sulphur. The analyses made at four points have shown that the crystal under study is homogeneous. Yet, it is interesting to note that it revealed differences in microhardness.

It has been found that ullmannite is accompanied by millerite and chalcopyrite. Millerite forms hair-like concentrations on the surface of crystals or fills tiny fissures in ullmannite. Chalcopyrite forms isometric grains up to 0.1 mm in size on the surface of ullmannite crystals. In the pholerites of Nowa Ruda some other ore minerals have been identified; they are cobaltite, antimonite, pyrite, nickelite and erythrite (Kossmann 1885; Traube 1888; Morawiecki 1956; Kowalski, Lipiarski 1973 — fide Zakrzewski 1974).

The genesis of polymetallic mineralization, so also of ullmannite in pholerites, is related to remobilization of metals from weathered gabbro. This process may be associated with the Permian volcanic activity.

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ULLMANIT Z OKOLIC NOWEJ RUDY

Streszczenie

Ullmanit stwierdzono w otworze wiertniczym zlokalizowanym w rejonie Zdrojowiska koło Nowej Rudy na głębokości 1090,4 m wśród drobnoziarnistych piaskowców karbońskich poprzecinanych kilkumilimetrowymi żyłkami folerytu. Ullmanit tworzy tam idiomorficzne sześcienne kryształy o krawędzi dochodzącej do 3 mm. Dane rentgenograficzne są zgodne z wzorcem. Parametr $a_0 = 5{,}925$ Å. Skład ullmanitu: Ni — 27,3%, Sb — 56,5%, As — 1,3%, S — 15,1%.

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УЛЬМАНИТ ИЗ ОКРЕСНОСТЕЙ НОВОЙ РУДЫ

Резюме

Ульманит обнаружено в буровой скважине, расположенной в районе Здроёвиска восле Новой Руды, на глубине 1090,4 м среди мелкозернистых каменноугольных песчаников с несколько миллиметровыми прожилками фаулерита. Ульманит образует там идиоморфные кубические кристаллы величиной ребра до 3 мм. Рентгенографические данные совпадают с эталоном. Параметр $a_0 = 5{,}925$ Å. Химический состав ульманита: Ni — 27,3%; Sb — 56,5%; As — 1,3%; S — 15,1%.