

N. V. ZUBKOVA,* I. V. PEKOV,* N. V. CHUKANOV,** A. V. KASATKIN,***
D. A. KSENOFONTOV,* V. O. YAPASKURT,* S. N. BRITVIN,****
D. Yu. PUSHCHAROVSKY.* REDEFINITION OF LEMANSKIITE:
NEW MINERALOGICAL DATA, CRYSTAL STRUCTURE
AND REVISED FORMULA $\text{NaCaCu}_5(\text{AsO}_4)_4\text{Cl} \cdot 3\text{H}_2\text{O}$

* *Moscow State University, Moscow, Russia*

** *Institute of Problems of Chemical Physics RAS, Moscow, Russia*

*** *Fersman Mineralogical Museum, RAS, Moscow, Russia*

**** *Saint Petersburg State University, Saint Petersburg, Russia*

Refinement of the crystal structure of lemanskiite ($R = 0.019$), studied for the first time, has allowed redefining this mineral: to carry out refinement of its formula; redefine crystal system, space group and parameters of its unit-cell. X-ray powder diffraction pattern of lemanskiite has been correctly identified, the IR spectrum was obtained for its pure sample — free from pollutions by other phases. It is shown that lemanskiite is not a dimorph of lavendulan $\text{NaCaCu}_5(\text{AsO}_4)_4\text{Cl} \cdot 5\text{H}_2\text{O}$ but contains less H_2O in comparison with the latter. Studied sample of lemanskiite has been picked up from the oxidation zone of Perseverancia deposit (Guanaco, Antofagasta, Chile). Its empirical formula is $\text{Na}_{0.98}(\text{Ca}_{0.98}\text{Sr}_{0.03})_{\Sigma 1.01}\text{Cu}_{5.07}\text{As}_{3.97}\text{O}_{15.97}\text{Cl}_{1.03} \cdot 3\text{H}_2\text{O}$. The idealized formula of lemanskiite may be written as $\text{NaCaCu}_5(\text{AsO}_4)_4\text{Cl} \cdot 3\text{H}_2\text{O}$. The mineral is monoclinic, $P2_1/m$, $a = 9.250(2)$, $b = 10.0058(10)$, $c = 10.0412(17)$ Å, $\beta = 97.37(3)^\circ$, $V = 921.7(3)$ Å³, $Z = 2$. Lemanskiite represents a new structure type in the lavendulan group. Crystal structure of lemanskiite is based on the heteropolyhedral layers built by clusters of four distorted Cu-centered tetragonal pyramids, linked by edges, and eight AsO_4 tetrahedra connected also with the Cu-centered squares not involved in the clusters. Na-centered trigonal prisms and Ca-centered seven-fold polyhedra, connected with heteropolyhedral layers from both sides of each layer, are linked in the interlayer space by shared edges.

Key words: lemanskiite, lavendulan, lavendulan group, arsenate, crystal structure, oxidation zone, Perseverancia mine, Chile.