

Balestraitite, $\text{KLi}_2\text{VSi}_4\text{O}_{10}\text{O}_2$, the first member of the mica group with octahedral V^{5+}

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ABSTRACT

A mica-group mineral characterized by a high V content and free of Al was found in the manganeseiferous beds within the metacherts of the ophiolitic sequences at the Cerchiara mine, Eastern Liguria (Italy), in association with hematite, quartz, and calcite. Chemical and structural characterization supported by Raman data defines this phase as a new mineral species, which is named balestraitite after Corrado Balestra, a prominent Italian amateur mineralogist. Balestraitite, ideally $\text{KLi}_2\text{V}^{5+}\text{Si}_4\text{O}_{10}\text{O}_2$, is a 1M trioctahedral mica crystallizing in the C2 space group, with $a = 5.2024(5)$, $b = 8.9782(7)$, $c = 9.997(2)$ Å, $\beta = 100.40(2)^\circ$, $V = 459.3(1)$ Å³, $Z = 2$. The reduction of symmetry from the “ideal” space group $C2/m$ is related to the ordering of V at only one of the two pseudo-symmetric octahedral sites. Vanadium forms very distorted octahedra with a [2+2+2] geometry characteristic of the valence state +5. The Li,V composition of the octahedral sheet, the pure tetrasilicic character of the tetrahedral sheet, and the anhydrous character produce unusual geometrical features for this mica. The occurrence of 5+ as the dominant valence state of V and the virtually complete $\text{O}^{2-} \rightarrow \text{OH}^-$ substitution at the O4 site indicate strongly oxidizing conditions of crystallization, which are consistent with balestraitite occurring at the boundary between carbonate-bearing veins and hematite bands.

The new mineral and name were approved by the Commission on New Minerals, Nomenclature and Classification, IMA (2013-080).

Keywords: Balestraitite, new mineral, Li-mica, V-mica, Cerchiara mine, pentavalent vanadium