

BISMUTOTANTALITE FROM NORTHWESTERN ARGENTINA: DESCRIPTION AND CRYSTAL STRUCTURE

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Abstract

Bismutotantalite from La Elvirita, a highly evolved rare-element granitic pegmatite placed in Salta, Northwestern Argentina is studied. The mineral occurs in the albite-rich core of the pegmatite associated preferentially with bismuth, bismuthinite, tapiolite, manganotantalite, microlite, uranmicrolite, bismutomicrolite, hafnian zircon and montebrasite. A fresh, cm-sized crystal, with dark gray color, greasy luster and $G = 8.809 \text{ gr/cm}^3$ was studied. In polished section it is gray with very weak birreflectance and shows two phases. EPMA analysis of both give averages of [Bi] = $(\text{Bi}_{0.98}\text{Sb}_{0.02})(\text{Ta}_{0.89}\text{Nb}_{0.11})\text{O}_4$ and [Bi,Sb] = $(\text{Bi}_{0.68}\text{Sb}_{0.32})(\text{Ta}_{0.89}\text{Nb}_{0.11})\text{O}_4$ respectively. Refined powder-diffraction data of [Bi] give $a 4.968(1)$, $b 11.796(3)$, $c 5.646(1) \text{ \AA}$, $V = 330.85(9) \text{ \AA}^3$. The crystal structure of [Bi] and [Bi,Sb] were solved by direct methods to an R Index of 1.9% and 2.4% based on 450 and 434 observed (4^*) reflections respectively, measured with MoK X-radiation. Both phases are orthorhombic, space group $Pcnn$, $Z = 4$, and the results for [Bi] are $a 4.9652(4)$, $b 11.7831(16)$, $c 5.6462(5) \text{ (\AA)}$, $V 330.32(6) \text{ (\AA}^3\text{)}$, and for [Bi,Sb] are $a 4.9471(4)$, $b 11.7878(7)$, $c 5.6048(3) \text{ (\AA)}$, $V 326.83(4) \text{ (\AA}^3\text{)}$. These results show that bismutotantalite can accommodate up to ~40% Sb^{3+} in the place of Bi^{3+} without changing to the $Pc2$ in polar structure of stibiotantalite.