

Na_{4-x}Nb₇P₄O₂₉: A phosphate niobium bronze intergrowth of the members $m = 3$ and $m = 4$ of the MPTB's series Na_x(NbO₃)_{2m}(PO₂)₄

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Description

A new niobium phosphate bronze Na_{4-x}Nb₇P₄O₂₉ ($0 \leq x \leq 1$) has been isolated. It crystallizes in the space group C2/c with $a = 32.850(4)$, $b = 5.3484(4)$, and $c = 13.252(2)$ Å and $\beta = 97.79(1)^\circ$. The structure was solved by X-ray diffraction on a twinned crystal with an (100) twinning plane. This oxide is an intergrowth of the $m = 3$ and $m = 4$ members of the series of the monophosphate tungsten bronzes with pentagonal tunnels (MPTB_p), corresponding to the formulation Na_x(NbO₃)_{2m}(PO₂)₄. The ReO₃ slabs alternate parallel to (100) and are linked by isolated PO₄ tetrahedra delimiting pentagonal tunnels running along **b**. Relationships with other niobium phosphate bronzes are also discussed.