

## **Ferrotitanowodginite, $\text{Fe}^{2+}\text{TiTa}_2\text{O}_8$ , a new mineral of the wodginite group from the San Elías pegmatite, San Luis, Argentina**

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### **ABSTRACT**

Ferrotitanowodginite is a new mineral of the wodginite group, which is found in and defined from two closely adjacent pegmatites in the San Luis province, Argentina, but previously encountered in the Tanco (Manitoba) and Marko's (Ontario) pegmatites. In the San Elías pegmatite, ferrotitanowodginite occurs aggregated with ferrowodginite and associated with microlite, ferrotapiolite, cleavelandite, and quartz. In La Viquita pegmatite, ferrotitanowodginite occurs in a replacement unit associated with wodginite, ferrowodginite, titanowodginite and ferrotapiolite in yellow muscovite and quartz. Ferrotitanowodginite is very dark brown to black, with a dark brown streak and submetallic luster. Mohs hardness is  $5\frac{1}{2}$  and  $D_{\text{calc}} = 7.368 \text{ g/cm}^3$ . In reflected light, it is creamy white and gray in air and oil, respectively; anisotropy is distinct, bireflectance and pleochroism moderate. Ferrotitanowodginite is monoclinic, space group  $C2/c$ ,  $Z = 4$ . Unit-cell dimensions for San Elías' material are  $a = 9.403(4) \text{ \AA}$ ,  $b = 11.384(3) \text{ \AA}$ ,  $c = 5.075(1) \text{ \AA}$ ,  $\beta = 90.55^\circ (2)$ ,  $V = 543.24(22) \text{ \AA}^3$ . The strongest lines in the X-ray powder diffraction are  $d = 2.963 \text{ \AA}$ ,  $I = 100\%$ , ( $hkl = 2\bar{2}\bar{1}$ );  $d = 2.939 \text{ \AA}$ ,  $I = 90\%$  ( $hkl = 221$ );  $d = 3.626 \text{ \AA}$ ,  $I = 70\%$  ( $hkl = 220$ ); and  $d = 1.715 \text{ \AA}$ ,  $I = 50\%$  ( $hkl = 402$ ). Eighteen analyses by electron microprobe gave the following mean composition:  $\text{WO}_3$  0.02,  $\text{Nb}_2\text{O}_5$  6.52,  $\text{Ta}_2\text{O}_5$  70.68,  $\text{TiO}_2$  7.10,  $\text{SnO}_2$  1.25,  $\text{ThO}_2$  0.01,  $\text{UO}_2$  0.02,  $\text{As}_2\text{O}_3$  0.03,  $\text{Sb}_2\text{O}_3$  0.02,  $\text{Bi}_2\text{O}_3$  0.03,  $\text{Fe}_2\text{O}_3$  2.18,  $\text{MgO}$  0.01,  $\text{CaO}$  0.01,  $\text{MnO}$  1.05,  $\text{FeO}$  10.27,  $\text{PbO}$  0.05, total 99.25 wt%. The La Viquita sample is much richer in Mn and Sn. The simplified formula for ferrotitanowodginite is:  $(\text{Fe}^{2+}, \text{Mn}^{2+})(\text{Ti}, \text{Sn}^{4+}, \text{Ta}, \text{Fe}^{3+})(\text{Ta}, \text{Nb})_2\text{O}_8$ , ideally  $\text{Fe}^{2+}\text{TiTa}_2\text{O}_8$ .