Oxyvanite $V^{3+}_2V^{4+}O_5$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As elongated ellipsoidal grains to 0.15 mm.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = 7-7.5 VHN = 1064-1266, 1180 average (30 g load). D(meas.) = n.d. D(calc.) = 4.66(2)

Optical Properties: Opaque. *Color*: Black; pale cream in reflected light. *Streak*: Black. *Optical Class*: Isotropic. *Luster*: Resinous.
R: (440) 17.8, (460) 18, (480) 18.2, (520) 18.6, (520) 18.6, (540) 18.8, (560) 18.9, (580) 19, (600) 19.1, (620) 19.2, (640) 19.3, (660) 19.4, (680) 19.5, (700) 19.7

Cell Data: *Space Group*: *C*2/*c*. *a* = 10.03(2) *b* = 5.050(1) *c* = 7.000(1) β = 111.14(1)° Z = 4

X-ray Powder Pattern: Slyudyanka Complex, southern Baikal region, Russia.
3.28 (5), 2.88 (5), 2.65 (5), 2.44 (5), 1.717 (5), 1.633 (5), 1.379 (5)

Chemistry:

	(1)	(2)	(3)
TiO_2	14.04	0.12	
V_2O_3	[53.97]	[47.58]	64.37
VO_2	[21.25]	[35.10]	35.63
Cr_2O_3	10.76	16.02	
Fe_2O_3	0.04	0.24	
Al_2O_3	0.01	0.09	
MgO	0.02		
Total	100.03	99.19	100.00

(1) Slyudyanka Complex, southern Baikal region, Russia; average electron microprobe analysis supplemented, total V as V_2O_3 = 73.13 assigned to VO_2 and V_2O_3; corresponds to $(V^{3+}_{1.70}Cr_{0.30})_{\Sigma=2.0}(V^{4+}_{0.59}Ti_{0.41})_{\Sigma=1.0}O_5$. (2) Green Giant deposit, Madagascar; electron microprobe analysis, includes MnO = 0.04, SiO_2 = 0.01; corresponds to $(V^{3+}_{1.49}Cr_{0.5})_{\Sigma=1.99}V^{4+}_{1.00})_{\Sigma=1.0}O_5$. (3) $V^{3+}_2V^{4+}O_5$.

Polymorphism & Series: End member of the oxyvanite-berdesinskiite series.

Occurrence: An accessory mineral in Cr-V-bearing quartz-diopside metamorphic rocks (Russia); in amphibolite to granulite facies quartzo-feldspathic gneisses (Madagascar).

Association: Quartz, Cr-V-bearing tremolite and micas, calcite, clinopyroxenes of the diopside-kosmochlor-natalyite series, Cr-bearing goldmanite, eskolaite-karelianite, dravite-vanadiumdravite series, V-bearing titanite, ilmenite, and rutile, berdesinskiite, schreyerite, plagioclase, scapolite, baryte, zircon (Russia); pyrrhotite, alabandite, phlogopite (Madagascar).

Distribution: From the Slyudyanka Complex, southern Baikal region, Russia [TL] and the Green Giant vanadium-graphite deposit, 145 km southeast of Toliara, Tulear Region, Madagascar.

Name: After constituents of its essential composition, *oxy*gen and *van*adium.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (3733/1-2).

References: (1) Reznitsky, L.Z., E.V. Sklyarov, T. Armbruster, Z.F. Ushchapovskaya, E.V. Galuskin, Yu.S. Polekhovsky, and I.G. Barash (2010) Oxyvanite, V_3O_5, a new mineral species and the oxyvanite-berdesinskiite V_2TiO_5 series from metamorphic rocks of the Sludyanka complex, Southern Baikal region. Geology of Ore Deposits, 52(7), 574-583. (2) Armbruster, T., E.V. Galuskin, L.Z. Reznitsky, and E.V. Sklyarov (2009) X-ray structural investigation of the oxyvanite (V_3O_5) - berdesinskiite (V_2TiO_5) series: V^{4+} substituting for octahedrally coordinated Ti^{4+}. Eur. J. Mineral., 21, 885-891. (3) Di Cecco, V.E., K.T. Tait, E.T.C. Spooner, and C. Scherba (2018) The vanadium-bearing oxide minerals of the Green Giant vanadium-graphite deposit, southwest Madagascar. Can. Mineral., 56, 247-257.