Wakefieldite-(Nd) $NdVO_4$

Crystal Data: Tetragonal. *Point Group*: 4/*m* 2/*m* 2/*m*. As platy, prismatic, or rounded crystals to 10 μm; in aggregates <0.1 mm.

Physical Properties: *Cleavage*: n.d. *Tenacity*: n.d. *Fracture*: n.d. Hardness = n.d. D(calc.) = 4.782

Optical Properties: Transparent. *Color*: Colorless or slightly reddish pink in thin section; dark gray under reflected light. *Streak*: n.d. *Luster*: n.d.
Optical Class: n.d. Weak reflection pleochroism and anisotropy.

Cell Data: *Space Group*: $I4_1/amd$. a = 7.338(16) c = 6.509(19) Z = 4

X-ray Powder Pattern: Arase deposit, Kochi Prefecture, Shikoku Island, Japan.
3.67 (100), 2.74 (51), 4.84 (27), 1.89 (25), 2.09 (14), 2.60 (11), 2.29 (9)

Chemistry:

	(1)	(2)
V_2O_5	35.25	35.09
As_2O_5	0.93	
SiO_2	0.14	
MnO	1.45	
Fe_2O_3	0.41	
Y_2O_3	2.87	
La_2O_3	7.61	
Ce_2O_3	7.37	
Pr_2O_3	6.04	
Nd_2O_3	26.79	64.91
Sm_2O_3	4.41	
Eu_2O_3	1.36	
Gd_2O_3	3.41	
Tb_2O_3	0.22	
Dy_2O_3	1.41	
Er_2O_3	0.10	
Total	99.77	100.00

(1) Arase deposit, Kochi Prefecture, Shikoku Island, Japan; average electron microprobe analysis supplemented by Raman spectroscopy; corresponds to $(Nd_{0.403}La_{0.118}Ce_{0.114}Pr_{0.093}Y_{0.064}Sm_{0.064}Mn_{0.052}Gd_{0.048}Eu_{0.020}Dy_{0.019}Fe_{0.013}Tb_{0.003}Er_{0.001})_{\Sigma=1.012}(V_{0.981}As_{0.020}Si_{0.006})_{\Sigma=1.007}O_4$. (2) $NdVO_4$.

Occurrence: From metamorphism-induced recrystallization and dehydration of Fe- and Mn-oxyhydroxide in a stratiform ferromanganese deposit. Hydrothermal in rhyolitic ash flow tuff.

Association: Hematite, caryopilite, rhodochrosite, calcite (Japan); rhodochrosite, calcite, cerite-(Ce), a Mn silicate (caryopilite?), monazite, magnetite, ilmenite, quartz (USA).

Distribution: From the Arase stratiform ferromanganese deposit in Kochi Prefecture, Shikoku Island, Japan [TL]. In the Joe Lott Tuff, southwestern Utah, USA.

Name: Indicates the Nd-dominant analogue of wakefieldite-(Y) and wakefieldite-(Ce).

Type Material: Geological Museum, Geological Survey of Japan, AIST, Tsukuba, Japan (GSJ D39505 and M41500).

References: (1) Moriyama, T., R. Miyawaki, K. Yokoyama, S. Matsubara, H. Hirano, H. Murakami, and Y. Watanabe (2010) Wakefieldite-(Nd), a new neodymium vanadate mineral in the Arase Statiform Ferromanganese Deposit, Kochi Prefecture, Japan. Resource Geology, 61, 101-110.
(2) Bagiński, B., R. Macdonald, H.E. Belkin, J. Kotowski, P. Jokubauskas, and B. Marciniak-Maliszewska (2020) The occurrence of wakefieldite, a rare earth element vanadate, in the rhyolitic Joe Lott Tuff, Utah, USA. Mineral. Mag., 84, 109-116.