Schindlerite $\{[Na_2(H_2O)_{10}](H_3O)_4\}\{V_{10}O_{28}\}$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. Crystals tabular on {011}, to 0.3 mm, and exhibit {100}, {010}, {001}, {110}, {011}, {111}, and {$11\bar{1}$}. Commonly as stacked parallel intergrowths.

Physical Properties: *Cleavage*: Good on {010}. *Fracture*: n.d. *Tenacity*: Brittle. *Hardness* = ~ 2 D(meas.) = n.d. D(calc.) = 2.461 Dissolves instantly in cold, dilute HCl and slowly in water.

Optical Properties: Transparent. *Color*: Orange. *Streak*: Yellow. *Luster*: Subadamantine. *Optical Class*: Biaxial (+). α = 1.74 (est.) β = 1.790(5) γ = 1.875 (calc) 2V(meas.) = 78(1)° *Orientation*: $X \wedge b = 25°$, $Y \wedge c = 12°$, $Z \wedge a = 3°$. *Dispersion*: Very strong, $r > v$.

Cell Data: *Space Group*: $P\bar{1}$. a = 8.5143(3) b = 10.4283(5) c = 11.2827(8) α = 68.595(5)° β = 87.253(6)° γ = 67.112(5)° Z = 1

X-ray Powder Pattern: St. Jude mine, Slick Rock district, San Miguel County, Colorado, USA. 8.68 (100), 10.51 (94), 7.70 (86), 6.73 (61), 2.993 (50), 3.815 (24), 2.787 (24)

Chemistry:

	(1)	(2)
Na_2O	4.08	4.92
K_2O	1.37	
CaO	0.08	
SrO	0.10	
V_2O_5	75.80	72.20
H_2O	[18.57]	22.88
Total	100.00	100.00

(1) St. Jude mine, San Miguel County, Colorado, USA.; average of 21 electron microprobe analyses, H_2O calculated from structure analysis; corresponding to $\{[(Na_{1.58}K_{0.35}Ca_{0.02}Sr_{0.01})_{\Sigma=1.96}(H_2O)_{10.00}][(H_3O)_4]\}\{V_{10}O_{28}\}$. (2) $\{[Na_2(H_2O)_{10}](H_3O)_4\}\{V_{10}O_{28}\}$.

Occurrence: As efflorescences on sandstone in the underground workings of a roll-front type uranium vanadium deposit, from the oxidation of montroseite-corvusite assemblages in a moist environment, possibly controlled by the presence of organic matter and phases such as pyrite.

Association: Calciodelrioite, gypsum, huemulite, hughesite, metarossite, pascoite, rossite.

Distribution: From the St. Jude mine, Slick Rock district, San Miguel County, Colorado, USA.

Name: Honors Dr. Michael Schindler (b. 1966), Associate Professor for Environmental Mineralogy, Laurentian University, Sudbury, Ontario, Canada, for his extensive work on the structures of vanadium minerals.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA. (#64005, 64006, 64007).

References: (1) Kampf, A.R., J.M. Hughes, J. Marty, and B. Nash (2013) Wernerbaurite, $\{[Ca(H_2O)_7]_2(H_2O)_2(H_3O)_2\}\{V_{10}O_{28}\}$, and schindlerite, $\{[Na_2(H_2O)_{10}](H_3O)_4\}\{V_{10}O_{28}\}$, the first hydronium-bearing decavanadate minerals. Can. Mineral., 51(2), 297-312. (2) (2015) Amer. Mineral., 100, 1331-1332 (abs. ref. 1).