Lavoisierite $Mn_8^{2+}[Al_{10}(Mn^{3+}Mg)][Si_{11}P]O_{44}(OH)_{12}$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As acicular to tabular prismatic crystals elongated on [010] and flattened on {001}, to a few millimeters.

Physical Properties: *Cleavage*: None. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.576

Optical Properties: Transparent. *Color*: Yellow-orange. *Streak*: White. *Luster*: Vitreous. *Optical Class*: n.d. n = 1.750 [calculated] *Pleochroism*: Pale yellow ∥ to [010], yellow-orange ⊥ to [010]. Parallel extinction; positive elongation on [010].

Cell Data: *Space Group*: *Pnmm*. a = 8.6891(10) b = 5.7755(3) c = 36.9504(20) Z = 2

X-ray Powder Pattern: Punta Gensane, Viù Valley, Piedmont, Italy.
2.931 (vs), 2.765 (s), 2.598 (s), 2.448 (ms), 4.62 (m), 4.23 (m), 3.747 (m)

Chemistry:

	(1)
P_2O_5	2.08
V_2O_5	0.37
SiO_2	34.81
TiO_2	0.13
Al_2O_3	22.92
Cr_2O_3	0.32
Fe_2O_3	0.86
MgO	5.73
MnO	[19.09]
Mn_2O_3	[6.92]
CaO	1.94
Na_2O	0.01
H_2O	[5.45]
Total	100.63

(1) Punta Gensane, Viù Valley, Piedmont, Italy; average of 3 electron microprobe analyses, H_2O calculated from structure, O/OH ratio adjusted for charge balance, MnO and Mn_2O_3 calculated from structure; corresponding to $(Mn^{2+}_{5.34}Mg_{1.81}Ca_{0.69}Na_{0.01})_{\Sigma=7.85}(Al_{8.92}Mn^{3+}_{1.74}Mg_{1.01}Fe^{3+}_{0.21}Cr_{0.08}Ti_{0.03})_{\Sigma=11.99}(Si_{11.50}P_{0.58}V_{0.08})_{\Sigma=12.16}O_{44.00}(OH)_{12.00}$.

Occurrence: In piemontite-bearing mica schists related to the Alpine tectono-metamorphism of (Mn, Al)-rich sediments.

Association: Quartz, "mica", sursassite, piemontite, spessartine, braunite, "tourmaline".

Distribution: From Punta Gensane, Viù Valley, Piedmont, Western Alps, Italy.

Name: Honors the French chemist and biologist Antoine-Laurent de Lavoisier (1743-1794), one of the fathers of modern chemistry.

Type Material: In Italy, at the Natural History Musuem, University of Pisa (# 19637), and in the mineralogical collections, Regional Museum of Natural Science, Torino (M/U 16359).

References: (1) Orlandi, P., C. Biagioni, M. Pasero, and M. Mellini (2013) Lavoisierite, $Mn^{2+}_8[Al_{10}(Mn^{3+}Mg)][Si_{11}P]O_{44}(OH)_{12}$, a new mineral from Piedmont, Italy: the link between "ardennite" and sursassite. Physics and Chemistry of Minerals, 40, 239-249. (2) (2014) Amer. Mineral., 99, 2155-2156 (abs. ref. 1).