Keystoneite $Mg_{0.5}NiFe^{3+}(Te^{4+}O_3)_3 \cdot 4.5H_2O$

Crystal Data: Hexagonal. *Point Group:* $6/m$ or 6. As acicular hexagonal crystals, to 0.2 mm, in parallel aggregates and radiating sprays.

Physical Properties: *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.40

Optical Properties: Semitransparent. *Color:* Golden yellow. *Streak:* Pale yellow-green. *Luster:* Adamantine.
Optical Class: Uniaxial (+). $\omega = 1.85(1)$ $\epsilon = [1.99(1)]$

Cell Data: *Space Group:* $P6_3/m$ or $P6_3$. $a = 9.344(2)$ $c = 7.607(3)$ Z = 2

X-ray Powder Pattern: Keystone mine, Colorado, USA.
2.77 (10), 8.12 (9), 4.05 (8), 1.720 (6), 2.95 (5), 2.84 (5), 1.498 (5)

Chemistry:

	(1)
TeO_2	65.5
Fe_2O_3	5.1
MnO	1.0
NiO	12.7
MgO	4.3
Na_2O	0.3
K_2O	0.1
H_2O	[11.0]
Total	[100.0]

(1) Keystone mine, Colorado, USA; by electron microprobe, total Fe as Fe_2O_3, total Mn as MnO, H_2O calculated by difference; corresponds to $(Mg_{0.41}Na_{0.07}K_{0.02})_{\Sigma=0.50}Ni_{1.00}(Fe^{3+}_{0.47}Mg_{0.38}Ni_{0.26}Mn^{2+}_{0.10})_{\Sigma=1.21}(Te_{1.01}O_3)_3 \cdot 4.52H_2O$.

Occurrence: A rare secondary mineral formed in the oxidized zone of a complex polymetallic hydrothermal mineral deposit.

Association: Melonite, tellurium, paratellurite, magnolite, coloradoite, calaverite, gold, stibnite, pyrite, "limonite", manganese oxides, quartz.

Distribution: From the Keystone mine, Magnolia district, Boulder Co., Colorado, USA.

Name: For its occurrence at the Keystone mine, Colorado, USA.

Type Material: Canadian Museum of Nature, Ottawa, Canada, 56561.

References: (1) Back, M.E., A.C. Roberts, Y. LePage, and J.A. Mandarino (1988) Keystoneite, a new tellurite from the Keystone mine, Colorado, U.S.A. Geol. Assoc. Canada – Mineral. Assoc. Canada, Prog. Abs., 13, A4. (2) Miletich, R. (1995) Crystal chemistry of the microporous tellurite minerals zemannite and kinichilite, $Mg_{0.5}[Me^{2+}Fe^{3+}(TeO_3)_3] \cdot 4.5H_2O$, ($Me^{2+}$ = Zn, Mn). Eur. J. Mineral., 7, 509–523.