Jouravskite $Ca_3Mn^{4+}(SO_4)(CO_3)(OH)_6 \cdot 12H_2O$

Crystal Data: Hexagonal. *Point Group:* $6/m$ or 6. As stubby hexagonal pyramidal crystals, exhibiting $\{10\bar{1}0\}$ and $\{10\bar{1}2\}$, to 0.3 mm, imbedded in marokite, in sugary masses and blotches.

Physical Properties: *Cleavage:* On $\{10\bar{1}0\}$, good. *Tenacity:* Brittle. Hardness = 2.5 D(meas.) = 1.81–1.95 D(calc.) = 1.88–1.93

Optical Properties: Transparent to translucent. *Color:* Greenish yellow to greenish orange, pink (aluminous); bright yellow in transmitted light. *Luster:* [Vitreous.]
Optical Class: Uniaxial (–). *Pleochroism:* Barely perceptible. $\omega = 1.548–1.556$ $\epsilon = 1.540$

Cell Data: *Space Group:* $P6_3/m$ or $P6_3$. $a = 10.997–11.06$ $c = 10.50–10.610$ Z = 2

X-ray Powder Pattern: Tachgagalt, Morocco.
9.6 (FFF), 5.53 (F), 3.81 (F), 3.42 (mF), 2.73 (mF), 2.52 (mF), 2.17 (mF)

Chemistry:

	(1)	(2)	(3)
SO_3	10.20	8.7	12.33
CO_2	7.45	7.2	6.78
SiO_2		0.7	
Al_2O_3		2.2	
MnO	12.33	8.9	13.38
CaO	25.67	26.8	25.90
O	2.45	1.9	
H_2O	41.90	42.7	41.61
Total	100.00	99.1	100.00

(1) Tachgagalt, Morocco. (2) Do.; by electron microprobe, total Mn as MnO, H_2O by the Penfield method; excluding impurities and converting Mn^{2+} to Mn^{4+} with excess O, corresponds to $Ca_3(Mn^{4+}_{0.78}Al_{0.26})_{\Sigma=1.04}(SO_4)_{0.68}(CO_3)_{1.02}(OH)_6 \cdot 12H_2O$.
(3) $Ca_3Mn(SO_4)(CO_3)(OH)_6 \cdot 12H_2O$.

Occurrence: Rare in the oxidized portions of manganese deposits; an aluminian variety formed by the action of volcanic fumaroles.

Association: Manganite, calcite, marokite, gaudefroyite, henritermierite, despujolsite, barite (Tachgagalt, Morocco).

Distribution: From Tachgagalt, 17 km south of Ouarzazate, Anti-Atlas Mountains, Morocco. In the N'Chwaning mine, near Kuruman, Cape Province, South Africa.

Name: Honors Georges Jouravsky (1896–1964), Chief Geologist, Geological Survey of Morocco, for his work on the mineral deposits of Morocco.

Type Material: Natural History Museum, Paris, 175.152; National School of Mines, Paris, France.

References: (1) Gaudefroy, C. and F. Permingeat (1965) La jouravskite, une nouvelle espèce minérale. Bull. Soc. fr. Minéral., 88, 254–262 (in French). (2) (1965) Amer. Mineral., 50, 2102–2103 (abs. ref. 1). (3) Granger, M.M. and J. Protas (1969) Détermination et étude de la structure cristalline de la jouravskite $Ca_3Mn^{IV}(SO_4)(CO_3)(OH)_6 \cdot 12H_2O$. Acta Cryst., 25, 1943–1951. (4) Gaudefroy, C., J.E. Dietrich, M. Orliac, and F. Permingeat (1972) Une variété aluminifère de jouravskite à Tachgagalt (Anti-Atlas, Maroc). Notes Serv. géol. Maroc, 32 (241), 19–24 (in French).