Talmessite **$Ca_2Mg(AsO_4)_2 \cdot 2H_2O$**

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. As crystals, to 3 mm; radiating fibrous aggregates, may be stalactitic or in crusts.

Physical Properties: Hardness = [∼5] (by analogy to the fairfieldite group).
D(meas.) = 3.421 D(calc.) = [3.53]

Optical Properties: Semitransparent. *Color:* White, colorless, pale green (nickelian), brownish pink (cobaltian); colorless in transmitted light. *Luster:* [Vitreous].
Optical Class: Biaxial (–). $\alpha = 1.672$ $\beta = 1.685$ $\gamma = 1.698$ 2V(meas.) = ∼90°

Cell Data: *Space Group:* $P\overline{1}$. $a = 5.874(7)$ $b = 6.943(11)$ $c = 5.537(6)$ $\alpha = 97.3(1)°$ $\beta = 108.7(1)°$ $\gamma = 108.1(2)°$ Z = 1

X-ray Powder Pattern: Talmessi mine, Iran; nearly identical to roselite-beta.
3.07 (100), 2.77 (100), 3.21 (80), 5.09 (60), 3.56 (60), 1.717 (60), 4.62 (40)

Chemistry:

	(1)	(2)
As_2O_5	47.7	54.94
NiO	0.8	
MgO	7.5	9.64
CaO	29.5	26.81
BaO	3.2	
H_2O	6.7	8.61
Total	95.4	100.00

(1) Talmessi mine, Iran; Ba and excess Ca [as carbonate?] probably impurities; after removal stated to correspond to $Ca_{2.00}(Mg_{0.97}Ni_{0.06})_{\Sigma=1.03}(AsO_4)_{2.06} \cdot 1.84H_2O$.
(2) $Ca_2Mg(AsO_4)_2 \cdot 2H_2O$.

Polymorphism & Series: Forms a series with gaitite.

Mineral Group: Fairfieldite group.

Occurrence: A rare secondary species formed typically in the oxidized zone of some hydrothermal mineral deposits, an alteration product of realgar, orpiment, or Cu–Ni arsenides.

Association: Gaitite, erythrite, annabergite, picropharmacolite, pharmacolite, austinite, fluorite, barite, aragonite, calcite, dolomite.

Distribution: From the Talmessi mine, 35 km west of Anarak, Iran. In the Arhbar (Aghbar) and Aït Ahmane mines, Bou Azzer district, Morocco. From Tsumeb, Namibia. In the USA, at the Gold Hill mine, Tooele Co., Utah: in a cave in Peach Springs Canyon, Mohave Co., Arizona. From Gomez Palacio, Durango, Mexico. At Cross Creek, near Savona, British Columbia, Canada. From Lucéram, Alpes-Maritimes, France. At Stelzing, Austria. In Russia, from the Khovu-Aksy Ni–Co deposit, Tuva, Siberia, and several other undefined localities.

Name: For the Talmessi mine, Iran, in which the mineral was first found.

Type Material: National School of Mines, Paris, France; The Natural History Museum, London, England.

References: (1) Bariand, P. and P. Herpin (1960) Un arséniate de calcium et de magnésium, isomorphe de la β rosélite. Bull. Minéral., 83, 118–121 (in French). (2) (1960) Amer. Mineral., 45, 1315 (abs. ref. 1). (3) Pierrot, R. (1964) Contribution à la minéralogie des arséniates calciques et calcomagnésiens naturels. Bull. Minéral., 87, 169–211 (in French). (4) Yakhontova, L.K. (1968) Magnesium-calcium and calcium arsenates from the oxidation zone of an arsenide deposit. Trudy Mineral. Muzeya, Akad. Nauk SSSR, 18, 154–167 (in Russian). (5) Catti, M., G. Ferraris, and G. Ivaldi (1977) Hydrogen bonding in the crystalline state. Structure of talmessite, $Ca_2(Mg,Co)(AsO_4)_2 \cdot 2H_2O$, and crystal chemistry of related minerals. Bull. Minéral., 100, 230–236.