Meta-alunogen $Al_2(SO_4)_3 \cdot 14H_2O$

Crystal Data: Orthorhombic (synthetic). *Point Group*: n.d. Typically, in fibrous tangled masses of prismatic to platy submillimeter crystals and efflorescences, or crackled massive, altered from alunogen.

Physical Properties: *Cleavage*: Perfect on {010}. Hardness = n.d. D(meas.) = n.d. D(calc.) = [2.85]

Optical Properties: Semitransparent. *Color*: White, pale yellow; colorless in transmitted light.
Luster: Waxy to pearly.
Optical Class: Biaxial (+). *Orientation*: $X \perp b$. $\alpha = 1.469$ $\beta = 1.473$ $\gamma = 1.491$ 2V(meas.) = Large.

Cell Data: *Space Group*: n.d. $a = 12.25$ $b = 13.95$ $c = 15.95$ Z = 4

X-ray Powder Pattern: Synthetic.
4.071 (100), 12.20 (26), 6.114 (11), 3.860 (9), 4.208 (7), 3.990 (5), 3.024 (4)

Chemistry:

	(1)	(2)
SO_3	41.04	40.41
Al_2O_3	17.33	17.15
H_2O	41.44	42.44
Total	99.81	100.00

(1) Francisco de Vergara, Chile. (2) $Al_2(SO_4)_3 \cdot 14H_2O$.

Occurrence: An uncommon mineral formed by dehydration of alunogen; found in sulfate-rich hydrothermal deposits and geothermal fields.

Association: Alunogen, pickeringite, halotrichite, mirabilite, kalinite, gypsum.

Distribution: From alum mines 3.5 km south of Francisco de Vergara, Antofagasta, Chile. In Ruatapu Cave and within the Te Kopia geothermal field, Taupo Volcanic Zone, New Zealand.

Name: For *meta*, indicating a lower hydrate, and *alunogen*.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 539-540, 537-539 [alunogen, part]. (2) Náray-Szabó, I (1969) Über die hydrate des Aluminiumsulfats. Acta Chimica Academiae Scientiarum Hungaricae, 60(1-2), 27-36 (in German). (3) Martin, R., K.A. Rodgers, and P.R.L. Browne (1999) The nature and significance of sulphate-rich, aluminous efflorescences from the Te Kopia geothermal field, Taupo volcanic zone, New Zealand. Mineral. Mag., 63, 413-419.