

Crystal Data: Orthorhombic. *Point Group:* 222. As indistinct crystals and fibers, in stalactites and efflorescent crusts.

Physical Properties: *Cleavage:* On {010}, distinct. *Fracture:* Conchoidal. Hardness = 2–2.5 D(meas.) = 1.953 D(calc.) = 1.959 Soluble in H₂O, metallic astringent taste; rapidly dehydrates to retgersite; weakly paramagnetic.

Optical Properties: Transparent. *Color:* Apple-green to greenish white; green in transmitted light. *Streak:* Pale green to white. *Luster:* Vitreous.

Optical Class: Biaxial (-). *Orientation:* X = a; Y = c; Z = b. *Dispersion:* r > v, weak. α = 1.470 β = 1.493 γ = 1.500 2V(meas.) = 41°54'

Cell Data: *Space Group:* P2₁2₁2₁ (synthetic). a = 11.746(7) b = 12.003(8) c = 6.751(4) Z = 4

X-ray Powder Pattern: Synthetic. (ICDD 1-403).

4.20 (100), 5.3 (60), 2.85 (25), 3.75 (16), 3.45 (16), 2.65 (16), 4.45 (12)

Chemistry:	(1)	(2)
SO ₃	28.54	28.51
As ₂ O ₅	0.27	
NiO	26.76	26.59
H ₂ O	44.43	44.90
Total	100.00	100.00

(1) Richelsdorf, Germany. (2) NiSO₄·7H₂O.

Polymorphism & Series: Forms a series with epsomite.

Occurrence: An uncommon secondary mineral in the oxidized zone of nickel-bearing hydrothermal mineral deposits, formed from H₂O solution below 31.5 °C.

Association: Retgersite, nickelhexahydrate, annabergite, millerite.

Distribution: Not all listed localities are certainly of this species. From Cabo Ortegal, Galicia, Spain. At Jáchymov (Joachimsthal), Czech Republic. From near Plattelen, and on Mt. Pollux, both near Zermatt, Valais, Switzerland. At Sasso Moro, Val Malenco, Lombardy, Italy. In Germany, from Richelsdorf, Hesse-Nassau; in the Rammelsberg mine, near Goslar, Harz Mountains; at Ramsbeck, Sauerland, and elsewhere. In the St. Patrick's copper mine, Avoca, Co. Wicklow, Ireland. In Australia, from Kambalda, 56 km south of Kalgoorlie, and at the Mount Keith nickel deposit, 400 km north-northwest of Kalgoorlie, Western Australia. At Minasragra, 46 km from Cerro de Pasco, Peru. From a number of mines in the Sudbury district, Ontario, Canada. In the USA, from the Gap Nickel mine, Lancaster Co., Pennsylvania; in California, at the Coyote Mountain nickel prospect, Imperial Co., at the Friday Ni-Co-Cu mine, San Diego Co., and in the Island Mountain copper mine, Trinity Co.; from the Lovelock and Nickel mines, Table Mountain district, Churchill Co., Nevada.

Name: To honor Señor Antonio Moreno Ruiz (1796–1852), Spanish pharmacist and chemist, Academy of Natural Sciences, Madrid, Spain.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 516–519. (2) Ptasiwicz-Bak, H., I. Olovsson, and G.J. McIntyre (1997) Charge density in orthorhombic NiSO₄·7H₂O at room temperature and 25 K. Acta Cryst., 53, 325–336.