Retgersite $NiSO_4 \cdot 6H_2O$

Crystal Data: Tetragonal. *Point Group:* 422. Rare in crude single crystals, to 3 mm; as fibers, elongated along [001], may be twisted spire- and hornlike, and in veinlets; most commonly as efflorescences.

Physical Properties: *Cleavage:* On {001}, perfect; on {110}, in traces, microscopically observed. *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle. Hardness = 2.5
D(meas.) = 2.04 D(calc.) = 2.075 Soluble in H_2O, taste slightly bitter and metallic.

Optical Properties: Semitransparent. *Color:* Deep emerald-green tinged with blue; pale green in transmitted light. *Streak:* Pale green. *Luster:* Vitreous.
Optical Class: Uniaxial (–). $\omega = 1.510–1.511$ $\epsilon = 1.486$

Cell Data: *Space Group:* $P4_12_12$. $a = 6.783(1)$ $c = 18.288(2)$ $Z = 4$

X-ray Powder Pattern: Synthetic.
4.25 (100), 4.57 (40), 2.964 (20), 4.64 (18), 2.721 (18), 2.571 (14), 3.39 (12)

Chemistry:

	(1)	(2)	(3)
SO_3	30.32	29.77	30.46
FeO	0.63	0.09	
CoO		0.12	
NiO	26.87	28.31	28.42
MgO	0.65	0.63	
CaO		0.33	
H_2O	[41.53]	40.35	41.12
Total	[100.00]	99.60	100.00

(1) Cottonwood Canyon, Nevada, USA; H_2O by difference. (2) Jáchymov, Czech Republic; H_2O by TGA, corresponds to $(Ni_{1.01}Mg_{0.04}Ca_{0.02})_{\Sigma=1.07}S_{0.99}O_4 \cdot 5.99H_2O$. (3) $NiSO_4 \cdot 6H_2O$.

Polymorphism & Series: Dimorphous with nickelhexahydrite.

Occurrence: An uncommon secondary mineral in the oxidization zone of nickel-bearing hydrothermal mineral deposits, formed from H_2O solution between 31.5 °C and 53.5 °C.

Association: Nickeline, gersdorffite, nickelian pyrite, morenosite, chalcanthite, annabergite.

Distribution: Crystallized from Minasragra, 46 km from Cerro de Pasco, Peru. In the USA, in Cottonwood Canyon, at the Nickel and Lovelock mines, Table Mountain district, Churchill Co., Nevada; from the Gap Nickel mine, Lancaster Co., Pennsylvania; at Mine La Motte, Fredericktown, Madison Co., Missouri. From Key Lake, Saskatchewan, Canada. In Germany, at Lichtenberg, near Bayreuth, Bavaria; at Lobenstein, Thuringia; and from Antweiler, Eifel; in the Rammelsberg mine, near Goslar, Harz Mountains. From "Menimuir Burn", near Cassencarie, Kirkcudbrightshire, Scotland. At the Newdigate colliery, near Bedworth, southwest of Nuneaton, Warwickshire, England. From the 132 North nickel mine, 4 km southwest of Widgiemooltha, and at Kambalda, 56 km south of Kalgoorlie, Western Australia. In the Allarechensk deposit, Kola Peninsula, and from the Noril'sk region, western Siberia, Russia. At Chelmiec, Poland. From Jáchymov (Joachimsthal), and near Smrkovec, about 10 km north-northeast of Mariánské Lázně (Marienbad), Czech Republic.

Name: To honor Jan Willem Retgers (1856–1896), Dutch physical chemist and chemical crystallographer, who studied the crystallography of many synthetic compounds.

Type Material: Harvard University, Cambridge, Massachusetts, USA, 100822.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 497–498. (2) Sejkora, J. and T. Řídkošil (1993) Retgersite from Jáchymov, Krušné hory Mountains, Czech Republic. Neues Jahrb. Mineral., Monatsh., 393–400.
(3) Stadnicka, K., A.M. Glazer, and M. Koralewski (1987) Structure, absolute configuration and optical activity of α-nickel sulphate hexahydrate. Acta Cryst., 43, 319–325. (4) (1957) NBS Circ. 539, 7, 36.