Halotrichite $Fe^{2+}Al_2(SO_4)_4 \cdot 22H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As acicular crystals, only very rarely terminated, elongated along [001], to 1 cm; asbestiform, in divergent or matted aggregates, and as incrustations and efflorescences.

Physical Properties: *Cleavage:* On {010}, poor. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 1.5 D(meas.) = 1.89 D(calc.) = 1.95 Soluble in H_2O, astringent taste.

Optical Properties: Transparent to translucent. *Color:* Colorless to white, pale gray, pale yellow, pale green; colorless in transmitted light. *Luster:* Vitreous.
Optical Class: Biaxial (–). *Orientation:* $Y = b$; $Z \wedge c = 38°$. $\alpha = 1.480$ $\beta = 1.486$ $\gamma = 1.490$
2V(meas.) = 35°

Cell Data: *Space Group:* $P2_1/c$. $a = 6.1954(7)$ $b = 24.262(3)$ $c = 21.262(2)$
$\beta = 100.30(1)°$ Z = 4

X-ray Powder Pattern: Középső-György mine, Hungary.
4.78 (100), 3.484 (75), 6.02 (35), 4.29 (31), 3.751 (27), 4.93 (21), 3.947 (21)

Chemistry:

	(1)	(2)		(1)	(2)
SO_3	35.39	35.97	Na_2O	0.05	
Al_2O_3	10.61	11.45	K_2O	0.02	
Fe_2O_3	0.22		H_2O^+	13.48	
FeO	9.00	8.07	H_2O^-	30.30	
MnO	0.05		H_2O		44.51
MgO	0.13		Total	99.25	100.00

(1) Középső-György mine, Hungary; after subtraction of ferrohexahydrite impurity, corresponds to $(Fe^{2+}_{0.97}Mg_{0.02}Mn_{0.01})_{\Sigma=1.00}(Al_{1.98}Fe^{3+}_{0.02})_{\Sigma=1.00}(SO_4)_4 \cdot 22H_2O$. (2) $FeAl_2(SO_4)_4 \cdot 22H_2O$.

Polymorphism & Series: Forms a series with pickeringite.

Mineral Group: Halotrichite group.

Occurrence: As efflorescences in weathering sulfide deposits and oxidizing pyritic coals, with persistent accumulations in arid climates; as a precipitate around volcanic fumaroles and hot springs.

Association: Melanterite, copiapite, gypsum, epsomite, alunogen.

Distribution: Widespread but typically in small amounts; only a few of the classic localities will be mentioned. At the Solfatara di Pozzuoli, Campi Flegrei, near Naples, Campania, Italy. From the Középső-György mine, Recsk, Mátra Mountains, Hungary. At Falun, Sweden. From Huelgoat and Poullaouen, Finistère, France. At the Feengrotten, near Saalfeld, Thuringia, Germany. In the USA, from the Alum Mountain district, Grant Co., New Mexico; at the Sulfur Hole prospect, near Borate, about 10 km northeast of Yermo, Calico Hills, San Bernardino Co., and at hot springs around Mt. Lassen, Shasta Co., California; from the Dexter No. 7 mine, Calf Mesa, San Rafael district, Emery Co., Utah. In the Glace Bay coal deposits, Nova Scotia, Canada. In Chile, at Tierra Amarilla, southeast of Copiapó, Atacama; from Alcaparrosa, near Cerritos Bayos, southwest of Calama, and from Chuquicamata, Antofagasta. At volcanoes on the Kamchatka Peninsula, Russia.

Name: From the Latin, *halotrichum*, derived from the Old German, *Haarsalz*, for *hair salts*, in allusion to its common hairlike habit.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 523–527. (2) Lovas, G.A. (1986) Structural study of halotrichite from Recsk (Mátra Mts., N-Hungary). Acta Geologica Hungarica, 29(3–4), 389–398 (in English).