Gerhardtite $Cu_2(NO_3)(OH)_3$

Crystal Data: Orthorhombic. *Point Group:* 222. As crystals, thick tabular on {001}, commonly heavily striated ∥ {001}, with rhombic outline, to 1.5 cm; mammillary, granular, paintlike, massive.

Physical Properties: *Cleavage:* On {001}, perfect; on {100}, good. *Tenacity:* Flexible. Hardness = 2 D(meas.) = 3.40–3.43 D(calc.) = 3.389

Optical Properties: Transparent. *Color:* Dark green, emerald-green, bluish green. *Streak:* Pale green. *Luster:* [Vitreous.]
Optical Class: Biaxial (+). *Pleochroism:* $X = Y$ = green; Z = blue. *Orientation:* X = a; $Y = b$; $Z = c$. *Dispersion:* $r < v$, very strong. $\alpha = 1.703$ $\beta = 1.713$ $\gamma = 1.722$
2V(meas.) = Large.

Cell Data: *Space Group:* $P2_12_12_1$. $a = 6.087(2)$ $b = 13.813(4)$ $c = 5.597(2)$ Z = 4

X-ray Powder Pattern: Kalabi, Congo.
6.91 (100), 2.624 (80), 2.310 (80d), 1.579 (80d), 2.595 (70), 3.454 (60), 2.797 (60d)

Chemistry:

	(1)	(2)
N_2O_5	22.76	22.49
CuO	66.38	66.26
H_2O	11.26	11.25
Total	100.40	100.00

(1) United Verde mine, Arizona, USA. (2) $Cu_2(NO_3)(OH)_3$.

Polymorphism & Series: Dimorphous with rouaite.

Occurrence: A rare secondary mineral in oxidized portions of copper deposits.

Association: Cuprite, malachite, atacamite, miersite, brochantite, pseudomalachite, buttgenbachite, likasite, connellite, claringbullite.

Distribution: In the USA, in Arizona, from the United Verde mine, Jerome, Yavapai Co.; in the Daisy shaft, Mineral Hill mine, Pima district, Pima Co.; and at Chase Creek Canyon, Greenlee Co. Large crystals from Likasi, and at Kalabi, near Likasi, Katanga Province, Congo [Shaba Province, Zaire]. From Dzhezkazgan, Kazakhstan. At Ramsbeck, Westphalia, Germany. From the Roua copper mines, about 50 km north of Nice, Alpes Maritimes, France. At the Great Australia and Monakoff mines, near Cloncurry, Queensland, Australia.

Name: Honors Charles Frederic Gerhardt (1816–1856), American chemist who first prepared the artificial compound.

Type Material: Yale University, New Haven, Connecticut, USA, 3.3269.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 308–309. (2) Bovio, B. and S. Locchi (1982) Crystal structure of the orthorhombic basic copper nitrate, $Cu_2(OH)_3NO_3$. J. Cryst. Spectr. Res., 12, 507–517.
(3) Oswald, H.R. (1961) Über natürlichen und künstlichen Gerhardtit. Zeits. Krist., 116, 210–219 (in German with English abs.).