

2.23; ⁴ 2.22 (calc.). Luster vitreous, pearly on {010}. Color commonly smoky white to colorless; rare crystals are pale pink at their tips, or are pale green. Streak white. Transparent.

Opt.⁵ In transmitted light, colorless.

ORIENTATION	<i>n</i>	
X about ⊥ {010}	1.534	Biaxial positive (+).
Y	1.543	2 <i>V</i> 73°.
Z	1.558	<i>r</i> > <i>v</i> , easily perceptible.

Chem. A hydrated basic phosphate of magnesium and aluminum, MgAl₂(PO₄)₂(OH)₂·8H₂O.

Anal.

	MgO	Al ₂ O ₃	P ₂ O ₅	H ₂ O+	H ₂ O-	Total
1.	9.03	22.84	31.80	36.33		100.00
2.	10.01	20.68	32.80	16.80	18.20	98.49

1. MgAl₂(PO₄)₂(OH)₂·8H₂O. 2. Fairfield, Utah.⁵

Tests. Fusibility 3. In the C.T. yields neutral water. Soluble in acids.

Occur. Found with variscite in phosphate nodules at Fairfield, Utah County, Utah. Usually in cavities between successive shells of variscite and crandallite, but frequently attached to wardite crusts.

Name. After Samuel G. Gordon (1897-), American mineralogist.

Ref.

1. Unit and orientation of Pough, *Am. Min.*, **22**, 625 (1937), from a goniometric study of poor-quality crystals which gave the ratios: *a*:*b*:*c* = 0.5192:1:0.6942; α 109°27', β 110°57½', γ 71°40½'. Transformation: Larsen and Shannon (1930) to Pough, 100/110/001. The axial ratios here given are calculated from the averaged cell constants of Larsen, *Am. Min.*, **27**, 295 (1942): *a*₀ 5.25 *kX*, *b*₀ 10.49, *c*₀ 6.97; α 107°20', β 111°12', γ 72°12', and Nuffield, priv. comm. (1948): *a*₀ 5.22, *b*₀ 10.49, *c*₀ 6.95; α 107°29½', β 110°55½', γ 72°32½'.

2. Larsen and Shannon (1930); Pough (1937). *Z* gives the phi angle of the form when (010) is made polar and the azimuth of (100) is set at 0°. Uncertain: 510, 470, 140, 101.

3. Pough (1937). The perfect cleavage, {110} in the structural setting, given by Larsen and Shannon (1930) is probably {100}.

4. Larsen (1942), the average of 7 determinations with the Berman microbalance on clear crystals. Larsen and Shannon (1930) gave 2.26.

5. Larsen and Shannon (1930).

42.8.9 **Calcioferrite** [Ca₃Fe₃(PO₄)₄(OH)₃·8H₂O (?)]. *Calcioferrit Blum (Jb. Min., 287, 1858). Calcioferrite Dana (578, 1868).*

Possibly hexagonal. In foliated nodular or reniform masses.

Phys. Cleavage perfect parallel to the foliation; also traces of another at right angles to the perfect one and traces of a third cleavage oblique to the same. Brittle. *H.* 2½. *G.* 2.53. Color sulfur-yellow, greenish yellow to skin-green and yellowish white. Streak sulfur-yellow to white. Luster pearly on cleavage surfaces. Thin laminae translucent.

Opt.² In transmitted light, yellow. Uniaxial negative (-); in part very fine-grained and nearly isotropic. *n_O* 1.57-1.58, variable.

Chem. A hydrated basic phosphate essentially of calcium and iron of uncertain formula, perhaps Ca₃Fe₃(PO₄)₄(OH)₃·8H₂O.

Anal.

	1	2
CaO	19.50	14.81
MgO		2.65
Al ₂ O ₃		2.90
Fe ₂ O ₃	27.76	24.34
P ₂ O ₅	32.90	34.01
H ₂ O	19.84	20.56
Total	100.00	99.27

1. Ca₃Fe₃(PO₄)₄(OH)₃·8H₂O. 2. Battenberg, Bavaria.¹

Tests. Fuses easily to a black magnetic globule. Easily decomposed by HCl.

Occur. In nodules in a bed of Tertiary clay at Battenberg in Rhenish Bavaria. The exterior of the nodules is yellowish or reddish brown impure calcioferrite.

Name. In allusion to the composition.

Ref.

1. Reissig in Rammelsberg (316, 1875).
2. Larsen (52, 1921).

42.8.10 **XANTHOXENITE** [Ca₂Fe(PO₄)₂(OH)·1½H₂O]. *Laubmann and Steinmetz (Zs. Kr., 55, 579, 1920).*

Monoclinic or triclinic. As masses and crusts composed of indistinct platy or lath-like crystals.¹

Phys. One perfect cleavage. *H.* ~2½.² *G.* 2.8 (Hühnerkobel), 2.97 (Palermo).² Luster dull to waxy. Color pale yellow to brownish yellow.

Opt. In transmitted light, pale yellow to pale lemon-yellow in color.

	<i>n</i> (Palermo) ²	
X	1.704 ± 0.003	Biaxial negative (-).
Y	1.715 ± 0.003	2 <i>V</i> large.
Z	1.724 ± 0.003	<i>r</i> < <i>v</i> , strong. Weakly pleochroic.

Chem. A hydrated basic phosphate of calcium and trivalent iron, Ca₂Fe(PO₄)₂(OH)·1½H₂O. Small amounts of Mn^{II} and Mg substitute for Ca, with Ca:Mn:Mg = 19.7:2.84:1 in the only reported analysis.³

Anal.

	CaO	MgO	MnO	Fe ₂ O ₃	P ₂ O ₅	H ₂ O+	H ₂ O-	Rem.	Total
1.	30.31			21.58	38.37	9.74			100.00
2.	24.99	0.91	4.55	21.68	37.62	9.13	0.86	0.79	100.53

1. Ca₂Fe(PO₄)₂(OH)·1½H₂O. 2. Palermo mine, New Hampshire.⁴ Rem. is insol. 0.78, Al₂O₃ 0.01.

Occur. Originally from the Hühnerkobel pegmatite near Rabenstein, Bavaria, associated with cacoxenite and dufrenite (?) as an alteration product of triphylite. Found abundantly with whitlockite, eosphorite-childrenite, rockbridgeite, and other phosphates in a triphylite-rich pegmatite at the Palermo mine, North Groton, New Hampshire.

Name. In allusion to its color and the originally supposed chemical resemblance to cacoxenite.