

Althausite

 $\text{Mg}_2(\text{PO}_4)(\text{OH}, \text{F}, \text{O})$

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Rare crude crystals are elongated along [001], flattened on {010}, showing {010}, {110}, {131}, to 3 cm; generally as cleavable masses.

Physical Properties: *Cleavage:* On {001}, perfect; on {101}, distinct. Hardness = 3.5–4
D(meas.) = 2.97(2) D(calc.) = 2.91

Optical Properties: Translucent. *Color:* Pale gray, reddish brown. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Orientation:* $X = b; Y = c; Z = a$. $\alpha = 1.588(2)$ $\beta = 1.592(2)$
 $\gamma = 1.598(2)$ $2V(\text{meas.}) = \sim 70^\circ$ $2V(\text{calc.}) = 78.5^\circ$

Cell Data: *Space Group:* $Pnma$. $a = 8.258(2)$ $b = 6.054(2)$ $c = 14.383(5)$ $Z = 8$

X-ray Powder Pattern: Tingelstadjern quarry, Norway.
3.593 (100), 3.316 (90), 3.024 (80), 2.786 (60), 2.641 (60), 3.418 (40), 2.894 (40)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P_2O_5	43.59	45.14	44.4	CaO	4.50		
SiO_2	0.11			Na_2O	0.22		
TiO_2	< 0.02			F	2.86	2.99	3.04
Al_2O_3	0.53			Cl	0.19		
Fe_2O_3	1.37			H_2O^+	1.87	2.10	
FeO			0.8	H_2O^-	0.07		
MnO	0.07			$-\text{O} = (\text{F}, \text{Cl})_2$	1.24	1.26	
MgO	45.38	51.03	50.5	Total	99.52	[100.00]	98.7

(1) Tingelstadjern quarry, Norway. (2) Do.; recalculated after deduction of apatite and excluding minor constituents; then corresponding to $\text{Mg}_{2.00}(\text{PO}_4)_{1.00}[(\text{OH})_{0.37}\text{F}_{0.25}\text{O}_{0.19}]_{\Sigma=0.81}$.
(3) Overntjern quarry, Norway; by electron microprobe, total Fe as FeO.

Polymorphism & Series: Dimorphous with holtedahllite.

Occurrence: In serpentine–magnesite deposits (Norway).

Association: Apatite, magnetite, xenotime, holtedahllite, szaibelyite, talc, magnesite (Tingelstadjern quarry, Norway); apatite, enstatite, talc, magnesite (Overntjern quarry, Norway); fluorapatite, wolfeite, topaz, muscovite, sphalerite, quartz, chalcopyrite, pyrrhotite, siderite, arsenopyrite, chlorite, vivianite, panasqueiraite, thadeuite (Panasqueira, Portugal).

Distribution: From the Tingelstadjern and Overntjern quarries, Modum, Norway. In the Panasqueira Sn–W deposit, Portugal.

Name: To honor Professor Egon Althaus (1933–), Karlsruhe University, Karlsruhe, Germany.

Type Material: Mineralogical-Geological Museum, Oslo University, Oslo, Norway, 22044, 22045.

References: (1) Raade, G. and M. Tysseland (1975) Althausite, a new mineral from Modum, Norway. *Lithos*, 8, 215–219. (2) (1976) *Amer. Mineral.*, 61, 502 (abs. ref. 1). (3) Rømming, C. and G. Raade (1980) The crystal structure of althausite, $\text{Mg}_4(\text{PO}_4)_2(\text{OH}, \text{O})(\text{F}, \square)$. *Amer. Mineral.*, 65, 488–498. (4) Raade, G. (1990) Hydrothermal syntheses of $\text{Mg}_2(\text{PO}_4)\text{OH}$ polymorphs. *Neues Jahrb. Mineral., Monatsh.*, 289–300.