

Phosphophyllite

$\text{Zn}_2(\text{Fe}^{2+}, \text{Mn}^{2+})(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$

©2001-2005 Mineral Data Publishing, version 1

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals tend to be thick tabular on {100}, with {110}, {011}, $\{\bar{1}02\}$, {111}, $\{\bar{3}11\}$, many other forms, to 13 cm. *Twinning:* Common on {100}, as contact twins giving “fishtail” shapes and as penetration twins, may be polysynthetic; rare on $\{\bar{1}02\}$.

Physical Properties: *Cleavage:* On {100}, perfect; on {010}, $\{\bar{1}02\}$, distinct. *Tenacity:* Brittle. Hardness = 3–3.5 D(meas.) = 3.08–3.13 D(calc.) = 3.12

Optical Properties: Transparent. *Color:* Pale bluish green, sea-green, colorless; colorless in transmitted light. *Luster:* Vitreous. *Optical Class:* Biaxial (–). *Orientation:* $Z = b$; $X \wedge c = 50^\circ$. *Dispersion:* $r > v$, perceptible. $\alpha = 1.595\text{--}1.599$ $\beta = 1.614\text{--}1.617$ $\gamma = 1.616\text{--}1.620$ $2V(\text{meas.}) = \sim 45^\circ$

Cell Data: *Space Group:* $P2_1/c$. $a = 10.378\text{--}10.397$ $b = 5.084\text{--}5.098$ $c = 10.553\text{--}10.574$ $\beta = 121.00^\circ\text{--}121.14(2)^\circ$ $Z = 2$

X-ray Powder Pattern: Potosí, Bolivia.

4.438 (100), 8.86 (85), 3.383 (60), 2.833 (50), 2.818 (45), 2.222 (30), 1.4806 (30)

Chemistry:

	(1)	(2)
P_2O_5	32.51	32.29
FeO	12.24	16.18
MnO	4.96	0.14
ZnO	34.26	34.59
H_2O	16.52	15.99
Total	100.49	99.19

(1) Hagendorf, Germany. (2) Potosí, Bolivia; by electron microprobe, H_2O by the Penfield method.

Occurrence: Typically a secondary mineral in zoned complex granite pegmatites, an alteration product of sphalerite and Fe–Mn phosphates; in hydrothermal vein deposits.

Association: Triplite, triphylite, sphalerite, apatite, vivianite, rockbridgeite, strengite, phosphosiderite, fairfieldite (Hagendorf, Germany).

Distribution: From Hagendorf, Bavaria, Germany. At Příbyslavice, Czech Republic. From the Norrö pegmatite, on Rånö Island, Sweden. Extraordinary crystals in the Unificada mine, Cerro Rico, and from the Siglo XX mine, Llallagua, Potosí; in the Morococala mine, near Oruro, Bolivia. In the USA, at the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire; at Red Hill, Rumford, and from Newry, Oxford Co., Maine. On Reaphook Hill, near Blinman, Flinders Ranges, South Australia. From Kabwe (Broken Hill), Zambia.

Name: From *phosphate* in the composition, and the Greek for *cleavage*.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana’s system of mineralogy, (7th edition), v. II, 738–739. (2) Hill, R.J. (1977) The crystal structure of phosphophyllite. *Amer. Mineral.*, 62, 812–817. (3) Hill, R.J. (1976) Crystal data for phosphophyllite, $\text{Zn}_2\text{Fe}(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$. *J. Appl. Crystallog.*, 9, 503–504. (4) Dunn, P.J. and J. Norberg (1977) Phosphophyllite, variation in composition. *Amer. Mineral.*, 62, 818. (5) Ericsson, T. and A.G. Nord (1984) Mössbauer studies of two natural phosphophyllites. *Neues Jahrb. Mineral., Monatsh.*, 193–197. (6) Wilson, W.E. and A. Petrov (1999) Famous mineral localities: Cerro Rico de Potosí, Bolivia. *Mineral. Record*, 30, 9–36.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.