

Macphersonite

$\text{Pb}_4(\text{SO}_4)(\text{CO}_3)_2(\text{OH})_2$

©2001-2005 Mineral Data Publishing, version 1

Crystal Data: Orthorhombic, pseudo-hexagonal. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals are commonly pseudo-hexagonal, thin to tabular on {010}, to 1 cm. *Twinning:* Common, lamellar and contact, composition plane {102}.

Physical Properties: *Cleavage:* On {010}, perfect. *Fracture:* Uneven. Hardness = 2.5–3 D(meas.) = 6.50–6.55 D(calc.) = 6.60–6.65 May exhibit a bright yellow fluorescence under SW and LW UV.

Optical Properties: Semitransparent. *Color:* Colorless, white, very pale amber. *Luster:* Adamantine to resinous.

Optical Class: Biaxial (-). *Orientation:* $X = b$; $Y = c$; $Z = a$. *Dispersion:* $r > v$, moderate. $\alpha = 1.87$ $\beta = 2.00$ $\gamma = 2.01$ $2V(\text{meas.}) = 35^\circ\text{--}36^\circ$

Cell Data: *Space Group:* $Pcab$. $a = 10.383(2)$ $b = 23.050(5)$ $c = 9.242(2)$ $Z = 8$

X-ray Powder Pattern: Argentolle mine, France; may show preferred orientation. 3.234 (100), 2.654 (90), 3.274 (50), 2.598 (30), 2.310 (30), 2.182 (30), 2.033 (30)

Chemistry:	(1)	(2)	(3)
SO ₃	6.6	7.65	7.42
CO ₂	8.8	8.47	8.16
CuO	0.1		
CdO	0.1		
PbO	83.4	83.59	82.75
H ₂ O ⁺	1.3	1.93	1.67
Total	100.3	101.64	100.00

- (1) Leadhills, Scotland; by electron microprobe, average of ten analyses, CO₂ by evolved gas analysis, H₂O by TGA; corresponds to $(\text{Pb}_{4.08}\text{Cu}_{0.10}\text{Cd}_{0.07})_{\Sigma=4.25}(\text{S}_{0.90}\text{O}_4)(\text{C}_{1.09}\text{O}_3)_2(\text{OH})_{1.58}$.
(2) Argentolle mine, France; corresponds to $\text{Pb}_{4.06}(\text{S}_{1.03}\text{O}_4)(\text{C}_{1.04}\text{O}_3)_2(\text{OH})_{2.32}$.
(3) $\text{Pb}_4(\text{SO}_4)(\text{CO}_3)_2(\text{OH})_2$.

Polymorphism & Series: Trimorphous with leadhillite and susannite.

Occurrence: An uncommon secondary mineral in the zone of oxidation of lead deposits.

Association: Leadhillite, susannite, cerussite, caledonite, pyromorphite, scotlandite, mattheddleite, galena, quartz

Distribution: From the Argentolle mine, near Saint-Prix, Saône-et-Loire, France. At Leadhills, Lanarkshire, Scotland. From the Red Gill mine, Caldbeck Fells, Cumbria, England. In the Churfürst Ernst mine, Bönkhausen, North Rhine-Westphalia, Germany. From Laurium, Greece, in slag. Large crystals from Tsumeb, Namibia. At the Moon Anchor mine, Maricopa Co., Arizona, USA.

Name: To honor Dr. Harry Gordon Macpherson (1925–), Keeper of Minerals, Royal Scottish Museum, Edinburgh, Scotland.

Type Material: Royal Scottish Museum, Edinburgh, Scotland, 721.34; Museum of Natural History, Geneva, Switzerland, 435/80.

References: (1) Livingstone, A. and H. Sarp (1984) Macphersonite, a new mineral from Leadhills, Scotland, and Saint-Prix, France – a polymorph of leadhillite and susannite. *Mineral. Mag.*, 48, 277–282. (2) (1985) *Amer. Mineral.*, 70, 874 (abs. ref. 1). (3) Steele, I.M., J.J. Pluth, and A. Livingstone (1998) Crystal structure of macphersonite $(\text{Pb}_4\text{SO}_4(\text{CO}_3)_2(\text{OH})_2)$: comparison with leadhillite. *Mineral. Mag.*, 62, 451–459.

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.