Berndtite SnS_2

Crystal Data: Hexagonal. *Point Group:* $\overline{3}\ 2/m$ (2T) and $6mm$ (4H). Tabular hexagonal crystals, to 0.01 mm, in powdery aggregates.

Physical Properties: *Cleavage:* {0001}, marked. Hardness = Very soft. VHN = n.d. D(meas.) = 4.5 (synthetic). D(calc.) = [4.55]

Optical Properties: Translucent to transparent. *Color:* Pale yellow; in polished section, gray, with intense brownish to yellow-orange internal reflections. *Luster:* Resinous. *Streak:* Golden yellow. *Pleochroism:* Strong. *Anisotropism:* Dark greenish gray.
R_1–R_2: n.d.

Cell Data: *Space Group:* $P\overline{3}m1$ (2T), with $a = 3.639$ $c = 5.868$ $Z = 1$, or
Space Group: $P6_3mc$ (4H), with $a = 3.650$ $c = 11.811$ $Z = 2$

X-ray Powder Pattern: Synthetic.
5.89 (100), 2.784 (55), 3.162 (30), 1.824 (30), 2.155 (25), 1.743 (20), 1.669 (8)

Chemistry: Sn and S are major constituents.

Polymorphism & Series: Stacking polytypes 2T and 4H are known.

Mineral Group: Melonite group.

Occurrence: A secondary mineral in tin sulfide ores (Cerro de Potosí, Bolivia); a secondary mineral in a tin-bearing pegmatite (Lagares-do-Estanho tin pegmatite); in a high-temperature deposit, hydrothermally altered (Arandis, Namibia).

Association: Stannite, pyrite, cassiterite, sulfur.

Distribution: From Cerro [Rico], Potosí, Bolivia [2T TL]. In Portugal, at Panasqueira [4H TL] and from the Lagares-do-Estanho tin pegmatite. In the Stiepelmann mine, Arandis, Namibia. From Forestville, Northumberland Co., Pennsylvania, USA.

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Type Material: National Museum of Natural History, Washington, D.C., USA, 114486, C5354A.

References: (1) Moh, G.H. and F. Berndt (1964) Two new natural tin sulfides, Sn_2S_3 and SnS_2. Neues Jahrb. Mineral., Monatsh., 94–95. (2) (1965) Amer. Mineral., 50, 2107 (abs. ref. 1). (3) Moh, G.H. (1966) Das binäre System Zinn-Schwefel und seine Minerale. Fortschr. Mineral. (abs.) 42, 211. (4) Clark, A.H. (1972) On the natural occurrence of tin sulfides (berndtite). Naturwissenschaften, 59, 361. (5) Hazen, R.M. and L.W. Finger (1978) The crystal structures and compressibilities of layer minerals at high pressure. I. SnS_2, berndtite. Amer. Mineral., 63, 289–292.