Guettardite  \( \text{Pb(As, Sb)\textsubscript{2}S\textsubscript{4}} \)

Crystal Data:  Monoclinic.  \textbf{Point Group}:  \( 2/m \).  As acicular crystals, to 2 mm, the faces of which are irregularly streaked parallel to the axis of elongation; also as small anhedral grains.  \textbf{Twinning}:  Polysynthetic twinning on \( \{100\} \), common in polished section.

Physical Properties:  \textbf{Cleavage}:  Perfect on \( \{001\} \).  \textbf{Fracture}:  Conchoidal.  \textbf{Tenacity}:  Very brittle.  Hardness = n.d.  \( \text{VHN} = 180–197 \) (50 g load).  \( D(\text{meas.}) = 5.26 \)  \( D(\text{calc.}) = 5.39 \)

Optical Properties:  Opaque.  \textbf{Color}:  Grayish black; in polished section, white with reddish internal reflections.  \textbf{Luster}:  Metallic.  \textbf{Pleochroism}:  Relatively strong.  \( R_1–R_2 : (470) 37.6–42.6, (546) 36.1–41.2, (589) 34.8–39.3, (650) 32.8–36.7 \)

Cell Data:  \textbf{Space Group}:  \( P2_1/\alpha \).  \( a = 20.05(5) \)  \( b = 7.95(2) \)  \( c = 8.44(2) \)  \( \beta = 101^\circ 46(10) \)  \( Z = 8 \)

X-ray Powder Pattern:  Madoc, Canada.  \( 3.52 \) (100), 2.795 (90), 4.19 (50), 3.90 (50), 2.670 (50), 2.653 (50), 2.335 (40)

Chemistry:

\[
\begin{array}{ccc}
\text{Pb} & 38.8 & 38.50 \\
\text{Cu} & 0.49 & \\
\text{Sb} & 24.1 & 23.57 \\
\text{As} & 12.2 & 13.61 \\
\text{S} & 24.1 & 23.46 \\
\hline
\text{Total} & 99.2 & 100.00
\end{array}
\]

(1) Madoc, Canada; by electron microprobe, corresponding to \( \text{Pb}_{1.01}(\text{Sb}_{1.07}\text{As}_{0.88})\Sigma=1.95\text{S}_{4.05} \).

(2) Pitone quarry, Italy; by electron microprobe; corresponding to \( \text{Pb}_{1.04}\text{Cu}_{0.04} \)

(3) \( \text{Pb(Sb, As)\textsubscript{2}S\textsubscript{4}} \) with Sb:As = 1:1.

Polymorphism & Series:  Dimorphous with twinnite.

Occurrence:  Of low-temperature hydrothermal origin, in marbles (Madoc, Canada; Seravezza, Italy).

Association:  Pyrite, sphalerite, wurtzite, galena, stibnite, orpiment, realgar, enargite, tetrahedrite, zinkenite, jordanite, bournonite, sterryrite, boulangerite, jamesonite, sartorite (Madoc, Canada); zinkenite, boulangerite, senseyite, jordanite, enargite (Silverton, Colorado, USA).

Distribution:  From Madoc, Ontario, Canada [TL].  At the Brobdingnag mine, near Silverton, San Juan Co., Colorado, USA.  In the Jas Roux deposit, 10 km east of Chapelle-en-Valgaudemar, Hautes-Alpes, France.  At the Pitone, Tognetti, and Ceragiola marble quarries, near Seravezza, Tuscany, Italy.  From Novoye, Khaydarkan, Fergana Valley, Alai Range, Kyrgyzstan.

Name:  Honors Jean Etienne Guettard (1715–1786), French mineralogist and geologist.

Type Material:  Canadian Geological Survey, Ottawa, 12167; Royal Ontario Museum, Toronto, Canada.


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