Hydrowoodwardite \( \text{Cu}_2\text{Al}_2(\text{SO}_4)(\text{OH})_8 \cdot n\text{H}_2\text{O} \).  

**Crystal Data:**  Hexagonal.  
Point Group: \( \text{3} 2/m \) (probable).  As porous botryoidal crusts and small stalactitic aggregates.

**Physical Properties:**  Fracture: Uneven.  Tenacity: Brittle upon partial dehydration.  
Hardness = n.d.  \( D(\text{meas.}) = 2.33(8) \quad D(\text{calc.}) = 2.48 \)  Slowly and reversibly dehydrates to woodwardite.

**Optical Properties:**  Translucent.  Color: Blue to pale blue.  Streak: Pale blue.  
Luster: Vitreous.  
Optical Class: [Uniaxial.\( n = 1.549(5)–1.565(5) \quad \omega = \text{n.d.} \quad \epsilon = \text{n.d.} \)]

**Cell Data:**  Space Group: \( \overline{R}3m \) (probable).  
\( a = 3.070(7) \quad c = 31.9(2) \quad Z = 3 \)

**X-ray Powder Pattern:**  St. Briccius mine, Germany.  
10.5 (100), 5.26 (17), 3.50 (6), 2.60 (5b), 1.524 (4b), 2.46 (2b), 2.23 (2b)

**Chemistry:**  
\begin{align*}
\text{SO}_3 & \quad 15.50 \\
\text{SiO}_2 & \quad 5.60 \\
\text{Al}_2\text{O}_3 & \quad 19.20 \\
\text{CuO} & \quad 28.39 \\
\text{ZnO} & \quad 0.41 \\
\text{Na}_2\text{O} & \quad 0.10 \\
\text{H}_2\text{O} & \quad 30.10 \\
\hline
\text{Total} & \quad [99.30]
\end{align*}

(1) St. Briccius mine, Germany; by ICP-MS, \( \text{SiO}_2 \) from admixed amorphous silica, \( \text{H}_2\text{O} \) by TGA, \( (\text{SO}_4)^{2-}, (\text{OH})^{1-} \) and \( \text{H}_2\text{O} \) confirmed by IR; original total given as 99.3%; corresponds to \( (\text{Cu}_{1.92}\text{Zn}_{0.04})\Sigma=1.96\text{Al}_{2.04}(\text{SO}_4)_{1.04}(\text{OH})_{7.96} \cdot 5.08\text{H}_2\text{O} \).  
(2) St. Christoph mine, Germany; analysis not given, \( (\text{CO}_3)^{2-} \) from stoichiometry and presence confirmed by IR; then stated to correspond to \( (\text{Cu}_{1.96}\text{Zn}_{0.04})\Sigma=2.00(\text{UO}_2)_{0.04}\text{Al}_{2.00}[(\text{SO}_4)_{0.64}(\text{CO}_3)_{0.36}]\Sigma=1.00(\text{OH})_8 \cdot n\text{H}_2\text{O} \).

**Occurrence:**  Rare in the oxidized portions of base metal sulfide mines.

**Association:**  Woodwardite, schulenbergite, namuwite, brianyoungite, langite, linarite, allophane, amorphous silica.

**Distribution:**  In Germany, in Saxony, from the St. Briceius mine, Königswalde, near Annaberg; in the Gelbe Birke mine, Schwarzenberg; at the St. Johannes mine, Wolkenstein, near Marienberg; and from the St. Christoph mine, Bärenhecke.  At Simdde Dyllhan, Drws-y-Coed, near Nantlle, Gwynedd, Wales.

**Name:**  As the hydrated analog of woodwardite.

**Type Material:**  Mining Academy, Freiberg, Germany, 76639.