Johannsenite  
\( \text{CaMn}^{2+}\text{Si}_2\text{O}_6 \)

Crystal Data: Monoclinic.  
Point Group: 2/m.  As prismatic crystals, to 10 cm. In columnar, radiating, and spherulitic aggregates of fibers and prisms.  
Twining: Simple and lamellar twinning common on \{100\}.

Physical Properties:  
Cleavage: Good on \{110\}, \{1\bar{1}0\} \(\sim\) 87°; partings on \{100\}, \{001\}, and \{010\}.  
Fracture: Uneven to conchoidal.  
Tenacity: Brittle.  
Hardness = 6.  
\(D(\text{meas.}) = 3.27 \pm 0.34 \quad D(\text{calc.}) = [3.52] \)

Optical Properties:  
Translucent to opaque.  
Color: Clove-brown, gray, colorless, blue, green; colorless in thin section.  
Optical Class: Biaxial (+).  
Orientation: \( Y = b; \quad Z(\bar{c}) = -46° \sim 55° \).  
\( r < v \) or \( r > v \), weak to moderate.  
\( \alpha = 1.699 \sim 1.710 \quad \beta = 1.710 \sim 1.719 \quad \gamma = 1.725 \sim 1.738 \)  
\( 2V(\text{meas.}) = 58° \sim 72° \)

Cell Data:  
Space Group: \( C2/c \).  
\( a = 9.978(9) \quad b = 9.156(9) \quad c = 5.293(5) \)  
\( \beta = 105°29(2) \)  
\( Z = 4 \)

X-ray Powder Pattern:  
Boriva deposits, Erzebezirk Maden, Bulgaria.  
(ICDD 18-299).  
3.02 (100), 2.547 (80), 2.600 (60), 2.564 (50), 2.243 (50), 1.633 (50), 6.58 (40)  

Chemistry:  
\[
\begin{array}{cccccc}
\text{SiO}_2 & 47.62 & 48.81 & \text{CaO} & 22.18 & 21.87 \\
\text{TiO}_2 & 0.01 & \text{Na}_2\text{O} & 0.07 & & \\
\text{Al}_2\text{O}_3 & 0.91 & 0.74 & \text{K}_2\text{O} & 0.02 & \\
\text{Fe}_2\text{O}_3 & 0.04 & 0.79 & \text{H}_2\text{O}^+ & 0.40 & 0.32 \\
\text{FeO} & 0.70 & 1.54 & \text{H}_2\text{O}^- & 0.09 & 0.35 \\
\text{MnO} & 27.47 & 22.58 & \text{CO}_2 & 0.24 & \\
\text{MgO} & 0.53 & 2.29 & \text{P}_2\text{O}_5 & 0.01 & \\
\end{array}
\]

(1) Tetela de Ocampo, Mexico; corresponds to \((\text{Ca}_{0.97}\text{Mg}_{0.03})_{\Sigma=1.00} (\text{Mn}^{2+}_{0.96}\text{Fe}^{2+}_{0.02}\text{Al}_{0.02})_{\Sigma=1.00} (\text{Si}_{1.97}\text{Al}_{0.03})_{\Sigma=2.00}\text{O}_6 \).

(2) Aravaipa district, Arizona, USA; corresponds to \((\text{Ca}_{0.96}\text{Na}_{0.01})_{\Sigma=0.97} (\text{Mn}^{2+}_{0.78}\text{Mg}_{0.14}\text{Fe}^{2+}_{0.05}\text{Al}_{0.03}\text{Fe}_{0.02})_{\Sigma=1.02} (\text{Si}_{1.99}\text{Al}_{0.01})_{\Sigma=2.00}\text{O}_6 \).

Polymorphism & Series: Forms two series, with diopside, and with hedenbergite.

Mineral Group: Pyroxene group.

Occurrence: In metasomatized limestones and manganiferous skarns; in quartz or calcite veins cutting rhyolite.

Association: Rhodonite, manganese oxides.

Distribution: From Tetela de Ocampo, Puebla, and Pachuca, Hidalgo, Mexico. In the USA, at Franklin, Sussex Co., New Jersey; from the Bohemia district, Lane Co., Oregon; at the Aravaipa district, Graham Co., Arizona; and in the Empire Zinc Co. mine, Hanover, Grant Co., New Mexico. From Schio, Vicenza, and Campiglia, Tuscany, Italy. In the Akatani mine, Niigata Prefecture; the Nakatatsu mine, Fukui Prefecture; the Onagusa mine, Katsuyam, Okayama Prefecture; and elsewhere in Japan. A number of other localities are known.

Name: To honor Professor Albert Johannsen (1871–1962), petrologist, University of Chicago, Chicago, Illinois, USA.


References: (1) Schaller, W.T. (1938) Johannsenite, a new manganese pyroxene.  

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