Creedite  \( \text{Ca}_3\text{Al}_2(\text{SO}_4)(\text{F}, \text{OH})_{10}\cdot2\text{H}_2\text{O} \)

Crystal Data:  Monoclinic.  Point Group:  2/m.  Crystals are prismatic [001], bladelike to acicular, typically with \{110\}, \{111\}, \{\overline{1}1\}, \{001\}, several other minor forms noted, to 8 cm; radiating, drusy to granular aggregates.

Physical Properties:  Cleavage:  \{100\}, perfect.  Fracture:  Conchoidal.  Tenacity:  Brittle.  Hardness = 4  \( D(\text{meas.}) = 2.713-2.730 \)  \( D(\text{calc.}) = 2.739 \)


Optical Class:  Biaxial (−).  Orientation:  \( Y = b \); \( Z \wedge c = 42.5^\circ \).  Dispersion:  \( r > v \), strong,  \( \alpha = 1.461(1) \)  \( \beta = 1.478(1) \)  \( \gamma = 1.485(1) \)  \( 2V(\text{meas.}) = 64^\circ22' \)  \( 2V(\text{calc.}) = 65^\circ \)

Cell Data:  Space Group:  \( C2/c \).  \( a = 13.936(1) \)  \( b = 8.606(1) \)  \( c = 9.985(1) \)  \( \beta = 94.39(1)^\circ \)  \( Z = 4 \)

X-ray Powder Pattern:  Wagon Wheel Gap, Colorado, USA.

Chemistry:

\[
\begin{array}{ccc}
\text{SO}_4 & 19.10 \\
\text{Al}_2\text{O}_3 & 21.42 \\
\text{CaO} & 35.18 \\
\text{F} & 30.30 \\
\text{H}_2\text{O} & 10.72 \\
-\text{O} = \text{F}_2 & 17.28 \\
\text{Total} & 99.44 \\
\end{array}
\]

(1) Wagon Wheel Gap, Colorado, USA; \( \text{H}_2\text{O} \) by the Penfield method, corresponds to \( \text{Ca}_{2.99}\text{Al}_{2.19}(\text{SO}_4)_{1.00}[\text{F}_{8.02}(\text{OH})_{2.00}]_\Sigma = 10.02 \cdot 2.06\text{H}_2\text{O} \).

Occurrence:  Uncommon in fluorite-rich hydrothermal mineral deposits.

Association:  Fluorite, barite, kaolinite (Wagon Wheel Gap, Colorado, USA).

Distribution:  In the USA, from Wagon Wheel Gap, near Creede, Mineral Co., Colorado; in the Liberty and Hall mines and at Granite, near Tonopah, Nye Co., Nevada; in Arizona, at the Grand Reef mine, Graham Co.; from the Thompson and Defiance mines, Darwin district, Inyo Co., California.  In Mexico, large crystals from the Potosí and other mines, Santa Eulalia district, Chihuahua.  Exceptional crystals from Colquiri, La Paz, Bolivia.  In the Dzhaambai deposit, eastern Pamir Mountains, Tajikistan.  Fine examples from Aktshatau, 40 km south of Dzhezkazgan, Kazakhstan.  Several other minor localities are known.

Name:  For the occurrence near Creede, Colorado, USA.

Type Material:  Harvard University, Cambridge, Massachusetts, 81273; National Museum of Natural History, Washington, D.C., USA, 93117, C1034.