Gatewayite

\[
Ca_6(As^{3+}V^{4+}_3V^{5+}9As^{5+}6O_{51})\cdot 31H_2O
\]

**Crystal Data:** Monoclinic. \( \text{Point Group}: 2 \). As blades flattened on \{101\} and elongated along [010] to 0.5 mm; as crude prisms with curved faces, to 1 mm, and as composite crystals of subparallel narrow prisms to 2 mm.

**Physical Properties:** Cleavage: Fair on \{010\} and \{101\}. Tenacity: Brittle. Fracture: Curved. Hardness = \( \sim 2 \). \( D(\text{meas.}) = 2.34(2) \). \( D(\text{calc.}) = 2.337 \). Dissolves in dilute HCl.

**Optical Properties:** Transparent. Color: Very dark greenish blue. Streak: Grayish blue. Luster: Vitreous. Optical Class: Biaxial (\(-\)). \( \alpha = 1.621(1) \), \( \beta = 1.654(5) \), \( \gamma = 1.668(5) \). \( 2V(\text{meas.}) = 66(1)^\circ \). \( 2V(\text{calc.}) = 65^\circ \). Orientation: \( Y = b, X^a \approx 30^\circ \) in obtuse \( \beta \). Absorption: \( X << Y < Z \). Pleochroism: \( X = \) pale olive green, \( Y = \) medium greenish blue, \( Z = \) dark greenish blue. Dispersion: Extreme.

**Cell Data:** Space Group: \( P2_1 \). \( a = 11.1850(4) \), \( b = 16.8528(4) \), \( c = 20.7146(15) \), \( \beta = 91.166(6)^\circ \). \( Z = 2 \).

**X-ray Powder Pattern:** Packrat mine, Gateway district, Mesa County, Colorado, USA. 9.7 (100), 13.2 (47), 2.810 (17), 2.866 (14), 3.246 (9), 2.953 (9), 2.758 (9).

**Chemistry:**

\[
\begin{array}{ccc}
\text{Na}_2O & 0.21 & 0.19 \\
\text{CaO} & 12.31 & 11.31 \\
\text{SrO} & 0.41 & 0.38 \\
\text{As}_5\text{O}_3 & [3.60] & [] \\
\text{As}_2\text{O}_3 & 32.18 & [25.40] \\
\text{VO}_2 & [7.40] & [] \\
\text{V}_2\text{O}_5 & 42.97 & [31.39] \\
\text{H}_2\text{O} & [20.33] & [] \\
\text{Total} & 88.08 & 100.00
\end{array}
\]

(1) Packrat mine, Gateway district, Colorado, USA; average of 9 electron microprobe analyses.
(2) Analysis 1 normalized, \( H_2O \) calculated from structure, As and V apportioned for charge balance and structural criteria; corresponds to \( (\text{Ca}_{5.54}\text{Na}_{0.17}\text{Sr}_{0.10})\Sigma=5.81(\text{As}^{3+}\text{V}^{4+,5+}_2\text{V}^{5+}_{9.48}\text{As}^{5+}_{6.07}\text{O}_{51})\cdot 31\text{H}_2\text{O} \).

**Occurrence:** A secondary mineral formed by the oxidation of montroseite-corvusite assemblages in a moist environment.

**Association:** Morrisonite, packratite, vanarsite, pharmacolite, montroseite, corvusite.

**Distribution:** From the Packrat mine, Gateway district, Mesa County, Colorado, USA.

**Name:** For the Gateway mining district in which the Packrat mine is located. Gateway is also the nearest town to the Packrat mine.

**Type Material:** Natural History Museum of Los Angeles County, Los Angeles, California, USA (64513, 64514, 65554, 65555 and 65559).