Caseyite

\[\text{[(V}^{5+}\text{O}_2)\text{Al}_{7.5}(\text{OH})_{15}(\text{H}_2\text{O})_{13}]\text{2[H}_2\text{V}^{4+}\text{V}^{5+}\text{O}_{28}]\text{[V}^{5+}_{10}\text{O}_{28}]\text{2.90H}_2\text{O}\]

**Crystal Data:** Monoclinic.  
*Point Group:* \(\text{2/m}^\prime\). As tapering needles or blades, elongated on [100], to 0.25 mm; in divergent sprays.

**Physical Properties:**  
*Cleavage:* None.  
*Fracture:* Curved.  
*Tenacity:* Brittle.  
*Hardness* = 2-3  
*D*(meas.) = n.d.  
*D*(calc.) = 2.151  
Dissolves in dilute HCl.  
Susceptible to dehydration at low relative humidity.

**Optical Properties:**  
*Translucent.*  
*Color:* Yellow.  
*Streak:* Pale yellow.  
*Luster:* Vitreous.  
*Optical Class:* Biaxial (+).  
\(\alpha = 1.659(3)\)  
\(\beta = 1.670(3)\)  
\(\gamma = 1.720(3)\)  
\(2V(\text{calc.}) = 51.5^\circ\)

*Dispersion:* Strong, \(r < v\).  
*Orientation:* \(Z = a\).  
*Pleochroism:* None.

**Cell Data:**  
*Space Group:* \(P2_1/n\).  
*\(a = 14.123(8)\)*  
*\(b = 30.998(15)\)*  
*\(c = 21.949(11)\)*  
*\(\beta = 97.961(8)^\circ\)*  
\(Z = 2\)

**X-ray Powder Pattern:** Calculated pattern.  
15.499 (100), 17.798 (92), 8.899 (43), 12.62 (33), 12.749 (26), 10.869 (16), 9.016 (14)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na(_2)O</td>
<td>0.52</td>
<td>0.41</td>
</tr>
<tr>
<td>K(_2)O</td>
<td>0.27</td>
<td>0.21</td>
</tr>
<tr>
<td>CaO</td>
<td>0.41</td>
<td>0.32</td>
</tr>
<tr>
<td>Al(_2)O(_3)</td>
<td>18.74</td>
<td>14.78</td>
</tr>
<tr>
<td>VO(_2)</td>
<td>[1.71]</td>
<td>1.35</td>
</tr>
<tr>
<td>V(_2)O(_5)</td>
<td>[58.00]</td>
<td>45.73</td>
</tr>
<tr>
<td>SO(_3)</td>
<td>2.19</td>
<td>1.73</td>
</tr>
<tr>
<td>H(_2)O</td>
<td>[35.47]</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

(1) Packrat mine, near Gateway, Mesa County, Colorado, USA; average of 7 electron microprobe analyses, H\(_2\)O calculated from structure, VO\(_2\) and V\(_2\)O\(_5\) allocated from total V as V\(_5\)O\(_3\) = 59.87 and structure analysis; corresponds to \[[(\text{V}^{5+}\text{O}_2)\text{Al}_{8.94}(\text{OH})_{17.88}(\text{H}_2\text{O})_{15.88}]2[\text{H}_2\text{V}^{4+}\text{V}^{5+}\text{O}_{28}]\]
\[\text{[V}^{5+}_{10}\text{O}_{28}]\text{2[Na}_{0.82}\text{Ca}_{0.35}\text{K}_{0.27}]^{2+0.44}(\text{SO}_4)_{1.33} \cdot 70.24\text{H}_2\text{O}][(+0.94 H)].  
(2) Do., Normalized.

**Occurrence:** A secondary mineral formed by oxidation in a moist, low-temperature, post-mining environment from montroseite-corsivusite and/or asphaltum assemblages on sandstone in a Colorado Plateau type, roll-front uranium/vanadium deposit.

**Association:** Gypsum, barite (West Sunday mine), huemulite (Packrat mine), postite (Burro mine), montroseite, corsivusite.

**Distribution:** From the, Packrat mine (near Gateway, Mesa County), Burro and West Sunday mines (Slick Rock district, San Miguel County), Uravan Mineral Belt, Colorado, USA.

**Name:** Honors the American geochemist William H. Casey (b. 1955), Distinguished Professor in the Departments of Chemistry and Earth & Planetary Sciences, University of California, Davis, USA, for his contributions in aqueous solution chemistry of natural waters, mineral surface chemistry, and reaction kinetics.

**Type Material:** Natural History Museum of Los Angeles County, Los Angeles, California, USA (73526, 73527, 73528, 73529, 73530, and 73531).

**References:**  

Mineralogical Society of America  
Handbook of Mineralogy  
Revised 10/10/2020