## Beckettite $Ca_2V_6Al_6O_{20}$

**Crystal Data**: Triclinic. *Point Group*: $\bar{1}$. As aggregates of grains to 48 $\mu$m.

**Physical Properties**: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. Hardness = n.d. D(meas.) = n.d. D(calc.) = n.d.

**Optical Properties**: n.d. *Color*: n.d. S*treak*: n.d. *Luster*: n.d.
*Optical Class*: n.d.

**Cell Data**: Space Group: $P\bar{1}$. $a$ = 10.367 $b$ = 10.756 $c$ = 8.895 $\alpha$ = 106.0° $\beta$ = 96.0° $\gamma$ = 124.7° Z = 2

**X-ray Powder Pattern**: Calculated pattern.
2.544 (100), 2.089 (89), 2.104 (84), 2.103 (84), 2.541 (81), 2.540 (75), 2.683 (68)

**Chemistry**:

| | (1) |
|---|---|
| $Na_2O$ | 0.04 |
| CaO | 13.58 |
| MgO | 1.22 |
| FeO | 0.35 |
| MnO | 0.05 |
| $Al_2O_3$ | 44.14 |
| $Sc_2O_3$ | 0.7 |
| $V_2O_3$ | 31.6 |
| $SiO_2$ | 2.02 |
| $TiO_2$ | 5.54 |
| Total | 99.24 |

(1) Allende CV3 meteorite; average of 5 electron microprobe analyses; corresponds to $(Ca_{1.99}Na_{0.01})_{\Sigma=1.00}(V^{3+}_{3.47}Al_{1.40}Ti^{4+}_{0.57}Mg_{0.25}Sc_{0.08}Fe^{2+}_{0.04}Mn_{0.01})_{\Sigma=5.82}(Al_{5.72}Si_{0.28})_{\Sigma=6.00}O_{20}$.

**Mineral Group**: Aenigmatite group of the sapphirine supergroup.

**Occurrence**: Probably formed in the parent body of a carbonaceous chondrite meteorite by late-stage metasomatic reactions in which grossular, corundum, coulsonite, and hercynite, replace primary phases such as melilite, hibonite, spinel, perovskite, and burnettite.

**Association**: Corundum, grossular, anorthite, coulsonite, hercynite.

**Distribution**: In a V-rich, fluffy Type A Ca-Al-rich inclusion (CAI) A-WP1 in Allende carbonaceous chondrite CV3, Pueblito de Allende, Chihuahua, Mexico.

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**Type Material**: National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (USNM 7617).

**References**: (1) Ma, C., J. Paque, and O. Tschauner (2016) Discovery of beckettite, $Ca_2V_6Al_6O_{20}$, a new alteration mineral in a V-rich Ca-Al-rich inclusion from Allende. 47th Lunar and Planetary Science Conference, session T335, 1704. (2) (2020) Amer. Mineral., 105(10), 1599 (abs. ref. 1).