

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As grains, to 250 μm. *Twinning:* Simple, rarely polysynthetic, on (001).

**Physical Properties:** *Cleavage:* Distinct on (001), particularly for OH:F ≈ 1. *Tenacity:* Brittle. *Fracture:* n.d. Hardness = 5-6 VHN = 280-320, 300 average (50 g load). D(meas.) = n.d. D(calc.) = 2.866

**Optical Properties:** Transparent. *Color:* Light-pink, colorless in thin-section. *Streak:* n.d. *Luster:* Vitreous. *Optical Class:* Biaxial (-) α = 1.594(2) β = 1.605(2) γ = 1.608(2) 2V(meas.) = 40°-55° 2V (calc.) = 54.8° *Orientation:* X ∧ c = 15(2)°, Z = b.

**Cell Data:** *Space Group:* P2<sub>1</sub>/a. a = 11.44637(18) b = 5.05135(8) c = 8.85234(13) β = 108.8625(7)° Z = 2

**X-ray Powder Pattern:** Upper Chegem caldera, Kabardino-Balkaria, Northern Caucasus, Russia. 1.9040 (100), 3.0344 (37), 1.8952 (37), 5.4202 (30), 1.6587 (28), 2.7737 (25), 1.8027 (23)

| Chemistry:                     | (1)         | (2)         |
|--------------------------------|-------------|-------------|
| TiO <sub>2</sub>               | 0.09        | 0.10        |
| SiO <sub>2</sub>               | 28.20       | 28.02       |
| Fe <sub>2</sub> O <sub>3</sub> | 0.04        | 0.02        |
| CaO                            | 66.19       | 66.38       |
| MgO                            | 0.05        | 0.04        |
| MnO                            | n.d.        | 0.03        |
| F                              | 6.22        | 6.09        |
| Cl                             | n.d.        | 0.03        |
| H <sub>2</sub> O               | [1.25]      | [1.33]      |
| <u>-O = F + Cl</u>             | <u>2.64</u> | <u>2.56</u> |
| Total                          | 99.40       | 99.48       |

(1) Upper Chegem caldera, Kabardino-Balkaria, Northern Caucasus, Russia; average electron microprobe analysis supplemented by Raman spectroscopy, H<sub>2</sub>O calculated for charge balance; corresponds to Ca<sub>5</sub>(Si<sub>1.99</sub>Ti<sub>0.01</sub>)<sub>Σ=2</sub>O<sub>8</sub>[F<sub>1.39</sub>(OH)<sub>0.61</sub>]<sub>Σ=2</sub>. (2) Do.; average electron microprobe analysis supplemented by Raman spectroscopy, H<sub>2</sub>O calculated for charge balance; corresponds to Ca<sub>5.01</sub>(Si<sub>1.98</sub>Ti<sub>0.01</sub>)<sub>Σ=1.99</sub>O<sub>8</sub>[F<sub>1.36</sub>(OH)<sub>0.62</sub>]<sub>Σ=1.98</sub>.

**Polymorphism & Series:** Forms a series with reinhardbraunsite.

**Mineral Group:** Humite group.

**Occurrence:** A rock-forming mineral in contact-metasomatic, spurrite-rondorfite-ellestadite skarn in carbonate-xenoliths in ignimbrites.

**Association:** Rondorfite, lakargiite, kimzeyite, srebrodolskite, bultfonteinite, Ca-hydrosilicates, ettringite.

**Distribution:** From between Lakargi and Vorlan mountain peaks, Upper Chegem caldera, Kabardino-Balkaria, Northern Caucasus, Russia.

**Name:** Derives from *Kum-Tyube*, the name of a mountain plateau near where the mineral was found.

**Type Material:** A.E. Fersman Mineralogical Museum, Moscow, Russia (3732/1).

**References:** (1) Galuskina, I.O., B. Lazic, T. Armbruster, E.V. Galuskin, V.M. Gazeev, A.E. Zadov, N.N. Pertsev, L. Ježak, R. Wrzalik, and A.G. Gurbanov (2009) Kumtyubeite Ca<sub>5</sub>(SiO<sub>4</sub>)<sub>2</sub>F<sub>2</sub> - A new calcium mineral of the humite group from Northern Caucasus, Kabardino-Balkaria, Russia. *Amer. Mineral.*, 94, 1361-1370.