

Chevkinite-(Ce)**(Ce, La, Ca)₄(Fe²⁺, Mg)₂(Ti, Fe³⁺)₃Si₄O₂₂**

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Crystal Data: Monoclinic. *Point Group:* 2/m. Small lamellar, lenticular, and prismatic crystals; massive, in lumps to 10 cm. *Twinning:* Twin plane {001}.

Physical Properties: *Fracture:* Irregular to conchoidal. *Tenacity:* Brittle. Hardness = 5.5–6 D(meas.) = 4.53–4.67 D(calc.) = [4.99]

Optical Properties: Opaque except on thin edges. *Color:* Dark reddish brown to black. *Luster:* Resinous to dull.

Optical Class: Biaxial (-). *Pleochroism:* X = almost colorless; Y = reddish brown; Z = dark brown. *Orientation:* Z ∧ c = 11°–26°. *Dispersion:* r < v, distinct to strong. *Absorption:* Z > Y > X. α = n.d. β = 1.88–2.02 γ = n.d. 2V(meas.) = Medium.

Cell Data: *Space Group:* P2₁/a. a = 13.370(3) b = 5.660(2) c = 11.280(3) β = 100°52(2)' Z = [2]

X-ray Powder Pattern: Meade Co., Kansas, USA; some materials are metamict. 3.17 (100), 3.14 (100), 2.71 (100), 2.16 (50), 1.961 (50), 4.58 (40), 3.46 (40)

| Chemistry: | (1) | (2) | | (1) | (2) |
|--------------------------------------|-------|-------|--------------------------------|-------|-------|
| SiO ₂ | 19.23 | 12.04 | Nb ₂ O ₅ | 0.01 | |
| TiO ₂ | 19.61 | 17.08 | FeO | 8.85 | 7.76 |
| ThO ₂ | 0.73 | 0.82 | MnO | 1.11 | 0.50 |
| Al ₂ O ₃ | 2.17 | 0.93 | MgO | 0.05 | 0.74 |
| Y ₂ O ₃ | 0.93 | 1.50 | CaO | 2.49 | 3.35 |
| (La, Dy) ₂ O ₃ | 18.77 | 18.35 | (Na, K) ₂ O | 0.10 | |
| Ce ₂ O ₃ | 20.52 | 25.29 | H ₂ O | 0.81 | 1.50 |
| Fe ₂ O ₃ | 2.60 | 9.56 | P ₂ O ₅ | | 0.38 |
| Cr ₂ O ₃ | 0.07 | | SO ₃ | 0.15 | |
| | | | Total | 98.10 | 99.80 |

(1) Ural Mountains, Russia. (2) Mohave Co., Arizona, USA.

Polymorphism & Series: Dimorphous with perrierite.

Occurrence: As an accessory mineral in some granites, and in pegmatites associated with alkalic granite and syenites; in air-fall ash deposits.

Association: Titanite, monazite, apatite, cronstedtite, quartz (Aquarius Mountains, Arizona, USA).

Distribution: From the Ilmen Mountains, Southern Ural Mountains; the Keivy massif, Kola Peninsula; and elsewhere in Russia. At Buer, Björkedalen, Norway. From Glen Bay, Na h-Eagan, and Conachair, in the Isles of St. Kilda, Outer Hebrides, Scotland. In Madagascar, from the Tordendrika-Ifasina region, Androngovato, and Ifasina, Ambatofinandrahana. In the USA, in the Aquarius Mountains, Mohave Co., Arizona; the Jemez Mountains and Pueblo Mesa, Rio Arriba Co., New Mexico; at Onion Creek, Grand Co., Utah; in Yellowstone National Park, Wyoming; from Irish Flats, Meade Co., Kansas. Also in the Spruce Pine district, Mitchell Co., North Carolina; near Martin's Store, Nelson Co., Virginia; and in New Hampshire, from near Stark, Coos Co. A few other localities have been verified.

Name: In honor of General-Major Konstantin Vladimirovich Tschevkin [Chevkin] (1802–1875), Chief of Staff of the Russian Mining Engineers Corps.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 718. (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 309–312. (3) Kauffman, A.J., Jr. and H.W. Jaffe (1946) Chevkinite (tscheffkinite) from Arizona. *Amer. Mineral.*, 31, 582–588. (4) Mitchell, R.S. (1966) Virginia metamict minerals: perrierite and chevkinite. *Amer. Mineral.*, 51, 1394–1405. (5) Izett, G.A. and R.E. Wilcox (1968) Perrierite, chevkinite, and allanite in upper Cenozoic ash beds in the western United States. *Amer. Mineral.*, 53, 1558–1567.

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