

Chukhrovite-(Y)**Ca₃(Y, Ce)Al₂(SO₄)F₁₃•10H₂O**

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Crystal Data: Cubic. *Point Group:* $2/m\bar{3}$. Crystals show varying degrees of dominance of {100} and {111}, to 1 cm.

Physical Properties: *Cleavage:* On {111}, distinct. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = ~3 D(meas.) = 2.274–2.398 D(calc.) = [2.16]

Optical Properties: Transparent to opaque. *Color:* Colorless, white, rarely with a lilac tint. *Luster:* Vitreous to pearly, greasy on fracture surfaces.

Optical Class: Isotropic, anomalously birefringent. $n = 1.42\text{--}1.44$

Cell Data: *Space Group:* $Fd\bar{3}$. $a = 16.80(0.5)$ $Z = 8$

X-ray Powder Pattern: Kara-Oba deposit, Kazakhstan. 2.193 (10), 1.834 (10), 3.261 (9), 2.572 (9), 2.843 (8), 1.684 (8), 1.512 (8)

Chemistry:	(1)
SO ₃	10.38
Al ₂ O ₃	10.56
RE ₂ O ₃	18.00
MgO	0.40
CaO	21.52
(Na, K) ₂ O	trace
F	28.32
H ₂ O ⁺	10.80
H ₂ O ⁻	12.00
insol.	trace
-O = F ₂	11.89
Total	100.09

(1) Kara-Oba deposit, Kazakhstan; RE₂O₃ = Y₂O₃ [40.9%], La₂O₃ 5%, Ce₂O₃ 15%, Pr₂O₃ 4%, Nd₂O₃ 12%, Sm₂O₃ 7.2%, Eu₂O₃ 0.2%, Gd₂O₃ 6.5%, Tb₂O₃ 0.9%, Dy₂O₃ 4.1%, Ho₂O₃ 0.8%, Er₂O₃ 1.7%, Tm₂O₃ 0.3%, Yb₂O₃ 1.2%, Lu₂O₃ 0.2% by X-ray spectroscopy; corresponds to Ca_{3.03}(Y, Ce)_{0.95}Al_{1.62}(SO₄)_{1.00}[F_{11.46}(OH)_{0.40}]_{Σ=11.86}•9.55H₂O.

Occurrence: In the oxidation zone of a Mo–W deposit.

Association: Halloysite, gearsutite, fluorite, creedite, anglesite, “limonite”.

Distribution: From the Kara-Oba Mo–W deposit, Bet-Pak-Dal Desert, central Kazakhstan.

Name: Honors Fedor Vasil’evich Chukhrov (1908–1988), Russian mineralogist, Director, Institute of Geology of Ore Deposits, Petrology, Mineralogy, and Geochemistry, Moscow, Russia, and *yttrium*, the dominant rare-earth element.

Type Material: Vernadsky State Geological Museum, 46354; Russian Research Institute of Mineral Resources; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 61518, 61519; National Museum of Natural History, Washington, D.C., USA, 144183.

References: (1) Ermilova, L.P., V.A. Moleva, and R.F. Klevtsova (1960) Chukhrovite, a new mineral from central Kazakhstan. *Zap. Vses. Mineral. Obshch.*, 89, 15–25 (in Russian). (2) (1960) *Amer. Mineral.*, 45, 1132 (abs. ref. 1). (3) Mathew, M., S. Takagi, K.R. Waerstad, and A.W. Frazier (1981) The crystal structure of synthetic chukhrovite, Ca₄AlSi(SO₄)F₁₃•12H₂O. *Amer. Mineral.*, 66, 392–397. (4) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union. *Ocean Pictures*, Moscow, 66.

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