Chukhrovite-(Ca) $Ca_{4.5}Al_2(SO_4)F_{13}\cdot 12H_2O$

Crystal Data: Isometric. *Point Group*: $2/m\ \bar{3}$. Forms sharp octahedral crystals, to 150 μm. *Twinning*: Contact twins by rotation of 90° around [001] (iron cross law) are common.

Physical Properties: *Cleavage*: None. *Fracture*: Indistinct. *Tenacity*: Brittle. *Hardness* = 3.5 D(meas.) = n.d. D(calc.) = 2.23

Optical Properties: Translucent to transparent. *Color*: Colorless to white. *Streak*: White. *Luster*: Vitreous.
Optical Class: Isotropic. n = 1.432(1)

Cell Data: *Space Group*: $F2/d\ \bar{3}$. a = 16.749(1) Z = 8

X-ray Powder Pattern: Val Cavallizza mine, Cuasso al Monte, Varese province, Italy.
9.665 (100), 5.921 (31), 1.915 (17), 5.053 (16), 3.226 (15), 2.182 (12), 4.190 (10)

Chemistry:

	(1)	(2)
SiO_2	0.03	
SO_3	10.64	8.94
Al_2O_3	15.72	22.77
FeO	0.34	
CaO	35.74	28.18
Na_2O	0.49	
F	36.61	27.58
H_2O	[15.85]	24.15
$-O=F_2$	15.42	11.61
Total	100.00	100.00

(1) Val Cavallizza mine, Varese province, Italy; average of 5 electron microprobe analyses, some H_2O lost during analysis, H_2O by difference, H_2O and SO_4 confirmed by spectroscopy; corresponding to $(Ca_{4.33}Na_{0.11}Fe_{0.03})_{\Sigma=4.47}Al_{2.10}(S_{0.90}O_{3.72})F_{13.10}\cdot 5.98H_2O$.
(2) $Ca_{4.5}Al_2(SO_4)F_{13}\cdot 12\ H_2O$.

Mineral Group: Chukhrovite group**.**

Occurrence: From low-temperature hydrothermal crystallization on the surfaces of fractures crosscutting a vein of marcasite and REE-bearing fluorite.

Association: Marcasite, REE-bearing fluorite, gypsum, hydrated Fe oxides, galena, sphalerite.

Distribution: From the Val Cavallizza Pb-Zn-Ag mine, Cuasso al Monte, Varese province, Italy.

Name: For the Ca-dominant species of the *chukhrovite* mineral group.

Type Material: Museum of Natural History, Milan, Italy (M37901) and the Laboratory of Mineralogy, University of Liège, Belgium (#20383).

References: (1) Vignola, P., F. Hatert, D. Bersani, V. Diella, P. Gentile, and A. Risplendente (2012) Chukhrovite-(Ca), $Ca_{4.5}Al_2(SO_4)F_{13}\cdot 12H_2O$, a new mineral species from the Val Cavallizza Pb-Zn-(Ag) mine, Cuasso al Monte, Varese province, Italy. Eur. J. Mineral., 24, 1069-1076. (2) (2015) Amer. Mineral., 100, 1322 (abs. ref. 1).