

MinIdent-Win - fluorapatite

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Formula: $\text{Ca}_5[\text{PO}_4]_3\text{F}$

Status: Mineral name is IMA approved or traditional

Level: Species

Parents: apatite-group and apatite-super-group

Symmetry: Hexagonal

Mean Atomic Number: 15.2

Diffraction Values: 2.800, 2.700, 2.770, 3.440, 2.620

Kretz abbreviation: Ap

First Described in 1876

Space Group: P6(3)/m

Z number: 2

ICDD (TM) Number: 35-496

	Minimum	Maximum	Average	Std. Dev.
a (A)	9.340	9.480	9.410	
b (A)	9.340	9.480	9.410	
c (A)	6.811	6.910	6.890	
Alpha	90.000	90.000	90.000	
Beta	90.000	90.000	90.000	
Gamma	120.000	120.000	120.000	
Volume	514.890	529.893	519.857	

	Minimum	Maximum	Average	Std. Dev.
n(Omega)	1.603	1.646	1.629	
n(Epsilon)	1.598	1.641	1.625	
Max. birefringence	0.004	0.013	0.006	

Optical Sign: +ve or -ve

C(Omega)	<input type="text"/>	Colourless
C(Epsilon)	<input type="text"/>	Colourless

	Minimum	Maximum	Average	Std. Dev.
Mohs	5.0	5.0	5.0	
Vickers	483	483	483	
Density	3.10	3.35	3.20	

	Total Min Wt (%)	Anal. Min Wt (%)	Average Wt (%)	Anal. Max Wt (%)	Total Max Wt (%)	Average Atomic	Coordination
H	0.0000	0.0000	0.0933	0.2462	0.2462	0.4796	
C	0.0000	0.0000	0.6848	1.2090	3.9868	0.2960	
O	32.3725	32.3725	38.7065	42.3265	42.3265	12.5599	
F	1.6500	1.6500	3.7644	5.6000	5.6000	1.0286	
Na	0.0000	0.0000	0.1122	1.3650	1.3650	0.0253	7 9
Mg	0.0000	0.0000	0.1070	0.5729	0.5729	0.0229	7 9
Al	0.0000	0.0000	0.2350	0.6245	0.6245	0.0452	4
Si	0.0000	0.0000	1.0611	1.1406	1.1406	0.1961	4
P	10.2806	15.1132	16.4468	18.6509	18.6509	2.7572	4
S	0.0000	0.0000	0.0081	0.1500	0.1500	0.0013	4
Cl	0.0000	0.0000	0.0433	2.7800	2.7800	0.0063	
K	0.0000	0.0000	0.0353	0.1411	0.1411	0.0047	7 9
Ca	23.4920	23.4920	38.5621	40.7161	44.3490	4.9952	7 9
Ti	0.0000	0.0000	0.0011	0.0240	0.0240	0.0001	7 9
V	0.0000	0.0000	0.0002	0.0060	0.0060	0.0000	4
Mn	0.0000	0.0000	1.9417	14.9548	14.9548	0.1835	7 9
Fe	0.0000	0.0000	0.5009	2.9927	2.9927	0.0466	7 9
As	0.0000	0.0000	0.0024	0.0700	0.0700	0.0002	4
Sr	0.0000	0.0000	0.0220	22.6364	22.6364	0.0013	7 9
Y	0.0000	0.0000	0.0828	1.5040	1.5040	0.0048	7 9
Ba	0.0000	0.0000	0.0105	0.5016	0.5016	0.0004	7 9
La	0.0000	0.0000	0.1561	2.2937	2.2937	0.0058	7 9

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Ce	0.0000	0.0000	0.2700	4.1066	4.1066	0.0100	7 9
Pr	0.0000	0.0000	0.0130	0.3674	0.3674	0.0005	7 9
Nd	0.0000	0.0000	0.0694	1.7747	1.7747	0.0025	7 9
Sm	0.0000	0.0000	0.0189	0.3881	0.3881	0.0007	7 9
Eu	0.0000	0.0000	0.0022	0.0777	0.0777	0.0001	7 9
Gd	0.0000	0.0000	0.0134	0.2169	0.2169	0.0004	7 9
Dy	0.0000	0.0000	0.0085	0.2178	0.2178	0.0003	7 9
Er	0.0000	0.0000	0.0034	0.1137	0.1137	0.0001	7 9
Tm	0.0000	0.0000	0.0026	0.0263	0.0263	0.0001	7 9
Yb	0.0000	0.0000	0.0902	1.2910	1.2910	0.0027	7 9
Pb	0.0000	0.0000	0.0066	0.0464	0.0464	0.0002	
Bi	0.0000	0.0000	0.0287	0.0987	0.0987	0.0007	
Th	0.0000	0.0000	0.0005	0.0170	0.0170	0.0000	7 9
U	0.0000	0.0000	0.0030	0.0881	0.0881	0.0001	7 9
Total			103.1080			22.6794	

Atomic proportions calculated for Si+P+S+V+As+Al = 3.0

Compilation based on 6 general and 48 sample records

Values in italics are calculated from the minimum and maximum values. Other data are from the sample and general records.

Lustre	Vitreous, Resinous
Aggregation	Mamillary, Concretionary, Massive, Granular, Globular, Stalactitic, Oolitic, Colloform
Habit	Prismatic, Tabular, Granular
Tenacity	Brittle
Fracture	Conchoidal, Subconchoidal, Uneven
Cleavage	{0001} Imperfect
Surface Colour	 Pale Yellow, Yellow, Greenish Yellow, Yellowish Green, Pale Blue, Blue, Pale Brown, Brown, Pale Violet, Violet, Colourless, White
Streak	 Colourless, White
Fluor. Short	 Yellow, Greenish Yellow, Pink, Blue, Pale Green, Pale Creamy White, Orange
Fluor. Unspec	 Yellow, Yellowish Brown, Yellowish Brown, Greenish Yellow, Pale Brownish Orange, Yellowish Orange, Golden Yellow
Fluor. Long	 Yellow, Pink, White, Pinkish White, Blue
Other lumin.	 Cathodoluminescent: Yellow, Blue, Pale Green, Greenish Blue, Yellowish Green, Pink, Dark Pink, Violet, Reddish Orange, Thermoluminescence:

Comp. Plan.	Comp. Surf.	Twin Plane	Twin Axis	Notes
		{11-21}		Contact
		{10-13}		

Synonyms: tavistockite, manganapatite, sombreroite, apatite-(CaF)

Remarks: Colour very variable from white to shades of grey, yellow, green, blue, violet, purple, red or brown; but the streak is always white. The lustre also varies from vitreous to resinous and is occasionally silky. Fluorapatite is brittle with an uneven to conchoidal fracture. Crystals are usually prismatic but can be tabular and the mode of aggregation ranges from massive and compact or granular to stalactitic, reniform, globular, oolitic, nodular and sometimes even fibrous. Fluorapatite is the "common" member of the apatite group.

Occurrences: As an accessory mineral in a wide range of rocks from igneous to metamorphic and sedimentary. Also in hydrothermal veins. In phosphate pegmatites, very large crystals can sometimes occur. In sedimentary rocks, entire beds may be made up of apatite (e.g., the Phosphoria Formation of Florida). It

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Fluorapatite on calcite



Dorian G.W. Smith

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Caption: Stout prismatic crystal of blue-green apatite are terminated by faces of the form {10-11}. The apatite crystals show well the vitreous lustre that become somewhat greasy in places. The imperfect basal cleavage is also very apparent, particularly towards the broken base of the uppermost crystal. The apatite is associated in this specimen with pale brown, massive calcite. Locality: Sludyanka, Transbaikal, Siberia, Russia.

Keywords: fluorapatite; apatite; apatite-super-group; phosphates; calcite; carbonates; prismatic habit; basal cleavage; vitreous to greasy lustre; Sludyanka; Transbaikal; Siberia; Russia

Acknowledgements: From a specimen kindly made available by the Provincial Museum of Alberta, Courtesy Ron Mussieux, Curator. Photography by Dorian Smith.

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has also been found in returned Lunar samples.

Localities of samples used in compilation: Lemnas, kimito, southwest Finland. Viitaniemi, Eräjärvi, Finland. Varuträsk, Sweden. Saint-Aubin-des-Châteaux, Brittany, France. Stromboli Volcano, Æolian Islands, southern Italy. Schwarzwald, southwestern Germany. Eibenstein an der Thaya, Austria. Pilansberg Ring Complex, Rustenburg District, Western Bushveld Complex, Northwest Province, South Africa. Near Libby, Montana; Hugo mine, Keystone, South Dakota, U.S.A. Durango, Mexico. La Madera Córdoba, Argentina. Bayan Obo, Inner Mongolia, China. Johnston Fjord, Stornes Peninsula and Brattnevet, Larsemann Hills, Prydz Bay, Antarctica. The Moon.

References: Lithos v.42, p.89-103. Can. Min. v.42, p.1799-1823; v.45, p.293-305. Eur. J. Min. v.18, p.233-241. Amer. Min. v.89, p.629-632; v.91, p.1412-1424. Min. Mag. v.71, p.223-234. Eur. J. Mineral. v.20, p.205–216. Deer et al. (1962) v.5, p.325. Roberts et al. (1974) Encycl. Mins. USGS Bull. 1627. Phosphate Minerals in Meteorites & Lunar Rocks, p.210. Strunz & Nickel (2001).