

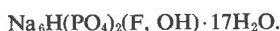
NEW MINERAL NAMES

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Natrophosphate

YU. L. KAPUSTIN, A. V. BYKOVA, AND V. I. BUKIN (1972)
Natrophosphate, a new mineral. *Zapiski Vses Mineral. Obshch.* **101**, 80-86 (in Russian).

Analyses by Bykova gave Na₂O 28.40, 28.35, 29.15; K₂O 0.32, —, —; P₂O₅ 22.10, 21.86, 21.42; F 0.42, 2.79, 2.60; H₂O 49.20, 48.45, 48.10, -(O = F₂) 0.17, 1.18, 1.07, sum 100.27, 100.27, 100.20%, corresponding to:



Spectrographic analysis showed traces of Mn, Ba, Fe, Ca, and Sr. The mineral is readily synthesized by crystallization from solutions containing sodium metaphosphate, NaF, and H₃PO₄; the synthetic compound has the same composition and X-ray pattern.

Oscillation and Laue photographs show the mineral to be cubic, space group *Fd3c*, *a* 27.79 ± 0.05 Å. The strongest lines (52 given, Cr radiation) are 8.12 (8) (222), 4.94 (6) (440), 4.03 (6) (444), 3.07 (6), 2.90 (6) (031), 2.68 (10) (951, 666, 10.2.), 2.43 (9) (971, 11.3.1).

Colorless to white, luster vitreous to greasy, H. 2.5, G. 1.71-1.72. Luminesces weakly orange in U.V. light. Cleavage octahedral imperfect, fracture conchoidal. Isotropic, *n* 1.460-1.462.

The mineral occurs as monomineralic aggregates up to 5 × 3 cm, sometimes surrounded by a rim of villiaumite, in the central cavernous zone of pegmatite in ijolite-urtite of Yukspor Mt., Khibina massif, Kola Peninsula. On exposure it alters and becomes covered by a film of villiaumite and secondary phosphates.

The name is for the composition. Type material is preserved at the Mineralogical Museum, Acad. Sci. USSR, Moscow. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, IMA.

Grimselite, Unnamed Carbonates (K-Ca and K-Ca-Mg)

KURT WALENTA (1972) Grimselit, ein neues Kalium-Natrium-Uranylkarbonat aus dem Grinselgebiet (Oberhasli, Kt. Bern, Schweiz): *Schweiz. Mineral. Petrog. Mitt.* **52**, 93-108.

Microchemical and probe analyses showed the mineral to contain K, Na, U, and CO₂; spectrographic analyses showed also small amounts of Al, Ca, and Mg, very little Cu, Fe, and Si, and Mn in traces. Analysis of synthetic material, with X-ray and optical data identical to those of the mineral, give K 18.52, Na 3.82, UO₂ 44.34, CO₂ 29.63, H₂O (at 180°) 2.4, sum 98.71% (Fresenius Lab., analyst). This corresponds to K₂Na(UO₂)(CO₃)₂·H₂O. Dissolved by water to give an alkaline solution (pH 8-9). Loss on heating: 100, 0.31; 200°, 2.41; 300°, 3.26%. The

DTA curve (on synthetic) shows endothermic breaks at 260° (small), 405° (distinct), 475° (large), 730° (distinct), and 835° (distinct). The mineral was synthesized from solutions of K₂CO₃, Na₂CO₃, and uranyl acetate.

Crystals show the forms *m*{101̄0} (dominant), *x*{101̄1}, and *c*{0001}. The X-ray powder pattern was indexed on a hexagonal cell, space group *P6̄2c*, *a* 9.30, *c* 8.26 Å., *Z* = 2, G. meas (synthetic) 3.30, calc 3.27. The strongest lines (74 given) are 8.09(8) (101̄0), 5.76(11)(101̄1), 3.65(7d)(101̄2, 202̄1), 3.08(8)(112̄2), 2.86(7)(202̄2, 213̄1), 2.68(7)(303̄0), 2.03(6)(213̄3, 224̄2, 1.032(6), 0.985(8).

Color yellow, streak pale yellow, does not fluoresce in U.V. light. No distinct cleavage, fracture conchoidal, brittle, H. 2-2½. Optically uniaxial to slightly biaxial, negative, *ns* ω 1.601, ε 1.480 (both ±0.002), pleochroic O yellow, E nearly colorless.

The mineral occurs as crusts of fine-grained aggregates, mostly of anhedral grains, in the cable tunnel between Gerstenegg and Sommerloch, Grimsel area, Aar massif, Oberhasli, Canton, Bern, Switzerland, associated with schroëckingerite, monohydrocalcite, and two new unnamed carbonates, where granodiorite, and aplite granite are cut by fissure veins and mineralized zones.

The name is for the locality. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, IMA. Type material is preserved at the University of Stuttgart, Germany.

One unnamed new carbonate contains K, Ca and a little Mg and Fe. Decomposed by H₂O, dissolved by HCl. Color pale rose. It occurs in aggregates of acicular crystals, apparently orthorhombic. Optically biaxial, neg., 2*V* about 25°, α 1.426, γ 1.508 (both ±0.002), *X* parallel to elongation. The strongest X-ray lines (18 given) are 6.11 (9), 3.20 (10), 2.90 (8), 2.37 (5), 2.31 (5), 1.917 (5).

The second new carbonate contains K and Mg and less Ca. It occurs in small colorless grains. Decomposed by water, dissolved by HCl. Optically biaxial, pos., 2*V* about 64°, *ns* α 1.462, γ 1.531 (both ±0.002). Probably orthorhombic. The strongest X-ray lines (26 given) are 6.33 (6), 3.12 (8), 2.98 (10d), 2.56 (7), 2.47 (8), 2.06 (7).

Discussion. The last compound is very similar in its optics to K₂Mg(CO₃)₂·4H₂O, orth., α 1.465, β 1.485, γ 1.535, 2*V* + 65° (quoted by Winchell and Winchell, 1964).

Ilmajokite

I. V. BUSSEN, L. F. GANNIBAL, E. A. GOIKO, A. N. MER'KOV, AND A. P. NEDOREZOVA (1972) Ilmajokite, a new mineral from the Lovozero Tundra. *Zapiski Vses. Mineral. Obshch.* **101**, 75-79 (in Russian).

Analysis by LFG on 1.6 g gave SiO₂ 35.55, TiO₂ 16.95, ZrO₂ 0.03, Nb₂O₅ 0.02, Ta₂O₅ 0.01, Al₂O₃ 0.28, Fe₂O₃ 0.07,

CaO 0.04, SrO 0.02, BaO 2.65, RE (= RE₂O₃?) 4.93, Na₂O 12.40, K₂O 0.40, H₂O⁻ 7.76, H₂O⁺ 16.78, CO₂ 1.46, S, P, F absent, sum 99.36%. The rare earths were determined ($\Sigma \text{TR}_2\text{O}_3 = 100\%$) as La₂O₃ 26.8, Ce₂O₃ 51.2, Pr₂O₃ 3.6, Nd₂O₃ 17.8, Sm₂O₃ 0.6%. The formula is given as:



or considering the C to be present as nahcolite, as



Infra-red study showed the presence of both OH groups and molecular water.

Before the blowpipe ilmajokite sinters to a white porcelain-like enamel, coloring the flame yellow, then melts to a white vesicular enamel. Loss of water begins at 60°. An endothermic peak on the DTA curve at 175° corresponds to a loss of weight of 12.7%. At 320°, 6.5% of H₂O is retained; loss of H₂O concludes at 760°. Melting occurs at 800°. An exothermic break occurs at 860°. The mineral is decomposed by water at 20°, giving amorphous silica, and by acids giving slight effervescence and amorphous silica gel.

The X-ray pattern was weak. The strongest lines (48 given) were: 11.5 (10), 10.9 (7), 10.2 (9), 4.3 (10), 3.7 (7), 3.1 (9), 2.48 (7), 2.44 (10). Monoclinic (?), $a \sim 23$, $b \sim 24.4$, $c \sim 37\text{Å}$.

Color bright yellow, luster vitreous. Perfect cleavages on the rhombic prism and pinacoid intersect at 72°. H. = 1, brittle. G. 2.20 ± 0.02 . Optically biaxial, positive, $n_s \alpha 1.573$, $\beta 1.576$, $\gamma 1.579$, $2V 90^\circ$.

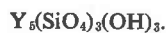
The mineral forms granular deposits, crusts, and brushes of crystals up to 2 mm long on the walls of cavities in the central natrolitic zone of pegmatites in the Lovozero Tundra, Kola Peninsula, near the valley of the Ilmajok River. Associated minerals are pale sphalerite, halite, mountainite, soda, and aegirine.

The name is for the locality. Type material is preserved at the museum of the Kola Branch, Acad. Sci. USSR. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, IMA.

Iimoriite

AKIRA KATO AND KOZO NAGASHIMA (1970) *In Introduction to Japanese Minerals*, pp. 39, 85–86.

Analysis by K. N. of about 1 g of hand-picked, purified material gave SiO₂ 19.09, P₂O₅ 0.91, $\Sigma \text{Y}_2\text{O}_3$ 64.99, $\Sigma \text{Ce}_2\text{O}_3$ 0.83, Ce₂O₃ 0.09, ThO₂ 0.11, U₃O₈ 0.88, CaO 0.85, (Zr, Hf)O₂ 1.43, MgO 0.71, Fe₂O₃ 1.33, Al₂O₃ 1.31, H₂O⁺ 5.85, H₂O⁻ 0.87, sum 99.25%. This corresponds to



X-ray study shows it to be triclinic, with supercell $P\bar{1}$ (subcell), structure along b and c axes, $a 11.6 \pm 0.05$, $b 6.65 \times 2 \pm 0.05$,

$c 2 \times 13.1 \pm 0.1\text{Å}$, $\alpha 94.3$, $\beta 95.0$, $\gamma 93.6^\circ$. The subcell contains $\text{Y}_{15}\text{MgSi}_9\text{O}_{34}(\text{OH})_{16}$. The strongest X-ray lines (private communication from A. Kato) (indexed on subcell) are 3.31(40) (020), 3.02 (65)(31 $\bar{2}$, 01 $\bar{4}$), 2.96 (100)(2 $\bar{2}0$, 20 $\bar{4}$, 12 $\bar{2}$), 2.88 (45) (004), 2.78 (50)(220, 114), 2.715 (50)(204, 222, 122, 40 $\bar{2}$).

Color light purplish gray, luster vitreous, streak white. H. 5 $\frac{1}{2}$ –6, G. 4.21 (meas), 4.22 (calc) Cleavage {011} distinct. In section colorless, optically biaxial, neg., $n_s \alpha 1.786$, $\beta = \gamma 1.827$ (all ± 0.050), $2V 5\text{--}15^\circ$.

The mineral occurs as masses up to $3 \times 3 \times 2$ cm in size in quartz-microcline pegmatite at Fusamata, Kawamata-machi, Fukushima Pref., Japan, associated with biotite, monazite, fergusonite, uranite, and an undetermined mineral. Also known from the nearby Suishoyama (formerly Iisaka) pegmatite as an alteration product of thalenite.

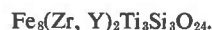
The name is for Dr. Satoyasu Iimori and the late Dr. Takeo Iimori, who described many rare-earth minerals from the pegmatites in this area.

Type material is preserved at the National Science Museum, Tokyo, and the U. S. National Museum, Washington. The mineral and name were approved in advance of publication by the Commission on New Minerals and Mineral Names, IMA.

Tranquillityite

J. F. LOVERING AND OTHERS (15 authors from 9 laboratories) (1971) Tranquillityite, a new silicate mineral from APOLLO XI and APOLLO XII basaltic rocks. *Proc. 2nd Lunar Sci. Conf., Jan. 11–14, 1971*, 1, 39–45, MIT Press.

Seventeen electron microprobe analyses are given on material from rock no. 10047 (APOLLO XI) and rocks 12018, 12039, 12051 (APOLLO XII). Ranges and averages for 12 of these are: SiO₂ 13.00–15.6, 14.00; TiO₂ 17.50–21.0, 19.45; Al₂O₃ 0.70–1.71, 1.12; Cr₂O₃ 0.06–0.19, 0.11; FeO 41.80–43.2, 43.48; MnO 0.16–0.36, 0.29; CaO 1.00–1.56, 1.26; ZrO₂ 16.20–17.8, 17.15; HfO₂ 0.04–0.60, 0.17; Y₂O₃ 1.28–5.40, 2.76; Nd₂O₃ 0.12–0.29, 0.24; Pr, Gd traces, U (by fission track) 56–93, 72 ppm, sum 99.32%. Six additional analyses are given by Peckett, Phillips, and Brown (*Nature*, 236, 215–217, 1972) from APOLLO XIV rocks; they agree well with these except for slightly higher TiO₂ (20.77–23.19, av. 21.93%) and lower ZrO₂ (13.90–15.41, av. 14.53%). They also report Y₂O₃ 0.50–0.52, av. 0.51%. Calculation of the average analysis gave the formula:



The X-ray pattern is indexed on a hexagonal cell with $a 11.69 \pm 0.05$, $c 22.25 \pm 0.10\text{Å}$, $Z = 3$, G. calc 4.7 ± 0.01 . The strongest X-ray lines (27 given) are 4.04 (5)(114), 3.23 (10)(302), 2.155 (6)(412, 308), 1.781 (7)(328).

The mineral is nearly opaque; thin crystals in strong transmitted light are deep foxy-red with $R = 12.9 \pm 0.2\%$ at 546 nm, so that n must be 2.11–2.13. Isotropic to

weakly anisotropic, non-pleochroic; one observer stated it to be biaxial $2V$ 40° .

The mineral occurs as thin laths from a few microns to approx. 65×15 microns in basaltic rocks as product of late stage crystallization, associated with interstitial phases such as troilite + metal, pyroxferroite, cristobalite, and alkali feldspar.

The name is for the Sea of Tranquillity from which the APOLLO XI rocks were collected. Type material is deposited in the Lunar Science Institute, Houston, Texas. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, IMA.

Unnamed Lunar Mineral (phase β)

E. L. HAINES, A. L. ALBEE, A. A. CHODOS, AND G. J. WASSERBURG (1971) Uranium-bearing minerals of lunar rock 12013. *Earth Planet. Sci. Lett.* **12**, 145-154.

Microprobe analyses gave TiO_2 22.1, 22.1; ZrO_2 17.1, 17.2; Nb_2O_5 8.6, 7.9; FeO 9.4, 13.8; CaO 3.0, 2.9; Y_2O_3 9.2, 8.9; La_2O_3 0.1, 0.2; Ce_2O_3 1.7, 1.6; Nd_2O_3 0.9, 0.9; other rare earths (calc) 2.4, 2.2; PbO 4.0, 4.2; ThO_2 4.7, 3.5; UO_2 3.2, 3.6; SiO_2 2.1, 2.0, sum 88.5 (given as 88.4), 91.0%. The cause of the low summations is not known.

The mineral occurs as irregular grains up to 5×10 microns in APOLLO XII rocks.

Unnamed Lunar Minerals (Phase X, Phase Y)

A. PECKETT, R. PHILLIPS, AND G. M. BROWN (1972) New zirconium-rich minerals from APOLLO XIV and XV lunar rocks. *Nature*, **236**, 215-217.

Electron microprobe analyses of "phase X" and "phase Y" gave TiO_2 68.8, 27.1; ZrO_2 6.1, 30.8; Cr_2O_3 4.3, 0.5;

Al_2O_3 0.9, 0.5; MgO 1.7, 0.1; FeO 13.4, 11.4; MnO 0.2, 0.3; CaO 3.1, 3.2; Y_2O_3 —, 10.4; RE_2O_3 1.3, 12.1; SiO_2 0.2, —; Nb, Pb, Th, U not found in either, sum 100.0, 96.4%. The rare earths (RE) in "phase Y" consist of La_2O_3 0.6, Ce_2O_3 1.9, Pr_2O_3 0.7, Nd_2O_3 3.3, Sm_2O_3 1.7, Eu_2O_3 0.4, Gd_2O_3 2.1, Tb_2O_3 0.3, Dy_2O_3 0.9, Ho_2O_3 0.2%. The cause of the deficiency in the analysis of "phase Y" is unknown; possibly the light elements Li, Be, B, C, N are present.

The authors state that "the new phase calculates to the zirkelite formula, $A^{+2}B_2^{+4}O_5$." The calculation actually gives on the basis of O_5 ,

"phase X":



"phase Y":



The two minerals are very similar in occurrence, crystal habit, and optical properties to tranquillityite. Both occur as rare, small crystals (12-40 microns) in the residual mesostasis of lunar basalts, with baddeleyite, whitlockite, K-Ba feldspar, and rhyolitic glass. "Phase X" is in APOLLO XIV basalt (no. 14310/20), "phase Y" in APOLLO XV basalt (no. 15555/39).

Both minerals are dark reddish-brown in transmitted light, with high n , and are nearly isotropic. In reflected light the grains are pale gray and rectangular or sheaf-like in habit.

NEW DATA

Freieslebenite

O. L. SVESHNIKOVA AND YU. S. BORODAEV (1972) The chemical composition of freieslebenite. *Tr. Mineral. Muzeya Akad. Nauk. SSSR*, **21**, 133-138 (in Russian).

New microprobe analyses were made of museum samples from Feiberg and Braunsdorf, Germany, and 4 samples

from Hiendelaencina, Spain, giving, resp., Ag 20.8, 20.8, 20.4, 20.3, 20.1, 20.0; Pb 41.1, 41.6, 40.5, 40.6, 40.2, 39.0; Sb 23.4, 23.3, 24.0, 23.4, 23.9, 22.4; S 17.1, 16.4, 16.9, 17.3, 17.0, 17.0; sum 102.4, 102.1, 101.8, 101.6, 101.2, 99.41%, averaging $Ag_{5.0}Pb_{1.0}Sb_{1.0}S_{2.8}$. The formula is therefore $AgPbSbS_3$, in agreement with Hellner (*Z. Kristallogr.* **109**, 284-295, 1957), not $Ag_5Pb_3Sb_3S_{12}$.