

## NEW MINERAL NAMES

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## Proarizonite

A. D. BYKOV, Proarizonite as a secondary mineral of the supergene alteration of ilmenite. *Doklady Akad. Nauk SSSR* **156**, 567-570 (1964) (in Russian).

Analysis of a concentrate from a Russian deposit (locality not given) gave TiO<sub>2</sub> 59.0, Fe<sub>2</sub>O<sub>3</sub> 26.16, FeO 3.64, SiO<sub>2</sub> 3.36, Al<sub>2</sub>O<sub>3</sub> 2.15, CaO+MgO 0.73, Cr<sub>2</sub>O<sub>3</sub> 0.69, H<sub>2</sub>O 2.1%. The concentrate contained 74% of an Fe-Ti mineral, 18.5% rutile, 2.2% staurolite, and a little pleonaste, ferromonticellite, hypersthene and zircon. Recalculation gives for the mineral itself TiO<sub>2</sub> 55.3 Fe<sub>2</sub>O<sub>3</sub> 35.6, FeO 2.9, Cr<sub>2</sub>O<sub>3</sub> 0.93, H<sub>2</sub>O 2.7 (sum 97.4%), corresponding to (Fe, Cr)<sub>2</sub>O<sub>3</sub>·3TiO<sub>2</sub>·0.6-0.7 H<sub>2</sub>O. The material is slowly decomposed by hot sulfuric acid; thus 44.5 hours treatment, including 8.5 hours with warming, dissolved 45% of the material and the solution contained Fe<sub>2</sub>O<sub>3</sub> 25.5, TiO<sub>2</sub> 9.4%. Not acted on by HCl or HNO<sub>3</sub>.

X-ray study shows ten lines, 6 of which are indexed as rutile lines, 2 as ilmenite lines, 1 as hematite, and 1 as hydrohematite. It is considered that this does not indicate a mixture because some of the strong lines of hematite and ilmenite are lacking. The name is given to indicate a specific mineral that precedes arizonite in the sequence of weathering of ilmenite to arizonite.

DISCUSSION.—Arizonite was long ago shown to be a mixture (*Am. Mineral.* **35**, 118, 1950), which differs from the material described in this paper in containing anatase, but not ilmenite. Doubtless different samples of weathered ilmenite show different proportions of these minerals (*Econ. Geol.* **55**, 1064 and 1068, 1960). There is no justification for regarding such mixtures as minerals and burdening the literature with new names.

## Chromsteigerite

E. A. ANKINOVICH, New data on steigerite from southern Kazakhstan. *Trudy Inst. Geol. Nauk, Akad. Nauk Kazakh SSSR*, **7**, 207-217 (1963) (in Russian).

Three new analyses with optical, x-ray, and DTA data are given from Kurumsak, Kazakhstan. These confirm the formula AlVO<sub>4</sub>·2.5H<sub>2</sub>O+nH<sub>2</sub>O. Two of the analyses gave Cr<sub>2</sub>O<sub>3</sub> 0.94, 1.40%. The third gave Cr<sub>2</sub>O<sub>3</sub> 8.00%. The author states, "It must be noted that repeated analyses of similar material selected from other mine works did not show such high contents of chromium and so there are some doubts as to its accuracy." This sample is referred to as chromsteigerite.

DISCUSSION.—Even if the analysis is correct, the name is an unnecessary one for chromian steigerite.

## Tikhonkovite

A. P. KHOMYAKOV, V. I. STEPANOV, V. A. MOLEVA AND Z. V. PUDOVKINA, The new mineral tikhonkovite, Sr Al F<sub>4</sub>(OH)·H<sub>2</sub>O: *Doklady Akad. Nauk SSSR*, **156**, 345-347 (1964) (in Russian).

Analysis by VAM (alkalies by G. E. Kalenychuk) gave Sr 36.74, Ca 0.93, K 0.012, Na 0.007, Al 12.10, Fe<sub>2</sub>O<sub>3</sub> (present as goethite) 0.52, F 33.88, (OH) 7.62, H<sub>2</sub>O<sup>+</sup> 7.97, H<sub>2</sub>O<sup>-</sup> none, SO<sub>3</sub>, P<sub>2</sub>O<sub>5</sub> none, total 99.78%. It is stated that "In calculating the analysis, H<sub>2</sub>O and (OH) were calculated from the determined H<sub>2</sub>O<sup>+</sup>; 12.00%." The analysis corresponds closely to (Sr, Ca)AlF<sub>4</sub>(OH)·H<sub>2</sub>O. Spectrographic analysis also showed La 0.01, Mg and Ba 0.0n%, Si, Be, Ce, Y, Cu traces. A DTA curve shows a large endothermal break at about 380° and smaller ones at about 580° and 920°.

The mineral occurs as small crystals, up to 5 mm in diameter, combinations of several prisms with {100} and {001}. Cleavage {001} perfect. Goniometric data will be published separately. X-ray study by ZVP by Laue and oscillation methods showed it to be monoclinic,  $a$  8.73 ± 0.03,  $b$  10.62 ± 0.04,  $c$  5.02 ± 0.02 Å.,  $\beta$  102° 43' ± 10',  $a:b:c=0.8220:1:0.4727$ . Unindexed x-ray powder data are given (59 lines); the strongest are 4.89 (10), 3.64 (9), 3.27 (8), 2.095 (7), 2.299 (6). The pattern is distinctly different from that of gearksutite, a calcium mineral with analogous formula.

The mineral is colorless to slightly rosy, luster vitreous, H 3½, G 3.26 ± 0.01 (by hydrostatic suspension). Fracture conchoidal to uneven. Optically biaxial, (-),  $\alpha$  1.452,  $\beta$  1.456,  $\gamma$  1.458, 2V (Universal stage) 70°.

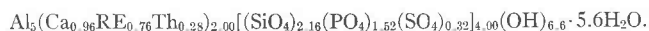
The mineral occurs in the oxidation zone of siderite-rich ores of Karasug in the western part of the Tannu-Ola Range, Tuva. It occurs in fissures and druses in limonite-hydrohematite ores, with gearksutite, fluorite, celestite, strontianite and barite.

The name is for Igor Petrovich Tikhonenkov (1927–1961), student of alkalic rocks and minerals.

### Saryarkite

O. F. KROL, V. I. CHERNOV, YU. V. SHIPOVALOV AND G. A. KHAN, Saryarkite, a new mineral. *Zapiski Vses. Mineralog. Obshch.* **93**, 147–155 (1964) (in Russian).

Analyses were made of two samples, the second of which contained some hydrous iron oxide; these gave, resp., SiO<sub>2</sub> 14.80, 14.24; P<sub>2</sub>O<sub>5</sub> 11.88, 12.18; SO<sub>3</sub> 2.88, 3.41; F, CO<sub>2</sub>, Cl none, none; Al<sub>2</sub>O<sub>3</sub> 28.72, 26.61; CaO 6.02, 6.59; rare earths 11.02, 10.79; ThO<sub>2</sub> 7.78, 9.07; Fe<sub>2</sub>O<sub>3</sub> 1.40, 2.21; Na<sub>2</sub>O 0.79, 0.75; K<sub>2</sub>O 0.44, 0.32; ZrO<sub>2</sub> trace, trace; MgO, MnO none, —; H<sub>2</sub>O<sup>-</sup> 2.39, 1.72; loss on ignition 12.36, 12.30; total 100.48, 100.19 (given as 100.26%). Spectrographic analysis by Kh. Ismagulova showed also Pb 0.1, Be, Sc 0.01–0.03, and Ba, Bi, Zr 0.00n%. The rare earths were determined spectrographically in the 2 samples by L. F. Kochubei, La<sub>2</sub>O<sub>3</sub> 5.5, 5.2; Ce<sub>2</sub>O<sub>3</sub> 6.8, 9.1; Nd<sub>2</sub>O<sub>3</sub> 13.6, 15.6; Sm<sub>2</sub>O<sub>3</sub> none, none; Gd<sub>2</sub>O<sub>3</sub> 4.90, 4.63; Tb<sub>2</sub>O<sub>3</sub> 0.55, 0.50; Dy<sub>2</sub>O<sub>3</sub> 0.82, 0.80; Ho<sub>2</sub>O<sub>3</sub> 1.37, 1.30; Er<sub>2</sub>O<sub>3</sub> 4.31, 4.15; Tm<sub>2</sub>O<sub>3</sub> 0.55, 0.50; Yb<sub>2</sub>O<sub>3</sub> 5.5, 5.2; Lu<sub>2</sub>O<sub>3</sub> 1.1, 1.0; Y<sub>2</sub>O<sub>3</sub> 55, 52% (of total rare earths). The formula is calculated, after deduction of the Fe<sub>2</sub>O<sub>3</sub>, to be



If it is assumed that part of the aluminum is present as an anionic complex, this can be recalculated into the form



A DTA curve showed rather small endothermal effects at 300°, 500°, and 800°. Infra-red spectrum, obtained by B. Taskarin, showed absorption bands at 1628 and 1445 cm<sup>-1</sup>, ascribed to H<sub>2</sub>O and hydroxyl, and a complex band in the region 1245–920, ascribed to PO<sub>4</sub>, SiO<sub>4</sub>, SO<sub>4</sub>, and perhaps AlO<sub>4</sub> groups. Partly dissolved by HCl, HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> (1:1)

Indexed x-ray powder data (37 lines) are given. The strongest lines are 3.014 (10)(102), 2.827 (10)(112), 1.854 (10)(331), 3.453 (9)(201), 2.143 (9)(321), 1.312 (8)(503). The pattern is very close to that of rhabdophane; the pattern obtained on material heated at 900° is very close to that of monazite. The powder data are indexed on a tetragonal cell with  $a$  8.213 ± 0.002,  $c$  6.55 ± 0.01,  $c/a=0.7975$ , space group  $D_4^2$  or  $D_4^6$ .

G (calc. from x-rays) 3.35, with Z=4, G (meas.) 3.07–3.15. Slightly attracted by an electromagnet.

The mineral is white, luster dull to greasy. H 3.5–4. Optically uniaxial, (+), (Na) Np 1 606, Ng 1.620.

The mineral occurs in Devonian propylitized acid effusives and in altered granitic rocks,

associated with secondary quartzites containing sericite, alunite and andalusite. Associated minerals, include hydrothorite (huttonite) (so given MF), barite, molybdenite, pyrite, hematite and hydrous Fe oxides. The locality is not given, as usual for radioactive minerals, but may be presumed to be in Kazakhstan (where the study was made). The derivation of the name is not explained (for the locality ?).

DISCUSSION.—Apparently a member of the rhabdophane group, differing in being assigned tetragonal symmetry, and in the high content of  $Al_2O_3$ . Compare *Am. Mineral.* **47**, 419–420, and brockite, *Am. Mineral.* **47**, 1346–1355 (1962). Note that neither formula suggested fits the general rhabdophane type.

### Uralolite

N. A. GRIGOR'EV, Uralolite, a new mineral. *Zapiski Vses. Mineralog. Obshch.* **93**, 156–162 (1964) (in Russian).

Three partial analyses were made of concretions not purified, of the fraction with G 2.22–2.29 from other concretions, and of the fraction with G 2.21–2.26 from a third concretion. Analyses were made by the Ural Geological Administration and the Ural Filial, Academy of Sciences. These gave, resp., BeO 18.07, 19.28, 18.91; CaO 15.16, 18.02, 18.71; MgO trace, —, trace; PbO —, —, 0.09; ZnO —, —, 0.88;  $Fe_2O_3$  2.27, —, 1.65;  $Al_2O_3$  —, 0.95, none;  $P_2O_5$  35.87 (including  $Al_2O_3$ ), 39.57, 37.57 and 37.48;  $SiO_2$  1.36, —, 0.02;  $CO_2$  0.61, —, 0.12; F 0.06, —, —;  $H_2O$  21.03, —, 21.46; loss on ignition —, 24.10, 22.60; insol. —, 0.11, 0.37; sum 94.43, 102.05, 99.81%. Spectrographic analysis by L. I. Kolenko showed Mo 0.1, Ba and Sr 0.03–0.1, Y 0.01, Yb 0.003, Cu, Ti, Mn 0.001%. The formula is near  $CaBe_3(PO_4)_2(OH)_2 \cdot 4H_2O$ .

A dehydration curve shows a loss in weight of 4.5% at 50°, 14% up to 300°, most of the remainder up to 600°. A DTA curve shows an endothermal effect with double minima at 280° and 325° and a small endothermal effect at 575°, also exothermic effects at 780° and 910°, the latter small.

The x-ray powder pattern of uralolite (by A. N. Aizikovitch) has strongest lines 3.56 (10), 2.654 (10,b), 3.07 (9), 2.050 (9,b), 1.728 (9), 4.35 (8), 3.21 (8), 1.972 (8), 7.09 (7). From these, the mineral is monoclinic with  $a$  8.43,  $b$  39.50,  $c$  7.12 Å.,  $\beta$  94°58' (very close to the unit cell parameters of moraesite).

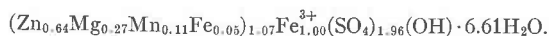
Uralolite occurs in kaolin-hydromuscovite rocks (from the Urals) containing fluorite, beryl, apatite, crandallite, moraesite and glucine. It forms concretions composed of radiating fibrous spherulites of diameter 2–3 mm and in sheaf-like growths. Colorless to white, sometimes stained brown by iron oxides. Luster of fibrous aggregates silky, of needles vitreous. Sp. gr. probably 2.05–2.14; H 2.5. Optically biaxial, (—), with  $\alpha$  1.510,  $\beta$  1.525,  $\gamma$  1.536, extinction angle 20°, elongation positive, 2V not given. There is probably a cleavage perpendicular to the elongation and others along the elongation.

The name is for the Ural region.

### Zincobotryogen

KUANG TU-CHIH, HSI-LIN LI, HSIEN-TE HSIEH AND SHU-SHEN YIN, Zincobotryogen and zincocopiapite, two new varieties of sulfate minerals. *Ti Chih Hsueh Pao*, **44**, 99–101 (1964), from *Chem. Abs.* **61**, 1616 (1964).

Analysis gave  $SO_3$  36.03,  $Fe_2O_3$  18.34,  $Al_2O_3$  0.01, MgO 2.50, FeO 0.85, MnO 1.75, ZnO 11.75,  $K_2O$  none,  $Na_2O$  0.05,  $H_3O^-$  0.22,  $H_3O^+$  29.13, sum 100.55%, corresponding to



X-ray study shows it to have space group  $C_{2h}^2-P2_1/n$  with  $a$  10.488,  $b$  17.819 ± 0.057,

$c$  7.185  $\pm$  0.006 Å,  $\beta$  100° 50',  $Z=4$ . The strongest lines of the powder pattern are 9.01 (10), 5.24 (8), 3.24 (6), 4.11 (5). DTA shows strong endothermal peaks at 247°, 750° and 855° and a weak endothermal peak at 525°. Color bright orange-red, luster vitreous to greasy.  $H \sim 2.5$ ,  $G$  2.201. Optically biaxial, (+), with  $\alpha$  1.542,  $\beta$  1.551,  $\gamma$  1.587,  $2V$  54° (calc.),  $r > v$ , elongation neg., pleochroism strong.

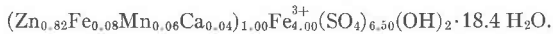
The mineral occurs in the oxidation zone of a Pb-Zn deposit on the northern border of the extremely arid Tsadam Basin in close association with pickeringite. It occurs in radiated crystalline aggregates and single prismatic crystals, showing the forms  $b$  {010},  $\sigma$  {101},  $l$  {120},  $m$  {110}.

DISCUSSION.—The mineral was previously described by Zemann (*Am. Mineral.* **46**, 1517, 1961), who preferred not to name it.

### Zincocopiapite

KUANG TU-CHIH, HSI-LIN LI, HSIEN-TE HSIEH AND SHU-SHEN YIN, Zincobotryogen and zincocopiapite, two new varieties of sulfate minerals. *Ti Chih Hsueh Pao*, **44**, 99–101 (1964), from *Chem. Abs.* **61**, 1616 (1964).

Analysis gave  $SO_3$  41.23,  $Fe_2O_3$  25.35,  $Al_2O_3$  none,  $FeO$  0.42,  $MgO$  none,  $ZnO$  5.22,  $MnO$  0.39,  $CaO$  0.20,  $K_2O$  0.15,  $Na_2O$  0.05,  $H_2O^-$  5.58,  $H_2O^+$  22.03, sum 100.62%, corresponding to



DTA shows endothermal peaks at 205°, 350°, 540°, 815°, and 875°. Weissenberg photographs show it to be triclinic, space group  $C_i^1-P\bar{1}$ ,  $a$  7.35  $\pm$  0.04,  $b$  18.16  $\pm$  0.03,  $c$  7.28  $\pm$  0.03 Å,  $\alpha$  93° 50',  $\beta$  101° 30',  $\gamma$  99° 22',  $Z=1$ . Strongest lines of the x-ray pattern are 9.25 (10), 6.12 (8), 3.56 (6), 5.66 (5). Crystals forms noted:  $b$  {010},  $a$  {100},  $e$  {011}, rarely  $M2$  {120},  $c$  {001}.

The mineral is yellowish-green, luster vitreous,  $H \sim 2$ ,  $G$  2.181. Optically biaxial, (+),  $\alpha$  1.534,  $\beta$  1.554,  $\gamma$  1.586,  $2V$  78° (calc.),  $r > v$ , pleochroism strong.

The mineral is widely distributed as compact, massive aggregates in the oxidation zone of a Pb-Zn deposit on the northern border of the extremely arid Tsadam Basin closely associated with copiapite, halotrichite, coquimbite, roemerite, sideronatrite and melanterite.

DISCUSSION.—Varieties with predominant ZnO had been described previously but not named (see Dana's System, 7th Ed., Vol. 2, p. 624–26).

### Metakaolinite

CHANG-LING LIU, TE-YEH LIU, FUCHANG, CHIN-CHENG, LI, MO-CHUN SUN, AND WEN-HAN LU, Metakaolinite, a new clay mineral. *K'o Hsueh T'ung Pao* 1963, No. 10, 59–62; from *Chem. Abs.* **60**, 15606 (1964).

The mineral occurs as dense white to gray masses in Upper Carboniferous carbonaceous kaolinite clay. Brittle, hard, compact, not dispersed in water, slight plasticity  $H$  6–7,  $G$  2.45. Cleavage {001}, fracture conchoidal. Analyses gave  $SiO_2$  50.10,  $TiO_2$  0.32,  $Al_2O_3$  42.63,  $Fe_2O_3$  0.10,  $FeO$  0.50,  $MgO$  0.09,  $MnO$  trace,  $CaO$  0.06,  $K_2O$  0.06,  $Na_2O$  0.03,  $ZrO_2$  0.008,  $P_2O_5$  0.005,  $H_2O^-$  1.63,  $H_2O^+$  4.55, sum 100.08%, corresponding to  $Al_2O_3 \cdot 2SiO_2 \cdot 0.82 H_2O$ . Optically biaxial, (–) or (+),  $2V$  0–5°,  $\alpha$  1.532 (1.530–1.534),  $\beta$  1.539 (1.535–1.543),  $\gamma$  1.541 (1.537–1.545), birefringence 0.009 (0.008–0.010).

DISCUSSION.—X-ray data are not mentioned in the abstract. In their absence the description is inadequate. Note that the material, containing less water than kaolinite, has lower  $G$  and  $ns$ .

## DISCREDITED MINERALS

**Gersbyite (=lazulite)**

PER GEIJER AND O. GABRIELSON, Three discredited mineral species. gersbyite, munkfors-site, and munkrudite. *Arkiv Min. Geol.* **3**, 413-414 (1963).

X-ray examination of type material in the Swedish Museum of Natural History (RMA), Stockholm, shows that the mineral occurring at Dicksberget in Sweden and named gersbyite by L. J. Igelström (*Zeit. Krist.* **28**, 310-312, 1898) is a member of the lazulite-scorzalite series. The color indicates that it belongs to the lazulite part of the series.

A. PABST

**Munkrudite (=kyanite)**

PER GEIJER AND O. GABRIELSON, Three discredited mineral species. gersbyite, munkfors-site, and munkrudite. *Arkiv Min. Geol.* **3**, 413-414 (1963).

Munkrudite was described by L. J. Igelström (*Zeit. Krist.* **28**, 310-312, 1898) as white, translucent, laminated, and occurring in quartzite and as a coating on joints at Dicksberget, Sweden. A mineral corresponding to this description is seen to form grains projecting into small cavities in type specimens preserved in the Swedish Museum of Natural History (RMA) in Stockholm. This mineral was identified by x-ray powder photograph as kyanite.

A. PABST

**Munkforsite (=manganiferous apatite) (?)**

PER GEIJER AND O. GABRIELSON, Three discredited mineral species. gersbyite, munkfors-site, and munkrudite. *Arkiv Min. Geol.* **3**, 413-414 (1963).

No material corresponding fully to the description of the phosphate munkforsite from Dicksberget, Sweden, by Igelström (*Zeit. Krist.* **27**, 601-604, 1897), could be found in type material at the Swedish Museum of Natural History (RMA), Stockholm. It may be that munkforsite corresponds to a manganiferous apatite present in the type material. In any case "munkforsite" cannot be regarded as a valid mineral species.

A. PABST