

Glossary of Uranium- and Thorium-Bearing Minerals

THIRD EDITION

GEOLOGICAL SURVEY BULLETIN 1009-F

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A CONTRIBUTION TO THE GEOLOGY OF URANIUM

GLOSSARY OF URANIUM- AND THORIUM-BEARING MINERALS

THIRD EDITION

By JUDITH WEISS FRONDEL and MICHAEL FLEISCHER

INTRODUCTION

The first edition of this work was published as U. S. Geological Survey Circular 74 in April 1950; the second edition was published as Circular 194 in February 1952. Research on the radioactive minerals has continued to be active, and this third edition contains many additions, revisions, and corrections, and brings the glossary up to date as of July 1954.

The compilation of this glossary is part of a continuing systematic survey of data on uranium and thorium minerals and on minerals that contain traces or more of uranium or thorium. This survey, part of the work being done by the U. S. Geological Survey on behalf of the U. S. Atomic Energy Commission, consists of collecting authoritative chemical, optical, and X-ray diffraction data from the literature and adding to these data, where they are inadequate, by further laboratory research. The results obtained are published from time to time as separate papers, and a comprehensive monograph on the mineralogy of uranium and thorium is in preparation.

The glossary is divided into three sections: A, minerals that contain uranium or thorium as major constituents; B, minerals that contain minor amounts of uranium or thorium; and C, minerals that probably do not contain uranium or thorium, but which have been reported to contain impurities or intergrowths of uranium or thorium minerals. Many of the minerals listed are highly variable in composition, some varieties containing much, some little uranium or thorium. The known range of composition is listed for each, but the variability causes the division of species between A and B to be somewhat arbitrary.

In previous editions of this glossary, a fourth group of nearly 40 minerals was listed as minerals not reported to contain uranium or thorium, but which, on crystal-chemical grounds, might be expected to show the presence of uranium or thorium if investigated by modern methods. The list is not included here; we wish, however, to repeat that these minerals—mainly those containing the rare-earth ele-

ments—are well worth additional study, as shown by the recent discovery of irinite, a thorian variety of the rare-earth mineral loparite.

It is hoped that this glossary will help to alleviate the confusion that obscures the nomenclature of the uranium and thorium minerals. For many of them, the confusion will remain until more thorough research is done. Some species may always be subject to question because their type specimens have been lost, and existing specimens bearing the species name have been found to be other minerals; for example, in section A, uranochalcite and voglite. The synonymy has been given for each species, but it is to be hoped that the many synonyms that serve no useful purpose will be abandoned. Identities and group relations are indicated.

It is beyond the scope of the present publication to describe these minerals or to include determinative tables. We have, however, added very brief statements of the color of the minerals and of the type of occurrence. A chemical classification of the uranium and thorium minerals has also been added.

For most of the minerals, a reference has been chosen from standard reference books and easily available journals. Dana VI and VII indicate the 6th and 7th editions, respectively, of Dana's System of Mineralogy.

The index has 327 entries. These represent 153 species: 103 in section A, 39 in section B, and 11 in section C.

The question is often asked, "How many uranium and thorium minerals are there?" If section A is used as the criterion, there are about 103 such minerals to which 215 names have been applied.

We are indebted to many persons for suggestions and for pointing out errors in the previous editions, especially to Clifford Frondel of Harvard University and to J. S. Vhay and J. C. Rabbitt of the U. S. Geological Survey. We hope that readers will inform us of any errors, omissions, or additional data.

CHEMICAL CLASSIFICATION OF THE URANIUM AND THORIUM MINERALS

Arsenates:

- Abernathyite $K_2(UO_2)_2(AsO_4)_2 \cdot 8H_2O$
 Kahlerite $Fe(UO_2)_2(AsO_4)_2 \cdot nH_2O$
 Metazeunerite $Cu(UO_2)_2(AsO_4)_2 \cdot 8H_2O$
 Novacekite $Mg(UO_2)_2(AsO_4)_2 \cdot 8-10H_2O$
 Troegerite $H_2(UO_2)_2(AsO_4)_2 \cdot 8H_2O$
 Uranospathite $Cu(UO_2)_2(AsO_4, PO_4)_2 \cdot 11H_2O?$
 Uranospinite $Ca(UO_2)_2(AsO_4)_2 \cdot 10H_2O$
 Walpurgite $Bi_4(UO_2)(AsO_4)_2 \cdot 3H_2O?$

Carbonates:

- Andersonite $Na_2Ca(UO_2)(CO_3)_3 \cdot 6H_2O$
 Bayleyite $Mg_2(UO_2)(CO_3)_3 \cdot 18H_2O$
 Liebigite $Ca_2(UO_2)(CO_3)_3 \cdot 10-11H_2O$
 Rabbittite $Ca_3Mg_3(UO_2)_2(CO_3)_6(OH)_4 \cdot 18H_2O$
 Rutherfordine $(UO_2)(CO_3)$
 Schrockingerite $NaCa_3(UO_2)(CO_3)_3(SO_4)F \cdot 10H_2O$
 Sharpite $(UO_2)(CO_3) \cdot H_2O?$ or $(UO_2)_6(CO_3)_5(OH)_2 \cdot 7H_2O?$
 Studtite Hydrated carbonate of U^6 and Pb
 Swartzite $CaMg(UO_2)(CO_3)_3 \cdot 12H_2O$
 Voglite $Ca_2CuU(CO_3)_5 \cdot 6H_2O$

Molybdates:

- Umohoite Close to $(UO_2)(MoO_4) \cdot 4H_2O$

Niobates-tantalates-titanates:

- Ampangabeite $(Y, Er, U, Ca, Th)_2(Nb, Ta, Fe, Ti)_7O_{18}$
 Betafite $(U, Ca)(Nb, Ta, Ti)_3O_9 \cdot nH_2O?$
 Brannerite Perhaps $A_3B_5O_{18}$ with $A=U, Ca, Fe, Th, Y$, and $B=Ti$.
 Calciosamarskite $(Ca, X, U, Th)_3(Nb, Ta, Fe, Ti, Sn)_5O_{15}$? $X=yttrium$ and other rare earths.
 Davidite $AB_3(O,OH)_7$ [with $A=Fe^2$, rare earths, U^6 , Ca, Zr, and Th, and $B=Ti, Fe^3, V, Cr$]
 Delorenzite $(Y, U, Fe^3)(Ti, Sn)_3O_3?$
 Eschynite $(Ce, Ca, Fe^2, Th)(Ti, Nb)_2O_6$
 Euxenite $(Y, Ca, Ce, U, Th)(Nb, Ta, Ti)_2O_6$
 Fergusonite $(Y, Er, Ce, Fe)(Nb, Ta, Ti)O_4$
 Formanite $(Y, U, Th, Ca)(Ta, Nb, Ti)O_4$
 Irinite $(Na, Ce, Th)_{1-x}(Ti, Nb)[O_{3-x}(OH)_x]$
 Ishikawaite $(U, Fe, X)(Nb, Ta)O_4$ [$X=rare\ earths$]
 Khlopinitite $(Y, U^4, Th)_3(Nb, Ta, Ti, Fe)_7O_{20}?$
 Microlite Essentially $(Na, Ca)_2Ta_2O_6(O, OH, F)$.
 Nohlite $(Ca, Mg, Fe^2, X, U)_2(Nb, Zr, Fe^3)_3O_{10}$ [$X=yttrium$ and other rare earths]
 Pisekite Niobate-tantalate-titanate of U and rare earths with Th and Sn.
 Polycrase $(Y, Ca, Ce, U, Th)(Ti, Nb, Ta)_2O_6$
 Priorite $(Y, Er, Ca, Fe^2, Th)(Ti, Nb)_2O_6$
 Pyrochlore $(Na, Ca)_2(Nb, Ta)_2O_6F$
 Samarskite $(Y, Ce, U, Ca, Fe, Pb, Th)(Nb, Ta, Ti, Sn)_2O_6$

Oxides:

- Becquerelite $7\text{UO}_3 \cdot 11\text{H}_2\text{O}$
 Billietite $\text{BaO} \cdot 6\text{UO}_3 \cdot 11\text{H}_2\text{O}$
 Clarkeite $(\text{Na}, \text{K})_{2-2x}(\text{Ca}, \text{Pb})_x\text{U}_2\text{O}_7 \cdot y\text{H}_2\text{O}$
 Curite $3\text{PbO} \cdot 8\text{UO}_3 \cdot 4\text{H}_2\text{O}$
 Epianthinite Hydrated uranyl oxide?
 Fourmarierite Probably $\text{PbO} \cdot 4\text{UO}_3 \cdot 7\text{H}_2\text{O}$.
 Ianthinite $2\text{UO}_2 \cdot 7\text{H}_2\text{O}$?
 Masuyite $\text{UO}_3 \cdot 2\text{H}_2\text{O}$
 Richetite Hydrated oxide of U and Pb?
 Schoepite $2\text{UO}_3 \cdot 5\text{H}_2\text{O}$
 Thorianite ThO_2
 Uraninite $(\text{U}^{4-}_x\text{U}^{6-}_x)\text{O}_{2+x}$
 Uranosphaerite $(\text{BiO})(\text{UO}_2)(\text{OH})_3$?
 Vandenbrandeite $\text{Cu}(\text{UO}_2)_2 \cdot 2\text{H}_2\text{O}$
 Vandendriesscheite Close to $\text{PbO} \cdot 7\text{UO}_3 \cdot 12\text{H}_2\text{O}$

Phosphates:

- Autunite $\text{Ca}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ [$n=10-12$ in natural material]
 Bassetite $\text{Fe}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$
 Cheralite $(\text{Th}, \text{Ca}, \text{Ce}, \text{La}, \text{U}, \text{Pb})(\text{PO}_4, \text{SiO}_4)$
 Dewindtite $\text{Pb}_3(\text{UO}_2)_5(\text{PO}_4)_4(\text{OH})_4 \cdot 10\text{H}_2\text{O}$
 Dumontite $\text{Pb}_2(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_4 \cdot 3\text{H}_2\text{O}$
 Fritzscheite Hydrated phosphate-vanadate of U and Mn.
 Meta-autunite $\text{Ca}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ [$n=2\frac{1}{2}$ to $6\frac{1}{2}$]
 Metatorbernite $\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ [$n=4$ to 8]
 Meta-uranocircite $\text{Ba}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$
 Monazite $(\text{Ce}, \text{La}, \text{Th})\text{PO}_4$
 Parsonsite $\text{Pb}_2(\text{UO}_2)(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$
 Phosphuranylite $\text{Ca}(\text{UO}_2)_4(\text{PO}_4)_2(\text{OH})_4 \cdot 7\text{H}_2\text{O}$
 Renardite $\text{Pb}(\text{UO}_2)_4(\text{PO}_4)_2(\text{OH})_4 \cdot 7\text{H}_2\text{O}$
 Sabugalite $\text{HAl}(\text{UO}_2)_4(\text{PO}_4)_4 \cdot 16\text{H}_2\text{O}$
 Saléeite $\text{Mg}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8-10\text{H}_2\text{O}$
 Torbernite $\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 12\text{H}_2\text{O}$
 Uranospathite $\text{Cu}(\text{UO}_2)_2(\text{AsO}_4, \text{PO}_4)_2 \cdot 11\text{H}_2\text{O}$?

Silicates:

- Beta-uranophane $\text{Ca}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 5\text{H}_2\text{O}$
 Cheralite $(\text{Th}, \text{Ca}, \text{Ce}, \text{La}, \text{U}, \text{Pb})(\text{PO}_4, \text{SiO}_4)$
 Coffinite $\text{U}(\text{SiO}_3)_{1-x}(\text{OH})_{4x}$
 Cuprosklodowskite $\text{Cu}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 5\text{H}_2\text{O}$
 Gastunite Essentially a calcium uranyl silicate containing minor Pb.
 Huttonite ThSiO_4
 Kasolite $\text{Pb}(\text{UO}_2)(\text{SiO}_3)(\text{OH})_2$
 Pilbarite Hydrated silicate of Pb, Th and U.
 Sklodowskite $\text{Mg}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 6\text{H}_2\text{O}$
 Soddyite $(\text{UO}_2)_5(\text{SiO}_4)_2(\text{OH})_2 \cdot 5\text{H}_2\text{O}$
 Thorite ThSiO_4 with substitution of U.
 Thorogummite $\text{Th}(\text{SiO}_3)_{1-x}(\text{OH})_{4x}$
 Tscheffkinite Complex silicate of rare earths, Fe, Mn, Mg, Ca, Al, Ti, Th, and U.
 Uranophane $\text{Ca}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 5\text{H}_2\text{O}$

Sulfates:

Cuprozippeite $\text{Cu}(\text{UO}_2)_3(\text{SO}_4)_3(\text{OH})_2 \cdot 11\text{H}_2\text{O}$ Johannite $\text{Cu}(\text{UO}_2)_2(\text{SO}_4)_2(\text{OH})_2 \cdot 6\text{H}_2\text{O}$ Meta-uranopilite $(\text{UO}_2)_6(\text{SO}_4)(\text{OH})_{10} \cdot 5\text{H}_2\text{O}?$ Schroëckingerite $\text{VaCa}_3((\text{UO}_2)(\text{CO}_3)_3(\text{SO}_4)\text{F}) \cdot 10\text{H}_2\text{O}$ Uranopilite $(\text{UO}_2)_6(\text{SO}_4)(\text{OH})_{10} \cdot 12\text{H}_2\text{O}$

Zippeite Basic sulfate of U, of uncertain formula.

Vanadates:

Carnotite $\text{K}_2(\text{UO}_2)_2(\text{VO}_4)_2 \cdot n\text{H}_2\text{O}$ [$n=1$ to 3]Ferghanite $\text{U}_3(\text{VO}_4)_2 \cdot 6\text{H}_2\text{O}?$

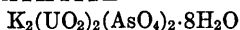
Fritzscheite Hydrated phosphate-vanadate of U and Mn.

Metatyuyamunite $\text{Ca}(\text{UO}_2)(\text{VO}_4)_2 \cdot 5-7\text{H}_2\text{O}$ Rauvite $\text{CaO} \cdot 2\text{UO}_3 \cdot 2\text{V}_2\text{O}_5 \cdot 16\text{H}_2\text{O}?$ Sengierite $\text{Cu}(\text{UO}_2)(\text{VO}_4)(\text{OH}) \cdot x\text{H}_2\text{O}$ [x is near 4 or 5]Tyuyamunite $\text{Ca}(\text{UO}_2)_2(\text{VO}_4)_2 \cdot 7-10.5\text{H}_2\text{O}$ Uvanite $\text{U}_2\text{V}_3\text{O}_{21} \cdot 15\text{H}_2\text{O}?$



A. URANIUM AND THORIUM MINERALS

ABERNATHYITE



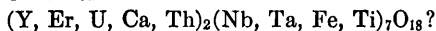
Potassium analogue of uranospinite.

U=52.8 percent.

Color: Yellow. A rare secondary mineral.

Thompson, M. E., Ingram, Blanche, and Gross, E. B.; *Am. Mineralogist* (in press).

AMPANGABEITE



Validity questionable; may be an inhomogeneous alteration product of euxenite.

U=17.1 percent, Th=1.8 percent.

Color: Brown to black. From granite pegmatite.

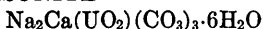
Dana VII, v. 1, p. 806-807.

Hydroeuxenite

Synonym of ampingabeite.

Dana VII, v. 1, p. 806.

ANDERSONITE

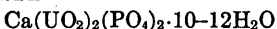


U=39.2 percent.

Color: Bright green. Rare secondary mineral.

Dana VII, v. 2, p. 239.

AUTUNITE



See meta-autunite.

U=45.4 to 48.2 percent.

Color: Yellow. Common secondary mineral.

Dana VII, v. 2, p. 984-987.

Calciumphosphoruranit

Synonym of autunite.

Mineralog. Mag., v. 28, p. 732, 1949.

Calcouranit

Synonym of autunite.

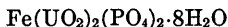
Berg- u. hüttenm. Zeitung, Band 24, p. 302, 1865.

Lime-uranite

Synonym of autunite.

Brooke and Miller, *Introduction to Mineralogy*, p. 519, 1852.

BASSETITE



U=51.0 percent.

Color: Yellow. Rare secondary mineral.

Dana VII, v. 2, p. 994-995.

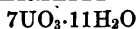
Mineralog. Mag., v. 30, p. 343-353, 1954.

BAYLEYITE

U=28.9 percent.

Color: Yellow. Rare secondary mineral.

Dana VII, v. 2, p. 237-238.

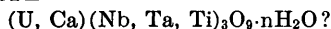
BECQUERELITE

Isostructural with billietite.

U=75.7 percent.

Color: Amber to yellow. Uncommon secondary mineral.

Am. Mineralogist, v. 38, p. 1019-1024, 1953.

BETAFITE

Composition uncertain; name includes several supposedly independent species that have been united on basis of X-ray and crystallochemical study.

U=13.7 to 24.5 percent, Th=1.0 to 1.1 percent.

Color: Yellow, brown, black. From granite pegmatites.

Dana VII, v. 1, p. 803-805.

Geol. Soc. Japan Jour., v. 57, p. 171-175, 1951.

Blomstrandite

Synonym of betafite.

U=16.3 percent.

Dana VII, v. 1, p. 803-804.

Mendeleevite

Titanian betafite.

U=13.7 percent.

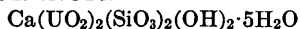
Dana VII, v. 1, p. 803-804.

Samiresite

Has been considered a plumbian variety of betafite.

U=18.7 percent.

Dana VII, v. 1, p. 803-805.

BETA-URANOPHANE

Dimorphous with uranophane.

U=55.6 percent.

Color: Yellow. A secondary mineral.

Am. Mineralogist, v. 35, p. 245-250, 1950.

Soc. franç. minéralogie bull., v. 74, p. 457-488, 1951.

Beta-uranotile

Synonym of beta-uranophane.

České Spol. Nauk Věstník, v. 2, p. 25, 1935.

Randite

A mixture of beta-uranophane, some tyuyamunite, and calcite.

Am. Mineralogist, v. 35, p. 245-250, 1950.

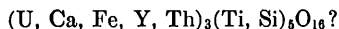
BILLIETITE

Isostructural with becquerelite.

U=68.8 percent.

Color: Yellow. A rare secondary mineral.

Am. Mineralogist, v. 38, p. 1019-1024, 1953.

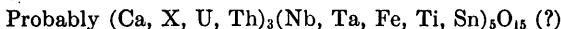
BRANNERITE

U=27.9 to 43.6 percent, Th=0.26 to 4.4 percent.

Color: Black to brown. Rare. In granitic rocks, placers.

Dana VII, v. 1, p. 774-775.

Am. Mineralogist, v. 39, p. 109-117, 1954.

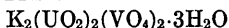
CALCIOSAMARSKITE

X=yttrium and other rare earths.

U=9.4 to 11.3 percent, Th=1.9 to 2.9 percent.

Color: Black to brown. Rare, from granite pegmatite.

Dana VII, v. 1, p. 772.

CARNOTITE

H₂O can range 1 to 3.

U=52.8 to 55.0 percent.

Color: Yellow. Common secondary mineral.

Dana VII, v. 2, p. 1043-1045.

CHERALITE

Phosphate-silicate of Th, Ca, and rare earths.

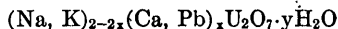
Isostructural with monazite, conforming to monazite formula type

AXO_4 with A=Th, Ca, Ce, La, U, Pb; X=P, Si. Cheralite is essentially an intermediate member of a solid-solution series apparently extending between monazite, CePO_4 , and $\text{CaTh}(\text{PO}_4)_2$, known only as an artificial compound.

U=3.5 to 5.5 percent, Th=25.9 to 27.7 percent.

Color: Green. Rare, from granite pegmatite.

Mineralog. Mag., v. 30, p. 93-99, 1953.

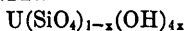
CLARKEITE

U=68.0 to 68.9 percent.

Color: Brown, reddish brown. Alteration product of uraninite.

Dana VII, v. 1, p. 624-625.

Am. Mineralogist, v. 39, p. 826-838, 1954.

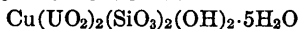
COFFINITE

U=60.2 percent in concentrated, but not pure sample. Most specimens associated with carbonaceous material.

Color: Black; very fine particles (-325 mesh) pale brown in transmitted light.

Stieff, L. R., Stern, T. W., and Sherwood, A. M., Am. Mineralogist, in preparation.

CUPROSKLODOWSKITE



Isostructural with sklodowskite and uranophane.

U = 54.1 percent.

Color: Greenish yellow. A secondary mineral.

Am. Mineralogist, v. 19, p. 235, 1934.

Frondel, Clifford, oral communication.

Jachymovite

Synonym of cuprosklodowskite.

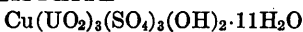
Mineralog. Abs., v. 6, p. 345, 1936.

Kieselkupfer-uranozyd

Synonym of cuprosklodowskite.

Neues Jahrb., 1845, p. 297.

CUPROZIPPEITE



Validity questionable.

Boldyrev, A. K., Course of descriptive mineralogy, v. 3, p. 83, 1935,
Leningrad and Moscow.

CURITE



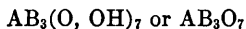
U = 62.9 percent.

Color: Orange-red. An alteration product of uraninite.

Dana VII, v. 1, p. 629-631.

Donnay, Gabrielle, written communication.

DAVIDITE



A = Fe², rare earths, U⁶, Ca, Zr, Th.

B = Ti, Fe³, V, Cr.

Ideal end-member is FeTi₃O₇.

U as much as 4.4 percent, Th as much as 0.12 percent.

Color: Black.

Mineralog. Mag., v. 29, p. 101, 1950.

Am. Mineralogist, v. 36, p. 563-572, 1951.

Radioactive mineral from Tête district of Mozambique

Possibly AB₃(O, OH)₇.

A = Fe², rare earths, U⁶, Ca, Na, Zr, Th.

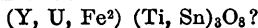
B = Ti, Fe³, U, Cr.

Near davidite.

U = 2.7 percent, Th = 0.06 to 0.12 percent.

Mineralog. Mag., v. 29, p. 101-112, 1950.

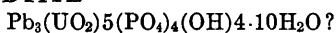
DELORENZITE



U = 8.7 percent.

Color: Black. Rare, from granite pegmatite.

Dana VII, v. 1, p. 808.

DEWINDTITE

Isostructural with phosphuranylite and renardite.

U=49.5 percent.

Color: Canary yellow. A rare secondary mineral.

Dana VII, v. 2, p. 875.

Am. Mineralogist, v. 35, p. 756-763, 1950; vol. 39, p. 444-451, 1954.

Geol. Soc. America Bull., v. 64, p. 1434, 1953.

Stasite

Synonym of dewindtite.

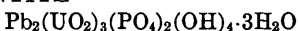
Am. Mineralogist, v. 7, p. 196-197, 1922.

DROOGMANSITE

No chemical analysis has been made.

May be related to sklodowskite.

Am. Mineralogist, v. 11, p. 168, 1926.

DUMONTITE

U=46.5 percent.

Color: yellow. A rare secondary mineral.

Dana VII, v. 2, p. 928-929.

EPIANTHINITE

Possibly one of $\text{UO}_3 \cdot 2\text{H}_2\text{O}$ polymorphs.

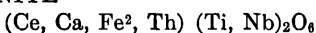
A rare alteration product of ianthinite.

U=87.8 percent.

Color: Yellow.

Am. Mineralogist, v. 32, p. 344-350, 1947.

Frondel, J. W., and Cuttitta, Frank, Am. Mineralogist (in press).

ESCHYNITE

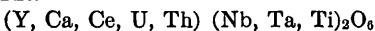
Also aeschynite.

Part of the eschynite-priorite series.

Th=9.9 to 15.4 percent.

Color: black to brown. From granite pegmatites and nepheline syenites.

Dana VII, v. 1, p. 793-796.

EUXENITE

Part of the euxenite-polyocrase series.

U=0.6 to 9.0 percent, Th=up to 4.3 percent.

Color: Black. From granite pegmatites.

Dana VII, v. 1, p. 787-791.

Geol. Soc. America Bull., v. 61, p. 129-132, 1950.

Eschwegite

Tantalum variety of euxenite.

Acad. Brasileira Cienc. Anais, v. 23, p. 119-127, 1951.

Lyndochite

Variety of euxenite-polyocrase, relatively high in Ca and Th and low in U.

Dana VII, v. 1, pp. 787, 789-791.

EUXENITE—Continued

Oliveiraite

Alteration product of euxenite.

Dana VII, v. 1, p. 791.

Tanteuxenite

Variety of euxenite with Ta substituting for Nb.

Dana VII, v. 1, p. 787, 789-790.

Am. Mineralogist, v. 35, p. 386-400, 1950.

Titanoniobite

Allied to euxenite.

Mineralog. Abs., v. 11, p. 232, 1951.

FERGHANITE

Supposedly $U_3(VO_4)_2 \cdot 6H_2O$.

Perhaps leached or weathered tyuyamunite.

U=67.9 percent.

Color: Yellow. A secondary mineral.

Dana VII, v. 2, p. 1048.

FERGUSONITE

(Y, Er, Ce, Fe) (Nb, Ta, Ti) O_4

Part of the fergusonite-formanite series.

U=0.8 to 7.2 percent, Th=0.7 to 2.5 percent.

Color: Black, altering to brown and yellow. From granite pegmatites.

Dana VII, v. 1, p. 757-762.

Adelpholite

Synonym of fergusonite?

A poorly defined substance, possibly an altered mossite.

Dana VII, v. 1, p. 762, 778-779.

Arrhenite

An altered fergusonite.

Dana VII, v. 1, p. 762.

Bragite

Synonym of fergusonite.

Dana VII, v. 1, p. 757, 759, 761.

Kochelite

Synonym of fergusonite.

Dana VII, v. 1, p. 757, 761.

Risörite

Synonym of fergusonite.

Dana VII, v. 1, p. 757-758, 760-762.

Rutherfordite

An altered fergusonite.

Dana VII, v. 1, p. 757 759-760, 762.

Sipylite

Synonym of fergusonite

Dana VII, v. 1 p. 757 759-760 762.

Tyrite

Synonym of fergusonite.

Dana VII, v. 1, p. 757 760-761

FORMANITE

(Y, U, Th, Ca) (Ta, Nb, Ti) O₄.
 Part of the fergusonite-formanite series.
 U=1.1 percent, Th=1.1 percent.
 Color: Black. From placers.
 Dana VII, v. 1, p. 758, 760, 762.

FOURMARIERITE

PbO·4UO₃·7H₂O or PbO·4UO₃·8H₂O
 U=63.7 percent or 63.0 percent.
 Color: Orange-red. An uncommon alteration product of uraninite.
 Am. Mineralogist, v. 33, p. 619-621, 1948.

FRITZCHEITE

Mn(UO₃)₂[(P, V)O₄]₂·8H₂O?
 No analysis available. May be the manganese analog of torbernite.
 Color: Reddish brown. A rare secondary mineral.
 Dana VII, v. 2, p. 984.

GASTUNITE

No chemical analysis has been made.
 Spectrographic analysis shows main components are U, Ca, Si, but
 X-ray powder patterns are unlike those of uranophane or β-uranophane.
 Min. pet. Mitt., Band 2, Heft 3, p. 307-313, 1951.

GUMMITE

Generic term for minerals occurring as alteration products of uraninite
 and not otherwise identified.
 Group includes silicates, phosphates, and oxides.
 Dana VII, v. 1, p. 622-625.

Eliasite

Synonym of gummite.
 U=57.2 percent.
 Dana VII, v. 1, p. 622-624.

Pittinile

Synonym of gummite.
 Dana VII, v. 1, p. 622-624.

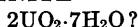
Yttrogummite

Yttrian variety of gummite.
 An alteration product of yttrian uraninite.
 Dana VII, v. 1, p. 622-624.

HUTTONITE

ThSiO₄
 Dimorph of thorite, isostructural with monazite and cheralite.
 Th=71.6 percent.
 Colorless to pale cream. From placers. Rare.
 Am. Mineralogist, v. 36, p. 60-69, 1951.

IANTHINITE

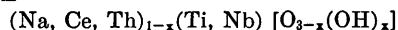


U=71.5 percent.

Color: Violet black. A rare alteration product of uraninite.

Dana VII, v. 1, p. 633-634.

IRINITE



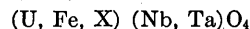
Thorian variety of loparite.

Th=11.4 percent.

Color: Reddish brown to yellowish brown. Rare, from nepheline syenite pegmatite.

Akad. Nauk S. S. R. Doklady, tom. 97, p. 725-728, 1954.

ISHIKAWAITE



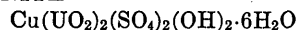
X=rare earths.

U=19.3 percent.

Color: Black. Rare, from granite pegmatites.

Dana VII, v. 1, p. 766.

JOHANNITE



U=50.8 percent.

Color: green. A secondary mineral.

Dana VII, v. 2, p. 606-607.

Gilpinite

Synonym of johannite.

Am. Mineralogist, v. 11, p. 1-5, 1926.

Peligoite

Probably identical with johannite.

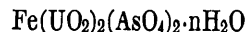
Soc. russe minéralogie Mém., v. 71, p. 9-11, 1942.

Uranvitriol

Synonym of johannite.

Chem. Untersuch., Band 5, p. 254, 1821.

KAHLERITE



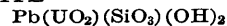
Arsenate analog of bassetite.

U=46.8 percent (?)

Color: Yellow to yellow green. A rare secondary mineral.

Der Karinthin, Band 23, p. 277-280, 1953.

KASOLITE



U=40.5 percent.

Color: Yellow to brown. A secondary mineral.

Am. Mineralogist, v. 7, p. 128-129, 1922.

Acad. roy. Belgique, v. 25, p. 654, 1939.

KHLOPINITE

$(Y, U^4, Th)_3(Nb, Ta, Ti, Fe)_7O_{20}?$

Also chlopinite, hlopinite.

May be related to euxenite-polycrase.

U=7.2 percent, Th=1.9 percent.

Color: Black. From pegmatites.

Dana VII, v. 1, p. 792.

LIEBIGITE

$Ca_2(UO_2)(CO_3)_3 \cdot 10-11H_2O$

U=33.6 percent.

Color: Green, yellow green. A rare secondary mineral.

Dana VII, v. 2, p. 240.

Am Mineralogist, v. 35, p. 251-254, 1950.

Thompson, M. E., and Meyrowitz, Robert, written communication.

Kalk-uran-carbonat

Synonym of liebigite.

Reichsanst. Wien Geol. Jahrb., Band v. 4, p. 221, 1853.

Uranothallite

Synonym of liebigite.

Dana VII, v. 2, p. 241.

Flutherite

Synonym of uranothallite.

Am. Mineralogist, v. 35, p. 251-254, 1950.

Dana VII, v. 2, p. 240.

MASUYITE

$UO_3 \cdot 2H_2O$

Probably isostructural with vandendriesscheite, but analysis of supposedly authentic material yielded no lead.

U=73.9 percent.

Color: Yellow to orange-yellow. A rare secondary mineral.

Soc. belge géologie Bull., v. 70, p. 212-225, 1947.

Fronde, J. W., and Cuttitta, Frank, written communication.

MEDJIDITE

Supposedly a uranium sulfate.

Validity of species is questionable.

Dana VII, v. 2, p. 600.

META-AUTUNITE I

$Ca(UO_2)_2(PO_4)_2 \cdot 2\frac{1}{2}-6\frac{1}{2}H_2O$

See autunite.

Apparently not formed directly in nature, but most field and museum specimens of autunite have been dehydrated to this phase.

U=52.4 to 57.1 percent.

Color: Yellow. A common secondary mineral.

Dana VII, v. 2, p. 985.

Metakalkuranite

Synonym of meta-autunite.

Centralbl. Mineralogie, 1901, p. 709.

META-AUTUNITE II

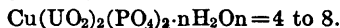
See autunite and meta-autunite I.

Not found in nature. Meta-autunite I passes into this phase on heating to about 80° C.

U=53.0 to 60.4 percent.

Color: Yellow.

Dana VII, v. 2, p. 985.

METATORBERNITE

See torbernite.

U=50.8 percent.

Color: Green. A common secondary mineral.

Dana VII, v. 2, p. 991.

Metachalcolite

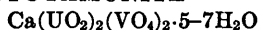
Synonym of metatorbernite.

Dana VII, v. 2, p. 991.

Metakupferuranit

Synonym of metatorbernite.

Centralb. Mineralogie, 1901, p. 618.

METATYUYAMUNITE

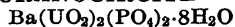
See tyuyamunite.

Lower hydrate of tyuyamunite.

U=50.1 to 52.2 percent.

Color: Yellow. A secondary mineral.

Stern, T. W. Stieff, L. R. Girhard, Nancy, and Meyrowitz, Robert, Am. Mineralogist (in press).

META-URANOCIRCITE

Belongs to the meta-series of hydrates of the metatorbernite group. and was known originally as uranocircite.

U=47.1 percent.

Color: Yellow-green. A rare secondary mineral.

Am. Mineralogist, v. 38, p. 476, 1953.

Uranocircite

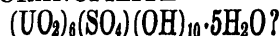
Now recognized as meta-uranocircite.

Am. Mineralogist, v. 38, p. 476, 1953.

Bariumphosphoruranit

Synonym of uranocircite.

Mineralog. Mag., v. 28, p. 732, 1949.

META-URANOPILITE

See uranopilite.

Recent work indicates validity of species is doubtful.

U=72.3 percent (?)

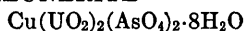
Dana VII, v. 2, p. 582-583.

Am. Mineralogist, v. 37, p. 958, 1954.

Beta-uranopilite

Synonym for meta-uranopilite.

Dana VII, v. 2, p. 582.

METAZEUNERITE

The name zeunerite, originally given to the species, was changed to metazeunerite when X-ray and dehydration studies indicated that the natural occurrences of the mineral corresponded to the later-recognized series of the hydrates of the metatorbernite group.

U = 46.4 percent.

Color: Green. A common secondary mineral.

Dana VII, v. 2, p. 993-994.

Am. Mineralogist, v. 36, p. 249-255, 1951.

Zeunerite

All natural specimens labeled zeunerite that have been examined by X-ray means have proved to be metazeunerite.

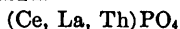
The fully hydrated, or true, zeunerite has not yet been found in nature.

Dana VII, v. 2, p. 989-990.

Kupferarsenuranit

Synonym of zeunerite.

Mineralog. Mag., v. 28, p. 732, 1949.

MONAZITE

Th is normally from a few percent to 10.6 percent, but series probably extends to 26.4 percent.

Color: Yellow, brown, reddish brown. Widely disseminated as an accessory mineral in granites and gneisses. In pegmatites. In placer deposits.

Dana VII, v. 2, p. 691-696.

Cryptolite

Synonym of monazite.

Dana VII, v. 2, p. 691.

Edwardsite

Synonym of monazite.

Dana VII, v. 2, p. 691.

Eremite

Synonym of monazite.

Dana VII, v. 2, p. 691.

Guadarramite

An intergrowth of radioactive monazite and some ilmenite.

Am. Mineralogist, v. 37, p. 1061, 1952.

Kârarfveite

Impure monazite.

Dana VII, v. 2, p. 691.

Mengite

Synonym of monazite.

Dana VII, v. 2, p. 691.

Monazitoid

Synonym of monazite.

Dana VII, v. 2, p. 691.

MONAZITE—Continued

Phosphocerite

Synonym of monazite.

Dana VII, v. 2, p. 691.

Turnerite

Synonym of monazite.

Dana VII, v. 2, p. 691, 695.

Urdite

Synonym of monazite.

Dana VII, v. 2, p. 691.

NOHLITE

$(\text{Ca}, \text{Mg}, \text{Fe}^2, \text{X}, \text{U})_2(\text{Nb}, \text{Zr}, \text{Fe}^3)_3\text{O}_{10}$

X=yttrium and other rare earths.

Validity of species is doubtful.

U=13.0 percent.

Color: Brownish black.

Dana VII, v. 1, p. 772-773.

NOVACEKITE

$\text{Mg}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 8-10\text{H}_2\text{O}$

Arsenate end-member of saléeite-novacekite series.

U=51.6 to 53.7 percent.

Color: Yellow. A rare secondary mineral.

Am. Mineralogist, v. 36, p. 680-686, 1951.

PARSONSITE

$\text{Pb}_2(\text{UO}_2)(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ or $2\text{H}_2\text{O}$

U=26.1 or 26.7 percent.

Color: Yellow. A rare secondary mineral.

Dana VII, v. 2, p. 913-914.

Am. Mineralogist, v. 35, p. 245-250, 1950.

PHOSPHURANYLITE

$\text{Ca}(\text{UO}_2)_4(\text{PO}_4)_2(\text{OH})_4 \cdot 7\text{H}_2\text{O}$

Isostructural with renardite and dewindtite.

U=63.3 percent.

Color: Deep to golden yellow. A secondary mineral.

Am. Mineralogist, v. 35, p. 756-763, 1950; v. 39, p. 444-451, 1954.

PILBARITE

$\text{PbO} \cdot \text{UO}_3 \cdot \text{ThO}_2 \cdot 2\text{SiO}_2 \cdot 4\text{H}_2\text{O}$

U=24.4 percent, Th=27.4 percent.

Color: Yellow.

Am. Mineralogist, v. 13, p. 464-465, 1928; v. 38, p. 1008, 1953.

PISEKITE

An ill-defined mineral, essentially a niobate-tantalate-titanate of U
and rare earths with Th and Sn.

May be related to amparagabeite.

Color: Yellowish brown to black. From granite pegmatite.

Narodni Mus., Prague, Casopis Min. Geol., Band 1, p. 2, 1923.

Dana VII, v. 1, p. 807-808.

POLYCRASE

(Y, Ca, Ce, U, Th) (Ti, Nb, Ta)₂O₆

Part of the euxenite-polycrase series.

U=5.5 to 12.4 percent, Th=up to 4.7 percent.

Color: Black. From granite pegmatites.

Dana VII, v. 1, p. 787-791.

PRIORITE

(Y, Er, Ca, Fe², Th) (Ti, Nb)₂O₆

Part of the eschynite-priorite series.

U=0.4 to 3.4 percent, Th=0.5 to 14.9 percent.

Color: Black. From granite pegmatites and nepheline syenites.

Dana VII, v. 1, p. 793-796.

Blomstrandine

Also blomstrandinite.

Synonym of priorite.

Dana VII, v. 1, p. 793-796.

RABBITTITE

Ca₃Mg₃(UO₂)₂(CO₃)₃(OH)₄·18H₂O

U=31.1 percent.

Color: Pale green. A rare secondary mineral.

Thompson, M. E., Weeks, A. D., and Sherwood, A. M., Am. Mineralogist (in press).

RAUVITE

CaO·2UO₃·5V₂O₅·16H₂O?

U=26.1 percent.

Color: Purplish to bluish black. A secondary mineral.

Dana VII, v. 2, p. 1058.

Sherwood, A. M., unpublished analysis.

Weeks, A. D., report in preparation.

RENARDITE

Pb(UO₂)₄(PO₄)₂(OH)₄·7H₂O

Isostructural with phosphuranylite and dewindtite.

U=57.3 percent.

Color: Yellow. A rare secondary mineral.

Dana VII, v. 2, p. 928.

Am. Mineralogist, v. 39, p. 444-451, 1954.

RICHETITE

Contains Pb and U.

Validity of species is questionable.

Soc. belge géologie Bull., v. 70, p. 212-225, 1947.

RUTHERFORDINE

UO₂CO₃

U=72.1 percent.

Color: Yellow. A rare alteration product of uraninite.

Dana VII, v. 2, p. 274-275.

Fron del, Clifford, and Meyrowitz, Robert, written communication

Diderichite

Synonym of rutherfordine.

Fron del, Clifford, and Meyrowitz, R., written communication.

SABUGALITE

$\text{HAl}(\text{UO}_2)_4(\text{PO}_4)_4 \cdot 16\text{H}_2\text{O}$

U = 53.6 percent.

Color: Yellow. A rare secondary mineral.

Am. Mineralogist, v. 36, p. 671-679, 1951.

SALÉEITE

$\text{Mg}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8-10\text{H}_2\text{O}$

Phosphate end-member of the saléeite-novacekite series.

U = 50.9 to 53.0 percent.

Color: Yellow. A rare secondary mineral.

Dana VII, v. 2, p. 988-989.

Am. Mineralogist, v. 36, p. 680-686, 1951.

Magnesium-phosphouranite

Synonym of saléeite.

Mineralog. Mag., v. 28, p. 732, 1949.

SAMARSKITE

$(\text{Y}, \text{Ce}, \text{U}, \text{Ca}, \text{Fe}, \text{Pb}, \text{Th}) (\text{Nb}, \text{Ta}, \text{Ti}, \text{Sn})_2\text{O}_6$

U = 8.4 to 16.1 percent, Th = up to 3.7 percent.

Color: Velvet-black to brown. From granite pegmatites.

Dana VII, v. 1, p. 797-800.

Annerödite

Samarskite with parallel overgrowths of columbite.

Dana VII, v. 1, p. 797, 799.

Eytländite

Synonym of samarskite.

Dana VIII, v. 1, p. 797.

Hydrosamarskite

An altered samarskite.

Dana VII, v. 1, p. 799-800.

Nuevite

Synonym of samarskite.

Am. Mineralogist, v. 36, p. 358, 1951.

Plumboniobite

A niobate of Y, U, Pb, Fe and rare earths.

May be a plumbian variety of samarskite.

Dana VII, v. 1, p. 800.

Rogersite

Probably an altered samarskite.

Of doubtful validity.

Dana VII, v. 1, p. 800.

Uranotantalite

Synonym of samarskite.

Dana VII, v. 1, p. 797.

Vietinghofite

Supposedly a ferroan samarskite.

Dana VII, v. 1, p. 800-801.

Yttro-ilmenite

Synonym of samarskite.

Dana VII, v. 1, p. 797.

SCHOEPITE

Close to $\text{UO}_3 \cdot 2\text{H}_2\text{O}$ but perhaps $8\text{UO}_3 \cdot 20\text{H}_2\text{O}$.

U = 71.9 percent.

Color: Yellow. An uncommon alteration product of uraninite.

Dana VII, v. 1, p. 627-628.

Cuttitta, Frank, unpublished analysis.

Paraschoepite

X-ray study indicates mineral is identical with schoepite.

Am. Mineralogist, v. 32, p. 344-350, 1947; v. 33, p. 513-514, 1948.

Frondel, J. W., unpublished data.

SCHROECKINGERITE

$\text{NaCa}_3(\text{UO}_2)(\text{CO}_3)_3(\text{SO}_4)\text{F} \cdot 10\text{H}_2\text{O}$

U = 26.8 percent.

Color: Greenish yellow. A secondary mineral.

Dana VII, v. 2, p. 236.

Hurlbut, C. S., Am. Mineralogist (in press).

Dakeite

Synonym of schroeckingerite.

Dana VII, v. 2, p. 236.

Neogastunite

Synonym of schroeckingerite.

Min. pet. Mitt., Band 2, Heft 3, p. 311-312, 1951.

SENGIERITE

$\text{Cu}(\text{UO}_2)(\text{VO}_4)(\text{OH}) \cdot 4-5\text{H}_2\text{O}?$

U = 42.8 to 44.3 percent ?

Color: Yellowish green. A rare secondary mineral.

Dana VII, v. 2, p. 1047.

SHARPITE

Perhaps $(\text{UO}_2)(\text{CO}_3) \cdot \text{H}_2\text{O}$ or $(\text{UO}_2)_6(\text{CO}_3)_5(\text{OH})_2 \cdot 7\text{H}_2\text{O}$

Composition needs to be checked.

U = 68.4 or 68.6 percent.

Color: Greenish yellow. A secondary mineral.

Dana VII, v. 2, p. 275.

SKLODOWSKITE

$\text{Mg}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 6\text{H}_2\text{O}$

Also sklodovskite:

Isostructural with uranophane and cuprosklodovskite.

U = 55.6 percent.

Color: Yellow. A rare secondary mineral.

Am. Mineralogist, v. 10, p. 132, 1925.

Natuurk. tijdschr. Ned.-Indië, deel 96, afl. 1, p. 284, 1936.

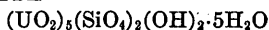
Chinkolobwite

Also shinkolobwite.

Synonym of sklodovskite.

Mineralog. Abs., v. 3, p. 115, 1926.

SODDYITE



U=71.8 percent.

Color: Yellow. A secondary mineral.

Mineralog Abs., v. 3, p. 371, 1927.

Am. Mineralogist, v. 37, p. 386, 1952.

STUDTITE

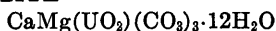
Hydrated carbonate of U and Pb.

Species not well-defined.

Color: Yellow. A secondary mineral.

Dana VII, v. 2, p. 275.

SWARTZITE



U=32.6 percent.

Color: Green. A rare secondary mineral.

Dana VII, v. 2, p. 238-239.

THORIANITE



Forms complete series with uraninite.

Division between thorianite and uraninite at Th:U=1:1.

U=as much as 46.5 percent, Th=45.3 to 87.9 percent.

Color: Gray, black, brownish black. From placers.

Dana VII, v. 1, p. 620-622.

Aldanite

A variety of thorianite containing 14.9 to 29.0 percent UO_3 and 11.2 to 12.5 percent PbO .

Soviet Geol. 1941, no. 6, p. 105-107.

Uranothorite

Synonym for thorianite containing U.

Am. Jour. Sci., v. 26, p. 47, 1933.

THORITE



U=up to 10.1 percent, Th=25.2 to 62.7 percent.

Color: Yellow, brown, black. From nepheline syenites and granites.

Dana VI, p. 488-490.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Auerlite

Phosphatian variety of thorite.

Dana VI, p. 488-490.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Calciorthorite

Variety of thorite.

Dana VI, p. 489.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Enalite

Uranoan variety of thorite.

Am. Mineralogist, v. 18, p. 223, 1933; v. 38, p. 1007-1018, 1953.

Eucrasite

Possibly a variety of thorite high in rare earths.

Dana VI, p. 489.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Ferrothorite

A ferroan variety of thorite.

Am. Mineralogist, v. 14, p. 78, 1929; v. 38, p. 1007-1018, 1953.

Freyalite

Variety of thorite high in rare earths.

Dana VI, p. 489.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Orangite

Synonym of thorite.

Dana VI, p. 488-489.

Uranothorite

Uranoan variety of thorite.

Am. Mineralogist, v. 36, p. 557-562, 1951.

Wisaksonite

Uranoan variety of thorite.

Am. Mineralogist, v. 39, p. 825-829.

THOROGUMMITE

$\text{Th}(\text{SiO}_4)_{1-x}(\text{OH})_x$

Isostructural with thorite.

U=2.5 to 31.4 percent, Th=18.2 to 50.8 percent.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Chlorothorite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953

Hyblite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Hydrothorite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Mackintoshite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Maillandite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953

Nicolayite

Synonym of thorogummite.

Am. Mineralogist, v. 38, p. 1007-1018, 1953.

THUCHOLITE

A complex of uraninite with hydrocarbons.

U as much as 53 percent in the ash, Th as much as 48 percent in the ash.

Color: Black.

Great Britain Geol. Survey Bull. 3, pp. 1-19, 1951.

Am. Mineralogist, v. 38, p. 802, 1953.

Carbocer

A mineral similar to thucholite, high in Ce.

Great Britain Geol. Survey Bull. 3, p. 3, 1951.

Am. Mineralogist, v. 38, p. 804, 1953.

Carburan

A hydrocarbon complex related to thucholite.

U = 4.29 percent.

Mineralog. Abs., v. 6, p. 437, 1936.

Titanothucholite

Titanian variety of thucholite.

Mineralog. Abs., v. 9, p. 37, 1944.

TORBERNITE

$\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 12\text{H}_2\text{O}$

See metatorbernite.

U = 47.1 percent.

Color: Green. A common secondary mineral.

Dana VII, v. 2, p. 981-984.

Chalkolith, Chalcilite

Synonyms of torbernite.

Dana VII, v. 2, p. 981.

Copper uranite

Synonym of torbernite.

Dana VII, v. 2, p. 981.

Cuprouranil

Synonym of torbernite.

Dana VII, v. 2, p. 981.

Kupferphosphoruranit

Synonym of torbernite.

Mineralog. Mag., v. 28, p. 732, 1949.

Torberite

Synonym of torbernite.

Brooke and Miller, Introduction to Mineralogy, p. 517, 1852.

Uranite

Synonym of torbernite-autunite group.

Dana VII, v. 2, p. 981-984.

Uran-mica

Synonym of torbernite.

Jameson, System of mineralogy, 1820.

Uranphylit

Synonym of torbernite.

Dana VII, v. 2, p. 981.

TROEGERITE

Probably $\text{H}_2(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$

New analysis is needed.

U = 55.1 percent.

Color: Lemon yellow. A rare secondary mineral.

Am. Mineralogist, v. 36, p. 322, 1951.

Dana VII, v. 2, p. 966-967.

TSCHEFFKINITE

Also chevkinite.

Complex silicate of rare earths, Fe, Mn, Mg, Ca, Al, Ti, Th, and U.

Color: Black. In alkaline granite pegmatites.

U = 2.3 percent, Th = up to 18.4 percent.

Am. Mineralogist, v. 31, p. 582-588, 1946.

Perrierite

Perhaps identical with tscheffkinite.

Th = 4.0 percent.

Am. Mineralogist, v. 36, p. 926, 1951.

TYUYAMUNITE

See metatyuyamunite.

$\text{Ca}(\text{UO}_2)_2(\text{VO}_4)_2 \cdot 7-10.5\text{H}_2\text{O}$

U = 54.4 to 56.7 percent.

Color: Yellow. A common secondary mineral.

Dana VII, v. 2, p. 1045-1047.

Calciocarnotite

Synonym for tyuyamunite.

Dana VII, v. 2, p. 1045.

UMOHOITE

Close to $(\text{UO}_2)(\text{MoO}_4) \cdot 4\text{H}_2\text{O}$

Umohoite is the only known uranium mineral that contains Mo as a major constituent.

U = 47.4 percent.

Color: Black to bluish black. A rare secondary mineral.

U. S. Atomic Energy Commission, RME-3046, p. 45, April, 1953.

Brophy, Gerald, and Kerr, P. F., Am. Mineralogist (in press).

UNNAMED MINERAL (Antipov, 1900)

Essentially $\text{Cu}(\text{UO}_2)(\text{CO}_3)_2 \cdot 10\text{H}_2\text{O}$

U = 37.6 percent.

Antipov, Gesell. Min. St. Petersburg Verh., Band 38, p. 33, 1900.

UNNAMED MINERAL (Chernik, 1922)

Ill-defined vanadate of Cu and U.

Has same qualitative chemical composition as sengierite.

U = 32.5 percent (from incomplete analysis).

Chernik, G., Acad. sci. U. R. S. S. Bull., v. 16, p. 505, 1922.

UNNAMED MINERAL (Chirvinsky, 1925)

An incompletely described mineral presumed to contain U by virtue of its properties and association.

May be a variety of tyuyamunite.

Mineralog. Mag., v. 20, p. 287, 1925.

URACONITE

This name has been used for uranium sulfates, but lacks specific meaning and should be abandoned.

Dana VII, v. 2, p. 600.

Calciouraconite

Near $\text{Ca}(\text{UO}_2)_4(\text{SO}_4)_2(\text{OH})_6 \cdot 20\text{H}_2\text{O}$

Validity questionable.

Boldyrev, A. K., Course of descriptive mineralogy, v. 3, 1935, Leningrad and Moscow.

URANINITE

Ideally UO_2 .

Usually more or less oxidized and ranging in composition to at least $(\text{U}^4, \text{U}^6)\text{O}_{2.6}$. Also contains Th, Pb, Y, and other rare earths, in solid solution. Forms complete series with thorianite. Division between uraninite and thorianite at $\text{U}:\text{Th}=1:1$.

$\text{U}=46.5$ to 88.2 percent, $\text{Th}=\text{up to } 45.3$ percent.

Color: Velvety brownish, grayish, greenish black.

In granite and syenite pegmatites (crystals), in hydrothermal sulfide veins (pitchblende).

Dana VII, v. 1, p. 611-620.

Am. Mineralogist, v. 37, p. 363-385, 1952.

Bröggerite

A thorian variety of uraninite.

Dana VII, v. 1, p. 611-614.

Cleveite

A variety of uraninite containing rare earths.

Dana VII, v. 1, p. 611, 613-614.

Coracite

Synonym of uraninite.

Dana VII, v. 1, p. 611, 615, 617.

Nasturan

Synonym of pitchblende.

Dana VII, v. 1, p. 611, 614, 617.

Nivenite

A variety of uraninite containing rare earths.

Dana VII, v. 1, p. 611, 613-615, 617.

Pitchblende

A colloform, fine-grained variety of uraninite.

Dana VII, v. 1, p. 611-619.

Ulrichite

Synonym of uraninite.

Dana VII, v. 1, p. 611, 613, 617.

Uranoniobite

Synonym of uraninite.

Dana VII, v. 1, p. 611, 613.

Uranopissite

Synonym of uraninite.

Mineralog. Mag., v. 16, p. 374, 1913.

URANOCHALCITE

An ill-defined uranium sulfate of doubtful validity.

Dana VII, v. 2, p. 600.

URANOCHER

A generic term used chiefly for uranium sulfates, and, in part, uranium oxides.

Dana VII, v. 2, p. 581, 598.

URANOPHANE

$\text{Ca}(\text{UO}_2)_2(\text{SiO}_3)_2(\text{OH})_2 \cdot 5\text{H}_2\text{O}$

Dimorphous with beta-uranophane; isostructural with sklodowskite and cuprosklodowskite.

U = 55.6 percent.

Color: Yellow. A common secondary mineral.

Frondel, Clifford, oral communication.

Lambertite

Synonym of uranophane.

Am. Mineralogist, v. 11, p. 155-157, 1926.

Uranotil, Uranotile

Synonym of uranophane.

Dana VI, p. 699.

URANOPILITE

See meta-uranopilite $(\text{UO}_2)_6(\text{SO}_4)(\text{OH})_{10} \cdot 12\text{H}_2\text{O}$.

U = 67.9 percent.

Color: Yellow. A secondary mineral.

Dana VII, v. 2, p. 581-582.

Am. Mineralogist, v. 37, p. 950, 1952.

URANOSPATHITE

$\text{Cu}(\text{UO}_2)_2(\text{AsO}_4, \text{PO}_4)_2 \cdot 11\text{H}_2\text{O}?$

U = 46.0 percent (?)

Color: Yellow to pale green. A rare secondary mineral.

Dana VII, v. 2, p. 990.

Mineralog. Mag., v. 30, p. 343-353, 1954.

URANOSPHERITE

$(\text{BiO})(\text{UO}_2)(\text{OH})_3?$

U = 43.6 percent (?)

Color: Orange to red. An alteration product of uraninite.

Dana VII, v. 1, p. 631.

URANOSPINITE

$\text{Ca}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 10\text{H}_2\text{O}$

U = 45.9 percent.

Color: Yellow to green. A rare secondary mineral.

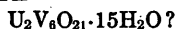
Dana VII, v. 2, p. 990-991.

Am. Mineralogist, v. 38, p. 1159-1168, 1953.

Calciumarsenuranit

Synonym of uranospinite.

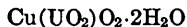
Mineralog. Mag., v. 28, p. 732, 1949.

UVANITE

U = 34.3 percent (?)

Color: Brownish yellow. A rare secondary mineral.

Dana VII, v. 2, p. 1056.

VANDENBRANDEITE

U = 59.3 percent.

Color: Blackish. A rare secondary mineral.

Dana VII, v. 1, p. 632-633.

Am. Mineralogist, v. 36, p. 394-410, 1951.

Uranolepidite

Synonym of vandenbrandeite.

Am. Mineralogist, v. 19, p. 235-236, 1934.

VANDENDRIESSCHEITE

This is "mineral x" of Charles Palache and Harry Berman, now a validated species.

U = 68.3 percent.

Color: Yellow. A rare alteration product of uraninite.

Am. Mineralogist, v. 18, p. 20-24, 1933.

Soc. belge géologie Bull., v. 70, p. 212-225, 1947.

Fron del, J. W., unpublished data.

VOGLIANITE

A hydrous calcium and uranium sulfate of doubtful validity.

Dana VII, v. 2, p. 600.

VOGLITE

U = 32.6 percent.

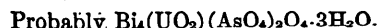
Color: Green. A rare secondary mineral.

Dana VII, v. 2, p. 237.

Uran-kalk-kupfer carbonat

Synonym of voglite.

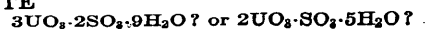
Reichsanst. Wien Geol. Jahrb., Band 4, p. 220, 1853.

WALPURGITE

U = 15.9 percent.

Color: Yellow. A rare secondary mineral.

Dana VII, v. 2, p. 796-797.

ZIPPEITE

New analysis needed.

U = 59.1 or 64.1 percent. (?)

Color: Orange-yellow. A secondary mineral.

Dana VII, v. 2, p. 598.

Am. Mineralogist, v. 37, p. 394, 950, 1952.

B. MINERALS WITH MINOR AMOUNTS OF URANIUM AND THORIUM**ABUKUMALITE**

$(\text{Th, Ca, Y})_3(\text{SiO}_4, \text{PO}_4, \text{AlO}_4)_3(\text{O, F})$

Related to apatite.

Th=0.8 percent.

Am. Mineralogist, v. 24, p. 66, 1939.

Strunz, Hugo, Mineralogische Tabellen, p. 167, Leipzig, 1949.

ALLANITE

$(\text{Ca, Ce, Th})_2(\text{Al, Fe, Mg})_3\text{Si}_3\text{O}_{12}(\text{OH})$

U=0.02 percent, Th=up to 3.2 percent.

Dana VI, p. 522-526.

Am. Mineralogist, v. 36, p. 223-248, 1951.

Mineralog. Abs., v. 11, p. 434-435, 1952.

Bagrathonite

Variety of allanite.

Name also refers to cerian variety of epidote.

Dana VI, p. 518-519.

Bucklandite

Synonym of allanite.

Dana VI, p. 522-523, 525.

Muromontite

Apparently related to allanite but containing yttrium and beryllium.

Dana VI, p. 526.

Bodenite

Related to muromontite in composition.

Dana VI, p. 526.

Nageteleite

Phosphatian variety of allanite.

Am. Mineralogist, v. 16, p. 343-344, 1931.

Orthite

Synonym of allanite.

Dana VI, p. 522-526.

Uralorthite

Synonym of allanite.

Dana VI, p. 523-525.

Wasite

Altered allanite.

Dana VI, p. 526.

Xanthorite

Altered allanite.

Dana VI, p. 522-523, 525.

Ytthro-orthite

Also yttrium orthite.

Variety of orthite containing 8 percent Y_2O_3 .

Mineralog. Mag., v. 23, p. 639, 1934.

ANTHRAXOLITE

A nickeliferous and uraniferous hydrocarbon.

U=0.003 percent.

Am. Mineralogist, v. 19, p. 426-428, 1934.

ASPHALTITE

Also asphaltum.

Includes solid bituminous hydrocarbons known as albertite, impsonite, gilsonite, grahamite, nigrite and uintaite.

U=0.001 percent.

Mineralog. Mag., v. 15, p. 417, 1910.

Broggite

A variety of asphaltite.

Mineralog. Mag., v. 24, p. 604, 1937.

BASTNAESITE

(Ce, La)FCO₃

U and Th present, but less than 1 percent.

Dana VII, v. 2, p. 289-291.

Am. Mineralogist, v. 38, p. 932-963, 1953.

Buszite

Synonym of bastnaesite.

Soc. franç. minéralogie Bull., v. 76, p. 124-129, 1953.

CAPPELENITE

Ba(Y, Ce, La)₆B₆O₁₂(OH)₂(SiO₄)₃

Th=0.42 percent.

Strunz, Hugo, Mineralogische Tabellen, p. 193, Leipzig, 1949.

CARBONATE-FLUORAPATITE

A carbonatian variety of fluorapatite which is an important constituent of many phosphate rocks. Analyses show U up to 0.02 percent.

Dana VII, v. 2, p. 879, 883-884.

McKelvey, V. E., Domestic phosphate deposits, in Soil and fertilizer phosphorus, Agronomy v. 4, Academic Press, p. 347-376, 1954.

Altschuler, Z. S., Clarke, R. D., Jr., and Young, E. J., Uranium in apatite (abst): Geol. Soc. America v. 65, p. 1225, 1954.

CERITE

A cerium silicate with minor Ca and Fe. Formula uncertain.

U=0.4 percent, Th=0.3 percent.

Am. Mineralogist, v. 25, p. 381-404, 1940.

CHINGLUSUITE

A complex silicate of Na, Mn, Ca, and Ti, containing small amounts of Th and rare earths.

Mineralog. Abs., v. 7, p. 222, 1938.

CORDYLITE

(Ce, La)₂Ba(CO₃)₃F₂

Th=0.26 percent.

Dana VII, v. 2, p. 285-287.

FERSMITE

$(\text{Ca}, \text{Ce}, \text{Na})(\text{Nb}, \text{Ti}, \text{Fe}, \text{Al})_2(\text{O}, \text{OH}, \text{F})_6$

Th=0.42 percent.

Acad. sci., U. R. S. S., C. R., tom 52, p. 69-71, 1946.

HIELMITE

Also hjelmite.

AB_2O_6 or $\text{A}_2\text{B}_3\text{O}_{10}$

A=Y, Fe^2 , U⁴, Mn, Ca.

B=Nb, Ta, Sn, W.

U=4.0 to 4.3 percent.

Dana VII, v. 1, p. 779-780.

HOKUTOLITE

Plumboan variety of barite. Radioactive mixture of Pb and Ba sulfate.

Probably contains Ra, Th, and U.

Dana VII, v. 2, p. 408, 411.

Anglesobarite

Synonym of hokutolite.

Dana VII, v. 2, p. 408, 411.

JOHNSTRUPITE

A complex silicate of Na, Ca, Th, Ce, and Ti.

Close to rinkite.

Th=0.7 percent.

Dana VI, p. 720-721.

KOLM

Material resembling oil shale.

Form in which uranium is present is unknown.

U=0.43 percent.

Washington Acad. Sci. Jour., v. 21, p. 409-414, 1931.

LOVCHORRITE

$\text{Ce}_2(\text{TiO}_3)_3 \cdot 10\text{CaSiO}_3 \cdot 2\text{CeF}_3$

U=0.03 percent, Th=up to 0.7 percent.

Mineralog. Mag., v. 21, p. 569, 1928.

Mineralog. Abs., v. 6, p. 341-343, 1936.

Vudyavrite

An altered lovchorrite.

Th=about 1 percent.

Mineralog. Abs., v. 6, p. 341-343, 1936.

LOVOZERITE

A complex silicate of Ti and Zr.

Th=0.50 percent.

Mineralog. Abs., v. 7, p. 468-469, 1940.

MELANOCERITE

Chiefly a borosilicate of the Ce and Y metals.

Th=1.5 percent.

Dana VI, p. 414-415.

MELANOCERITE—Continued

Caryocerite

Near melanocerite, but contains more Th.

Th=12.0 percent.

Dana VI, p. 415.

MICROLITE

$(\text{Na}, \text{Ca})_2(\text{Ta}, \text{Nb})_2\text{O}_6(\text{O}, \text{OH}, \text{F})$

In pyrochlore-microlite series, with $\text{Ta} > \text{Nb}$.

U=as much as 10.4 percent, Th=0.2 percent.

Dana VII, v. 1, p. 748-754.

Calciotantalite

Possibly a mixture of microlite and tantalite.

Dana VII, v. 1, p. 787.

Djalmaite

Synonym of microlite.

Acad. Brasileira Cienc. Anais, v. 22, p. 139-140, 1950.

Haddamite

Synonym of microlite.

Dana VII, v. 1, p. 748.

Metasimpsonite

An alteration product of simpsonite; later identified with microlite.

Dana VII, v. 1, p. 748, 755.

Neotantalite

An altered microlite with composition close to tantalite.

Dana VII, v. 1, p. 748, 750-751, 753.

Niobantal pyrochlore

Synonym of microlite.

Chemie der Erde, Band 7, p. 56, 1932.

Tantal pyrochlore

Synonym of microlite.

Chemie der Erde, Band 7, p. 56, 1932.

MOSANDRITE

Complex silicate of Na, Ca, Ce, and Ti.

Close to rinkite.

Th=0.3 percent.

Dana VI, p. 721-722.

Zentralbl. Mineralogie, 1934, Abt. A, p. 76-79.

POLYMIGNYTE

$\text{A}(\text{Nb}, \text{Ti}, \text{Ta})\text{O}_4$

A=Ca, Fe², Y, Zr, Th.

Th=3.4 percent.

Dana VII, v. 1, p. 764-766.

PYROCHLORE

$(\text{Na}, \text{Ca})_2(\text{Nb}, \text{Ta})_2\text{O}_6\text{F}$

In pyrochlore-microlite series, with $\text{Nb} > \text{Ta}$.

U as much as 1.4 percent usually, but as much as 17.1 percent in some varieties, Th as much as 4.4 percent.

Dana VII, v. 1, p. 748-754.

Azor-pyrrhit

Synonym of pyrochlore.

Naturh. Ver. preuss. Rheinlande u. Westfalens Sitzungsber. Band 43, p. 217, 1886.

Chalcolamprite

Synonym of pyrochlore.

Dana VII, v. 1, p. 748, 750, 754.

Ellsworthite

An altered uranoan variety of pyrochlore related to hatchettolite.

Dana VII, v. 1, p. 748, 750-752, 755.

Endeolite

Similar in composition to chalcolamprite.

An altered pyrochlore ?

Dana VII, v. 1, p. 748, 754.

Fluochlore

Synonym of pyrochlore (?)

Jour. prakt. Chemie, Band 50, p. 186-187, 1850.

Hatchettolite

Uranoan variety of pyrochlore.

Dana VII, v. 1, p. 748, 750-752, 754.

Hydrochlore

Synonym of pyrochlore.

Jour. prakt. Chemie, Band 50, p. 186-187, 1850.

Koppite

Synonym of pyrochlore.

Dana VII, v. 1, p. 748, 754.

Maignacite

Synonym of pyrochlore.

Dana VII, v. 1, p. 748, 750-752, 755.

Niobpyrochlor

Synonym of pyrochlore.

Chemie der Erde, Band 7, p. 56, 1932.

Pyrrhite

Synonym of pyrochlore.

Dana VII, v. 1, p. 748, 752, 754.

Uran-pyrochlore

Synonym of pyrochlore.

Upsala Univ., Geol. Inst., Bull. 3, p. 181, 1896.

RINKITE

$\text{Ce}_2(\text{TiO}_3)_3 \cdot 10\text{CaSiO}_3 \cdot 3\text{CaF}_2$

Intermediate member of lovchorrite-calcium-rinkite series.

Th=small amounts.

Mineralog. Abs., v. 6, p. 342-343, 1936.

RINKOLITE

Complex silicate of Na, Ca, Ce, and Zr in lovchorrite-calcium-rinkite series.

Th up to 0.41 percent.

Mineralog. Mag., v. 21, p. 575, 1928.

Mineralog. Abs., v. 6, p. 341-343, 1936.

ROWLANDITE

$(Y, La, Ce)_4Fe(F, Si_2O_7)_2?$

U=0.4 percent.

Possibly a metamict thalenite.

Dana VI, p. 1047.

Strunz, Hugo, Mineralogische Tabellen, p. 194, Leipzig, 1949.

STEENSTRUPINE

Complex silicate of rare earths, Th, Na, K, Fe, Mn, Mg, P, Be, Al, and Ta, with (OH) and F.

Th=6.2 percent.

Dana VI, p. 415.

Strunz, Hugo Mineralogische Tabellen, p. 192, Leipzig, 1949.

TENDERITE

$CaY_3(CO_3)_4(OH)_3 \cdot 3H_2O?$

The originally described tenderite, Dana VI, pp. 306-307, is a different mineral, supposedly beryllium yttrium carbonate; no published analysis.

Th=0.26 percent.

Dana VII, v. 2, p. 275-276.

THALENITE

$Y_4Si_4O_{13}(OH)_2$

Related to yttrialite.

Th=0.16 percent.

Dana VI, appendix I, p. 68.

TRITOMITE

A borosilicate of Ce, Y, Th, Ca, and F; exact formula uncertain.

Th=7.5 to 8.3 percent.

Dana VI, p. 419.

TURANITE

Supposedly $Cu_5(VO_4)_2(OH)_4$.

Seems to be related to mottramite.

Reported to contain 3.2 percent U.

Dana VII, v. 2, p. 818.

VANOXITE

Perhaps $2V_2O_4 \cdot V_2O_5 \cdot 8H_2O$.

Reported to contain up to 0.5 percent U; work in progress indicates species may be invalid.

Dana VII, v. 1, p. 601-602.

VOLBORTHITE

Perhaps $Cu_3(VO_4)_2 \cdot 3H_2O$.

Reported to contain 3.1 percent U.

Dana VII, v. 2, p. 816-819.

Calciovolborthite

Probably $CuCa(VO_4)(HO)$.

Possibly only a calcian variety of volborthite.

Dana VII, v. 2, p. 816-818.

Tangeite

Also tanguéite.

Appears to be identical with calciovolborthite.

Dana VII, v. 2, p. 816-818.

Uzbekite

Synonym of volborthite.

Dana VII, v. 2, p. 818.

WIIKITE

Ill-defined mixture and alteration product of minerals high in Nb, Ta, Ti, Si, and Y.

U=up to 13.2 percent, Th=0.09 to 3.7 percent.

Comm. géol. Finlande Bull. 13, no. 82, 1928; idem, no. 149, 1950.

Mineralog. Abs., v. 11, p. 227, 1951.

Nuolaite

A mixture similar to wiikite.

Th=1.8 to 3.5 percent.

Dana VII, v. 1, p. 801.

XENOTIME

YPO_4

U=as much as 3.6 percent, Th=as much as 2.2 percent.

Dana VII, v. 2, p. 688-681.

YTTRIALITE

Silicate, chiefly of Th and Y metals.

Possibly thalenite with much Th.

U=0.8 percent, Th=10.5 percent.

Dana VI, p. 512.

Strunz, Hugo, Mineralogische Tabellen, p. 194, Leipzig, 1949.

YTTROCRASITE

$(\text{Y, Th, U, Ca})_2\text{Ti}_4\text{O}_{11}?$

U=2.3 percent, Th=7.7 percent.

Dana VII, v. 1, p. 793.

YTTROTANTALITE

$(\text{Fe, Y, U})(\text{Nb, Ta})\text{O}_4$

Grades to samarskite.

U=as much as 4.8 percent, Th=as much as 1.6 percent.

Dana VII, v. 1, p. 763-764.

Mineralog. Abs., v. 11, p. 231-232, 1950.

Yttrocolumbite

Similar to yttrotantalite.

Am. Mineralogist, v. 25, p. 155, 1940.

ZIRCON

ZrSiO_4

U and Th low in most specimens, but as much as 2.7 percent U and as much as to 13.1 percent Th reported.

Dana VI, p. 482-486.

ZIRCON—Continued

Alvite

Variety of zircon, near cyrtolite.
Dana VI, p. 487-488.

Azorite

Variety of zircon.
Dana VI, p. 482-484.

Calyptolite

Probably altered zircon.
Dana VI, p. 482, 486.

Cyrtolite

Altered zircon, containing U, Th, Y and other rare earths.
Dana VI, p. 487.
Am. Mineralogist, v. 38, p. 1007-1018, 1953.

Hagatalite

Synonym of zircon.
Am. Mineralogist, v. 11, p. 137, 1926.

Hoeghteitite

May be alvite.
Am. Mineralogist, v. 12, p. 97, 1927.

Malacon

Hydrated or altered zircon containing the common elements, but no U, Th, or rare earths except in trace amounts.
Dana VI, p. 486.

Naegite

Variety of zircon.
Mineralog. Abs., v. 2, p. 36, 1923.

Oerstedite

Altered zircon.
Dana VI, p. 486.

Oyamalite

Variety of zircon.
Am. Mineralogist, v. 11, p. 137-138, 1926.

Ribeirite

An altered zircon.
Mineralog. Abs., v. 12, p. 305, 1954.

Tachyphallite

Probably altered zircon.
Dana VI, p. 486.

Yamagutilite

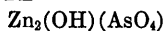
Also yamaguchilite.
Variety of zircon.
Contains P_2O_5 and rare earths.
Mineralog. Mag., v. 24, p. 626, 1937.

ZIRKELITE

$(Ca, Fe, Th, U)_2(Ti, Zr)_2O_5?$
U=1.4 percent, Th=6.4 percent.
Dana VII, v. 1, p. 740.

C. MINERALS REPORTED TO CONTAIN URANIUM AND THORIUM MINERALS AS IMPURITIES OR INTER-GROWTHS

ADAMITE



Reported to contain small amounts of U.

Mineralog. Abs., v. 10, p. 375, 1948.

Strunz, Hugo, Mineralogische Tabellen, p. 161, Leipzig, 1949.

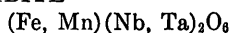
BODENBENDERITE

Mixture of fluorite and spessartite.

U = 0.11 percent.

Am. Mineralogist, v. 34, p. 608-611, 1949.

COLUMBITE



U = as much as 9.8 percent.

Dana VII, v. 1, p. 780-785.

Baierite

Also baierine.

Synonym of columbite.

Dana VII, v. 1, p. 780.

Dianite

Synonym of columbite.

Dana VII, v. 1, p. 780.

Ferrocolumbite

Synonym of columbite.

Dana VII, v. 1, p. 780, 783.

Ferro-ilmenite

Synonym of columbite.

Dana VII, v. 1, p. 780, 785.

Greenlandite

Synonym of columbite.

Dana VII, v. 1, p. 780, 784.

Hermannolite

Synonym of columbite.

Dana VII, v. 1, p. 780, 785.

Manganocolumbite

Variety of columbite.

Dana VII, v. 1, p. 700, 783-784.

Toddite

Probably a uranoan variety of columbite.

Dana VII, v. 1, p. 785-786.

Ellsworth, H. V., written communication.

CORVUSITE



U = 1.45 percent.

Work in progress indicates species may be valid.

Reexamination of type material shows presence of rauvite which might account for reported uranium content.

Am. Mineralogist, v. 18, p. 195-205, 1933.

Weeks, A. D., written communication, March 1952.

EVANSITE

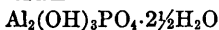


Reported to contain small amounts of U.

Mineralog. Abs., v. 10, p. 375, 1948.

Strunz, Hugo, Mineralogische Tabellen, p. 176, Leipzig, 1949.

FISCHERITE



Reported to contain small amounts of U.

Mineralog. Abs., v. 10, p. 375, 1948.

Strunz, Hugo, Mineralogische Tabellen, p. 175, Leipzig, 1949.

FLUORITE



Some specimens, especially deep-purple ones, are radioactive. This can generally be shown to be due to inclusions of uranium minerals, but the fluorite itself may possibly have U in substitution for Ca.

Dana VII, v. 2, p. 28-37.

Strong alpha bombardment produces the semiopaque to opaque black variety antozonite as in the inner bands of halos surrounding uraninite and thorite inclusions. Centered thorium halos in fluorite have a maximum radius of about 41 microns. Uranium halos are smaller with a maximum radius of about 31 microns.

Am. Mineralogist, v. 37, p. 659-666, 910-930, 1952.

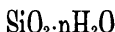
KATANGITE

Synonym of chrysocolla.

May contain U in admixture.

Mineralog. Abs., v. 9, p. 231, 1946.

OPAL



Some varieties, particularly hyalite, show a green fluorescence due to uranium content.

U (in hyalite) = 0.000048-0.064 percent.

Mineralog. Abs., v. 10, p. 374-375, 1948.

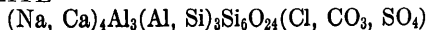
PYROMORPHITE



Some specimens are uraniferous.

Zeitschr. Kristallographie, Band 62, p. 177-178, 1925.

SCAPOLITE



A fluorescent variety contains 0.023 percent U.

Chemie der Erde, Band 9, p. 139-144, 1934.

SEFSTRÖMITE

A mixture of ilmenite with minor amounts of radioactive minerals.

Dana VII, v. 1, p. 542.

Mineralog. Mag., v. 29, p. 112, 1950.

[Names in *italic* are synonyms or varieties]

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