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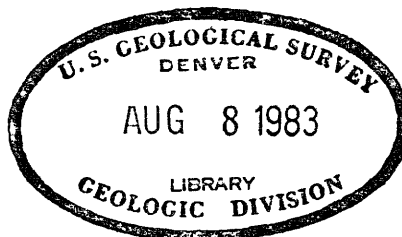
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A GLOSSARY OF URANIUM- AND THORIUM-BEARING MINERALS

by

Judith Weiss Frondel and Michael Fleischer

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Introduction

The U. S. Geological Survey has for some time been making a systematic survey of data pertaining to uranium and thorium minerals and to those minerals which contain traces or more of uranium and thorium. This survey consists of collecting authoritative chemical, optical, and X-ray diffraction data from the literature and of adding to this data, where it is inadequate, by work in the laboratory. The results will be reported from time to time, and the authors welcome information on additional data and names.

The first of a series of reports on these results is this glossary of uranium- and thorium-bearing minerals. The glossary is divided into four groups: A, minerals containing uranium and thorium as major constituents; B, minerals containing minor amounts of uranium and thorium; C, minerals which, if investigated by modern analytical methods, might show uranium or thorium content; and D, minerals which are non-uranium- or non-thorium-bearing, but which have been reported to contain impurities or intergrowths of uranium, thorium, or rare-earth minerals. Uranium is more widespread in its natural occurrence than generally has been supposed, and it is possible that the third group of minerals will give valuable information upon reinvestigation.

Such a glossary has long been needed to alleviate the confusion which obscures the nomenclature of these minerals. For many of them the confusion will remain until more thorough research is done. Some species always may be subject to question as their type specimens have been lost and existing specimens bearing the species name have been found to be other substances (e.g., in group A, uranochalcite and voglianite). Structural formulas are given for most of the minerals. Oxide formulas are given where no good structural data are available. The glossary summarizes the state of our knowledge, as of August 1949, concerning the validity of all the included species. Identities and group relations are indicated. It might be well to relegate to obscurity the many synonyms existing in the literature.

In the index there are 325 entries which represent 81 species containing uranium and thorium as major constituents, 39 species containing small amounts of uranium and thorium, 29 species which should be tested for uranium and thorium, and 13 species which have been reported to contain impurities or intergrowths of uranium, thorium, or rare-earth minerals. These four categories are shown in the index by reference letters.

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

The authors wish to thank Dr. Clifford Frondel of the Department of Mineralogy and Petrography, Harvard University, and Professor Esper S. Larsen, Jr., of the U. S. Geological Survey, for their suggestions and critical reading of the manuscript.

I N D E X

- (A) indicates minerals containing uranium or thorium as major constituents.
 (B) indicates minerals containing minor amounts of uranium or thorium.
 (C) indicates minerals which should be tested for uranium and thorium content.
 (D) indicates minerals which are non-uranium- or non-thorium-bearing, but which have been reported to contain impurities or intergrowths of uranium, thorium, or rare-earth minerals.

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GROUP A. URANIUM AND THORIUM MINERALS

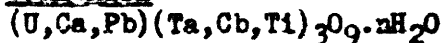
1. AMPANGABEITE
 $(Y, Er, U, Ca, Th)_2(Cb, Ta, Fe, Ti)_7O_{18}?$
 Validity of species is questionable; may be an inhomogeneous alteration product.
 $U = 17.1\%, Th = 1.8\%$
 Dana VII, pp. 806-807
Hydroeuxenite - synonym of ampingabeite
 Dana VII, p. 806
2. ANDERSONITE
 $Na_2Ca(UO_2)(CO_3)_3 \cdot 6H_2O$
 $U = 39.15\%$
 Milton, C., U. S. Geol. Survey
 Personal communication
3. AUTUNITE
 $Ca(UO_2)_2(PO_4)_2 \cdot 8-12H_2O$
 $U = 49.7$ to 56.2%
 Dana VI, pp. 857-858
Calcouranite - synonym of autunite
Meta-autunite is the hydrate with $8H_2O$
4. BASSETITE
 $Fe(UO_2)_2(PO_4)_2 \cdot 8H_2O$
 $U = 51\%$
 Mineralog. Mag., vol. 17, pp. 221-236, 1915
 Chemie der Erde, vol. 12, pp. 433-450, 1939-40
 Frondel, C., Harvard University
 Personal communication
5. BAYLEYITE
 $Mg_2(UO_2)(CO_3)_3 \cdot 18H_2O$
 $U = 27.8$ to 29.2%
 Milton, C., U. S. Geol. Survey
 Personal communication
6. BECCUERELITE
 $2UO_3 \cdot 3H_2O?$
 $U = 82.4\%$
 Dana VII, pp. 625-627
Billietite - variety of becquerelite
 Am. Mineralogist, vol. 33, pp. 503-507, 1948
7. BETAFITE
 $(U, Ca)(Cb, Ta, Ti)_3O_9 \cdot nH_2O?$
 $U = 16.3$ to 24.5%
 $Th = 1.0$ to 1.1%
 Dana VII, pp. 803-805
Blomstrandite - synonym of betafite
 $U = 16.3\%$
 Dana VII, pp. 803-805
Mendelevevite - titanian betafite
 $U = 13.7\%$
 Dana VII, pp. 803-804
Samirésite - synonym of betafite
 $U = 18.7\%$
 Dana VII, pp. 803-805

8. BRANNERITE
 $(U, Ca, Fe, Y, Th)_3Ti_5O_{16}?$
 U = 39.3%, Th = 3.6%
 Dana VII, pp. 774-775
9. CALCIOSAMARSKITE
 $(Ca, Y, etc., U, Th)_3(Cb, Ta, Fe, Ti, Sn)_5O_{15}$
 and
 $(Ca, Y, etc., U, Th, Zr)_3(Cb, Ta, Fe, Ti)_5O_{16}$
 U = 9.4 to 11.3%
 Th = 1.9 to 2.9%
 Dana VII, p. 772
10. CARNOTITE
 $K(UO_2)(VO_4) \cdot \frac{1}{2} - 1\frac{1}{2}H_2O$
 U = 56.3 to 58.4%
 Dana VI, Appendix I, pp. 13-14
11. CLARKEITE
 $UO_3 \cdot nH_2O?$
 U = 73.7%
 Dana VII, pp. 624-625
12. CUPROSKLODOWSKITE
 $Cu(UO_2)_2Si_2O_7 \cdot 6H_2O$
 U = 58.6%
 Am. Mineralogist, vol. 19,
 p. 235, 1934
Jachymovite = cuprosklodowskite
 Mineral Abs., vol. 6,
 p. 345, 1936
Uranochalcite - a hydrous copper,
 uranium, and calcium sulfate
 of questionable validity.
12. CUPROSKLODOWSKITE (Cont.)
Voglianite - A hydrous
 calcium and uranium
 sulfate of questionable
 validity. The type ma-
 terial of Vogl for
 uranochalcite and
 voglianite has not been
 found. Present museum
 specimens bearing these
 names have proven to be
 cuprosklodowskite.
 Vogl, J. F., Gangver-
 hltnisse und Mineral-
 reichthum Joachimthals,
 Teplitz, 1857
 Vstnk Krlovsk esk
 Spolenostinauk, 1935,
 article VII, pp. 1-36
13. CURITE
 $Pb_2U_5O_{17} \cdot 4H_2O?$
 U = 66.2 to 70.1%
 Dana VII, pp. 629-631
14. DELORENZITE
 $(Y, U, Fe^2)(Ti, Sn)_3O_8?$
 U = 8.7%
 Dana VII, p. 808
15. DEWINDTITE
 $Pb(UO_2)_2(PO_4)_2 \cdot 3H_2O?$
 U = 52.1%
 Am. Mineralogist, vol. 7,
 p. 162, 1922
Stasite = dewindite? -
 $Pb_4U_8P_6O_{43} \cdot nH_2O?$
 Am. Mineralogist, vol. 7,
 pp. 196-197, 1922

16. DIDERICHITE

Contains uranium, water,
and carbonate. Validity
of species is questionable.

Soc. belge geologie Bull.,
vol. 70, pp. 212-225, 1947

17. DJALMAITE

May be tantalum equivalent
of betafite. May be micro-
lite.

Tavora, E., University
of Brazil
Personal communication,
Oct. 1949

U = 10.4%

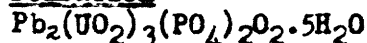
Dana VII, p. 805

18. DROOGMANSITE

No chemical analysis has
been made.

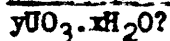
May be related to sklodowskite.

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

19. DUMONTITE

U = 51.0%

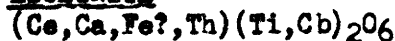
Am. Mineralogist, vol. 10,
p. 131, 1925

20. EPIANTHINITE

No good chemical analysis
has been made.

An alteration product of
ianthinite.

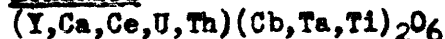
Am. Mineralogist, vol. 32,
pp. 344-350, 1947

21. ESCHYNITE

Also aeschynite. In
eschynite-priorite series.

Th = 9.9 to 15.4%

Dana VII, pp. 793-796

22. EUXENITE

In euxenite-polycrase series.

U = 3.0 to 9.0%

Th = up to 4.3%

Dana VII, pp. 787-791

Lyndochite - variety of
euxenite

U = 0.6%, Th = 4.3%

Dana VII, pp. 787, 789-791

Tanteuxenite - variety of
euxenite

U = 3.0 to 3.8%, Th = tr.

Dana VII, pp. 787, 789-790

Eschwegite - AB_2O_6

A = Y,Er,U,Th

B = Cb,Ta,Ti,Fe

U = 1.7%, Th = 0.5%

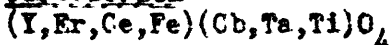
May belong to euxenite-
polycrase series.

Dana VII, pp. 792-793

Toddite - possibly a mixture
of columbite and euxenite.

U = 9.8%, Th = 0.4%

Dana VII, pp. 785-786

23. FERGUSONITE

In fergusonite-formanite series.

U = 0.8 to 6.3%

Th = 0.7 to 2.5%

Dana VII, pp. 757-762

Adelpholite - synonym of fergusonite? A poorly defined substance, possibly an altered mossite.

Dana VII, pp. 762, 778-779

Arrhenite - an altered fergusonite

Dana VII, p. 762

Bragite - synonym of fergusonite

U = 7.2%

Dana VII, pp. 757, 759, 761

Kochelite - synonym of fergusonite

Dana VII, pp. 757, 761

Risörite - synonym of fergusonite

U = 0.09%, Th = tr.

Dana VII, pp. 757-758, 760-762

Rutherfordite - an altered fergusonite

Dana VII, pp. 757, 761-762

Sipylite - synonym of fergusonite

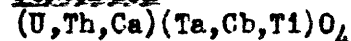
U = 0.8 to 6.3%

Dana VII, pp. 757, 759-760, 762

23. FERGUSONITE (Cont.)

Tyrite - synonym of fergusonite

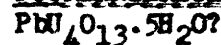
Dana VII, pp. 757, 760-761

24. FORMANITE

In fergusonite-formanite series.

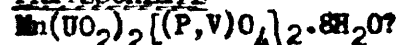
U = 1.1%, Th = 1.1%

Dana VII, pp. 758, 760, 762

25. FOURMARIERITE

U = 70.1 to 70.8%

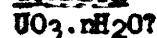
Dana VII, pp. 628-629

26. FRITZSCHEITE

No actual analysis is available.

May be the manganese analogue of torbernite.

Dana VI, p. 860

27. GUMMITE

Generic term for minerals occurring as alteration products of uraninite and not otherwise identified.

Group includes silicates, phosphates, and oxides.

U = 31.3 to 70.1%

Th = up to 22.0%

Dana VII, pp. 622-625

Eliasite - synonym of gummite

U = 57.2%

Dana VII, pp. 622-624

27. GUMMITE (Cont.)Pittinite - synonym of gummite

Dana VII, pp. 622-624

Yttrogummite - synonym of gummite

Alteration product of yttrian uraninite.

Dana VII, pp. 622-624

28. IANTHINITE $2\text{UO}_2 \cdot 7\text{H}_2\text{O}?$

U = 70.3%

Dana VII, pp. 633-634

29. ISHIKAWAITE $(\text{U}, \text{Fe}, \text{Y}, \text{etc.})(\text{Cb}, \text{Ta})\text{O}_4$

U = 19.3%

Dana VII, p. 766

30. JOHANNITE $\text{CuU}_2(\text{SO}_4)_2(\text{OH})_{10} \cdot 2\text{H}_2\text{O}$

U = 55.3 to 61.1%

Am. Mineralogist, vol. 11,
pp. 1-5, 1926Gilpinite = johanniteAm. Mineralogist, vol. 11,
pp. 1-5, 192631. KASOLITE $\text{Pb}(\text{UO}_2)\text{SiO}_4 \cdot \text{H}_2\text{O}$

U = 43.6 to 44.5%

Am. Mineralogist, vol. 7,
pp. 128-129, 192232. CHLOPINITE $(\text{Y}, \text{U}^4, \text{Th})_3(\text{Cb}, \text{Ta}, \text{Ti}, \text{Fe})_7\text{O}_{20}?$

Also chlopinite, hlopinite

May be related to euxenite-polyserase series.

U = 7.2%, Th = 1.9%

Dana VII, p. 792

33. LIEBIGITE $\text{Ca}(\text{UO}_2)(\text{CO}_3)_2 \cdot 20\text{H}_2\text{O}?$

U = 34.3%

Dana VI, p. 308

Uranothallite - synonym of liebigiteFronzel, C., Harvard
University
Personal communicationFlutherite - synonym of uranothallite

Dana VI, p. 307

34. MACKINTOSHITE $(\text{Th}, \text{U})\text{SiO}_4 \cdot \text{H}_2\text{O}?$

U = 19.7%, Th = up to 39.9%

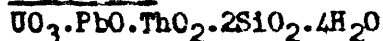
Dana VI, appendix I, p. 44

Hydrothorite $\text{ThSiO}_4 \cdot 4\text{H}_2\text{O}$

Alteration product of mackintoshite.

U = 1.9%, Th = 50.7%

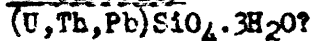
Am. Mineralogist, vol. 13,
p. 570, 1928

34. MACKINTOSHITE (Cont.)Pilberite

Alteration product of
mackintoshite.

U = 24.4%, Th = 27.4%

Am. Mineralogist, vol. 13,
pp. 464-465, 1928

35. MAITLANDITE

U = 31.2%, Th = 22.7%

Am. Mineralogist, vol. 16,
p. 472, 1931

Nicolayite - close to
maitlandite

U = 33.7%, Th = 21.4%

Am. Mineralogist, vol. 16,
p. 409, 1931

36. MASUYITE

Hydrated lead uranium oxide.

Validity of species is
questionable.

Soc. belge geologie Bull.,
vol. 70, pp. 212-225,
1947

37. MEDJIDITE

Sulfate of uranium and
calcium.

Validity of species is
questionable.

Dana VI, p. 978

38. MONAZITE

Essentially (Ce, La, Nd, Pr)PO₄
containing ThO₂ and SiO₂

Th = commonly 8%, but up
to 26% is reported.

Davidson, C. F.; Geol.
Survey Great Britain
Personal communication

Dana VI, pp. 749-752

Cryptolite - synonym of
monazite

Dana VI, pp. 749, 752

Edwardsite - synonym of
monazite

Dana VI, p. 749

Eremite - synonym of monazite

Dana VI, pp. 749, 752

Kärarfeite - impure monazite

Dana VI, p. 752

Mengite - synonym of monazite

Dana VI, p. 749

Monazitoid - synonym of
monazite

Dana VI, p. 749

Phosphocerite - synonym of
monazite

Dana VI, p. 749

Turnerite - synonym of
monazite

Dana VI, pp. 749, 751-752

Urdite - synonym of monazite

Dana VI, pp. 749, 752

39. NOHLITE
 $(Ca, Mg, Fe, Y, \text{etc.}, U)_2(Ch, Zr, Fe^3)_{30}O_{10}$
 Validity of species is questionable.
 $U = 13.0\%$
 Dana VII, p. 772
40. PARASCHOEPITE
 $UO_3 \cdot 2H_2O?$
 $U = 80.5\%$
 Am. Mineralogist, vol. 32,
 pp. 344-350, 1947
41. PARSONSITE
 $Pb_2(UO_2)(PO_4)_2 \cdot 2H_2O$
 $U = 26.8\%$
 Am. Mineralogist, vol. 8,
 p. 150, 1923
42. PHOSPHURANYLITE
 A lead, calcium, uranium
 phosphate.
 $U = 57.3\%$
 Frondel, C., Harvard
 University
 Personal communication
43. POLYCRASE
 $(Y, Ca, Ce, U, Th)(Ti, Cb, Ta)_2O_6$
 In euxenite-polycrase series.
 $U = 5.5$ to 12.4%
 $Th =$ up to 4.7%
 Dana VII, pp. 787-791
44. POLYMIGNYTE
 $A(Cb, Ti, Ta)O_4$
 $A = Ca, Fe^2, Y, \text{etc.}, Zr, Th$
 $Th = 3.4\%$
 Dana VII, pp. 746-766
45. PRIORITE
 $(Y, Fr, Ca, Fe^2, Th)(Ti, Cb)_2O_6$
 In eschynite-priorite
 series.
 $U = 0.4$ to 3.4%
 $Th = 0.5$ to 14.9%
 Dana VII, pp. 793-796
Blomstrandine - synonym of
 priorite
 Also, blomstrandinite
 Dana VII, pp. 793-796
46. RAUVITE
 $CaO \cdot 2UO_3 \cdot 6V_2O_5 \cdot 2CH_2O$
 $U = 21.4\%$
 Am. Mineralogist, vol. 8,
 p. 187, 1923
 U. S. Geol. Survey
 Bull. 750, pp. 68-70,
 1935
47. RENARDITE
 $Pb(UO_2)_2(PO_4)_2O_6 \cdot 9H_2O$
 $U = 58.5\%$
 Am. Mineralogist, vol. 14,
 p. 244, 1929
48. RICHETITE
 Contains Pb and U.
 Validity of species is
 questionable.
 Soc. belge geologie Bull.,
 vol. 70, pp. 212-225,
 1947
49. RUTHERFORDINE
 $UO_2CO_3?$
 Validity of species is
 questionable.
 $U = 72.1\%$
 Mineralog. Mag., vol. 14,

50. SALEHITE
 $\text{Mg}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$
 U = 58.4%
 Am. Mineralogist, vol. 19,
 p. 36, 1934
51. SAMARSKITE
 $(\text{Y}, \text{Er}, \text{U}, \text{Ca}, \text{Fe}, \text{Th})(\text{Cb}, \text{Ta})_2\text{O}_6$
 U = 8.4 to 16.1%
 Th = up to 3.7%
 Dana VII, pp. 797-800
Annerödite - mixture of
 samarskite and parallel
 growths of columbite.
 Dana VII, pp. 797, 799
Eytlandite - synonym of
 samarskite
 Dana VII, p. 797
Hydrosamaraskite - an altered
 samarskite
 Dana VII, pp. 799-800
Plumbonilobite - a columbate of
 Y, U, Pb, Fe, etc.
 May be a plumbian variety of
 samarskite.
 Dana VII, p. 800
Rogersite - synonym of samarskite
 Dana VII, p. 800
Uranotantalite - synonym of
 samarskite
 Dana VII, p. 797
Vietinghofite - synonym of
 samarskite
 Dana VII, pp. 800-801
Yttrio-ilmenite - synonym of
 samarskite
 Dana VII, p. 797
52. SCHOEPIITE
 $4\text{UO}_3 \cdot 9\text{H}_2\text{O}$
 U = 79.0%
 Am. Mineralogist, vol. 8,
 pp. 67-69, 1923
53. SCHROECKINGERITE
 $\text{Ca}_3\text{NaUO}_2(\text{CO}_3)_3(\text{SO}_4)\text{F} \cdot 10\text{H}_2\text{O}$
 U = 29.0%
 Am. Mineralogist, vol. 33,
 pp. 152-157, 1948
Dakeite - synonym of
 schroeckingerite
54. SENGIERITE
 $\text{Cu}_2(\text{UO}_2)_2(\text{VO}_4)_2 \cdot 0.10\text{H}_2\text{O}$
 U = 47.2%
 Am. Mineralogist, vol. 34,
 pp. 109-120, 1949
55. SHARHITE
 $6\text{UO}_3 \cdot 5\text{CO}_2 \cdot 8\text{H}_2\text{O}$
 Composition needs to be checked
 U = 73.1%
 Am. Mineralogist, vol. 24,
 p. 658, 1939
56. SKŁODOWSKITE
 $\text{Mg}(\text{UO}_2)_2\text{Si}_2\text{O}_7 \cdot 7\text{H}_2\text{O}$
 U = 58.4%
 Am. Mineralogist, vol. 10,
 p. 132, 1925
Chinkolobwite - synonym of
 sklodowskite
 Am. Mineralogist, vol. 9,
 p. 156, 1924
57. SODDYITE
 $5\text{UO}_3 \cdot 2\text{SiO}_2 \cdot 6\text{H}_2\text{O}$
 U = 77.0%
 Mineral Abs., vol. 3, p. 371,

58. STUDTITE

A hydrated carbonate of
U and Pb.

Validity of species is
questionable.

Soc. belge geologie Bull.,
vol. 70, pp. 212-225, 1947

59. SWARTZITE

$\text{CaMgUO}_2(\text{CO}_3)_3 \cdot 12\text{H}_2\text{O}$

U = 33.6%

Milton, C., U. S. Geol. Survey
Personal communication

60. THORIANITE

$(\text{Th}, \text{U})\text{O}_2$

Forms series with uraninite

U = 15.9 to 39.0%

Th = 33.7 to 81.5%

Dana VII, pp. 620-622

Uranothorianite = uranium-rich
member of series

61. THORITE

ThSiO_4

U = up to 9.0%

Th = 25.2 to 62.7%

Dana VI, pp. 488-489

Auerlite - phosphatian variety of
thorite

Th = 60.7 to 61.5%

Dana VI, pp. 488-490

Calciorthorite - variety of
thorite

Th = 52.3%

Dana VI, p. 489

61. THORITE (Cont.)

Enalite - uranoan thorite

U = 9.4%, Th = 25.4%

Am. Mineralogist, vol. 18,
p. 223, 1933

Eucrasite - variety of thorite

Th = 31.6%

Dana VI, p. 489

Ferrothorite - a ferrian thorite

U = 2.4%, Th = 54.0%

Am. Mineralogist, vol. 14,
p. 78, 1929

Frevalite - variety of thorite

Th = 25.2%

Dana VI, p. 489

Hyblite - (both alpha and beta) -
hydrous basic sulfo-silicate
of Th, with minor U, Fe, and
Pb.

An alteration product of
thorite.

Am. Mineralogist, vol. 12,
pp. 368-372, 1927

Orangite - synonym of thorite

U = 1.0%, Th = 62.7%

Dana VI, pp. 488-489

Uranothorite - uranoan thorite

U = 7.4 to 13.9%

Th = 38.2 to 42.3%

Dana VI, pp. 488-489

62. THOROGUMMITE
 $(\text{Th}, \text{U})\text{SiO}_4 \cdot 6\text{H}_2\text{O}?$
 Compare MAITLANDITE, p. 14
 $\text{U} = 20.2\%$, $\text{Th} = 36.3\%$
 Dana VI, p. 893
Chlorothorite - synonym of thorogummite
 Dana VI, p. 893
63. THOROTUNGSTITE
 $3\text{WO}_3 \cdot \text{ThO}_2 \cdot 4\text{H}_2\text{O}?$
 $\text{Th} = 14.0\%$
 Am. Mineralogist, vol. 13,
 p. 159, 1928
64. TORBERNITE
 $\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8-12\text{H}_2\text{O}$
 $\text{U} = 51.2$ to 56.0%
 Dana VI, pp. 856-857
Chalcolite - synonym of torbernite
Cuprouranite - synonym of torbernite
Metachalcolite - synonym of metatorbernite
Metatorbernite
 $\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$
 $\text{U} = 56\%$
 Mineralog. Mag., vol. 17,
 pp. 326-339, 1916
Uranite = torbernite-autunite group
 Dana VI, pp. 856-857
Uranophyllite - synonym of torbernite
65. TROGERITE
 $(\text{UO}_2)_3(\text{AsO}_4)_2 \cdot 12\text{H}_2\text{O}$
 $\text{U} = 57.5\%$
66. TYUYAMUNITE
 $\text{Ca}(\text{UO}_2)_2(\text{VO}_4)_2 \cdot n\text{H}_2\text{O}$
 $n = 9-10$, but may be down to 4.
 $\text{U} = 47.1$ to 59.0%
 Am. Mineralogist, vol. 12,
 p. 382, 1927
Calciocarnotite - synonym of tyuyamunite
Ferghanite - probably identical with tyuyamunite but original descriptions indicate minerals may be different.
 Frondel, C., Harvard University
 Personal communication
67. URACONITE
 Hydrous sulfate of U and Cu .
 $\text{U} = 61.0\%$
 Dana VI, p. 978
Uranocher - synonym of uraconite
68. URANINITE
 UO_2 (between UO_2 and U_3O_8 , with U^{4+} predominant)
 $\text{U} = 46.4$ to 97.6%
 $\text{Th} =$ up to 12.2%
 Dana VII, pp. 611-620
Bröggerite
 Thorian uraninite $(\text{U}, \text{Th})\text{O}_2$
 $\text{U} = 68.3\%$, $\text{Th} = 5.3\%$
 Dana VII, pp. 611-614
Cleveite - uraninite with rare earths
 $\text{U} = 57.0\%$, $\text{Th} = 4.0\%$
 Dana VII, pp. 611, 613-614

68. URANINITE (Cont.)

Coracite - synonym of uraninite

Dana VII, pp. 611, 615, 617

Masturan - synonym of pitchblende

Dana VII, pp. 611, 614, 617

Nivenite - uraninite with rare earths

U = 57.8%, Th = 5.9%

Dana VII, pp. 611, 613-615, 617

Pitchblende - colloform and massive uraninite

U = 56.9 to 82.9%

Dana VII, pp. 611-619

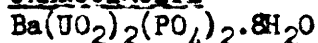
Ulrichite - synonym of uraninite

Dana VII, pp. 611, 613, 617

Uranoniobite - synonym of uraninite

Dana VII, pp. 611, 613

"Uranopissite" - synonym of uraninite

69. URANOCIRCITE

Barium analogue of autunite

U = 51.3%

Dana VI, p. 859

70. URANOPHANE

U = 48.1 to 60.4%

Dana VI, p. 699

70. URANOPHANE (Cont.)

Beta-uranophane - polymorph of uranophane

Nováček, R., Vestník
Královské České Spol.,
article VII, pp. 1-36,
1935

Lambertite - synonym of uranophane

Am. Mineralogist, vol. 11,
pp. 155-157, 1926

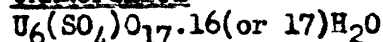
Randite - a mixture of beta-uranophane, some tyuyamunite, and calcite.

Fronzel, C., Harvard
University
Personal communication

Uranotil - synonym of uranophane

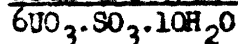
U = 56.7 to 60.2%

Dana VI, p. 699

71. URANOPILLITE

U = 69.6 to 69.9%

Beta-uranopillite



Nováček, R., Vestník
Královské České Spol.,
article VII, pp. 1-36,
1935

72. URANOSPATHITE

Hydrated uranyl phosphate?

Composition unknown

Mineralog. Mag., vol. 17,
pp. 221-236, 1915

73. URANOSPHERITE
 $\text{Bi}_2\text{U}_2\text{O}_9 \cdot 3\text{H}_2\text{O}$
 U = 45.9 to 43.3%
 Dana VII, p. 631
74. URANOSPINITE
 $\text{Ca}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 8-12\text{H}_2\text{O}$
 U = 53.4%
 Dana VI, pp. 858-859
75. UVANITE
 $2\text{UO}_3 \cdot 3\text{V}_2\text{O}_5 \cdot 15\text{H}_2\text{O}$
 U = 32.9%
 Mineralog. Mag., vol. 17,
 p. 359, 1916
 Washington Acad. Sci. Jour.,
 vol. 4, p. 576, 1914
76. VANDENBRANDEITE
 $\text{CuUO}_4 \cdot 2\text{H}_2\text{O}$
 U = 63.5 to 64.3%
 Dana VII, pp. 632-633
Uranolepidite - synonym of
 vandenbrandeite
 Am. Mineralogist, vol. 19,
 pp. 235-236, 1934
77. VANDENDRIESSCHEITE
 Hydrous lead uranium oxide.
 Validity of species is
 questionable.
 Soc. belge geologie Bull.,
 vol. 70, pp. 212-225, 1947
78. VOGLITE
 $\text{Cu}(\text{UO}_2)(\text{CO}_3)_2 \cdot 10\text{H}_2\text{O}?$
 U = 34.7%
 Dana VI, p. 308
79. WALPURGITE
 $\text{Bi}_4\text{UAs}_2\text{O}_{14} \cdot 3\text{H}_2\text{O}$
 U = 13.5 to 17.0%
 Dana VI, p. 860
 Neues Jahrb., 44, Abt. A,
 1948, Evans, H. T.
 Personal communication, 1949
80. ZEUNERITE
 $\text{Cu}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$
 U = 50.4%
 Dana VI, p. 857
81. ZIPPEITE
 $2\text{UO}_3 \cdot \text{SO}_3 \cdot 5-6\text{H}_2\text{O}$
 U = 64.9 to 67.4%
 Dana VI, p. 978

GROUP B. MINERALS WITH MINOR AMOUNTS OF URANIUM AND THORIUM

1. ALLANITE
 $(Ca, Ce, Th)_2(Al, Fe, Mg)_3Si_3O_{12}(OH)$
 U = 0.017%, Th = up to 3.2%
 Dana VI, pp. 522-526
Magatelite - phosphatian variety of allanite
 Th = 0.8%
 Am. Mineralogist, vol. 16, pp. 343-344, 1931
Orthite - synonym of allanite
Yttrio-orthite (also, yttrium orthite) - synonym of allanite
 Mineralog. Mag., vol. 23, p. 639, 1934
2. ANTHRAXOLITE
 A hydrocarbon, nickeliferous and uraniferous; compare kolm and thucolite.
 U = 0.0029%
 Am. Mineralogist, vol. 19, pp. 426-428, 1934
Asphaltite, broggite, and carburan are similar materials
3. BASTNAESITE
 $(Ce, La)FCO_3$
 U and Th present but less than 1%.
 U. S. Geol. Survey, manuscript report
 Dana VI, p. 291
4. CAPPELENITE
 $(Ba, Y)_2SiBO_6$
 Th = 0.42%
 Dana VI, pp. 413-414
5. GERITE
 Ce_2SiO_5
 U = 0.4%, Th = 0.3%
 Am. Mineralogist, vol. 25, pp. 381-404, 1940
6. CHINGLUSUITE
 A complex silicate of Na, Mn, Ca, and Ti.
 Th = 0.05%
 Acad. Sci. URSS Bull., pp. 153-157, 1938
7. CORDYLITE
 $Ce_2BaF(CO_3)_3$
 Th = up to 0.27%
 Dana VI, appendix II, p. 31
8. CORVUSITE
 $V_2O_4 \cdot 6V_2O_5 \cdot xH_2O?$
 Validity of species is questionable.
 U = 1.0 to 2.8%
 Am. Mineralogist, vol. 18, pp. 195-205, 1933
9. DAVIDITE
 Contains Ti, Fe, rare earths, U, V, and Cr.
 U = 8.1%, Th = 0.12%
 Dana VII, p. 542
 Royal Soc. S. Australia Trans., vol. 68, p. 334, 1944

10. PERSMITE
 $(\text{Ca}, \text{Ce}, \text{Na})(\text{Cb}, \text{Ti}, \text{Fe}, \text{Al})_2(\text{O}, \text{OH}, \text{F})_6$
 Th = 0.42%
 Acad. Sci. URSS, Comptes rendus,
 52, pp. 69-71, 1946
11. HJELMITE
 AB_2O_6 or $\text{A}_2\text{B}_3\text{O}_{10}$
 Also hjelmite.
 $\text{A} = \text{Y}, \text{Fe}^2, \text{U}^4, \text{Mn}, \text{Ca}$
 $\text{B} = \text{Cb}, \text{Ta}, \text{Sn}, \text{W}$
 $\text{U} = 4.0$ to 4.3%
 Dana VII, pp. 779-780
12. HOKUTOLITE
 Variety of barite. Radio-
 active mixture of Pb and Ba
 sulfate. Probably contains
 Ra, Th, and U.
 Mineralog. Mag., vol. 16,
 p. 362, 1913
Anglesobarite - synonym of
 hokutolite
13. JOHNSTROPITE
 A complex silicate of Na, Ca,
 Th, Ce, and Ti.
 Th = 0.7%
 Dana VI, pp. 720-721
14. KOLM
 Rock with hydrocarbon and
 uranium.
 Form in which uranium is
 present is unknown.
 $\text{U} = 0.44\%$
 Am. Chem. Soc. Jour.,
 vol. 52, pp. 4848-4851,
 1930
 See also anthraxolite
 and thucolite.
15. LOVOZERITE
 Complex silicate of Ti and Zr.
 Th = 0.50%
 Acad. Sci. URSS, Comptes
 rendus, 25, p. 735, 1939
16. MELANOCERITE
 Chiefly a boro-silicate of
 the Ce and Y metals.
 Th = 1.5%
 Dana VI, pp. 414-415
Caryocerite - near melanocerite
 Th = 12.0%
 Dana VI, p. 415
17. MICROLITE
 $(\text{Na}, \text{Ca})_2(\text{Ta}, \text{Cb})\text{O}_6(\text{O}, \text{OH}, \text{F})$
 In pyrochlore-microlite
 series.
 $\text{U} =$ up to 5.1% , Th = 0.2%
 Dana VII, pp. 748-754
Calciotantalite - possibly
 a mixture of microlite
 and tantalite.
 Dana VII, p. 787
Haddamite - synonym of micro-
 lite
 Dana VII, p. 748
Metasimpsonite - an alteration
 product of simpsonite, later
 identified with microlite.
 Dana VII, p. 755
Neotantalite - an altered micro-
 lite with composition close
 to tantalite.
 $\text{U} = \text{tr.}$
 Dana VII, pp. 748, 750-751, 753

18. MOSANDRITE

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

Th = 0.3%

Dana VI, pp. 721-722

Also, Zentralbl. Min. A, pp. 76-79, 1934

19. PISEKITE

Essentially a columbate-tantalate-titanate of U and rare earths, with Th and Sn. No quantitative analysis available. May be related to ampangabeite.

Dana VII, pp. 807-808

20. PYROCHLORE

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

In pyrochlore-microlite series.

U = up to 14.0%

Th = up to 4.4%

Dana VII, pp. 748-754

Azorite - synonym of pyrochlore

Chalcolamprite - synonym of pyrochlore

Dana VII, pp. 748, 750, 754

Ellsworthite - composition is close to pyrochlore, but analyses show it is relatively high in U and H_2O and low in alkalis.

U = 17.1%

Dana VII, pp. 748, 750-752

20. PYROCHLORE (Cont.)

Endeolite - similar in composition to chalcolamprite.

An altered pyrochlore?

Dana VII, pp. 748, 754

Hatchettolite - uranian pyrochlore

U = 14.0%, Th = 0.5%

Dana VII, pp. 748, 750-752

Koppite - synonym of pyrochlore

Dana VII, pp. 748, 750, 752

Marignacite - synonym of pyrochlore

Th = 0.2%

Dana VII, pp. 748, 750-752

Pyrhite - synonym of pyrochlore

Dana VII, pp. 748, 752, 754

21. RINKITE

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

Th = small amounts

Dana VI, p. 722

Kondrikite - a mixture of rinkite and zeolite

Lowchorrite - alteration product of rinkite?

U = up to 0.01%

Th = up to 0.7%

Vudavrite - alteration product of rinkite.

Th = about 1%

22. RINKOLITE
Complex silicate of
Na, Ca, Ce, and Zr.

Th = up to 0.41%

Am. Mineralogist, vol. 11,
p. 289, 1926

Acad. Sci., URSS Bull. 20,
p. 1181, 1926
23. ROWLANDITE
Anyttrium silicate.

U = 0.4%

Dana VI, p. 1047
24. STEENSTRUPINE
Complex silicate of rare
earths, Th, Na, K, Fe, Mn, Mg,
P, Be, Al, and Ta, with (OH)
and F.

Th = 6.2%

Dana VI, p. 415

Also, Neues Jahrb.,
Beilage-Band 64, Abt. A,
pp. 235-249, 1931
25. TCHIEFFKINITE
Complex silicate of rare
earths, Fe, Mn, Mg, Ca, Al, Ti,
Th, and U.

Also chevkinite

U = 2.3%, Th = up to 18.4%

Am. Mineralogist, vol. 31,
pp. 582-588, 1946
26. TENGERITE
 $\text{CaY}_3(\text{CO}_3)_4(\text{OH})_3 \cdot 3\text{H}_2\text{O?}$

Alteration product of
yttrialite.

Th = 0.3%

Sci. Papers Inst. Phys.
Chem. Res. (Tokyo),
vol. 34, pp. 832-841, 1938
26. TENGERITE (Cont.)

The originally described
tengerite, Dana VI, pp. 306-
307, is a different mineral,
supposedly beryllium yttrium
carbonate; no published analysis.
27. THALENITE
 $\text{Y}_4\text{Si}_4\text{O}_{13}(\text{OH})_2$

Related to yttrialite.

Th = 0.16%

Dana VI, appendix I, p. 68
28. THUCOLITE
A hydrocarbon.

See kolm and anthraxolite.

U = 4.9%, Th = 42.5% -
these percentages are from
the ash which is only about
1 percent by weight of total
material.

Am. Mineralogist, vol. 13,
pp. 419-448, 1928
29. TRITOMITE
A boro-silicate of the cerium
and yttrium metals, calcium,
and thorium, also containing
fluorine. Exact formula un-
certain.

Th = 7.5 to 8.3%

Dana VI, p. 416
30. TURANITE
A hydrated copper vanadate of
dubious validity reported to
contain 3.2% U.

Acad. Sci. St. Petersburg,
Bull. 3, p. 185, 1909
31. VANOXITE
A hydrated vanadium oxide,
perhaps $2\text{V}_2\text{O}_5 \cdot \text{V}_2\text{O}_5 \cdot 8\text{H}_2\text{O}$, re-
ported to contain up to 0.5% U.

U. S. Geol. Survey Bull. 750,
p. 63 1924

32. VOLBORTHITE
 $(\text{Cu,Ca})_2(\text{VO}_4)(\text{OH})$

U = 3.1%

Menadkevich and Volkov, C. R.,
 Acad. Sci., URSS, 43, 1926

Calciovolborthite
 Calcium end-member in
 volborthite series.

Menadkevich and Volkov, C. R.,
 Acad. Sci., URSS, 43, 1926

33. WILKITE

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

Dana VII, p. 801

Nuolaite
 A mixture similar to wilkite.

Th = 1.8 to 3.5%

Dana VII, p. 801

34. XENOTIME
 YPO_4

U = up to 3.6%

Th = 0.4 to 2.9%

Dana VI, pp. 748-749

35. YTTRIALITE

Silicate of Th and Y
 metals chiefly.

U = 0.8%, Th = 10.5%

Dana VI, p. 512

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

U = 2.3%, Th = 7.7%

Dana VII, p. 793

37. YTTROTALITE
 $(\text{Fe,Y,U})(\text{Cb,Ta})\text{O}_4$

U = 3.4 to 3.9%

Th = 0.6 to 0.7%

Dana VI, pp. 763-764

Yttrocolumbite is similar

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

38. ZIRCON
 ZrSiO_4

U and Th very low in
 most samples, but up to
 2.7% U, and up to 13.1%
 Th reported.

Dana VI, pp. 482-486

Alvite
 Variety of zircon, near
 cyrtolite.

Th = 13.1%?

Dana VI, pp. 487-488

Calypsolite
 Probably altered zircon.

Dana VI, pp. 482, 486

Cyrtolite
 Altered zircon, containing U,
 Th, Y, and other rare earths.

U = up to 1.4%

Dana VI, p. 487

Hagatalite - synonym of zircon

U = tr., Th = 1.3%

Am. Mineralogist, vol. 11,
 p. 137, 1926

38. ZIRCON (Cont.)Hoegtveitite

May be alvite.

Am. Mineralogist, vol. 12,
p. 97, 1927

Naegite - synonym of zircon

U = 2.4 to 2.7%
Th = 2.5 to 4.4%

Chem. Soc. Japan Jour.,
vol. 42, p. 1, 1921

Also, Mineral Abs., vol. 2,
p. 36, 1923

Oerstedite

Altered zircon.

Dana VI, p. 486

Oyamalite - synonym of zircon

Th = 0.5%

Am. Mineralogist, vol. 11,
pp. 137-138, 1926

Tachyaphaltite

Probably altered zircon.

Dana VI, p. 486

Yamagutilite - synonym of zircon

Also, yamaguchilite

Contains P_2O_5 and rare earths.

Mineralog. Mag., vol. 24,
p. 626, 1937

39. ZIRKELITE

$(Ca, Fe, Th, U)_2(Ti, Zr)_2O_5?$

U = 1.4%, Th = 6.4%

Dana VII, p. 740

GROUP C. MINERALS WHICH SHOULD BE TESTED FOR URANIUM AND THORIUM

1. ABUKUMALITE
CaY phosphate silicate

Am. Mineralogist, vol. 24,
p. 66, 1939
2. AMBATOARINITE
Carbonate of Sr and rare
earths.

Mineral Abs., vol. 1,
p. 148, 1920
3. ANCYLITE
 $\text{Sr}_3\text{Ce}_4(\text{CO}_3)_7(\text{OH}) \cdot 3\text{H}_2\text{O}$

Dana VI, appendix II,
pp. 5-6

Weibyte
Related to ancyllite

Dana VI, pp. 291-292
4. BAZZITE
Silicate of scandium, with
Fe, Na, and rare earths.

Mineral Abs., vol. 8,
p. 105, 1941
5. BECKELITE
 $\text{Ca}_3(\text{Ce}, \text{La}, \text{Pr}, \text{Nd})_4\text{Si}_3\text{O}_{15}$

Dana VI, appendix II, p. 14
6. BRITHOLITE
A cerium-silicate apatite?

Dana VI, appendix II,
pp. 19-20
7. BUSZITE
Silicate of rare earths

Am. Mineralogist, vol. 14,
pp. 438-439, 1929
8. CENOSITE
 $2\text{CaO} \cdot (\text{Ce}, \text{Y})_2\text{O}_3 \cdot \text{CO}_2 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$

Also kainosite

Am. Mineralogist, vol. 15,
pp. 205-219, 1930
9. CHURCHITE
A hydrous phosphate of cerium
and calcium.

Dana VI, p. 820
10. ERDMANNITE
Hydrous silicate of Ce,
Y, Fe, Mn, Al, and Ca.

A mixture of homilite with
a mineral in the melanocerite
group?

Dana VI, pp. 416, 507
11. ERIKITE
Phosphate-silicate of rare
earths, Al, Ca, and Na.

Mineralog. Mag., vol. 14,
p. 348, 1907
12. EUDIALYTE
 $\text{X}_5\text{Y}_2\text{Si}_6\text{O}_{18}(\text{OH}, \text{Cl})$

X = Ca, Na, Ce, etc.

Y = Zr, Fe, Cb, etc.

Dana VI, pp. 409-412

Eucolite
Same as eudialyte, but with
different optical sign.

Dana VI, pp. 409-412
13. FLORENCITE
 $\text{CeAl}_3(\text{PO}_4)_2(\text{OH})_6$

Dana VI, appendix II, p. 42

14. FLUOCERITE
 $(\text{Ce}, \text{La})\text{F}_3$
 Am. Mineralogist, vol. 6,
 p. 119, 1921
Tysonite = fluocerite
 Dana VI, p. 166
15. GADOLINITE
 $\text{Be}_2\text{FeY}_4\text{Si}_2\text{O}_{13}$
 Dana VI, pp. 509-512
16. HELLANITE
 $\text{Ca}_2(\text{Ce}, \text{Al}, \text{Mn})_6\text{Si}_4\text{O}_{19} \cdot 3\text{H}_2\text{O}$
 Mineralog. Mag., vol. 13,
 p. 368, 1903
17. LANTHANITE
 $\text{La}_2(\text{CO}_3)_2 \cdot 9\text{H}_2\text{O}$
 Dana VI, pp. 302-303,
 also Dana V, p. 710
18. LESSINGITE
 Silicate of the rare
 earths.
 Mineral Abs., vol. 10,
 p. 245, 1948
19. LORANSKITE
 $(\text{Y}, \text{Ce}, \text{Ca})(\text{Ta}, \text{Zr})\text{O}_4?$
 Dana VII, p. 767
20. RIEVITE
 Titano-columbate of Y,
 Fe, and Ta.
 Validity of species is
 questionable.
 Am. Mineralogist, vol. 32,
 pp. 204-205, 1947
21. PARISITE
 $\text{CaCe}_2\text{F}_2(\text{CO}_3)_3?$
 Dana VI, pp. 290-291
21. PARISITE (Cont.)
Synchisite
 $\text{CaCeF}(\text{CO}_3)_2$
 Related to parisite.
 Mineralog. Mag., vol. 13,
 pp. 207-208, 1902
22. PEROVSKITE GROUP
Perovskite
 CaTiO_3 - some analyses show
 rare earths.
 Dana VII, pp. 730-734
Dysanalyte - synonym of
 perovskite; analysis shows
 rare earths.
 Dana VII, pp. 730-732
Knopite - in perovskite group
 Analysis shows rare earths.
 Dana VII, pp. 730-733
Loparite - end member in
 perovskite-knopite-loparite
 series.
 Perhaps $(\text{Na}, \text{Ce}, \text{Ca})_2(\text{Ti}, \text{Cb})_2\text{O}_6$
 Dana VII, pp. 730, 732-734
23. RETZIAN
 Basic arsenate of Mn, Cu, and
 rare earths.
 Dana VI, appendix I, p. 59
24. RHABDOPHANITE
 Hydrous phosphate of Ce and Y
 groups; perhaps $(\text{Ce}, \text{Y})\text{PO}_4 \cdot \text{H}_2\text{O}$
 Also rhabdophane
 Dana VI, p. 820

24. RHABDOPHANITE (Cont.)

Scovillite - synonym of
rhabdophanite

Dana VI, p. 820

25. SCHETELIGITE

$(Ca, Y, Sb, Mn)_2(Ti, Ta, Cb)_2(O, OH)_7$

Dana VII, p. 757

26. SPHENE

Essentially $CaTiSi_2O_5$, but
commonly contains rare earths,
columbium, and other elements.

Am. Mineralogist, vol. 32,
pp. 637-642, 1947

Keilhauite = yttrian sphene

Dana VI, p. 717

Yttrotitanite - synonym of
keilhauite

27. THORTVEITITE

$(Sc, Y)_2Si_2O_7$

Am. Mineralogist, vol. 7,
pp. 195-196, 1922

Befanomite - synonym of
thortveitite

Am. Mineralogist, vol. 11,
p. 137, 1926

28. TORNEBOHMITE

Chiefly $R_3(F, OH)(SiO_4)_2$

$R = Ce, (La, Nd), Al, Fe, Mn, Mg, Ca$

Am. Mineralogist, vol. 6,
pp. 118-119, 1921

29. WEINSCHENKITE

$YPO_4 \cdot 2H_2O$

Am. Mineralogist, vol. 29,
pp. 97-107, 1944

GROUP D. MINERALS WHICH ARE NON-URANIUM- OR NON-THORIUM-BEARING,
BUT WHICH HAVE BEEN REPORTED TO CONTAIN IMPURITIES OR
INTERGROWTHS OF URANIUM, THORIUM, OR RARE-EARTH MINERALS

1. BADDELEYITE

Analyses show traces of
rare earths.

Dana VII, pp. 607-610

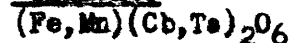
Brasilite - mixture of
fibrous baddeleyite,
zircon, altered zircon,
and other minerals.

Dana VII, p. 610

Caldasite - mixture of
baddeleyite, zircon,
altered zircon, and
other minerals.

Dana VII, p. 610

Zirkite - mixture of
baddeleyite, zircon,
altered zircon and
other minerals.

2. COLUMBITE-TANTALITE SERIESColumbite

U = up to 1.7%

Dana VII, pp. 780-785

Baierite - synonym of columbite

Also baierine

Dana VII, p. 780

Dianite - synonym of columbite

Dana VII, p. 780

2. COLUMBITE-TANTALITE SERIES (Cont.)

Ferrocolumbite - synonym of
columbite

Dana VII, pp. 780, 783

Ferro-ilmenite - synonym of
columbite

Dana VII, pp. 780, 785

Ferrotantalite - synonym of
tantalite

Dana VII, pp. 780, 783

Greenlandite - synonym of
columbite

Dana VII, pp. 780, 784

Hermannolite - synonym of
columbite

Dana VII, pp. 780, 785

Ildefonsite - synonym of
tantalite

Dana VII, p. 780

Manganocolumbite - variety of
columbite

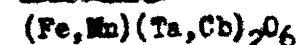
Dana VII, pp. 780, 783, 785

Manganotantalite - synonym of
tantalite

Dana VII, pp. 780, 783-784

Siderotantalite - synonym of
tantalite

Dana VII, p. 780

Tantalite

3. FLUORITE
 CaF_2

Some samples, especially those of deep-purple color, show radioactivity. This generally can be shown to be due to inclusions of uranium minerals, but the fluorite itself may possibly contain traces of uranium.

Dana VI, pp. 161-164

Yttrocerite

CaF_2 with varying amounts of $(\text{Y}, \text{Ce})\text{F}_3$.

Dana VI, p. 182

Yttrifluorite - yttrian variety of fluorite

Mineralog. Mag., vol. 16,
 p. 376, 1913

4. FRANCOLITE

An apatite which is an important constituent of many phosphate rocks, but which analyses show contain very little rare earths.

Dana VI, pp. 762, 764

5. ILMENORUTILE

Columbian rutile.

Dana VII, pp. 554, 557, 560

6. KALKOWSKITE

$\text{Fe}_2\text{Ti}_3\text{O}_9?$

Analysis shows rare earths.

Dana VII, pp. 773-774

7. KATANGITE

$\text{H}_2\text{CuSiO}_4 + \text{H}_2\text{O}?$

Is identical with chrysocolla; found together with uranium minerals in Katanga, Belgian Congo.

Am. Mineralogist, vol. 8,
 p. 39, 1923

8. OPAL
 $\text{SiO}_2 \cdot n\text{H}_2\text{O}$

Some varieties show green fluorescence due to uranium content.

9. PYROMORPHITE

$\text{Pb}_5(\text{PO}_4)_3\text{Cl}$

Some specimens are uraniferous.

Zeitschr. Kristallographie,
 vol. 62, pp. 177-178, 1925

10. SCAPOLITE

$(\text{Na}, \text{Ca})_4\text{Al}_3(\text{Al}, \text{Si})_3\text{Si}_6\text{O}_{24}(\text{Cl}, \text{CO}_3, \text{SO}_4)$

A fluorescent variety contains 0.023% U.

Chemie der Erde, vol. 9,
 pp. 139-144, 1934-35

11. SEFSTROMITE

Mixture largely of ilmenite, similar to davidite.

Dana VII, p. 542

12. STRUEVERITE

Tantalian rutile.

Dana VII, pp. 554, 557-560

13. TAPIOLITE SERIES

Cassiterotantalite - synonym of ixiolite

Dana VII, p. 778

Ixiolite - may be equal to tapiolite

Dana VII, p. 778

Ixionolite - synonym of ixiolite

Mossite

$\text{Fe}(\text{Cb}, \text{Ta})_2\text{O}_6$

Dana VII, pp. 775-777

13. TAPIOLITE SERIES (Cont.)

Skogbölite - synonym of
tapiolite

Dana VII, pp. 775-778

Tapiolite
 FeTa_2O_6

Dana VII, pp. 775-777