

Класификация на минералите по акад. Иван Костов

Mineralogical classification of Acad. Ivan Kostov

Kostov's classification of minerals has been proposed since 1954 and displayed in his monographic **Mineralogy** as well as in a lot of publications on classification of different classes of minerals. In a series of papers and monographs the author extended this classification in which an attempt is made to cover the requirements of mineralogists and geochemists as a whole (Kostov, 1956, 1957, 1964; 1965; 1968; 1971; 1973; 1975; 1979; 1981; 1982; 1985; 1986; 1993; 2000; Kostov, Minčeva-Stefanova, 1982; 1984; Kostov, Breskovska, 1989; Kostov, R. Kostov, 1999; 2002; with additions for carbonates - Kostov, R. Kostov, 2006; also nitrates, iodates and organic minerals - R. Kostov, 2010).

Proposed classification

The classification offered is based on geochemical-paragenetic and crystal chemical-structural criteria. Its trends run as follows:

1. Paragenetic trend:

- 1.1. Native elements and anionic subdivisions as **classes**. These subdivisions are universally accepted with slight rearrangements.
- 1.2. Cationic (metallic) subdivisions as **mineral assemblages**, based on geochemically associated metals in the composition of the minerals, becomingly presented as triads.

2. Structural trend:

- 2.1. Structural subdivisions based on anisometricity of unit-cell or sub-cell and strong bonds in the structure, viz. chain-like or **axial A-type**, sheet-like or **planar P-type**, **pseudoisometric (I)-type**, and **isometric I-type**. These subdivisions roughly correspond to the generally accepted structural patterns in the pure structural classifications of minerals but exclude subdivisions with isolated coordination polyhedra, finite clusters of polymerized polyhedra of one or different kinds, as well as framework structures which by unit cell or sub-cell anisometricity fall either into the isometric and pseudoisometric structure types (most of them) or within axial or planar types.
- 2.2. **Groups** and **sub-groups** of minerals, based on identity or similarity of crystal structure and space group.

A dual structural-paragenetic principle is applied to a rational classification of all minerals. Main divisions (associations) are based on geochemically allied metals in the composition of these minerals, subdivisions (axial, planar, pseudoisometric and isometric) on their overall structural anisometricity. The latter provides both structural similarity and genetic hint, viz. manner of crystal growth in geological setting under different conditions of crystallization.

The shape and dimensions of the unit cell or sub-cell of the crystal lattice provide a rough-and-ready idea about the overall structural anisotropy and direction of strong bonds. The overall structural anisotropy may conveniently be presented by the c/a ratio of the minerals with spindle symmetry and by the $2c/(a+b)$, $2b/(a+c)$ and $2a/(b+c)$ ratios for the low symmetry minerals. The respective ratios are less, nearly equal, equal or above 1.00, the unit cell or sub-cell and the corresponding structures denoted as axial or A-type, pseudo-isometric or (I)-type, isometric or I-type and planar or P-type, notations which correspond to chain-like, framework and sheet-like structures, respectively ino-, tecto- and phyllo-structures.

The notations A, (I) and P offered are further enriched by adding as superscript the direction of structural anisotropy for the low symmetry minerals, viz. A^c , A^b and A^a , $(I)^c$, $(I)^b$ and $(I)^a$, and P^c , P^b and P^a ; A, (I) and P notations remain for the minerals with spindle symmetry. A second enrichment in these notations refer to the morphology of the minerals, genetically important. Use is made of the indices (hkl) of the crystal habit form and $[uvw]$ symbols for elongation added as subscripts. Combinations of both indicate form and elongation. The notations offered avoid frequent loose terms used for the dynamic variation of the crystal habits of minerals and their successive growth important for interpretation of their genesis and for outlining crystallogenic zonation in variable geosetting.

Classes:

1. Elements
2. Sulphides and related compounds
3. Oxides and hydroxides
4. Halides
5. Silicates
6. Borates
7. Phosphates, arsenates and vanadates
8. Wolframates and molybdates
9. Sulphates, selenates and tellurates
10. Chromates
11. Carbonates
12. Nitrates and iodates
13. Organic minerals

Structural-paragenetic classification of sulphide and related minerals (Kostov, Minčeva-Stefanova, 1981)

1. Metallic

1.1. Pt-Pd Assemblages

1.1.1. Axial Types

Hongshiite

Omeiite

Anduoite

Temagamite

1.1.2. Planar Types

Merthierite II

Stillwaterite

Stibiopalladinite

Merthierite I

Arsenopalladinite

Genkinite

Daomanite

Froodite

Telluropalladinite

1.1.3. (Pseudo-) Isometric Types

Palladobismutharsenide

Fengluanite

Guanglinit

Atheneite

Isomerthierite

Vincentite

Telargpalite

Keithconnite

Palladoarsenite

Mayakite

Borovskite

Palladseite

Osterboshite

Polarite

Sobolevskite

Urwantsevite

Sudburite

Stumpflite

Ruthenarsenide

Cooperite

Braggite

Vysotskite

Yenshanite

Xingzhongite

Kotulskite

Yanzhongite

Hexatestibiopanickelite

Dayingite

Insizwaite

Geversite

Borishanskiite

Sperrylite

Platarsite

Iridarsenide

Laurite

Erlichmanite

Malanite

Chengbolite

Monchelite

Merenskyite

Tolovkite

Irarsite

Hollingworthite

Osarsite

Mishenerite

Maslovite

Testibiopalladite

1.2. Ni-Co-Fe Assemblages

1.2.1. Axial Types

Millerite

Makinenite

1.2.2. Planar Types

Parkerite

Bismuthohauchecornite

Hauchecornite

Asenohauchecornite

Tellurohauchecornite

Tucekite

Paracostibite

Pararamelsbergite

Kitkaite

Melonite

Mackinawite

Smythite

Haapalaite

Vallerite

Tochilinite I

Tochilinite II

1.2.3. (Pseudo-) Isometric Types

Dienerite

Orcelite

Oregonite

Maucherite

Shandite

Heazlewoodite

Godlevskite

Pentlandite

Cobaltpentlandite

Argentopentlandite

(Djerfisherite)

(Thalfenisite)

Breithauptite

Nickeline

Langisite

Modderite

Westerverdite

Jaipurite

Pyrhotite

Troilite

Pyrrhotite 3C

Pyrrhotite 4C

Pyrrhotite 5C

Pyrrhotite 11C

Pyrrhotite 6C

Sederholmite

Freboldite

Imgreite

Polydymite

Trustedtite

Wilkmanite

Siegenite
Linnarite
Bornhardite
Carrolite
Fletcherite
Violarite
Greigite
Tyrrellite
Indite
Daubreelite
Heideite
Brezinaite

Nisbite
Seinajokite
Krutovite
Rammelsbergite
Safflorite
Clinosafflorite
Loellingite

Vaesite
Cattierite
Pyrite
Bravoite
Villamaninite
Trogtalite
Penrosite

Kullerudite
Hastite
Marcasite
Ferroselite
Mattagamite
Frohbergite

Ullmannite
Gersdorfite I
Gersdorfite II
Gersdorfite III
Cobaltite

Costibite
Alloclasite
Gudmundite
Arsenopyrite

Nickelskutterudite
Skutterudite
Chloanthite

1.3. Mn-V-Tl-(K) Assemblages

1.3.1. Axial Types

Patronite
Raguinite
Picotpaulite
Rasvumite
Bartonite
Erdite
Coyoteite

1.3.2. Planar Types

Carlinite

Chalcothalite

Rohaite

Sabatierite

Thalcusite

Bukovite

1.3.3. (Pseudo-) Isometric Types

Alabandine

β -Alabandine

Niningerite

Oldhamite

Hauerite

(Sylvanite)

(Colusite)

Djerfisherite

Thalfenisite

(Galkhaite)

(Crookesite)

1.4. Mo-W-Sn Assemblages

1.4.1. Axial Types

Ottemannite

1.4.2. Planar Types

Herzenbergite

Montesite

Teallite

Molybdenite 2H

Molybdenite 3R

Grysdalite

Tungstenite

Berndtite C6

Berndtite C27

Castaingite

1.4.3. (Pseudo-) Isometric Types

Stistaite

(Kuramite)

(Stannite)

(Rhodostannite)

(Kesterite)

(Černyite)

(Velikovite)

(Stannoidite)

(Mawsonite)

(Colusite)

(Hemusite)

(Canfieldite)

(Hocardite)

1.5. Zn-Cu(Ge)-Pb Assemblages

1.5.1. Axial Types

Paxite

Furutobeite

Betekhtinite

Larosite

1.5.2. Planar Types

Umangite

Athabaskite

Rickardite

Covellite

Klockmannite
Vulcanite
Bambollaite
Nukundamite

(Shandite)

(Naguagite)

1.5.3. (Pseudo-) Isometric Types

Horsfordite?

Algodonite

Novakite

α -Domeykite

β -Domeykite

Kutinaite

Cuprostibite

Koutekite

Chalcocite (-High)

Chalcocite (-Low)

Djurleite

Digenite (-High)

Digenite (-Interm.)

Digenite (-Low)

Geerite

Anilite

Berzelianite

Bellidoite

Crookesite

Weissite (-High)

Weissite (-Low)

Bornite (-High)

Bornite (-Interm.)

Bornite (-Low)

Chalcopyrite

Talnakhite

Putoranite

Mooihoekite

Haycockite

Cabriite

Eskebornite

Gallite

Rokesite

Kuramite

Stannite

Rhodostannite

Kesterite

Černyite

Velikite

Briartite

Stannoidite

Sakuraiite

Mawsonite

Cubanite

Tetrahedrite

Tennantite

Sb-Sandbergerite

As-Sandbergerite

Freibergite

Galkhaite
Nowackiite
Hakite
Goldfieldite

Famatinite
Permingeatite
Luzonite
Lazarevicite
Colusite
Renierite
Polkovicite
Sulvanite
Enargite
Lautite

Shadlunite
Mangan-Shadlunite
Hemusite
Fukuchilite
Krutaite

Sphalerite
Wurtzite
Stilleite

Hawleyite
Greenockite
Cadmoselite

Galena
Clausthalite
Altaite
Morozeviczite

1.6. Ag-Au-Hg Assemblages

1.6.1. Axial Types

Balkanite
Cinnabar
(Temagamite)

1.6.2. Planar Types

Krennerite
Sylvanite
Kostovite
Nagyagite

1.6.3. (Pseudo-) Isometric Types

Jalpaite
Stromeyerite
Eucairite
MacKinstryite

Sternbergite
Argentopyrite

Argyrodite (-High)
Argyrodite (-Low)
Canfieldite
Hocardite

Dyscrasite

Bilibinskiite

Bogdanovite

Argentite

Acanthite

Aguilarite

Naumannite (-High)

Naumannite (-Low)

Hessite (-High)

Hessite (-Low)

Empressite

Stuetzite

Uytenbogaardite

Fischesserite

Petzite

Calaverite

Montbrayite

Volynskite

Metacinnabar

Saukovite

Polhemusite

Tiemannite

Coloradoite

(Galkhaite)

Corderoite

2. Sulphosalts

2.1. Cu-Pb-(Fe,Sn) Assemblages

2.1.1. Axial Types

Emplectite

Chalcostibite

Cuprobismutite

Hodrusite

Neyite

Nuffieldite

Aikinite

Friedrichite

Hammarite

Berryite

Lindstromite

Krupkaite

Junoite

Gladite

Pekoite

Miharaite

(Petrovicite)

Heyrovskyite

Bursaite

Goongarrite

Lillianite

Cosalite

Proudite

Giessenite

Weibullite

Wittite

Cannizzarite

Kobellite

Galenobismutite

Sakharovait
Bonchevite
Ustrasite

Berthierite
Garavellite

Meneghinite
(Gruzdevite)
(Aktashite)
Lengenbachite
Potosiite
Boulangerite
Zinckenite
Robinsonite
Tintinaite
Jamesonite

Ardaite
Gratonite
2.1.2. Planar Types
Aleksite
Poubaite

Cylindrite
Incaite
Franckeite

Geocronite
Jordanite
Dufrenoyite
Baumhauerite
Rathite I-IV
Sarthorite

2.1.3. Pseudoisometric Types
Wittichenite
Skinnerite (-High)
Skinnerite (-Low)
Sinnerite

Součekite
Bournonite
Seligmannite

Semseyite
Madocite
Veenite
Playfairite
Heteromorphite
Sterryite
Dadsonite
Launayite
Sorbyite
Plagionite
Guettardite
Twinnite
Fülöppite

2.2. Ag-(Pb,Tl)-Hg Assemblages

2.2.1. Axial Types
Ourayite
Eskimoite
Vikingite

Treasurite
Schirmerite

Pavonite
Benjaminite
Cupropavonite

Owyheeite
Ramdohrite
Teremkovite
Fizelyte

Samsonite
Livingstonite
Petrovicite
Twalcheridzeite
Gruzdevite
Aktashite

Routhierite
2.2.2. Planar Types
Gustavite
Hutchinsonite

Pyrostilpnite
Xanthoconite
Smithite
Bohdanowiczite

Weissbergite
Vrbaite
Lorandite
Imhofite
Parapierroite
Pierrotite

Christite
Laffittite
2.2.3. Pseudoisometric Types
Matildite (-High)
Matildite (-Interm.)
Matildite (-Low)
Aramayoite
Miargyrite
Trenchmannite

Freieslebenite
Marrite
Diaphorite
Brogniarite
Nakaseite
Andorite

Chabourneite
Hatchite
Wallisite

Polybasite Tac
Polybasite T2ac
Polybasite T2a2c
Pearseite Tac

Pearseite T2ac
Pearseite T2a2c

Stephanite
Billingsleyite
Sb-Billingsleyite
Tapalpaite

Pyrargyrite
Proustite
Ellisite
Arcubisite

3. Semi-Metallic

3.0.1. Axial Types
Paraguanahuatite
Guanahuatite
Bismuthinite
Horbetsuite

Stibnite
Wakabayashilite
3.0.2. Planar Types
Hedleyite
Wehrlite

Joseite A
Joseite B
Laitakarite
Ikunolite
Tsumoite
Rucklidgeite
Tellurobismutite
Kawazulite
Tetradymite
Csiklovaite

Tellurantimony
Getchellite
Orpiment
Realgar
3.0.3. Pseudoisometric Types
Dimorphite
Duranusite
Pararealgar

4. Oxisulphides

4.0.1. Axial Types
Kermesite
Sarabauite
Gestleyite
4.0.2. Planar Types
(Haapalaite)
4.0.3. Pseudoisometric Types
Versiliaite
Apuanite

Structural-paragenetic classification of halide minerals (Kostov, 1993)

- 1. Fluorides**
- 2. Chlorides, bromides, iodides**
 - 2.1. Al-Mg-Fe Assemblages**
 - 2.2. Na-Ca-K Assemblages**
 - 2.3. Cu-Ag-Pb-Hg Assemblages**

Structural-paragenetic classification of silicate minerals (Kostov, 1975; 1993)

1. Silicates with (Si,Al):M²⁺ = 4:1 – 3:1

1.1. Free SiO₂ and non-aluminous silicates

Quartz group

Kenyanite

Magadiite

Mountanite

Rodesite

Makatite

Kanemite

1.2. Aluminosilicates

1.2.1. Axial Structures

Feldspar group

Celsian

Cymrite

Banalsite

Buddingtonite

Scapolite group

Nepheline

Katiophyllite

Kalsilite

Trikalsilite

Eucryptite

Cancrinite

Leifite

1.2.2. Planar structures

Petalite

1.2.3. Isometric Structures

Leucite

Pollucite

Sodalite

Nosean

Hauyne

Lazurite

1.3. Zeolites (with water molecules)

1.3.1. Axial Structures

Mordenite

Dachiardite

Erionite

Offretite

Natrolite

Gonnardite

Mesolite

Thomsonite

Scolecite

Edingtonite

Laumontite

Leonhardite

1.3.2. Planar structures

Stilbite

Stellerite

Heulandite

Clinoptilolite

Epistilbite

Yugawaralite

Brewsterite

Ferrierite

1.3.3. (Pseudo-) Isometric Structures

Chabasite

Gmelinite

Levyne

Gismondine

Phillipsite

Garronite

Harmotome

Analcime

Wairakite

Faustite

Paulingite

2. Silicates with (Si,Al):M²⁺ = 3:1 – 1:1

2.1. Be-Al-Mg(Fe) Assemblages

2.1.1. Axial Structures

Bavenite

Karpinskiite

Sorensenite

Pyroxene group

Spodumene

Bikitaite

Carpholite

Amphibole group

Holmquistite

Joersmithite

Howieite

Deerite

Tuhualite

Mboziite

Paligorskite

Sepiolite

Loughlinitite

2.1.2. Planar Structures

Epididymite

Eudidymite

Kaolinite

Nacrite

Dickite

Halloysite

Imogolite

Pyrophyllite

Antigorite

Chrysolite

Nepouite

Talk

Minnesotaite

Mica group

Hydromica (illite) group

Zusmanite

Stilpnomelane

Smektite (montmorillonite) group

Zincsilite

Brittle mica group

Bitiyite

Rayerite

Latiumite

Chlorite group

2.1.3. (Pseudo-) Isometric Structures

Beryl

Cordierite

Sekaninaite

Milarite

Osumilite

Roedderite

Merrhueite

Yagiite

Magbasite

Chkalovite

Tugtupite

2.2. Zr-Ti-Nb Assemblages

2.2.1. Axial Structures

Lorenzenite

Vinogradovite

Neptunite

Narsarsukite

Tinaksite

2.2.2. Planar Structures

Astrophyllite

Kupletskite

Niobophyllite

Lamprophyllite

Armstrongite

Muirite

Traskite

2.2.3. Pseudoisometric Structures

Catapleite

Gaidonnayite

Wadeite

Vlasovite

Eudialite

Lovozerite

Dalyite

Lemoynite

Sogdianite

Benitoite

Pabstite

Stokesite

Ilmajokite

Baotite

Joaquinite

Ilmaussite

Branockite

2.3. Ca(TR)-Mn-Ba Assemblages

2.3.1. Axial Structures

Pectolite
Serandite
Fenaksite
Kanasite
Combeite
Misserite
Ashcroftine

Taramelite

Wollastonite
Pseudowollastonite
Rosenhahnite
Foshagite
Xonotlite
Thaumasite

Rhodonite
Bustamite
Babingtonite
Inesite

Alleghanyite
Leucophoenisite
Sonolite
Pyroxmangite
Pyroxferroite
Gageite

2.3.2. Planar Structures

Okenite
Nekoite
Gyrolite
Truscitite
Riversidite
Tobermorite
Plombierite

Aphophyllite
Carletonite
Cavansite
Pentagonite
Zeophyllite

Pyrosmalite
Bementite
Schallerite
Freidelite

Walstromite
Macdonaldite
Pellyite
Sanbornite
Krauskopfite

Gillespite
Verplanckite
Ericksonite
Ortoeriksonite
Bannisterite
Ganophyllite

Chernykhite
2.3.3. (Pseudo-) Isometric Structures
Ertixiite
Peliite
2.4. Zn-Cu-Pb(U) Assemblages
2.4.1. Axial Structures
Chrysocolla
Plancheite

Alamosite
Margarosanite
Roebingite
Plumasite
Jagoite
2.4.2. Planar Structures
Zincsilite
Zinnsilite

Weeksite
Haiweeite
Ursilite
Boltwoodite
Ranquillite
2.4.3. (Pseudo-) Isometric Structures
Dioptase
Ajoite
Papagoite
Kinoite

Ecanite
3. Silicates with (Si,Al):M²⁺ < 1:1
3.1. **Be-Al-Mg Assemblages**
3.1.1. Axial Structures
Phenakite
Liberite

Andalusite
Sillimanite
Kyanite
Topaz
Yoderite
Staurolite

Zoisite
Clinozoisite
Epidote
Mukhinitite
Allanite
Lawsonite
Cebollite
Pumpellyite
Ardennite
Roggianite
Latiumite
Tacharanite
Delhayelite
Eakerite

Ilvaite
Julgoldite
Tungusite

Krinovite

3.1.2. Planar Structures

Bertrandite

Beryllite

Euclase

Semenovite

Saphirine

Prenite

3.1.3. (Pseudo-) Isometric Structures

Trimerite

Gugiaite

Aminoffite

Meliphanite

Leucophanite

Harstigit

Barylite

Akermanite

Ferroakermanite

Gehlenite

Helvite

Danalite

Genthelvite

Hsinghualite

Zunyite

Garnet group

Vesuvianite

Armenite

Olivine group

Ringwoodite

Monticellite

Kirschteinite

Norbergite

Chondrodite

Humite

Clinohumite

3.2. **Zr-Ti-Nb Assemblages**

3.2.1. Axial Structures

Wohlerite

Hiordahlite

Lovenite

Niocalite

Elpidite

Chevkinite

Perrierite

Aenigmatite

3.2.2. Planar Structures

Seidozerite

Mosandrite

Rosenbuschite

Keldyshite

Tranquilitite

Murmanite
Epistolite
Lomonosovite
Tundrite
Wuonnemite

Batisite
Noonkanbahite
Bafertisite
Fresnoite
Innelite
Yoshimuraite
3.2.3. (Pseudo-) Isometric Structures
Zircon
Kimzeyite

Titanite
Malayaite
Fersmanite

Scherbakovite
Labuntsovite
Nenadkevichite
Karnasurtite
Komarovite

3.3. **Ca(TR)-Mn-Ba Assemblages**

3.3.1. Axial Structures

Afwillite
Bultfonteinite
Hillebrandite
Killalaite
Cuspidine
Rustumite

Thortveitite
Yttrialite
Haradaite
Thalenite
Jennite

3.3.2. Planar Structures

Spurrite
Tilleyite
Scawtite

3.3.3. Pseudoisometric Structures

Larniet
Bredigite
Merwinite
Ramkinitite
Foshallasite
Solanite
Kilchoanite
Dellaite

Tephroite
Glaucouchroite
Orientite

Cerite
Tornebohmitite
Kainosite

Nordite

Steenstrupine

Rowlandite

3.4. **Zn-Cu-Pb(U) Assemblages**

3.4.1. Axial Structures

Willemite

Larsenite

Esperite

Hemimorphite

Melanotekite

Kentrolite

3.4.2. Planar Structures

Clinohedrite

Hodgkinsonite

Hardystonite

Kurumsakite

Barysilite

Molybdophyllite

Ganomalite

Nasolite

Soddyite

Uranophane

Sklodowskite

Cuprosklodowskite

Kasolite

Dixenite

Macgovernite

Asbekasite

Parwelite

Chapmanite

Langbanite

Yeatmanite

Katoptrite

3.4.3. (Pseudo-) Isometric Structures

Thorite

Huttonite

Thorogummite

Coffinite

Eulytine

Bismutoferrite

4. **Borosilicates**

4.0.1. Axial Structures

Dumortierite

Holtite

Kornerupine

Grandidierite

Tourmanine group

4.0.2. Planar Structures

Searlesite

Howlite

Bakerite

Leucosphenite

Tyansxanite

Tadzhikite
4.0.3. (Pseudo-) Isometric Structures
Ferroaxinite
Manganaxinite
Tinzenite
Serendibite
Harkerite
Painite

Datolite
Homilite
Reedmergnerite
Danburite

Stillwellite
Spencite
Hellandite
Melanocerite
Tritomite-(Ce)
Tritomite-(Y)
Cappelenite
Hyalotekite

5. Silicates with additional anions

5.1. With semimetallic (AsO₃, AsO₄ etc.) groups

5.1.1. Axial Structures
5.1.2. Planar Structures
5.1.3. (Pseudo-) Isometric Structures

5.2. With PO₄-groups

5.2.1. Axial Structures
5.2.2. Planar Structures
5.2.3. (Pseudo-) Isometric Structures

5.3. With SO₄-groups

5.3.1. Axial Structures
5.3.2. Planar Structures
5.3.3. (Pseudo-) Isometric Structures

5.4. With CO₃-groups

5.4.1. Axial Structures
5.4.2. Planar Structures
5.4.3. (Pseudo-) Isometric Structures

Structural-paragenetic classification of borate minerals (Kostov, R. Kostov, 2002)

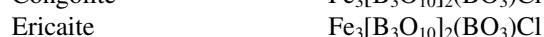
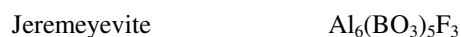
Sassolite	B(OH) ₃
Metaborite	B ₃ O ₃ (OH) ₃
Be-Al-Mg(Fe,Mn) Assemblages	
Axial, A-type, Structures	
Hambergite	Be ₃ (BO ₃)(OH)
Peprossiite-(Ce)	CeAl ₂ [B ₃ O ₉]
Johachidolite	Ca ₂ Al ₂ [B ₆ O ₁₉]
Fluoborite	Mg ₃ (BO ₃)(F,OH) ₃
Inderite	Mg[B ₃ O ₃ (OH) ₅](H ₂ O) ₅
Kurnakovite	Mg[B ₃ O ₃ (OH) ₅](H ₂ O) ₅
Aksaite	Mg[B ₆ O ₇ (OH) ₆](H ₂ O) ₂
Kotoite	Mg ₂ (BO ₃) ₂
Jimboite	Mn ₂ (BO ₃) ₂
Suanite	Mg ₂ [B ₂ O ₅]

Szaibelyite	$\text{Mg}_2(\text{OH})[\text{B}_2\text{O}_4(\text{OH})]$
Sussexite	$\text{Mn}_2(\text{OH})[\text{B}_2\text{O}_4(\text{OH})]$
Ludwigite	$\text{Mn}_2\text{FeO}_2(\text{BO}_3)$
Vonsenite	$\text{Fe}_2\text{FeO}_2(\text{BO}_3)$
Bonaccordite	$\text{Ni}_2\text{FeO}_2(\text{BO}_3)$
Chestermanite	$\text{Mg}_2(\text{Fe,Al,Sb})\text{O}_2(\text{BO}_3)$
Warwikite	$(\text{Mg,Ti,Fe,Al})_2\text{O}_2(\text{BO}_3)$
Azoproite	$(\text{Mg,Fe})_2(\text{Fe,Ti})\text{O}_2(\text{BO}_3)$
Friedriksonite	$\text{Mg}_2(\text{Mn,Fe})\text{O}_2(\text{BO}_3)$
Hulsite	$(\text{Fe,Mg})_2(\text{Fe,Sn})\text{O}_2(\text{BO}_3)$
Magnesiöhulsite	$(\text{Mg,Fe})_2(\text{Fe,Sn})\text{O}_2(\text{BO}_3)$
Wightmanite	$\text{Mg}_5\text{O}(\text{OH})_5(\text{BO}_3)(\text{H}_2\text{O})_2$
Shabinite	$\text{Mg}_5(\text{OH})_5(\text{BO}_3)(\text{Cl,OH})_2(\text{H}_2\text{O})_4$
Karlite	$\text{Mg}_7(\text{OH})_4(\text{BO}_3)_4\text{Cl}$

Planar, P-type, Structures



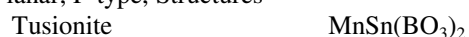
(Pseudo-)Isometric, (I) resp. I-type Structures



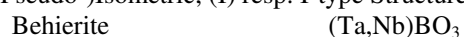
(Ta,Nb)-Sn-Zr Assemblages

Axial, A-type, Structures (no mineral known)

Planar, P-type, Structures

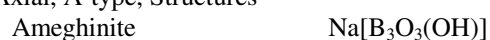


(Pseudo-)Isometric, (I) resp. I-type Structures



Na-Ca-Sr(K,Mg,NH₄) Assemblages

Axial, A-type, Structures



Ezcurrite	$\text{Na}_2[\text{B}_5\text{O}_7(\text{OH})_3](\text{H}_2\text{O})_2$
Sborgite	$\text{Na}[\text{B}_5\text{O}_6(\text{OH})_4](\text{H}_2\text{O})_3$
Kernite	$\text{Na}_2[\text{B}_4\text{O}_6(\text{OH})_2](\text{H}_2\text{O})_3$
Borax	$\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4](\text{H}_2\text{O})_8$
Aristarainite	$\text{NaMg}_2[\text{B}_6\text{O}_8(\text{OH})_4]_2(\text{H}_2\text{O})_4$
Rivadavite	$\text{Na}_2\text{Mg}[\text{B}_6\text{O}_8(\text{OH})_6]_4(\text{H}_2\text{O})_{10}$
Ulexite	$\text{NaCa}[\text{B}_5\text{O}_6(\text{OH})_6](\text{H}_2\text{O})_5$
Proberite	$\text{NaCa}[\text{B}_5\text{O}_7(\text{OH})_4](\text{H}_2\text{O})_3$
Calciborite	$\text{Ca}[\text{B}_2\text{O}_4]$
Sibirskite	$\text{Ca}[\text{BO}_2(\text{OH})]$
Parasibirskite	$\text{Ca}_2\text{B}_2\text{O}_5(\text{H}_2\text{O})$
Vimsite	$\text{Ca}[\text{B}_2\text{O}_2(\text{OH})_4]$
Uralborite	$\text{Ca}_2[\text{B}_4\text{O}_4(\text{OH})_8]$
Korzhinskite	$\text{Ca}_2[\text{B}_4\text{O}_6(\text{OH})_4]$
Olshanskyite	$\text{Ca}_3[(\text{B}(\text{OH})_4)_4/(\text{OH})_2]$
Hexahydroborite	$\text{Ca}[\text{B}(\text{OH})_4]_2(\text{H}_2\text{O})$
Pentahydroborite	$\text{Ca}[\text{B}_2\text{O}(\text{OH})_4]_6(\text{H}_2\text{O})_2$
Meyerhofferite	$\text{Ca}[\text{B}_3\text{O}_3(\text{OH})_5](\text{H}_2\text{O})$
Nifontovite	$\text{Ca}_3[\text{B}_3\text{O}_3(\text{OH})_6](\text{H}_2\text{O})_2$
Colemanite	$\text{Ca}[\text{B}_3\text{O}_4(\text{OH})_3]_2(\text{H}_2\text{O})_3$
Gowerite	$\text{Ca}[\text{B}_5\text{O}_8(\text{OH})/\text{B}(\text{OH})_3](\text{H}_2\text{O})_3$
Kurchatovite	$\text{CaMg}[\text{B}_2\text{O}_5]$
Fedorovskite	$\text{Ca}_2\text{Mg}_2(\text{OH})_4[\text{B}_4\text{O}_7(\text{OH})_2]$
Roweite	$\text{Ca}_2\text{Mg}_2(\text{OH})_4[\text{B}_4\text{O}_7(\text{OH})_2]$
Hydroboracite	$\text{CaMg}[\text{B}_3\text{O}_4(\text{OH})_3]_2(\text{H}_2\text{O})_3$
Planar, P-type, Structures	
Tinkalconite	$\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4](\text{H}_2\text{O})_3$
Biringuccite	$\text{Na}_2[\text{B}_5\text{O}_8(\text{OH})](\text{H}_2\text{O})$
Nasinite	$\text{Na}_2[\text{B}_5\text{O}_8(\text{OH})](\text{H}_2\text{O})_2$
Tuzlaite	$\text{NaCa}[\text{B}_5\text{O}_6(\text{OH})_2](\text{H}_2\text{O})_3$
Frolovite	$\text{Ca}[\text{B}(\text{OH})_4]_2$
Solongoite	$\text{Ca}_2[\text{B}_3\text{O}_4(\text{OH})_4]\text{Cl}$
Hilgardite	$\text{Ca}_2[\text{B}_5\text{O}_9]\text{Cl}(\text{H}_2\text{O})$
Tyretskite	$\text{Ca}_2[\text{B}_5\text{O}_9](\text{OH})(\text{H}_2\text{O})$
Fabianite	$\text{Ca}_2[\text{B}_6\text{O}_{10}(\text{OH})_2]$
Nobleite	$\text{Ca}_2[\text{B}_6\text{O}_9(\text{OH})_2](\text{H}_2\text{O})_3$
Ginorite	$\text{Ca}_2[\text{B}_{14}\text{O}_{20}(\text{OH})_6](\text{H}_2\text{O})_5$
Strontioborite	$\text{Sr}[\text{B}_6\text{O}_{11}(\text{OH})_4]$
Tunellite	$\text{Sr}[\text{B}_6\text{O}_9(\text{OH})_2](\text{H}_2\text{O})_3$
Veatchite	$\text{Sr}_2[\text{B}_5\text{O}_8(\text{OH})_2][\text{B}(\text{OH})_3](\text{H}_2\text{O})$
Volkovskite	$\text{KCa}_4[\text{B}_5\text{O}_8(\text{OH})]_4[\text{B}(\text{OH})_3]_2\text{Cl}(\text{H}_2\text{O})_4$
(Pseudo-)Isometric, (I) resp. I-type Structures	
Inyoite	$\text{Ca}[\text{B}_3\text{O}_3(\text{OH})_5](\text{H}_2\text{O})_4$
Pringleite	$\text{Ca}_9[\text{B}_{20}\text{O}_{28}(\text{OH})_{18}][\text{B}_6\text{O}_6(\text{OH})_6]\text{Cl}_4(\text{H}_2\text{O})_{13}$
Ruitenbergitte	$\text{Ca}_9[\text{B}_{20}\text{O}_{28}(\text{OH})_{18}][\text{B}_6\text{O}_6(\text{OH})_6]\text{Cl}_4(\text{H}_2\text{O})_{13}$
Santite	$\text{K}[\text{B}_5\text{O}_6(\text{OH})_4](\text{H}_2\text{O})_2$
Kaliborite	$\text{KMgH}[\text{B}_7\text{O}_8(\text{OH})_5](\text{H}_2\text{O})_4$
Larderellite	$(\text{NH})_4[\text{B}_5\text{O}_7(\text{OH})_2](\text{H}_2\text{O})$

Ammonioborite	$(\text{NH})_4[\text{B}_{15}\text{O}_{20}(\text{OH})_8](\text{H}_2\text{O})_4$
[Zn]-Cu-[Pb] Assemblages	
Axial, A-type, Structures	
synthetic	$\text{Zn}_4\text{O}[\text{B}_6(\text{OH})_{12}]$
Hemimilite	$\text{Ca}_2\text{Cu}(\text{OH})_4[\text{B}(\text{OH})_4]_2$
Planar, P-type, Structures	
synthetic	$\text{Zn}_3(\text{BO}_3)_2$
Bandykite	$\text{Cu}[\text{B}(\text{OH})_4]\text{Cl}$
(Pseudo-)Isometric, (I) resp. I-type Structures	
synthetic	ZnB_4O_7
synthetic	$\text{Zn}_4\text{O}[\text{BO}_2]_6$
synthetic	CuB_2O_4
synthetic	PbB_4O_7
synthetic	$\text{Pb}_6\text{B}_{10}\text{O}_{21}$

Note: Mixed oxyanions borates (sulphate-, phosphate-, arsenate-, carbonate- and silico-borates) are excluded from the classification but can easily be added as a sub-class or referred to the other corresponding classes. Beryllate-borates are conveniently included in the Be-Al-Mg association.

Structural-paragenetic classification of the phosphate, arsenate and vanadate minerals (Kostov, Breskovska, 1989)

Phosphates

1. Be-Al-Mg Assemblages

1.1. Axial Structures

Moraesite
 Faheyite
 Tiptopite
 Uralolite
 Glicine
 Augelite
 Wavellite
 Kingite
 Souzalite
 Gormanite
 Viitaniemiite
 Gatumbaite
 Farringtonite
 Kovdorskite
 Wagnerite
 Holtedahlite
 Althausite
 Satterlyite

1.2. Planar Structures

Vayrynenite
 Beryllonite
 Fransoleite
 Ehrleite
 Senegalite
 Crandallite
 Goyazite
 Zairite
 Florensite
 Morinite
 Matulaite
 Foggite
 Overite
 Lunyokite
 Kingsmountite

Montgomerite
Wardite
Millisite
Gordonite
Sigloite
Altermanite
Burangaite
Francoanellite
Minyulite
Newberyite
Phosphorroesslerite
Bobierrite
Thadeuite
Baricite
Dittmarite
Struvite
Schertelite
Hannayite
Paulkerrite
Mantienneite

1.3. (Pseudo)Isometric Structures

Hurlbutite
Gainesite
Herderite
Babelphite
Roscherite
Berlinite
Variscite
Meta-variscite
Kolbeckite
Fluellite
Trolleite
Lasulite
Scorzalite
Aheylite
(Amblygonite)
Natromontebasite
Brasilianite
Lacroixite
Isokite
Panasqueiraite
Curetonite
Tinsleyite
Coeruleolactite
Childrenite
Eosphorite
Ernstite
Sinkankasite
Vauxite
Para-vauxite
Whiteite
Stanfieldite
Panethite

2. Li-Fe-Mn Assemblages

2.1. Axial Structures

Tancoite
Bertossaite
Palermoite
Rockbridgeite
Zinc-rockbridgeite
Frondelite

Giniite
Laubmannite
Whitmoreite
Earlshanoite
Cacoxenite
Strunzite
Ferrostrunzite
Graftonite
Beusite
Melonjosephite
Meta-vivianite
Olmsteadite
Keckite
Huhnerkobelite

2.2. Planar Structures

Lithiophosphate
Ludlamite
Switzerite
Meta-switzerite
Vivianite
Ushkovite
Laueite
Pseudo-laueite
Stewartite
Segelerite
Wilhelmvierlingite
Richellite
Dufrenite
Natrodufrenite
Cyrillovite
Kidwellite
Jahnsite
Bermanite
Mitridatite
Robertsite

2.3. (Pseudo)Isometric Structures

Triphylite
Lithiophylite
Sicklerite
Ferrisicklerite
Amblygonite
Montebrasite
Tavorite
Heterosite
Purpurite
Triploidite
Wolfeite
Sarcopside
Zwieselite
Triplite
Lipscombite
Barbosalite
Kryzhanovskite
Beraunite
Landesite
Strengite
Meta-strengite
Garyansellite
Phosphoferrite
Reddingite
Hureaulite

Niahite
Hagendorphite
Alluaudite
Fillowite
Johnsomervilleite
Wicksite
Griphite
Johnwalkite
Leucophosphite
Spheniscidite

3. Na-Ca-Ba Assemblages

3.1. Axial Structures

Vitusite
Penikisite
Kulanite
Bjarebyite
Perloffite
Ningyonite

3.2. Planar Structures

Strecorite
Mundrabiliaite
Brusjite
Weinschenkite
Collinsite
Messelite
Fairfieldite
Cassidyite
Anapaite
Canaphite
Calcioferrite

3.3. (Pseudo) Isometric Structures

Nahpoite
Olympite
Apatite
Arctite
Belovite
Alforsite
Samuelsonite
Dorfmanite
Natrophosphate
Maricite
Natrophilite
Buchwaldite
Olgite
Vitusite
Brianite
Wyllieite
Qingheite
Nacaphite
Nastrophite
Archerite
Biphosphammite
Arrojadite
Dickinsonite
Monetite
Monazite
Rhabdophanite
Xenotime
Brabantite
Whitlockite
Goedkenite

Jagowerite

Gorceixite

Curetonite

4. **Zn-Cu-Pb(U) Assemblages**

4.1. Axial Structures

Kleemanite

Libethenite

Andrewsite

Petersite

Phosphofibrite

Upalite

Phuraluminite

4.2. Planar Structures

Tarbuttite

Hopeite

Para-hopeite

Spencerite

Veszelyite

Phosphophyllite

Schoonerite

Jungite

Scholzite

Para-scholzite

Turquoise

Calcosiderite

Zapatalite

Sampleite

Vyacheslavite

Plumbogummite

Drugmanite

Vanmeerscheite

Ranunculite

Mundite

Threadgoldite

Furongite

Moreuite

Sabugaliite

Althupite

Saleeite

Bassetite

Meta-basetite

Sodium-autunite

Autunite

Meta-autunite

Pseudo-autunite

Phosphouranylite

Uranocircite

Meta-uranocircite I

Meta-uranocircite II

Bergenite

Meta-ankoleite

Kivuite

Torbernite

Meta-torbernite

Parsonsite

Przhevalskite

Renardite

Dewindtite

4.3. Pseudoisometric Structures

Cornetite

Pseudomalachite

Pyromorphite
Phurcalite
Dumontite

Arsenates

1. Be-Al-Mg Assemblages

1.1. Axial Structures

Bearsite
Bulachite
Adelite

1.2. Planar Structures

Arsenokrandallite
Arsenogoyazite
Brassite
Roesslerite
Arsen-struvite
Hoernesite
Mangan-hoernesite

Chudobaite

1.3 (Pseudo) Isometric Structures

Bergslagite
Mansfieldite
Liskeardite
Durangite
Tilasite
Philipsbornite
Alumopharmacosiderite
Berzeliite
Mangan-berzeliite

2. Li-Fe-Mn Assemblages

2.1. Axial Structures

Kankite
Kaatialaite
Arseniosiderite
Eveite
Sarkinite
Hamafibrite

Acrochordite

2.2. Planar Structures

Scorodite
Symplesite
Para-symplesite
Ogdensburgite
Krautite
Arsenoclasite
Synadelphite
Jarosewichite
Chlorophoenicite

Hematolite

Allactite

Brandtite

Wallkiellite

Villyaellenite

Fluckite

2.3. (Pseudo) Isometric Structures

Angelellite

Dussertite

Pharmacosiderite

Sodium-pharmacosiderite

Kolfanite

Flinkite

Grischunite

Retzian

Stenhuggarite

Magnussonite

Holdenite

3. Na-Ca-Ba Assemblages

3.1. Axial Structures

Pharmacolite

Picropharmacolite

Irhtemite

Vladimirite

Raenthalite

Phaunouxite

Caryinite

Monearite

3.2. Planar Structures

Haidingerite

Machatschkiite

Sainfeldite

Ferrarisite

Guerinite

α -Roselite

β -Roselite

3.3. (Pseudo) Isometric Structures

Chernovite

Weilite

Strontium weilite

Svabite

Johnbaumite

Morelandite

Cafarsite

4. Zn-Cu-Pb(U) Assemblages

4.1. Axial Structures

Adamite

Paradamite

Legrandite

Austinite

Duftite

Johillerite

Tsumcorite

Helmutwinklerite

Thometzekite

Prosperite

Lotharmeyerite

Xanthiosite

Keyite

Aerugite

Arhbarite

Coeruleite

Mixite

Agardite

Goudeyite

Arthurite

Lindackerite

Carminite

Bayldonite

4.3. Planar Structures

Warikanite

Kottigite

Meta-kottigite

Erythrite

Annabergite

Koritnigite
Cobaltkoritnigite
Clinoclasite
Cornwallite
Cornubite
Strashimitite
Luetheite
Chenevixite
Tyrolite
Zinclavendulanite
Lavendulanite
Richelsdorfite
Gerdtrammelite
Theisite
Jamesite
Paulmooreite
Gebhardtite
Shultenite
Trigonite
Trogerite
Arsenuranospathite
Novačekite
Meta-novačekite
Kahlerite
Meta-kahlerite
Meta-kirchheimerite
Uranospinite
Meta-uranospinite
Arsenuranylite
Abernathyite
Heinrichite
Meta-heinrichite
Lodevite
Zeunerite
Meta-zeunerite
Walpurgite
Hallimondite
Hugelite
4.3. (Pseudo) Isometric Structures
Reinerite
Olivenite
Euchroite
Philipsburgite
Stranskiite
Lammerite
Gaitite
O'Danielite
Liroconite
Conichalcite
Arsendescloisite
Mimetite
Finnemanite
Georgiadesite
Sahlinite
Philipsbornite
Arsenbrackebuschite
Nealite
Rooseveltite
Preisingerite
Atelestite

Chursinite

Vanadates

1. Be-Al-Mg Assemblages

1.1. Axial Structures

Frederiksonite

1.2. Planar Structures

Alvanite

1.3. (Pseudo) Isometric Structures

Steigerite

2. Li-Fe-Mn Assemblages

2.1. Axial Structures

Fervanite

Schubnelite

2.2. Planar Structures

Ferganite

2.3. (Pseudo) Isometric Structures

-

3. Na-Ca-Ba Assemblages

3.1. Axial Structures

Barnessite

Meta-hewettite

Sodium-calcium-meta-hewettite

Hewettite

Bannermanite

Delrioite

Grantsite

3.2. Planar Structures

Hendersonite

3.3. (Pseudo) Isometric Structures

Wakefieldite

Kusuite

Hummerite

Munirite

Rossite

Meta-rossite

Fernandinite

Gamagarite

4. Zn-Cu-Pb(U) Assemblages

4.1. Axial Structures

Vesignieite

Duhamelite

Stibivanite

4.2. Planar Structures

Stoiberite

Ziesite

Chervetite

Mounanaite

Pucherite

Clinobisvanite

Dreyerite

Schumacherite

Uvanite

Vanuralite

Meta-vanuralite

Strelkinitite

Tuyamuyunite

Meta-tuyamuyunite

Rauvite

Francevillite

Carnotite

Margaritasite
Curienite

Sengierite
4.3. (Pseudo) Isometric Structures
Volborthite
Fingerite
Tangeite
Vanadinite
Pyrobelonite
Descloizite
Mottramite
Čechite
Heyite
Brackebuschite
Schumacherite

Phosphates – arsenates – vanadates with mixed anions

1. Axial Structures
Walentaite
Santafeite
2. Planar Structures
Schoderite
Meta-schoderite
Arsenocrandalite
Natrourosphinite
Sincosite
Uranospathite
Kamitugaite
3. (Pseudo) Isometric Structures
Asselbornite

With additional (SO₄) groups

1. Axial Structures
Tristramite
Lindackerite
2. Planar Structures
Sassaite
Sarmientite
Bukovskyite
Zykaite
Ardealite
Chalcophyllite
Parnauite
Hinsdalite
Orpheite
Corkite
Beudanite
Svanbergite
Schlossmacherite
Coconinoite
Xiangjiangite
3. (Pseudo) Isometric Structures
Diadochite
Hotsonite
Peisleyite
Tsumebite

With additional (SiO₄) groups

1. Axial Structures
Attakolite
Wilkeite
2. Planar Structures
Waylandite

Phosinaite
Clinophosinaite
Lomonosovite
Sobolevite
Perhamite
Viseite
Nelenite
Parweliet
Kraisslite
Dixenite
Madaite

3. (Pseudo) Isometric Structures

Asbecasite
Sayakite
Britholite
Karnasurtite
Smirnovskite
Steenstrupine
Cheralite
Saneroite
Sarcolite

With additional (CO₃), (BO₃), (NO₃), (MoO₄) or (CrO₄) groups

1. Axial Structures

Seamanite
Bellite

2. Planar Structures

Lunenburgite
Sidorenkite
Likasite
Betpakdalite
Na-Betpakdalite
Obradovichite
Fornacite
Molybdoformacite

3. (Pseudo) Isometric Structures

Cahnite
Bradleyite
Bonshtedtite
Daqiongshamite
Brockite
Embreyite

Structural-paragenetic classification of the sulphate minerals (Kostov, 2000)

1. Al-Mg-Fe Assemblages

1.1. Axial Structures

- 1.1.1. Alumininite $\text{Al}_2\text{SO}_4(\text{OH})_4 \cdot 7\text{H}_2\text{O}$
- 1.1.2. Pickeringite $\text{MgAl}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O}$
Halotrichite $\text{FeAl}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O}$
- 1.1.3. Kalinite $\text{KAlSO}_4 \cdot 11\text{H}_2\text{O}$
Mendosite $\text{NaAlSO}_4 \cdot 11\text{H}_2\text{O}$
Ettringite $\text{Ca}_6\text{Al}_2(\text{SO}_4)_3(\text{OH})_{16} \cdot 26\text{H}_2\text{O}$
- 1.1.4a. Epsomite $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
Tauriscite $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
Morenosite $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$
- 1.1.4b. Melanterite $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
Hexahydrate $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$
Ferrohexahydrate $\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$
- 1.1.5. Sideronatrite $\text{Na}_2\text{Fe}(\text{SO}_4)_2(\text{OH}) \cdot 3\text{H}_2\text{O}$

1.2. Planar Structures

- 1.2.1. Alunogen $\text{Al}_2(\text{SO}_4)_3 \cdot 17\text{H}_2\text{O}$
- 1.2.2. Alunite $\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6$

- Jarosite $\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$
- 1.2.3a. Starkeyite $\text{MgSO}_4 \cdot 4\text{H}_2\text{O}$
- Rosenite $\text{FeSO}_4 \cdot 4\text{H}_2\text{O}$
- Coquimbite $\text{Fe}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$
- Römeite $\text{Fe}_2\text{Fe}(\text{SO}_4)_4 \cdot 14\text{H}_2\text{O}$
- 1.3. (Pseudo-) Isometric Structures
- 1.3.1. Soda alum $\text{NaAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$
- Potash alum $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$
- 1.3.2a. Langbeinite $\text{K}_2\text{Mg}_2(\text{SO}_4)_3$
- D'Ansite $\text{Na}_{21}\text{Mg}(\text{SO}_4)_{10}\text{Cl}_3$
- 1.2.3b. Vanthoffite $\text{Na}_6\text{Mg}(\text{SO}_4)_4$
- Polynalite $\text{K}_2\text{Ca}_2\text{Mg}(\text{SO}_4)_4 \cdot 2\text{H}_2\text{O}$
- 1.3.3. Kieserite $\text{MgSO}_4 \cdot \text{H}_2\text{O}$
- Szomolnokite $\text{FeSO}_4 \cdot \text{H}_2\text{O}$
- 1.3.4. Kainite $\text{KMgSO}_4\text{Cl} \cdot 3\text{H}_2\text{O}$
- 2. Na(K)-Ca-Ba Assemblages**
- 2.1. Axial Structures
- 2.1.1. Mirabilite $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
- 2.1.2. Syngenite $\text{K}_2\text{Ca}(\text{SO}_4)_2 \cdot \text{H}_2\text{O}$
- 2.2. Planar Structures
- 2.2.1. Gypsum $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- 2.3. (Pseudo-) Isometric Structures
- 2.3.1. Thenardite Na_2SO_4
- Arcanite K_2SO_4
- Glaserite $\text{K}_3\text{Na}(\text{SO}_4)_2$
- Glauberite $\text{CaNa}_2(\text{SO}_4)_2$
- 2.3.2. Anhydrite CaSO_4
- Celestite SrSO_4
- Barite BaSO_4
- 2.3.3. Kogarkoite $\text{Na}_3(\text{SO}_4)\text{F}$
- Galeite $\text{Na}_3(\text{SO}_4)(\text{F},\text{Cl})$
- Sulfohalite $\text{Na}_6(\text{SO}_4)_2(\text{F},\text{Cl})$
- Schairerite $\text{Na}_{21}(\text{SO}_4)_7\text{F}_6\text{Cl}$
- 3. Zn-Cu-Pb(U) Assemblages**
- 3.1. Axial Structures
- 3.1.1. Zincosite ZnSO_4
- Goslarite $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
- 3.1.2. Chalcocyanite CuSO_4
- 3.1.3. Cyanotrychite $\text{Cu}_4\text{Al}_2\text{SO}_4(\text{OH})_{12} \cdot 2\text{H}_2\text{O}$
- Ransomite $\text{CuFe}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$
- 3.1.4. Chlorothionite $\text{K}_2\text{CuSO}_4\text{Cl}_2$
- 3.1.5. Linarite $\text{PbCuSO}_4(\text{OH})_2$
- Fleischerite $\text{Pb}_3\text{Ge}(\text{SO}_4)_2(\text{OH})_2$
- Elyite $\text{Pb}_4\text{CuSO}_4(\text{OH})_8$
- 3.2. Planar Structures
- 3.2.1. Zincbotryogen $\text{ZnFe}(\text{SO}_4)_2(\text{OH}) \cdot 7\text{H}_2\text{O}$
- Zinccopiapite $\text{ZnFe}_4(\text{SO}_4)_6(\text{OH})_2 \cdot 2\text{H}_2\text{O}$
- 3.2.2. Antlerite $\text{Cu}_3\text{SO}_4(\text{OH})_4$
- Langite $\text{Cu}_3\text{SO}_4(\text{OH})_4 \cdot \text{H}_2\text{O}$
- Brochantite $\text{Cu}_4\text{SO}_4(\text{OH})_6$
- Posnjakite $\text{Cu}_4\text{SO}_4(\text{OH})_6 \cdot \text{H}_2\text{O}$
- Wroewolfeite $\text{Cu}_4\text{SO}_4(\text{OH})_8 \cdot 2\text{H}_2\text{O}$
- 3.2.3. Kröhnkite $\text{CuNa}_2(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$
- 3.2.4. Plumbojarosite $\text{PbFe}_6(\text{SO}_4)_4(\text{OH})_{12}$
- 3.3. (Pseudo-) Isometric Structures
- 3.3.1. Bonatite $\text{CuSO}_4 \cdot 3\text{H}_2\text{O}$
- Chalcanthite $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- Boothite $\text{CuSO}_4 \cdot 7\text{H}_2\text{O}$
- 3.3.2. Dolerophanite $\text{Cu}_2(\text{SO}_4)\text{O}$
- Connellite $\text{Cu}_{19}\text{SO}_4(\text{OH})_{32}\text{Cl}_4 \cdot 3\text{H}_2\text{O}$
- 3.3.3. Anglesite PbSO_4

3.3.4. Caracolite $\text{Pb}_2\text{Na}_3(\text{SO}_4)_3\text{Cl}$

4. Sulphates with Other Cations

4.1. Axial Structures

4.1.1. Bentorite $\text{Ca}_6\text{Cr}_2(\text{SO}_4)_3(\text{OH})_{12}\cdot 26\text{H}_2\text{O}$

4.2. Planar Structures

4.2.1. Klebesbergite $\text{Sb}_4\text{FeSO}_4(\text{OH})\text{O}$

Peretaite $\text{CaSb}_4(\text{SO}_4)_2(\text{OH})_2\text{O}_4\cdot 2\text{H}_2\text{O}$

4.3. (Pseudo-) Isometric Structures

4.3.1. Zircosulphate $\text{Zr}(\text{SO}_4)_2\cdot 4\text{H}_2\text{O}$

4.3.2. Schuetteite $\text{Hg}_3(\text{SO}_4)\text{O}_2$

Gianellite $(\text{Hg}_2\text{N})_2\text{SO}_4$

5. Sulphates with Other Anions

Mixed-anion sulphate minerals (F- and Cl-bearing excluded) can also be subdivided into axial, planar and (pseudo-)isometric, when (SO_4) anion prevail over the other anions; otherwise they should be transferred to corresponding other classes.

Structural-paragenetic classification of the carbonate minerals (Kostov, R. Kostov, 2006)

1. Al-Mg-Fe(Ni,Co,Mn) assemblages

1.1. Axial (A-type) structures

Barringtonite $\text{MgCO}_3\cdot 2\text{H}_2\text{O}$

Nesquehonite $\text{MgCO}_3\cdot 3\text{H}_2\text{O}$

Langsfordite $\text{MgCO}_3\cdot 5\text{H}_2\text{O}$

Artinite $\text{Mg}_2(\text{CO}_3)(\text{OH})_2\cdot 3\text{H}_2\text{O}$

Chlorartinite $\text{Mg}_2(\text{CO}_3)\text{Cl}(\text{OH})\cdot 3(\text{H}_2\text{O})$

Loseyite $(\text{Mn,Zn})(\text{CO}_3)_2(\text{OH})_{10}$

Hellyerite $\text{NiCO}_3\cdot 6\text{H}_2\text{O}$

Kambaldaite $\text{NaNi}_4(\text{CO}_3)_3(\text{OH})_3\cdot 3\text{H}_2\text{O}$

Dawsonite $\text{NaAl}(\text{CO}_3)(\text{OH})_2$

Alumohydrocalcite $\text{CaAl}_2(\text{CO}_3)_2(\text{OH})_4\cdot 3\text{H}_2\text{O}$

Paraalumohydrocalcite $\text{CaAl}_2(\text{CO}_3)_2(\text{OH})_4\cdot 6\text{H}_2\text{O}$

Sergeevite $\text{Ca}_2\text{Mg}_{11}(\text{CO}_3)_9(\text{HCO}_3)(\text{OH})_4\cdot 6\text{H}_2\text{O}$

Dresserite $\text{Ba}_2\text{Al}_4(\text{CO}_3)_4(\text{OH})_2\cdot 3\text{H}_2\text{O}$

Hydrodresserite $\text{BaAl}_2(\text{CO}_3)_2(\text{OH})_4\cdot 3\text{H}_2\text{O}$

Strontiodresserite $\text{SrAl}_2(\text{CO}_3)_2(\text{OH})_4\cdot 3\text{H}_2\text{O}$

Sahamalite-(Ce) $(\text{Mg,Fe})(\text{Ce,La,Nd})_2(\text{CO}_3)_4$

Holdawayite $\text{Mn}_6(\text{CO}_3)_2(\text{OH})_7(\text{Cl,OH})$

1.2. Planar (P-type) structures

Scarbroite $\text{Al}_5\text{CO}_3(\text{OH})_{13}\cdot 5\text{H}_2\text{O}$

Hydroscarbroite $\text{Al}_{14}(\text{CO}_3)_3(\text{OH})_{36}\cdot n\text{H}_2\text{O}$

Pokrovskite $\text{Mg}_2(\text{CO}_3)(\text{OH})_2\cdot 0,5\text{H}_2\text{O}$

Hydromagnesite $\text{Mg}_5(\text{CO}_3)_4(\text{OH})_2\cdot 4\text{H}_2\text{O}$

Manasseite $\text{Mg}_6\text{Al}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Hydrotalcite $\text{Mg}_6\text{Al}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Chlormanasseite $\text{Mg}_6\text{Al}_2(\text{CO}_3)(\text{OH})_{16}\text{Cl}_2\cdot 4\text{H}_2\text{O}$

Barbertonite $\text{Mg}_6\text{Cr}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Stichtite $\text{Mg}_6\text{Cr}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Sjögrenite $\text{Mg}_6\text{Fe}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Pyroaurite $\text{Mg}_{10}\text{Fe}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Coalingite $\text{Mg}_6\text{Fe}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Desautelsite $\text{Mg}_6\text{Mn}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Indigerite $\text{Mg}_2\text{Al}_2(\text{CO}_3)_4(\text{OH})_2\cdot 15\text{H}_2\text{O}$

Brugnatellite $\text{Mg}_6\text{Fe}(\text{CO}_3)(\text{OH})_{13}\cdot 4\text{H}_2\text{O}$

Chlormagaluminite $(\text{MgFe})_4\text{Al}_2(\text{OH})_{12}(\text{Cl}_2,\text{CO}_3)\cdot 2\text{H}_2\text{O}$

Nullagingite $\text{Ni}_2(\text{CO}_3)(\text{OH})_2$

Otwayite $(\text{Ni,Mg})_2\text{CO}_3(\text{OH})_2\cdot \text{H}_2\text{O}$

Takovite $\text{Ni}_6\text{Al}_2(\text{CO}_3,\text{OH})(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Eardleyite $\text{Ni}_6\text{Al}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Reevesite $\text{Ni}_6\text{Fe}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Widgiemoolthalite $\text{Ni}_5(\text{CO}_3)_4(\text{OH})_2\cdot 4\cdot 5\text{H}_2\text{O}$

Comblainite $\text{Ni}_6\text{Co}_2(\text{CO}_3)(\text{OH})_{16}\cdot 4\text{H}_2\text{O}$

Gaspeite (Ni,Mg,Fe)CO₃
 Quintinite-2H Mg₄Al₂(CO₃)(OH)₁₂.3H₂O
 Quintinite-3T Mg₄Al₂(CO₃)(OH)₁₂.3H₂O
 Caresite-3T Fe₄Al₂(CO₃)(OH)₁₂.3H₂O
 Charmarite-2H Mn₄Al₂(CO₃)(OH)₁₂.3H₂O
 Charmarite-3T Mn₄Al₂(CO₃)(OH)₁₂.3H₂O
 Wermlandite Ca₂Mg₁₄(Al,Fe)₄(CO₃)(OH)₄₂.15H₂O
 1.3. (Pseudo-)Isometric, (I) resp. I-type structures
 Eitelite Na₂Mg(CO₃)₂
 Northupite Na₃Mg(CO₃)₂Cl
 Tychite Na₆Mg(CO₃)₂Cl
 Huntite CaMg(CO₃)₄
 Tunisite NaCa₂Al₄(CO₃)₄(OH)₈Cl
 Dashkovaite Mg(HCO₃)₂.2H₂O
 Baylissite K₂Mg(CO₃)₂.4H₂O
 Magnesite MgCO₃
 Siderite FeCO₃
 Rhodochrosite MnCO₃
 Spherochalcite CoCO₃
 Dolomite CaMg(CO₃)₂
 Ankerite Ca(Fe,Mg,Mn)(CO₃)₂
 Kutnahorite CaMn(CO₃)₂
 Norsethite BaMg(CO₃)₂
 Zaratite Ni₃(CO₃)(OH)₂.4H₂O

2. Na-Ca-Ba(K)-REE assemblages

2.1. Axial (A-type) structures

Kalicinite KHCO₃
 Teschemacherite NH₄HCO₃
 Wegscheiderite Na₅(CO₃)(HCO₃)₃
 Nahcolite NaHCO₃
 Gaylussite Na₂Ca(CO₃)₂.5H₂O
 Trihydrocalcite CaCO₃.3H₂O
 Pentahydrocalcite CaCO₃.5H₂O
 Ikaite CaCO₃.6H₂O
 Brenkite Ca₂(CO₃)F₂
 Barytocalcite BaCa(CO₃)₂
 Defernite Ca₃CO₃(OH,Cl)₄.H₂O
 Tuliokite Na₆BaTh(CO₃)₆.6H₂O
 Petersenite-(Ce) Na₄(Ce,La,Nd)₂(CO₃)₅
 Shomiokite-(Y) Na₃Y(CO₃)₃.3H₂O
 Lokkaite-(Y) CaY₄(CO₃)₇.9H₂O
 Kukharenkoite-(Ce) Ba₂Ce(CO₃)₃F

2.2. Planar (P-type) structures

Vaterite CaCO₃
 Nyereraite Na₂Ca(CO₃)₂
 Shortite Na₂Ca₂(CO₃)₃
 Gregoryite (Na₂,K₂,Ca)CO₃
 Rouvilleite Na₃Ca₂(CO₃)₃F
 Fairchildite K₂Ca(CO₃)₂
 Bütschliite K₂Ca(CO₃)₂
 Tengerite-(Y) Y₂(CO₃)₃.2-3H₂O
 Calkinsite-(Ce) (Ce,La)₂(CO₃)₃.4H₂O
 Adamsite-(Y) NaY(CO₃)₂.6H₂O
 Lanthanite-(La) (La,Dy,Ce)₂(CO₃)₃.8H₂O
 Thermonatrite Na₂(CO₃).H₂O
 Trona Na₃(HCO₃)(CO₃).2H₂O
 Natron Na₃CO₃.10H₂O
 Kozoite-(Nd) Nd(CO₃)(OH)
 Galgenbergite-(Ce) Ca(Ce,Nd,La)₂(CO₃)₄.H₂O
 Kamphaugite-(Y) Ca(Y,REE)(CO₃)₂(OH).H₂O

Kimuraite-(Y) $\text{CaY}_2(\text{CO}_3)_4 \cdot 6\text{H}_2\text{O}$
 Weloganite $\text{Sr}_3\text{Na}_2\text{Zr}(\text{CO}_3)_6 \cdot 3\text{H}_2\text{O}$
 Thomasclarkite-(Y) $\text{Na}(\text{Y},\text{REE})(\text{HCO}_3)(\text{OH})_3 \cdot 4\text{H}_2\text{O}$
 Mckelveyite-(Y) $\text{Ba}_3\text{Na}(\text{Ca},\text{U})\text{Y}(\text{CO}_3)_6 \cdot 3\text{H}_2\text{O}$
 Gysinite-(Nd) $\text{Pb}(\text{Nd},\text{La})(\text{CO}_3)_2(\text{OH}) \cdot \text{H}_2\text{O}$
 Sheldrickite $\text{NaCa}_3(\text{CO}_3)_2\text{F}_3 \cdot \text{H}_2\text{O}$
 Rouvilleite $\text{Na}_3(\text{Ca},\text{Mn},\text{Fe})_2(\text{CO}_3)_3\text{F}$
 Huanghoite-(Ce) $\text{BaCe}(\text{CO}_3)_2\text{F}$
 Zhonghuacerite-(Ce) $\text{Ba}_2\text{Ce}(\text{CO}_3)_3\text{F}$
 Lukechangite-(Ce) $\text{Na}_3\text{Ce}_2(\text{CO}_3)_4\text{F}$
 2.3. Pseudo-Isometric, (I)-type structures
 Zabuyelite Li_2CO_3
 Natrite Na_2CO_3
 Calcite CaCO_3
 Aragonite CaCO_3
 Strontianite SrCO_3
 Witherite BaCO_3
 Pirssonite $\text{CaNa}_2(\text{CO}_3)_2 \cdot 2\text{H}_2\text{O}$
 Monohydrocalcite $\text{CaCO}_3 \cdot \text{H}_2\text{O}$
 Zemkorite $(\text{Na},\text{K})_2\text{Ca}(\text{CO}_3)_2$
 Alstonite $\text{BaCa}(\text{CO}_3)_2$
 Paralstonite $\text{BaCa}(\text{CO}_3)_2$
 Olekminskite $\text{Sr}(\text{Sr},\text{Ca},\text{Ba})(\text{CO}_3)_2$
 Ewaldite $\text{Ba}(\text{Ca},\text{Y},\text{Na},\text{K})(\text{CO}_3)_2$
 Benstonite $\text{Ba}_6\text{Ca}_7(\text{CO}_3)_{13}$
 Carbocernaite $(\text{Ca},\text{Na})(\text{Sr},\text{Ce},\text{Ba})(\text{CO}_3)_2$
 Burbankite $(\text{Na},\text{Ca})_3(\text{Sr},\text{Ba},\text{Ce})_3(\text{CO}_3)_5$
 Calcioburbankite $(\text{Na},\text{Ca})_3(\text{Sr},\text{Ba},\text{Ce})_3(\text{CO}_3)_5$
 Khanneshite $(\text{Na},\text{Ca})_3(\text{Ba},\text{Sr},\text{Ce},\text{Ca})_3(\text{CO}_3)_5$
 Remondite-(Ce) $\text{Na}_3(\text{Ce},\text{La},\text{Ca},\text{Na},\text{Sr})_3(\text{CO}_3)_5$
 Ancylite-(Ce) $\text{SrCe}(\text{CO}_3)_2(\text{OH}) \cdot \text{H}_2\text{O}$
 Ancylite-(La) $\text{Sr}(\text{La},\text{Ce})(\text{CO}_3)_2(\text{OH}) \cdot \text{H}_2\text{O}$
 Calcio-ancylite-(Ce) $(\text{Ca},\text{Sr})\text{Ce}_3(\text{CO}_3)_4(\text{OH})_3 \cdot \text{H}_2\text{O}$
 Calcio-ancylite-(Nd) $\text{Ca}(\text{Nd},\text{Ce},\text{Gd},\text{Y})_3(\text{CO}_3)_4(\text{OH})_3 \cdot \text{H}_2\text{O}$
 Bastnäsite-(Ce) $(\text{Ce},\text{La})(\text{CO}_3)\text{F}$
 Bastnäsite-(La) $(\text{La},\text{Ce})(\text{CO}_3)\text{F}$
 Bastnäsite-(Y) $(\text{Y},\text{Ce})(\text{CO}_3)\text{F}$
 Hydroxylbastnäsite-(Ce) $(\text{Ce},\text{La})(\text{CO}_3)(\text{OH},\text{F})$
 Hydroxylbastnäsite-(La) $(\text{La},\text{Ce})(\text{CO}_3)(\text{OH},\text{F})$
 Hydroxylbastnäsite-(Nd) $(\text{Nd},\text{Ce},\text{La})(\text{CO}_3)(\text{OH},\text{F})$
 Parisite-(Ce) $\text{Ca}(\text{Ce},\text{La})_2(\text{CO}_3)_3\text{F}$
 Parisite-(Nd) $\text{Ca}(\text{Nd},\text{Ce},\text{La})_2(\text{CO}_3)_3\text{F}$
 Röntgenite-(Ce) $\text{Ca}_2(\text{Ce},\text{La})_3(\text{CO}_3)_5\text{F}_3$
 Synchysite-(Ce) $\text{Ca}(\text{Ce},\text{La})(\text{CO}_3)_2\text{F}$
 Synchysite-(Nd) $\text{Ca}(\text{Nd},\text{La})(\text{CO}_3)_2\text{F}$
 Synchysite-(Y) $\text{Ca}(\text{Y},\text{Ce})(\text{CO}_3)_2\text{F}$
 Cordylite-(Ce) $\text{NaBaCe}_2(\text{CO}_3)_4\text{F}$
 Donnayite-(Y) $\text{NaCaSr}_3\text{Y}(\text{CO}_3)_6 \cdot 3\text{H}_2\text{O}$
 Horvathite-(Y) NaYCO_3F_2
 Stenonite $(\text{Sr},\text{Ba},\text{Na})_2\text{AlCO}_3\text{F}_5$
 Barentsite $\text{Na}_7\text{AlH}_2(\text{CO}_3)_4\text{F}_4$
 Montroyalite $\text{Sr}_4\text{Al}_8(\text{CO}_3)_3(\text{OH},\text{F})_{26} \cdot 10\text{-}11\text{H}_2\text{O}$

3. Zn-Cu-Pb(U) assemblages

3.1. Axial (A-type) structures

Malachite $\text{Cu}_2(\text{CO}_3)(\text{OH})_2$
 Glaucosphaerite $(\text{Cu},\text{Ni})_2(\text{CO}_3)(\text{OH})_2$
 Loseyite $(\text{Mn},\text{Zn})_7(\text{CO}_3)_2(\text{OH})_{10}$
 Sclarite $(\text{Zn},\text{Mg},\text{Mn})_4\text{Zn}_3(\text{CO}_3)_2(\text{OH})_{10}$
 Shannonite $\text{Pb}_2\text{O}(\text{CO}_3)$
 Schuilingite $\text{Pb}_3\text{Cu}_2\text{Ca}_6(\text{CO}_3)_8(\text{OH})_6 \cdot 6\text{H}_2\text{O}$

Sharpite $(\text{UO}_2)(\text{CO}_3)\cdot\text{H}_2\text{O}$
 Bayleyite $\text{Mg}_2(\text{UO}_2)(\text{CO}_3)_3\cdot 18\text{H}_2\text{O}$
 Swartzite $\text{CaMg}(\text{UO}_2)(\text{CO}_3)_3\cdot 12\text{H}_2\text{O}$
 Zellerite $\text{Ca}(\text{UO}_2)(\text{CO}_3)_2\cdot 5\text{H}_2\text{O}$
 Metazellerite $\text{Ca}(\text{UO}_2)(\text{CO}_3)_2\cdot 3\text{H}_2\text{O}$
 Urancalcarite $\text{Ca}(\text{UO}_2)_3\text{CO}_3(\text{OH})_6\cdot 3\text{H}_2\text{O}$
 Voglite $\text{Ca}_2\text{Cu}(\text{UO}_2)_2(\text{CO}_3)\cdot 14\text{H}_2\text{O}$
 Fontanite $\text{Ca}(\text{UO}_2)(\text{CO}_3)_4\cdot 3\text{H}_2\text{O}$
 Oswaldpeetersite $(\text{UO}_2)_2(\text{CO}_3)(\text{OH})_2\cdot 4\text{H}_2\text{O}$
 Astrocyanide-(Ce) $\text{Cu}_2(\text{Ce,Nd,La})(\text{UO}_2)(\text{CO}_3)_5(\text{OH})_2\cdot 1,5\text{H}_2\text{O}$
 Szymanskiite $\text{Hg}_{10}\text{Ni}_6(\text{CO}_3)_{12}(\text{H}_3\text{O})_8\cdot 3\text{H}_2\text{O}$
 3.2. Planar (P-type) structures
 Hydrozincite $\text{Zn}_5(\text{CO}_3)_2(\text{OH})_6$
 Aurichalcite $(\text{Zn,Cu})_5(\text{CO}_3)_2(\text{OH})_6$
 Claraite $(\text{Cu,Zn})_3(\text{CO}_3)(\text{OH})_4\cdot 4\text{H}_2\text{O}$
 Zaccagnaite $\text{Zn}_4\text{Al}_2(\text{CO}_3)(\text{OH})_{12}\cdot 3\text{H}_2\text{O}$
 Chalconatrite $\text{Na}_2\text{Cu}(\text{CO}_3)_2\cdot 3\text{H}_2\text{O}$
 Cuproartinite $(\text{Cu,Mg})_2(\text{CO}_3)(\text{OH})_2\cdot 3\text{H}_2\text{O}$
 Glaukosphaerite $(\text{Cu,Ni})_2(\text{CO}_3)(\text{OH})_2$
 Kolwezite $(\text{Cu}^{2+},\text{Co})_2(\text{CO}_3)(\text{OH})_2$
 Mcquinnessite $(\text{Mg,Cu}^{2+})_2(\text{CO}_3)(\text{OH})_2$
 Rosasite $(\text{Cu}^{2+},\text{Zn})_2(\text{CO}_3)(\text{OH})_2$
 Zincrosasite $(\text{Zn,Cu}^{2+})_2(\text{CO}_3)(\text{OH})_2$
 Decrespingnyite-(Y) $(\text{Y,REE})_4\text{Cu}(\text{CO}_3)_4\text{Cl}(\text{OH})_5\cdot 2\text{H}_2\text{O}$
 Rutherfordine $(\text{UO}_2)(\text{CO}_3)$
 Blatonite $(\text{UO}_2)(\text{CO}_3)\cdot\text{H}_2\text{O}$
 Joliotite $(\text{UO}_2)(\text{CO}_3)\cdot 2\text{H}_2\text{O}$
 Cejkaite $\text{Na}_4(\text{UO}_2)(\text{CO}_3)_3$
 Liebigite $\text{Ca}_2(\text{UO}_2)(\text{CO}_3)_3\cdot 10\text{H}_2\text{O}$
 Rabbittite $\text{Ca}_3\text{Mg}_3(\text{UO}_2)_2(\text{CO}_3)_6\cdot 18\text{H}_2\text{O}$
 Wyartite $\text{Ca}_3\text{U}(\text{UO}_2)_6(\text{CO}_3)_2(\text{OH})_8\cdot 4\text{H}_2\text{O}$
 Znucalite $\text{CaZn}_{12}(\text{UO}_2)(\text{CO}_3)_3(\text{OH})_{22}\cdot 4\text{H}_2\text{O}$
 Widenmannite $\text{Pb}_2(\text{UO}_2)(\text{CO}_3)_3$
 Hydrocerussite $\text{Pb}_3(\text{CO}_3)_2(\text{OH})_2$
 Plumbonacrite $\text{Pb}_{10}(\text{CO}_3)_6\text{O}(\text{OH})_6$
 Petterdite $\text{PbCr}_2(\text{CO}_3)_2(\text{OH})_4\cdot\text{H}_2\text{O}$
 Dundasite $\text{PbAl}_2(\text{CO}_3)_2(\text{OH})_4\cdot\text{H}_2\text{O}$
 Barstowite $\text{Pb}_4(\text{CO}_3)\text{Cl}_6\cdot\text{H}_2\text{O}$
 Bismutite $\text{Bi}_2\text{O}_2(\text{CO}_3)$
 Kettnerite $\text{CaBi}(\text{CO}_3)\text{OF}$
 Beyerite $\text{CaBi}_2(\text{CO}_3)_2\text{O}_2$
 Clearcreekite $\text{Hg}_3(\text{CO}_3)(\text{OH})\cdot 2\text{H}_2\text{O}$
 Peterbaylissite $\text{Hg}_3(\text{CO}_3)(\text{OH})\cdot 2\text{H}_2\text{O}$
 Astrocyanite-(Ce)
 $\text{Cu}_2(\text{Ce,Nd,La})_2(\text{UO}_2)(\text{CO}_3)_5(\text{OH})_2\cdot 1,5\text{H}_2\text{O}$
 Shabaite-(Nd) $\text{Ca}(\text{Nd,Sm,Y})_2(\text{UO}_2)(\text{CO}_3)_4(\text{OH})_2\cdot 6\text{H}_2\text{O}$
 Bijvoetite-(Y) $(\text{Y,Dy})_2(\text{UO}_2)_4(\text{CO}_3)_4(\text{OH})_6\cdot 11\text{H}_2\text{O}$
 3.3. Pseudo-isometric,(I)-type structures
 Smithsonite ZnCO_3
 Minrecordite $\text{CaZn}(\text{CO}_3)_2$
 Otavite CdCO_3
 Azurite $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$
 Callaghanite $\text{Cu}_2\text{Mg}_2(\text{CO}_3)(\text{OH})_6\cdot 2\text{H}_2\text{O}$
 Cerussite PbCO_3
 Phosgenite $\text{Pb}(\text{CO}_3)\text{Cl}_2$
 Grimselite $\text{K}_3\text{Na}(\text{UO}_2)(\text{CO}_3)_3\cdot\text{H}_2\text{O}$
 Andersonite $\text{Na}_2\text{Ca}(\text{UO}_2)(\text{CO}_3)_3\cdot 6\text{H}_2\text{O}$
 Albrechtschraufite $\text{Ca}_4\text{Mg}(\text{UO}_2)_2(\text{CO}_3)_6\text{F}_2\cdot 17\text{H}_2\text{O}$
 3.4. Amorphous
 Georgeite $\text{Cu}_2\text{CO}_3(\text{OH})_2$

Classes of nitrates, iodates and organic minerals (Kostov, R. I. 2010)

Nitrates

Al-Mg-Fe association

Pseudoisometric type

nitromagnesite $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$

Planar type

humberstonite $\text{K}_3\text{Na}_7\text{Mg}_2(\text{SO}_4)_6(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$

Na(K)-Ca-Ba association

Axial type

nitrocalcite $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$

gwihabaite $(\text{NH}_4, \text{K})\text{NO}_3$

Pseudoisometric and isometric type

nitratine NaNO_3

niter KNO_3

nitrobarite $\text{Ba}(\text{NO}_3)_2$

darapskite $\text{Na}_3(\text{NO}_3)(\text{SO}_4) \cdot \text{H}_2\text{O}$

Planar type

sveite $\text{KAl}_7(\text{NO}_3)_4(\text{OH})_{16}\text{Cl}_2 \cdot 8\text{H}_2\text{O}$

Cu-Pb-Zn association

Axial type

buttgenbachite $\text{Cu}_{36}(\text{NO}_3)_2\text{Cl}_6(\text{OH})_{64} \cdot n\text{H}_2\text{O}$

Planar type

gerhardite $\text{Cu}_2\text{NO}_3(\text{OH})_3$

rouaite $\text{Cu}_2\text{NO}_3(\text{OH})_3$

likasite $\text{Cu}_3\text{NO}_3(\text{OH})_5 \cdot 2\text{H}_2\text{O}$

mbobomkulite $(\text{Ni}, \text{Cu})\text{Al}_4(\text{NO}_3, \text{SO}_4)_2(\text{OH})_{12} \cdot 3\text{H}_2\text{O}$

hydrombobomkulite $(\text{Ni}, \text{Cu})\text{Al}_4(\text{NO}_3, \text{SO}_4)_2(\text{OH})_{12} \cdot 14\text{H}_2\text{O}$

Iodates

Na(K)-Ca-Mg association

Axial type

lautarite $\text{Ca}(\text{IO}_3)_2$

brüggenite $\text{Ca}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$

dietzeite $\text{Ca}_2(\text{IO}_3)_2(\text{CrO}_4) \cdot \text{H}_2\text{O}$

georgeericksenite $\text{Na}_6\text{CaMg}(\text{IO}_3)_6(\text{CrO}_4)_2 \cdot 12\text{H}_2\text{O}$

hectorfloresite $\text{Na}_9(\text{IO}_3)(\text{SO}_4)_4$

Planar type

carlosruizite $\text{K}_3\text{Na}_2\text{Na}_3\text{Mg}_5(\text{IO}_3)_6(\text{SeO}_4)_6 \cdot 6\text{H}_2\text{O}$

Cu-Pb-Zn association

Axial type

salesite $\text{Cu}(\text{IO}_3)(\text{OH})$

Pseudoisometric (I) type

bellingrite $\text{Cu}_3(\text{IO}_3)_6 \cdot 2\text{H}_2\text{O}$

Planar type

seeligerite $\text{Pb}_3(\text{IO}_3)\text{Cl}_3$

schwartzembergite $\text{Pb}_5\text{H}_2\text{IO}_6\text{Cl}_3$

Organic Minerals

Axial type

karpatite $\text{C}_{24}\text{H}_{12}$

flagstaffite $\text{C}_{10}\text{H}_{22}\text{O}_3$

refikite $\text{C}_{20}\text{H}_{32}\text{O}$

Pseudoisometric type

dinite $\text{C}_{20}\text{H}_{36}$

urea $\text{CO}(\text{NH}_2)_2$

uricite $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$

acetamide CH_3CONH_2

Planar type

kratochvilite $\text{C}_{13}\text{H}_{10}$

ravatite $\text{C}_{14}\text{H}_{10}$

simmonellite $\text{C}_{19}\text{H}_{34}$

idrialite $C_{22}H_{14}$
evenkite $C_{24}H_{50}$
hoelite $C_{14}H_8O_2$
oxammite $(NH_4)CO \cdot H_2O$
guanine $C_6H_3(NH_3)N_4O$

Al-Mg-Fe association

Axial type

glushinskite $MgC_2O_4 \cdot 2H_2O$
humboldtine $FeC_2O_4 \cdot 2H_2O$
lindbergite $MnC_2O_4 \cdot 2H_2O$
zhemchuzhnikovite $NaMgAl(C_2O_4)_3 \cdot 8H_2O$
levinsonite-(Y) $YAl(SO_4)_2(C_2O_4) \cdot 12H_2O$
dashkovaite $Mg(HCOO)_2 \cdot 2H_2O$
julienite $Na_2Co(SCN)_4 \cdot 8H_2O$

Pseudoisometric type

mellite $Al_2C_6(COO)_6 \cdot 16H_2O$

Planar type

minguzzite $K_3FeC_2O_4 \cdot 3H_2O$
stepanovite $NaMgFe(C_2O_4)_3 \cdot 8H_2O$
coskrenite-(Ce) $Ce_2(SO_4)_2(C_2O_4) \cdot 8H_2O$
zugshunite-(Ce) $CeAl(SO_4)_2(C_2O_4) \cdot 12H_2O$
abelsonite $NiC_{31}H_{32}N_4$
pigotite? $Al_4C_6H_5O_{10} \cdot 13H_2O$
[kafehydrocyanite] $K_4Fe(CN)_6 \cdot 3H_2O$

Na-Ca-Ba association

Axial type

kladnoite $Ca_6H_4(CO)_2NH$
earlandite $Ca_3(C_6H_5O_7)_2 \cdot 4H_2O$

Pseudoisometric type

whewellite $CaC_2O_4 \cdot H_2O$
weddellite $CaC_2O_4 \cdot 2H_2O$
novgorodovaite $Ca_2(C_2O_4)Cl_2 \cdot 2H_2O$

Planar type

natroxalate $Na_2C_2O_4$
caoxite $CaC_2O_4 \cdot 3H_2O$
formicaite $Ca(CHOO)_2$
calclacite $Ca(CH_3COO)Cl \cdot 5H_2O$

Cu-Pb-Zn association

Axial type

moolite $CuC_2O_4 \cdot H_2O$
weatleyite $Na_2Cu(C_2O_4)_2 \cdot 2H_2O$

Planar type

hoganite $Cu(CH_3COO)_2 \cdot H_2O$
paceite $CaCu(CH_3COO)_4 \cdot 6H_2O$

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