CPC COOPERATIVE PATENT CLASSIFICATION

C01F COMPOUNDS OF THE METALS BERYLLIUM, MAGNESIUM, ALUMINIUM, CALCIUM, STRONTIUM, BARIUM, RADIUM, THORIUM, OR OF THE RARE-EARTH METALS (metal hydrides { monoborane, diborane or addition complexes thereof } C01B 6/00; salts of oxyacids of halogens C01B 11/00; peroxides, salts of peroxyacids C01B 15/00; sulfides or polysulfides of magnesium, calcium, strontium, or barium C01B 17/42; thiosulfates, dithionites, polythionates C01B 17/64; compounds containing selenium or tellurium C01B 19/00; binary compounds of nitrogen with metals C01B 21/06; azides C01B 21/08; { compounds other than ammonia or cyanogen containing nitrogen and non-metals and optionally metals C01B 21/082; amides or imides of silicon C01B 21/087 }; metal { imides or } amides C01B 21/092, { C01B 21/0923 }; nitrites C01B 21/50; { compounds of noble gases C01B 23/0005 }; phosphides C01B 25/08; salts of oxyacids of phosphorus C01B 25/16; carbides C01B 31/30; compounds containing silicon C01B 33/00; compounds containing boron C01B 35/00; compounds having molecular sieve properties but not having base-exchange properties C01B 37/00; compounds having molecular sieve and base-exchange properties, e.g. crystalline zeolites, C01B 39/00;cyanides C01C 3/08; salts of cyanic acid C01C 3/14; salts of cyanamide C01C 3/16; thiocyanates C01C 3/20; { double sulfates of magnesium with sodium or potassium C01D 5/12; with other alkali metals C01D 15/00, C01D 17/00 })

C01F 1/00 **Methods of preparing compounds of the metals beryllium, magnesium, aluminium, calcium, strontium, barium, radium, thorium, or the rare earths, in general**

C01F 3/00 **Compounds of beryllium**

C01F 3/005 . { Fluorides or double fluorides of beryllium with alkali metals or ammonium; Preparation of beryllium compounds therefrom }

C01F 3/02 . Oxides; Hydroxides

C01F 5/00 **Compounds of magnesium**

C01F 5/02 . Magnesia

C01F 5/04 . . by oxidation of metallic magnesium

C01F 5/06 . . by thermal decomposition of magnesium compounds (calcining magnesite or dolomite C04B 2/10)

C01F 5/08 . . . by calcining magnesium hydroxide

C01F 5/10 . . . by thermal decomposition of magnesium chloride with water vapour

C01F 5/12 . . . by thermal decomposition of magnesium sulfate, with or without reduction

C01F 5/14 . Magnesium hydroxide

C01F 5/145 . . { Purification }

C01F 5/16 . . by treating magnesia, e.g. calcined dolomite, with water or solutions of salts not containing magnesium

C01F 5/20 . . by precipitation from solutions of magnesium salts with ammonia

C01F 5/22 . . from magnesium compounds with alkali hydroxides or alkaline- earth oxides or hydroxides

C01F 5/24 . Magnesium carbonates

C01F 5/26 . Magnesium halides

C01F 5/28 . . Fluorides

C01F 5/30 . . Chlorides

C01F 5/305 . . . { Dehydrating ammonium or alkali magnesium chlorides, e.g. carnalite }

C01F 5/32 . . . Preparation of anhydrous magnesium chloride by chlorinating magnesium compounds

C01F 5/34 . . . Dehydrating magnesium chloride containing water of crystallisation

C01F 5/36 . . Bromides

C01F 5/38 . Magnesium nitrates

C01F 5/40 . Magnesium sulfates (double sulfates of magnesium with sodium or potassium C01D 5/12, with other alkali metals { C01D 15/00 }, C01D 17/00)

C01F 5/42 . Magnesium sulfites

C01F 7/00 Compounds of aluminium

C01F 7/001 . { Aluminium carbonate }

C01F 7/002 . { Compounds containing, besides aluminium, two or more other elements, with the exception of oxygen and hydrogen (compounds containing aluminium, fluorine and alkali or alkaline earth metals C01F 7/54; compounds containing sulfur and other cations besides aluminium C01F 7/68) }

C01F 7/004 . . { containing carbonate ions, e.g. dawsonite }

C01F 7/005 . . . { Hydrotalcite }

C01F 7/007 . . { containing, besides aluminium, only anions, e.g. Al(OH)xCLy(SO4)z (mixed halides C01F 7/48) }

C01F 7/008 . . { Ammonium aluminium fluorides }

C01F 7/02 . Aluminium oxide; Aluminium hydroxide; Aluminates

C01F 7/021 . . { After-treatment of oxides or hydroxides }

C01F 7/022 . . . { Classification }

C01F 7/023 . . . { Grinding, deagglomeration, disintegration }

C01F 7/025 . . . { Granulation, agglomeration }

C01F 7/026 . . . { Making or stabilising dispersions }

C01F 7/027 . . . { Treatment involving fusion or vaporisation }

C01F 7/028 . . { Beta-aluminas }

C01F 7/04 . . Preparation of alkali metal aluminates; Aluminium oxide or hydroxide therefrom { (C01F 7/028 takes precedence) }

C01F 7/043 . . . { Lithium aluminate }

C01F 7/046 . . . { Stabilisation of aluminates }

C01F 7/06 . . . by treating aluminous minerals { or waste-like raw materials } with alkali hydroxide, { e.g. leaching of bauxite according to the Bayer process (obtaining aluminium oxide or hydroxide from the resulting aluminate solution C01F 7/14) }

C01F 7/0606 . . . . { Make-up of the alkali hydroxide solution from recycled spent liquor }

C01F 7/0613 . . . . { Pretreatment of the minerals, e.g. grinding }

C01F 7/062 . . . . { Digestion }

C01F 7/0626 . . . . . { Processes making use of tube digestion only }

C01F 7/0633 . . . . . { characterised by the use of additives }

C01F 7/064 . . . . . { Apparatus for digestion, e.g. digestor vessels, heat exchangers }

C01F 7/0646 . . . . { Separation of the insoluble residue, e.g. red mud }

C01F 7/0653 . . . . . { characterised by the flocculant added to the slurry (final clarification of the aluminate solution C01F 7/47) }

C01F 7/066 . . . . { Treatment of the separated residue }

C01F 7/0666 . . . . { Process control or regulation (control per se G05) }

C01F 7/0673 . . . . { from phosphate-containing minerals }

C01F 7/068 . . . . { from carbonate-containing minerals, e.g. dawsonite }

C01F 7/0686 . . . . { from sulfate-containing minerals, e.g. alunite }

C01F 7/0693 . . . . { from waste-like raw materials, e.g. fly ash, Bayer calcination dust }

C01F 7/08 . . . by treating aluminous minerals with sodium carbonate, { e.g. sinter processes (C01F 7/0613 and C01F 7/066 take precedence) }

C01F 7/085 . . . . { according to the lime-sinter process }

C01F 7/10 . . . by treating aluminous minerals with alkali sulfates and reducing agents

C01F 7/12 . . . Alkali metal aluminates from alkaline-earth metal aluminates

C01F 7/14 . . . Aluminium oxide or hydroxide from alkali metal aluminates

C01F 7/141 . . . . { from aqueous aluminate solutions by neutralisation with an acidic agent }

C01F 7/142 . . . . . { with carbon dioxide }

C01F 7/144 . . . . { from aqueous aluminate solutions by precipitation due to cooling, e.g. as part of the Bayer process }

C01F 7/145 . . . . . { characterised by a crystal growth modifying agent other than aluminium hydroxide seed }

C01F 7/147 . . . . . { Apparatus for precipitation }

C01F 7/148 . . . . . { Separation of the obtained hydroxide, e.g. filtration, dewatering }

C01F 7/16 . . Preparation of alkaline-earth metal aluminates { or magnesium aluminate }; Aluminium oxide or hydroxide therefrom { (C01F 7/028 takes precedence) }

C01F 7/162 . . . { Magnesium aluminates }

C01F 7/164 . . . { Calcium aluminates }

C01F 7/166 . . . { Strontium aluminates }

C01F 7/168 . . . { Barium aluminates }

C01F 7/18 . . . Aluminium oxide or hydroxide from alkaline-earth metal aluminates

C01F 7/20 . . Preparation of aluminium oxide or hydroxide from aluminous ores with acids or salts

C01F 7/22 . . . with halides { or halogen acids }

C01F 7/24 . . . with nitric acid or nitrogen oxides

C01F 7/26 . . . with sulfuric acids or sulfates

C01F 7/28 . . . with sulfurous acid

C01F 7/30 . . Preparation of aluminium oxide or hydroxide by thermal decomposition { or by hydrolysis or oxidation } of aluminium compounds

C01F 7/302 . . . { Hydrolysis or oxidation of gaseous aluminium compounds in the gas phase }

C01F 7/304 . . . . { of organic aluminium compounds }

C01F 7/306 . . . { Thermal decomposition of hydrated chlorides, e.g. aluminium trichloride hexahydrate }

C01F 7/308 . . . { Thermal decomposition of nitrates }

C01F 7/32 . . . { Thermal decomposition } of sulfates { including complex sulfates, e.g. alums }

C01F 7/34 . . Preparation of aluminium hydroxide by precipitation from solutions containing aluminium salts

C01F 7/36 . . . from organic aluminium salts

C01F 7/38 . . Preparation of aluminium oxide by thermal reduction of aluminous minerals

C01F 7/40 . . . in the presence of aluminium sulfide

C01F 7/42 . . Preparation of aluminium oxide or hydroxide from metallic aluminium, e.g. by oxidation

C01F 7/422 . . . { by oxidation with a gaseous oxidator at a high temperature }

C01F 7/424 . . . . { using a plasma }

C01F 7/426 . . . { by applying mechanical energy to solid aluminium at a low temperature }

C01F 7/428 . . . { by oxidation in an aqueous solution }

C01F 7/44 . . Dehydration of aluminium { oxide or } hydroxide, { i.e. all conversions of one form into another involving a loss of water }

C01F 7/441 . . . { by calcination }

C01F 7/442 . . . . { in presence of a calcination additive }

C01F 7/444 . . . . { Apparatus therefor }

C01F 7/445 . . . . { making use of a fluidised bed }

C01F 7/447 . . . { by wet processes }

C01F 7/448 . . . . { using superatmospheric pressure, e.g. hydrothermal conversion of gibbsite into boehmite }

C01F 7/46 . . Purification of aluminium oxide, aluminium hydroxide or aluminates { (7/02H takes precedence) }

C01F 7/47 . . . of aluminates, { e.g. removal of compounds of Si, Fe, Ga or of organic compounds from Bayer process liquors }

C01F 7/473 . . . . { Removal of organic compounds, e.g. sodium oxalate }

C01F 7/476 . . . . . { by oxidation }

C01F 7/48 . Aluminium halides

C01F 7/50 . . Fluorides

C01F 7/52 . . . Double compounds containing both fluorine and other acid { halide } groups

C01F 7/54 . . . Double compounds containing both aluminium and alkali metals or alkaline-earth metals

C01F 7/56 . . Chlorides (containing fluorine C01F 7/52)

C01F 7/58 . . . Preparation of anhydrous aluminium chloride

C01F 7/60 . . . . from oxygen-containing aluminium compounds

C01F 7/62 . . . Purification

C01F 7/64 . . Bromides (containing fluorine C01F 7/52)

C01F 7/66 . Aluminium nitrates (containing fluorine { C01F 7/002 })

C01F 7/68 . Aluminium compounds containing sulfur (containing fluorine { C01F 7/002 })

C01F 7/70 . . Sulfides

C01F 7/72 . . Sulfites

C01F 7/74 . . Sulfates

C01F 7/741 . . . { Preparation from elemental aluminium or elemental aluminium containing materials, e.g. foil, dross }

C01F 7/743 . . . { Preparation from silicoaluminious materials, e.g. clays, bauxite }

C01F 7/745 . . . { Preparation from alums, e.g. alunite }

C01F 7/746 . . . { After-treatment, e.g. dehydration, stabilisation }

C01F 7/748 . . . . { Purification }

C01F 7/76 . . . Double salts, { i.e. compounds containing, besides aluminium and sulfate ions, only other cations }, e.g. alums

C01F 7/762 . . . . { Ammonium or alkali metal aluminium sulfates }

C01F 7/765 . . . . . { Ammonium aluminium sulfates }

C01F 7/767 . . . . { Alkaline earth metal aluminium sulfates }

C01F 11/00 **Compounds of calcium, strontium, or barium** (C01F 7/00 takes precedence)

C01F 11/005 . { Preparation involving liquid-liquid extraction, absorption or ion-exchange }

C01F 11/02 . Oxides or hydroxides (production of lime C04B 2/00)

C01F 11/04 . . by thermal decomposition

C01F 11/06 . . . of carbonates

C01F 11/08 . . by reduction of sulfates

C01F 11/10 . . from sulfides

C01F 11/12 . . from silicates

C01F 11/16 . . Purification

C01F 11/18 . Carbonates

C01F 11/181 . . { Preparation of calcium carbonate by carbonation of aqueous solutions and characterised by control of the carbonation conditions }

C01F 11/182 . . { Preparation of calcium carbonate by carbonation of aqueous solutions and characterised by an additive other than CaCO3-seeds }

C01F 11/183 . . . { the additive being an organic compound }

C01F 11/184 . . { Preparation of calcium carbonate by carbonation of solutions based on non-aqueous solvents }

C01F 11/185 . . { After-treatment, e.g. grinding, purification, conversion of crystal morphology }

C01F 11/186 . . { Strontium or barium carbonate }

C01F 11/187 . . . { Strontium carbonate }

C01F 11/188 . . . { Barium carbonate }

C01F 11/20 . Halides
C01F 11/22 . . Fluorides
C01F 11/24 . . Chlorides
C01F 11/26 . . . from sulfides
C01F 11/28 . . . by chlorination of alkaline-earth metal compounds
C01F 11/30 . . . Concentrating; Dehydrating; Preventing the adsorption of moisture or caking
C01F 11/32 . . . Purification
C01F 11/34 . . Bromides

C01F 11/36 . Nitrates
C01F 11/38 . . Preparation with nitric acid or nitrogen oxides
C01F 11/40 . . Preparation by double decomposition with nitrates
C01F 11/42 . . Double salts (with magnesium C01F 5/38)
C01F 11/44 . . Concentrating; Crystallisating; Dehydrating; Preventing the absorption of moisture or caking

C01F 11/46 . Sulfates (dehydration of gypsum { for the production of calcium sulfate cements } C04B 11/02)
C01F 11/462 . . { Sulfates of Sr or Ba }
C01F 11/464 . . { Sulfates of Ca from gases containing sulfur oxides }
C01F 11/466 . . { Conversion of one form of calcium sulfate to another }
C01F 11/468 . . { Purification of calcium sulfates }

C01F 11/48 . Sulfites

C01F 13/00 Compounds of radium

C01F 15/00 Compounds of thorium

C01F 17/00 Compounds of the rare earth metals, i.e. scandium, yttrium, lanthanum, or the group of the lanthanides

NOTE

In this group "rare earth metals" means one single element or a combination of elements taken from the group as specified above

C01F 17/0006 . { Preparation involving a liquid-liquid extraction, an adsorption or an ion exchange }

C01F 17/0012 . { Compounds containing besides rare earth metals two or more other element with the exception of oxygen or hydrogen, e.g. La4S3Br6 or ternary oxides or hydroxides, e.g. NaCeO2 }
C01F 17/0018 . . { Oxygen being the only anion }
C01F 17/0025 . . . { Aluminates }
C01F 17/0031 . . { Halogen being the only anion (compounds containing besides rare earth metals

only different halogens, e.g. Sc C01F 17/0056) }

C01F 17/0037 .. { Sulfur being the only anion }

C01F 17/0043 . { Oxides or hydroxides (ternary oxides or hydroxides, e.g. NaCeO2 C01F 17/0018) }

C01F 17/005 . { Carbonates }

C01F 17/0056 . { Halides }

C01F 17/0062 .. { Fluorides }

C01F 17/0068 .. { Chlorides }

C01F 17/0075 . { Nitrates }

C01F 17/0081 . { Sulfates }

C01F 17/0087 . { Sulfides }

C01F 17/0093 .. { Oxysulfides }