

# 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](#)})

<b>1/00</b>	<b>Methods of preparing compounds of the metals beryllium, magnesium, aluminium, calcium, strontium, barium, radium, thorium, or the rare earths, in general</b>	5/32	. . . Preparation of anhydrous magnesium chloride by chlorinating magnesium compounds
		5/34	. . . Dehydrating magnesium chloride containing water of crystallisation
<b>3/00</b>	<b>Compounds of beryllium</b>	5/36	. . Bromides
3/005	. {Fluorides or double fluorides of beryllium with alkali metals or ammonium; Preparation of beryllium compounds therefrom}	5/38	. Magnesium nitrates
		5/40	. Magnesium sulfates (double sulfates of magnesium with sodium or potassium <a href="#">C01D 5/12</a> , with other alkali metals { <a href="#">C01D 15/00</a> }, <a href="#">C01D 17/00</a> )
3/02	. Oxides; Hydroxides	5/42	. Magnesium sulfites
<b>5/00</b>	<b>Compounds of magnesium</b>	<b>7/00</b>	<b>Compounds of aluminium</b>
5/02	. Magnesia	7/001	. {Aluminium carbonate}
5/04	. . by oxidation of metallic magnesium	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 <a href="#">C01F 7/54</a> ; compounds containing sulfur and other cations besides aluminium <a href="#">C01F 7/68</a> )}
5/06	. . by thermal decomposition of magnesium compounds (calcining magnesite or dolomite <a href="#">C04B 2/10</a> )	7/004	. . {containing carbonate ions, e.g. dawsonite}
5/08	. . . by calcining magnesium hydroxide	7/005	. . . {Hydrotalcite}
5/10	. . . by thermal decomposition of magnesium chloride with water vapour	7/007	. . {containing, besides aluminium, only anions, e.g. Al(OH) <sub>x</sub> CL <sub>y</sub> (SO <sub>4</sub> ) <sub>z</sub> (mixed halides <a href="#">C01F 7/48</a> )}
5/12	. . . by thermal decomposition of magnesium sulfate, with or without reduction	7/008	. . {Ammonium aluminium fluorides}
5/14	. Magnesium hydroxide	7/02	. Aluminium oxide; Aluminium hydroxide; Aluminates
5/145	. . {Purification}	7/021	. . {After-treatment of oxides or hydroxides}
5/16	. . by treating magnesia, e.g. calcined dolomite, with water or solutions of salts not containing magnesium	7/022	. . . {Classification}
5/20	. . by precipitation from solutions of magnesium salts with ammonia	7/023	. . . {Grinding, deagglomeration, disintegration}
5/22	. . from magnesium compounds with alkali hydroxides or alkaline- earth oxides or hydroxides	7/025	. . . {Granulation, agglomeration}
5/24	. Magnesium carbonates	7/026	. . . {Making or stabilising dispersions}
5/26	. Magnesium halides	7/027	. . . {Treatment involving fusion or vaporisation}
5/28	. . Fluorides	7/028	. . {Beta-aluminas}
5/30	. . Chlorides	7/04	. . Preparation of alkali metal aluminates; Aluminium oxide or hydroxide therefrom ({ <a href="#">C01F 7/028</a> takes precedence})
5/305	. . . {Dehydrating ammonium or alkali magnesium chlorides, e.g. carnalite}	7/043	. . . {Lithium aluminate}

- 7/046 . . . {Stabilisation of aluminates}
- 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)}
- 7/0606 . . . . {Make-up of the alkali hydroxide solution from recycled spent liquor}
- 7/0613 . . . . {Pretreatment of the minerals, e.g. grinding}
- 7/062 . . . . {Digestion}
- 7/0626 . . . . . {Processes making use of tube digestion only}
- 7/0633 . . . . . {characterised by the use of additives}
- 7/064 . . . . . {Apparatus for digestion, e.g. digester vessels, heat exchangers}
- 7/0646 . . . . . {Separation of the insoluble residue, e.g. red mud}
- 7/0653 . . . . . {characterised by the flocculant added to the slurry (final clarification of the aluminate solution C01F 7/47)}
- 7/066 . . . . . {Treatment of the separated residue}
- 7/0666 . . . . . {Process control or regulation (control per se G05)}
- 7/0673 . . . . . {from phosphate-containing minerals}
- 7/068 . . . . . {from carbonate-containing minerals, e.g. dawsonite}
- 7/0686 . . . . . {from sulfate-containing minerals, e.g. alunite}
- 7/0693 . . . . . {from waste-like raw materials, e.g. fly ash, Bayer calcination dust}
- 7/08 . . . by treating aluminous minerals with sodium carbonate, {e.g. sinter processes (C01F 7/0613 and C01F 7/066 take precedence)}
- 7/085 . . . . . {according to the lime-sinter process}
- 7/10 . . . by treating aluminous minerals with alkali sulfates and reducing agents
- 7/12 . . . Alkali metal aluminates from alkaline-earth metal aluminates
- 7/14 . . . Aluminium oxide or hydroxide from alkali metal aluminates
- 7/141 . . . . . {from aqueous aluminate solutions by neutralisation with an acidic agent}
- 7/142 . . . . . {with carbon dioxide}
- 7/144 . . . . . {from aqueous aluminate solutions by precipitation due to cooling, e.g. as part of the Bayer process}
- 7/145 . . . . . {characterised by a crystal growth modifying agent other than aluminium hydroxide seed}
- 7/147 . . . . . {Apparatus for precipitation}
- 7/148 . . . . . {Separation of the obtained hydroxide, e.g. filtration, dewatering}
- 7/16 . . Preparation of alkaline-earth metal aluminates {or magnesium aluminate}; Aluminium oxide or hydroxide therefrom {(C01F 7/028 takes precedence)}
- 7/162 . . . {Magnesium aluminates}
- 7/164 . . . {Calcium aluminates}
- 7/166 . . . {Strontium aluminates}
- 7/168 . . . {Barium aluminates}
- 7/18 . . . Aluminium oxide or hydroxide from alkaline-earth metal aluminates
- 7/20 . . Preparation of aluminium oxide or hydroxide from aluminous ores with acids or salts
- 7/22 . . . with halides {or halogen acids}
- 7/24 . . . with nitric acid or nitrogen oxides
- 7/26 . . . with sulfuric acids or sulfates
- 7/28 . . . with sulfurous acid
- 7/30 . . Preparation of aluminium oxide or hydroxide by thermal decomposition {or by hydrolysis or oxidation} of aluminium compounds
- 7/302 . . . {Hydrolysis or oxidation of gaseous aluminium compounds in the gas phase}
- 7/304 . . . . {of organic aluminium compounds}
- 7/306 . . . {Thermal decomposition of hydrated chlorides, e.g. aluminium trichloride hexahydrate}
- 7/308 . . . {Thermal decomposition of nitrates}
- 7/32 . . . {Thermal decomposition} of sulfates {including complex sulfates, e.g. alums}
- 7/34 . . Preparation of aluminium hydroxide by precipitation from solutions containing aluminium salts
- 7/36 . . . from organic aluminium salts
- 7/38 . . Preparation of aluminium oxide by thermal reduction of aluminous minerals
- 7/40 . . . in the presence of aluminium sulfide
- 7/42 . . Preparation of aluminium oxide or hydroxide from metallic aluminium, e.g. by oxidation
- 7/422 . . . {by oxidation with a gaseous oxidator at a high temperature}
- 7/424 . . . . {using a plasma}
- 7/426 . . . {by applying mechanical energy to solid aluminium at a low temperature}
- 7/428 . . . {by oxidation in an aqueous solution}
- 7/44 . . Dehydration of aluminium {oxide or} hydroxide, {i.e. all conversions of one form into another involving a loss of water}
- 7/441 . . . {by calcination}
- 7/442 . . . . {in presence of a calcination additive}
- 7/444 . . . . {Apparatus therefor}
- 7/445 . . . . {making use of a fluidised bed}
- 7/447 . . . {by wet processes}
- 7/448 . . . . {using superatmospheric pressure, e.g. hydrothermal conversion of gibbsite into boehmite}
- 7/46 . . Purification of aluminium oxide, aluminium hydroxide or aluminates {(C01F 7/028 takes precedence)}
- 7/47 . . . of aluminates, {e.g. removal of compounds of Si, Fe, Ga or of organic compounds from Bayer process liquors}
- 7/473 . . . . {Removal of organic compounds, e.g. sodium oxalate}
- 7/476 . . . . . {by oxidation}
- 7/48 . . Aluminium halides
- 7/50 . . Fluorides
- 7/52 . . . Double compounds containing both fluorine and other acid {halide} groups
- 7/54 . . . Double compounds containing both aluminium and alkali metals or alkaline-earth metals
- 7/56 . . Chlorides (containing fluorine C01F 7/52)
- 7/58 . . . Preparation of anhydrous aluminium chloride
- 7/60 . . . . from oxygen-containing aluminium compounds
- 7/62 . . . Purification

- 7/64 . . Bromides ([containing fluorine C01F 7/52](#))
- 7/66 . Aluminium nitrates ([containing fluorine {C01F 7/002}](#))
- 7/68 . Aluminium compounds containing sulfur ([containing fluorine {C01F 7/002}](#))
- 7/70 . . Sulfides
- 7/72 . . Sulfites
- 7/74 . . Sulfates
- 7/741 . . . {Preparation from elemental aluminium or elemental aluminium containing materials, e.g. foil, dross}
- 7/743 . . . {Preparation from silicoaluminous materials, e.g. clays, bauxite}
- 7/745 . . . {Preparation from alums, e.g. alunite}
- 7/746 . . . {After-treatment, e.g. dehydration, stabilisation}
- 7/748 . . . . {Purification}
- 7/76 . . . Double salts, {i.e. compounds containing, besides aluminium and sulfate ions, only other cations}, e.g. alums
- 7/762 . . . . {Ammonium or alkali metal aluminium sulfates}
- 7/765 . . . . . {Ammonium aluminium sulfates}
- 7/767 . . . . {Alkaline earth metal aluminium sulfates}
- 11/00 Compounds of calcium, strontium, or barium**  
([C01F 7/00](#) takes precedence)
- 11/005 . {Preparation involving liquid-liquid extraction, absorption or ion-exchange}
- 11/02 . Oxides or hydroxides ([production of lime C04B 2/00](#))
- 11/04 . . by thermal decomposition
- 11/06 . . . of carbonates
- 11/08 . . by reduction of sulfates
- 11/10 . . from sulfides
- 11/12 . . from silicates
- 11/16 . . Purification
- 11/18 . Carbonates
- 11/181 . . {Preparation of calcium carbonate by carbonation of aqueous solutions and characterised by control of the carbonation conditions}
- 11/182 . . {Preparation of calcium carbonate by carbonation of aqueous solutions and characterised by an additive other than CaCO<sub>3</sub>-seeds}
- 11/183 . . . {the additive being an organic compound}
- 11/184 . . {Preparation of calcium carbonate by carbonation of solutions based on non-aqueous solvents}
- 11/185 . . {After-treatment, e.g. grinding, purification, conversion of crystal morphology}
- 11/186 . . {Strontium or barium carbonate}
- 11/187 . . . {Strontium carbonate}
- 11/188 . . . {Barium carbonate}
- 11/20 . Halides
- 11/22 . . Fluorides
- 11/24 . . Chlorides
- 11/26 . . . from sulfides
- 11/28 . . . by chlorination of alkaline-earth metal compounds
- 11/30 . . . Concentrating; Dehydrating; Preventing the adsorption of moisture or caking
- 11/32 . . . Purification
- 11/34 . . Bromides
- 11/36 . Nitrates
- 11/38 . . Preparation with nitric acid or nitrogen oxides
- 11/40 . . Preparation by double decomposition with nitrates
- 11/42 . . Double salts ([with magnesium C01F 5/38](#))
- 11/44 . . Concentrating; Crystallising; Dehydrating; Preventing the absorption of moisture or caking
- 11/46 . Sulfates ([dehydration of gypsum {for the production of calcium sulfate cements} C04B 11/02](#))
- 11/462 . . {Sulfates of Sr or Ba}
- 11/464 . . {Sulfates of Ca from gases containing sulfur oxides}
- 11/466 . . {Conversion of one form of calcium sulfate to another}
- 11/468 . . {Purification of calcium sulfates}
- 11/48 . Sulfites
- 13/00 Compounds of radium**
- 15/00 Compounds of thorium**
- 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
- 17/0006 . {Preparation involving a liquid-liquid extraction, an adsorption or an ion exchange}
- 17/0012 . {Compounds containing, besides rare earth metals, two or more other elements with the exception of oxygen or hydrogen, e.g. La<sub>4</sub>S<sub>3</sub>Br<sub>6</sub>, or ternary oxides or hydroxides, e.g. NaCeO<sub>2</sub>}
- 17/0018 . . {Oxygen being the only anion}
- 17/0025 . . . {Aluminates}
- 17/0031 . . {Halogen being the only anion ([compounds containing besides rare earth metals only different halogens, e.g. ScCl<sub>2</sub>F C01F 17/0056](#))}
- 17/0037 . . {Sulfur being the only anion}
- 17/0043 . {Oxides or hydroxides ([ternary oxides or hydroxides, e.g. NaCeO<sub>2</sub> C01F 17/0018](#))}
- 17/005 . {Carbonates}
- 17/0056 . {Halides}
- 17/0062 . . {Fluorides}
- 17/0068 . . {Chlorides}
- 17/0075 . {Nitrates}
- 17/0081 . {Sulfates}
- 17/0087 . {Sulfides}
- 17/0093 . . {Oxysulfides}