CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY
(NOTES omitted)

CHEMISTRY

C01 INORGANIC CHEMISTRY (processing powders of inorganic compounds preparatory to the manufacturing of ceramic products C04B 35/00; fermentation or enzyme-using processes for the preparation of elements or inorganic compounds except carbon dioxide C12P 3/00; obtaining metal compounds from mixtures, e.g. ores, which are intermediate compounds in a metallurgical process for obtaining a free metal C21B, C22B; production of non-metallic elements or inorganic compounds by electrolysis or electrophoresis C25B)
(NOTES omitted)

C01B NON-METALLIC ELEMENTS; COMPOUNDS THEREOF; {METALLOIDS OR COMPOUNDS THEREOF NOT COVERED BY SUBCLASS C01C}

NOTES
1. In this subclass, tradenames that are often found in scientific and patent literature have been used in order to define precisely the scope of the groups.
2. Attention is drawn to the definitions of groups of chemical elements following the title of section C.

WARNINGS
1. The following IPC groups are not used in the CPC system. Subject matter covered by these groups is classified in the following CPC groups:
   
   C01B31/16 covered by B01J 39/24, B01J 41/18
   C01B 35/16, C01B 35/18 covered by C01B 35/00 + s.gr.

2. General concordance IPC4 or IPC5 to IPC6 groups is as follows:
   
   C01B 25/37 (partly) : C01B 37/002
   C01B 25/453 : C01B 37/00, C01B 39/54
   C01B 33/185 : C01B 37/02
   C01B 33/28 and subgroups : C01B 37/00, C01B 39/00
   C01B 35/1009 : C01B 37/06, C01B 39/12, C01B 39/54

Hydrogen; Hydrides; Water; Synthesis gas from hydrocarbons

3/00 Hydrogen; Gaseous mixtures containing hydrogen; Separation of hydrogen from mixtures containing it (separation of gases by physical means B01D);
Purification of hydrogen (production of water gas or synthesis gas from solid carbonaceous material C10J; purifying or modifying the chemical compositions of combustible technical gases containing carbon monoxide C10K)

NOTES
1. In this group it is desirable to add the indexing codes of groups B01J 2208/00 and B01J 2219/00, for details relating to the reactors used in the generation of hydrogen or synthesis gas.
2. In groups C01B 3/12 - C01B 3/18 and in groups C01B 3/22 - C01B 3/586 it is desirable to add the indexing codes of group C01B 2203/00, for aspects relating to hydrogen or synthesis gas generation processes.

3/0005 . [Reversible uptake of hydrogen by an appropriate medium, i.e. based on physical or chemical sorption phenomena or on reversible chemical reactions, e.g. for hydrogen storage purposes (purification of hydrogen C01B 3/508); Reversible getters of hydrogen; Reversible uptake of hydrogen by electrodes]

3/0001 . . [characterised by the uptaking medium; Treatment thereof]
3/0015 . . . [Organic compounds; Solutions thereof]
3/0021 . . . [Carbon, e.g. active carbon, carbon nanotubes, fullerenes; Treatment thereof]
3/0026 . . . [of one single metal or a rare earth metal; Treatment thereof]

NOTES
1. In all of the groups C01B 3/0026 - C01B 3/0084, the metallic storage materials may contain minor quantities of non-metals such as B, C, O, S, Se, Si; e.g. C01B 3/0036 "only containing iron and titanium" includes Fe-Ti compositions comprising non-metals
Hydrogen; Hydrides; Water; Synthesis gas from hydrocarbons

C01B 3/0026

2. In the groups C01B 3/0026 and C01B 3/0047 - C01B 3/0068 a “rare-earth metal” means one single metal or a combination of metals selected from the lanthanides, Sc or Y.

3/031 . . . [Intemetall) compounds; Metal alloys; Treatment thereof]
3/036 . . . . . (only containing iron and titanium; Treatment thereof]
3/042 . . . . . (only containing magnesium and nickel; Treatment thereof]
3/047 . . . . . (containing a rare earth metal; Treatment thereof]
3/052 . . . . . (also containing titanium]
3/057 . . . . . (also containing nickel]
3/063 . . . . . (only containing a rare earth metal and only one other metal]
3/068 . . . . . (the other metal being nickel]
3/073 . . . . . (Slurries, Suspensions)
3/078 . . . . . (Composite solid storage mediums, i.e. coherent or loose mixtures of different solid constituents, chemically or structurally heterogeneous solid masses, coated solids or solids having a chemically modified surface region]
3/084 . . . . . (Solid storage mediums characterised by their shape, e.g. pellets, sintered shaped bodies, sheets, porous compacts, spongy metals, hollow particles, solids with cavities, layered solids]
3/089 . . . . . (Ortho-para conversion]
3/094 . . . . . . (Atomic hydrogen]
3/02 . . . Production of hydrogen or of gaseous mixtures containing a [substantial proportion of] hydrogen]
3/025 . . . (Preparation or purification of gas mixtures for ammonia synthesis]
3/04 . . . by decomposition of inorganic compounds, e.g. ammonia [(C01B 3/0005 takes precedence)]
3/042 . . . . . (Decomposition of water]
3/045 . . . . . [in gaseous phase]
3/047 . . . . . (Decomposition of ammonia]
3/06 . . . by reaction of inorganic compounds containing electro-positively bound hydrogen, e.g. water, acids, bases, ammonia, with inorganic reducing agents (by electrolysis of water C25B 1/04]
3/061 . . . [by reaction of metal oxides with water]
3/063 . . . . . (Cyclic methods]
3/065 . . . . . . {from a hydride]
3/066 . . . [by reaction of water with phosphorus]
3/068 . . . . . [the hydrogen being generated from the water as a result of a cyclus of reactions, not covered by groups C01B 3/063 or C01B 3/105]
3/08 . . . with metals
3/10 . . . by reaction of water vapour with metals
3/105 . . . . . (Cyclic methods]
3/12 . . . by reaction of water vapour with carbon monoxide
3/14 . . . . . (Handling of heat and steam]
3/16 . . . . . using catalysts
3/18 . . . . . using moving solid particles
3/20 . . . by reaction of metal hydroxides with carbon monoxide
3/22 . . . by decomposition of gaseous or liquid organic compounds [(C01B 3/0005 takes precedence] ; coking liquid carbonaceous materials C10B 55/00]
3/24 . . . . of hydrocarbons
3/26 . . . . using catalysts
3/28 . . . . using moving solid particles
3/30 . . . . using the fluidised bed technique
3/32 . . . . by reaction of gaseous or liquid organic compounds with gasifying agents, e.g. water, carbon dioxide, air
3/323 . . . . . (Catalytic reaction of gaseous or liquid organic compounds other than hydrocarbons with gasifying agents]
3/326 . . . . [characterised by the catalyst]
3/34 . . . . by reaction of hydrocarbons with gasifying agents
3/342 . . . . . (with the aid of electrical means, electromagnetic or mechanical vibrations, or particle radiations]
3/344 . . . . . [using non-catalytic solid particles]
3/346 . . . . . [using heat generated by superheated steam]
3/348 . . . . . . (by direct contact with heat accumulating liquids, e.g. molten metals, molten salts]
3/36 . . . . . . using oxygen or mixtures containing oxygen as gasifying agents
3/363 . . . . . [characterised by the burner used]
3/366 . . . . . . (Partial combustion in internal-combustion engines]
3/38 . . . . using catalysts
3/382 . . . . . (Multi-step processes]
3/384 . . . . . . (the catalyst being continuously externally heated]
3/386 . . . . . . (Catalytic partial combustion]
3/388 . . . . . . . (the heat being generated by superheated steam]
3/40 . . . . characterised by the catalyst
3/42 . . . . . using moving solid particles
3/44 . . . . . using the fluidised bed technique
3/46 . . . . using discontinuously preheated non-moving solid materials, e.g. blast and run
3/48 . . . . . followed by reaction of water vapour with carbon monoxide
3/50 . . . Separation of hydrogen or hydrogen containing gases from gaseous mixtures, e.g. purification (C01B 3/14 takes precedence]
3/501 . . . . . (by diffusion]
3/503 . . . . [characterised by the membrane]
3/505 . . . . . (Membranes containing palladium]
3/506 . . . . [at low temperatures]
3/508 . . . . . [by selective and reversible uptake by an appropriate medium, i.e. the uptake being based on physical or chemical sorption phenomena or on reversible chemical reactions (the appropriate mediums per se C01B 3/0005)]
3/52 . . . . by contacting with liquids; Regeneration of used liquids [(C01B 3/508 takes precedence)]
3/54 . . . . . including a catalytic reaction
3/56 . . . . . by contacting with solids; Regeneration of used solids [(C01B 3/508 takes precedence)]
3/58 . . . . . including a catalytic reaction
3/583 . . . . . (the reaction being the selective oxidation of carbon monoxide]
Hydrogen; Hydrides; Water; Synthesis gas from hydrocarbons

6/00

Hydrogen isotopes; Inorganic compounds thereof prepared by isotope exchange, e.g. \( \text{NH}_3 + \text{D}_2 \rightarrow \text{NH}_4\text{D}_+ + \text{HD} \) (separation of isotopes C01D 59/00; other chemical reactions to form compounds of hydrogen isotopes, see the relevant groups for hydrogen compounds in class C01)

Compounds containing at least one metal-hydrogen bond, e.g. \((\text{GeH}_3)_2\text{S}, \text{SiH}_2\text{GeH}_2\); Monoborane or diborane; Addition complexes thereof (higher hydrides of boron, substituted hydrides of boron C01B 35/00)

6/00

Hydrides of metals (including fully or partially hydrided metals, alloys or intermetallic compounds (use of some thereof for reversible sorption of hydrogen C01B 3/0005, C01B 3/508); Compounds containing at least one metal-hydrogen bond, e.g. \((\text{GeH}_3)_2\text{S}, \text{SiH}_2\text{GeH}_2\);

Monoborane or diborane; Addition complexes thereof (higher hydrides of boron, substituted hydrides of boron C01B 35/00)

6/003

[Hydrides containing only one metal and one several non-metals]

6/006

[only one metal and one or several halogens]

6/02

Hydrides of transition elements: Addition complexes thereof

6/04

Hydrides of alkali metals, alkaline earth metals, beryllium or magnesium; Addition complexes thereof

6/06

Hydrides of aluminium, gallium, indium, thallium, germanium, tin, lead, arsenic, antimony, bismuth or polonium; Monoborane; Diborane; Addition complexes thereof

6/065

[Hydrides of arsenic or antimony]

6/10

Monoborane; Diborane; Addition complexes thereof

6/11

Preparation from boron or inorganic compounds containing boron and oxygen

6/13

Addition complexes of monoborane or diborane, e.g. with phosphine, arsine or hydrazine

6/15

Metal borohydrides; Addition complexes thereof

6/17

Preparation from boron or inorganic compounds containing boron and oxygen

6/19

Preparation from other compounds of boron

6/21

Preparation of borohydrides of alkali metals, alkaline earth metals, magnesium or beryllium; Addition complexes thereof, e.g. \( \text{LiBH}_4, \text{NaH}_2\text{BO}_2, \text{NaBH}_4 \)

6/23

Preparation of borohydrides of other metals, e.g. aluminium borohydride; Addition complexes thereof, e.g. \( \text{Li}[[\text{Al BH}_4]{\text{H}}] \)

6/24

Hydrides containing at least two metals; Addition complexes thereof (C01B 6/13 - C01B 6/23 take precedence)

6/243

[containing only hydrogen, aluminium and alkali metals, e.g. Li(AH)_4]

6/246

[also containing non-metals other than hydrogen]

6/26

Preparation from the metal with the highest valency or from its oxides or salts of its oxyacids

6/34

Purification; Stabilisation

Halogens, compounds thereof

7/00

Halogen acids (oxyacids C01B 11/00)

7/01

Chlorine; Hydrogen chloride

7/012

(Preparation of hydrogen chloride from the elements)

7/015

(Chlorine hydrates; Obtaining chlorine therefrom)

7/017

(Preparation of hydrogen chloride by reacting together chlorine, water and carbon or carbon monoxide (the carbon not acting only as catalyst))

7/03

Preparation from chlorides

7/035

(Preparation of hydrogen chloride from chlorides)

7/04

Preparation of chlorine from hydrogen chloride

7/05

Preparation from ammonium chloride

7/055

(Preparation of hydrogen chloride from ammonium chloride)

7/07

Purification; Separation (C01B 7/015 takes precedence)

7/0706

[of hydrogen chloride]

7/0712

(by distillation)

7/0718

(by adsorption)

7/0725

(by active carbon)

7/0731

(by extraction)

7/0737

(hydrogen chloride being extracted)

7/0743

[of gaseous or dissolved chlorine]

7/075

(of liquid chlorine)

7/09

Bromine; Hydrogen bromide

7/093

(Hydrogen bromide)

7/096

(Bromine)

7/13

Iodine; Hydrogen iodide

7/135

(Hydrogen iodide)

7/14

Iodine

7/16

Preparation from seaweed

7/19

Fluorine; Hydrogen fluoride

7/191

(Hydrogen fluoride)

7/192

(Preparation from fluor spar)

7/193

(Preparation from silicon tetrafluoride, fluosilicic acid or fluosilicates)

7/194

(Preparation from ammonium fluoride)

7/195

(Separation; Purification)

7/196

(by distillation)

7/197

(by adsorption)

7/198

(by solid ion-exchangers)

7/20

Fluorine

7/24

Inter-halogen compounds

9/00

General methods of preparing halides (particular individual halides, see the relevant groups in C01B - C01G according to the element combined with the halogen; electrolytic production of inorganic compounds C25B)

9/02

Chlorides

9/04

Bromides

9/06

Iodides

9/08

Fluorides

11/00

Oxides or oxyacids of halogens; Salts thereof
Halogens, compounds thereof  
C01B

11/02 . Oxides of chlorine 
11/021 . [Chlorine hemioxide (Cl₂O)] 
11/022 . [Chlorine dioxide (ClO₂)] 
11/023 . {Preparation from chlorites or chlorates} 
11/024 . . . [from chlorites] 
11/025 . . . [from chlorates without any other reaction reducing agent than chloride ions] 
11/026 . . . [from chloride ions in the presence of a peroxodic compound, e.g. hydrogen peroxide, ozone, peroxy sulfates] 
11/027 . . . [from chloride ions in the presence of a nitrogen compound selected from nitrogen dioxide, nitrate or nitrite ions, nitrosyl chloride, hydrazine or hydrazine compounds] 
11/028 . . . [Separation; Purification] 
11/029 . . [Chlorine trioxide (ClO₃); Chlorine hexoxide (Cl₆O₃); Chlorine heptoxide (Cl₇O₇)] 
11/04 . Hypochlorous acid 
11/06 . . Hypochlorites 
11/062 . . . [Hypochlorites of alkali metals] 
11/064 . . . [Hypochlorites of alkaline-earth metals] 
11/066 . . . [Magnesium hypochlorite] 
11/068 . . . [Stabilisation by additives other than oxides, hydrides, carbonates of alkali or alkaline-earth metals; Coating of particles; Shaping; Granulation] 
11/08 . . Chlorous acid 
11/10 . . Chlorites 
11/12 . . Chloric acid 
11/14 . . Chlorates 
11/145 . . . [Separation; Crystallisation; Purification, After-treatment; Stabilisation by additives] 
11/16 . . Perchloric acid 
11/18 . . Perchlorates 
11/185 . . . [Ammonium perchlorate] 
11/20 . Oxygen compounds of bromine 
11/22 . Oxygen compounds of iodine 
11/24 . Oxygen compounds of fluorine

**Oxygen; Oxides or hydroxides in general; Per-compounds** 

13/00 Oxygen; Ozone; Oxides or hydroxides in general 
13/02 . Preparation of oxygen (by liquefying F₂5J) 
13/0203 . . . [from inorganic compounds] 
13/0207 . . . [Water] 
13/0211 . . . [ Peroxy compounds] 
13/0214 . . . . [Hydrogen peroxide] 
13/0218 . . . . Chlorate 
13/0222 . . . . [from organic compounds] 
13/0225 . . . . Peroxy compounds 
13/0229 . . . . [Purification or separation processes] 

**NOTE** 
In groups C01B 13/11 and C01B 13/115, additional features relating to the preparation of ozone by electrical discharge are indexed with codes chosen from C01B 2201/00 - C01B 2201/90.

13/10 . Preparation of ozone 
13/11 . . by electric discharge 

**NOTE** 
In group C01B 13/14, Methods for preparing oxides or hydroxides in general, preparation of ozone by electrical discharge is indexed with codes chosen from C01B 2201/00 - C01B 2201/90.

13/14 . Methods for preparing oxides or hydroxides in general (particular individual oxides or hydroxides, see the relevant groups of subclasses C01B - C01G or C25B, according to the element combined with the oxygen or hydroxy group) 
13/145 . . . [After-treatment of oxides or hydroxides, e.g. pulverising, drying, decreasing the acidity] 
13/16 . . Purification 
13/18 . . by thermal decomposition of compounds, e.g. of salts or hydroxides 
13/185 . . . [Preparing mixtures of oxides] 
13/20 . . by oxidation of elements in the gaseous state; by oxidation or hydrolysis of compounds in the gaseous state 
13/22 . . . of halides or oxyhalides 
13/24 . . . . in the presence of hot combustion gases 
13/26 . . . . in the presence of a fluidised bed 
13/28 . . . . using a plasma or an electric discharge 
13/30 . . . . Removal and cooling of the oxide-containing suspension
... by oxidation or hydrolysis of elements or compounds in the liquid or solid state (or in non-aqueous solution, e.g. sol-gel process)

[15/32]... [Stabilisation of the solid compounds, subsequent to the preparation or to the crystallisation, by additives or by coating]

[15/102]... [Separation of sulfur from liquids, e.g. by coalescence]

[15/021]... [Separation of sulfur from gases]

[15/0216]... [Solidification or cooling of liquid sulfur]

[15/0221]... [Melting]

[15/0226]... [Vaporising or superheating]

[15/0232]... [Purification, e.g. degassing]

[15/0237]... [Converting into particles, e.g. by granulation, milling]

[15/0243]... [Other after-treatment of sulfur]

[15/0248]... [of particulate sulfur]

[15/0253]... [from non-gaseous sulfur compounds other than sulfides or materials containing such sulfides]

[15/0259]... [by reduction of sulfates]

[15/0264]... [of calcium sulfates]

[15/027]... [Recovery of sulfur from material containing elemental sulfur, e.g. luxmasses or sulfur containing ores]; Purification [of the recovered sulfur]

[15/033]... [using a liquid extractant]

[15/04]... [from gaseous sulfur compounds including gaseous sulfides]

[15/0404]... [by processes comprising a dry catalytic conversion of hydrogen sulfide-containing gases, e.g. the Claus process]

[15/0408]... [Pretreatment of the hydrogen sulfide-containing gases]

[15/0413]... [characterised by the combustion step]

[15/0417]... [Combustion reactors]

[15/0421]... [Multistage combustion]

[15/0426]... [characterised by the catalytic conversion]

[15/043]... [Catalytic converters]

[15/0434]... [Catalyst compositions]

[15/0439]... [at least one catalyst bed operating below the dew-point of sulfur]

[15/0443]... [in a moving bed]

[15/0447]... [Separation of the obtained sulfur]

[15/0452]... [Process control; Start-up or cooling-down procedures of the Claus process]

[15/0456]... [the hydrogen sulfide-containing gas being a Claus process tail gas]

[15/046]... [without intermediate formation of sulfur dioxide]

[15/0465]... [Catalyst compositions]

[15/0469]... [at least one catalyst bed operating below the dew-point of sulfur]

[15/0473]... [by reaction of sulfur dioxide or sulfur trioxide containing gases with reducing agents other than hydrogen sulfide]

[15/0478]... [with hydrocarbons or mixtures containing them]

[15/0482]... [with carbon or solid carbonaceous materials]
Oxygen; Oxides or hydroxides in general; Per-compounds

17/0486 . . . . [with carbon monoxide or carbon monoxide containing mixtures]
17/0491 . . . . [with hydrogen or hydrogen-containing mixtures, e.g. synthesis gas]
17/0495 . . . . [by dissociation of hydrogen sulfide into the elements]
17/05 . . . . by wet processes
17/06 . . . . from non-gaseous sulfides or materials containing such sulfides, e.g. ores
17/10 . . . . Finely divided sulfur, e.g. sublimed sulfur, flowers of sulfur
17/12 . . . . Insoluble sulfur (mu-sulfur)
17/125 . . . . [Sulfur isotopes other than 32S]
17/16 . Hydrogen sulfides
17/161 . . . . [Preparation from elemental sulfur]
17/162 . . . . [from elemental sulfur and hydrogen]
17/164 . . . . [Preparation by reduction of oxidic sulfur compounds]
17/165 . . . . [Preparation from sulfides, oxysulfides or polysulfides]
17/167 . . . . [Separation]
17/168 . . . . [Purification]
17/18 . Hydrogen polysulfides
17/20 . Methods for preparing sulfides or polysulfides, in general (ammonium sulfides or polysulfides C01C; sulfides or polysulfides of metals, other than alkali metals, magnesium, calcium, strontium and barium, see the relevant groups of subclasses C01F or C01G, according to the metal)
17/22 . . . . Alkali metal sulfides or polysulfides
17/24 . . . . Preparation by reduction
17/26 . . . . with carbon
17/28 . . . . with reducing gases
17/30 . . . . Preparation from sodium or potassium amalgam with sulfur or sulfides
17/32 . . . . Hydrosulfides of sodium or potassium
17/34 . . . . Polysulfides of sodium or potassium
17/36 . . . . Purification
17/38 . . . . Dehydration
17/40 . . . . Making shaped products, e.g. granules
17/42 . . . . Sulfides or polysulfides of magnesium, calcium, strontium, or barium
17/43 . . . . from oxides or hydroxides with sulfur or hydrogen sulfide
17/44 . . . . by reduction of sulfates
17/45 . . . . Compounds containing sulfur and halogen, with or without oxygen
17/4507 . . . . [containing sulfur and halogen only]
17/4515 . . . . [containing sulfur and fluorine only]
17/4523 . . . . [Sulfur tetrafluoride]
17/453 . . . . [Sulfur hexafluoride]
17/4538 . . . . [containing sulfur and chlorine only]
17/4546 . . . . [Sulfur dichloride]
17/4553 . . . . [Sulfur hexachloride]
17/4561 . . . . [Compounds containing sulfur, halogen and oxygen only]
17/4569 . . . . [Thionyl fluoride (SOF₂)]
17/4576 . . . . [Sulfonyl fluoride (SO₂F₂)]
17/4584 . . . . [Thionyl chloride (SOCl₂)]
17/4592 . . . . [Sulfonyl chloride (SO₂Cl₂)]
17/46 . . . . Compounds containing sulfur, halogen, hydrogen, and oxygen
17/463 . . . . [Fluorosulfonic acid (FSO₃H)]
17/466 . . . . [Chlorosulfonic acid (CISO₃H)]
17/48 . . . . Sulfur dioxide; Sulphurous acid
17/50 . . . . Preparation of sulfur dioxide
17/501 . . . . [by reduction of sulfur compounds]
17/502 . . . . [of sulfur trioxide]
17/503 . . . . [of sulfuric acid]
17/504 . . . . [of ammonium sulfates (of ammonium sulfates containing sulfuric acid solutions C01B 17/585)]
17/505 . . . . [of alkali metal sulfates]
17/506 . . . . [of calcium sulfates]
17/507 . . . . [of iron sulfates]
17/508 . . . . [by oxidation of sulfur compounds]
17/52 . . . . by roasting sulfides (C22B 1/00 takes precedence)
17/54 . . . . by burning elemental sulfur
17/56 . . . . Separation; Purification
17/58 . . . . Recovery of sulfur dioxide from acid tar or the like [or from any waste sulfuric acid]
17/585 . . . . [from ammonium sulfate containing sulfuric acid solutions]
17/60 . . . . Isolation of sulfur dioxide from gases
17/62 . . . . Methods of preparing sulfites in general (particular individual sulfites, see the relevant groups of subclasses C01B - C01G, according to the cation)
17/625 . . . . (metabisulfites or pyrosulfites)
17/64 . . . . Thiosulfates; Dithionites; Polythionates
17/66 . . . . Dithionites [or hydrosulfites (S₂O₃²⁻)]
17/665 . . . . [Stabilisation by additives subsequent to preparation; Dust prevention by additives]
17/69 . . . . Sulfur trioxide; Sulfuric acid
17/70 . . . . Stabilisation of gamma-form sulfur trioxide
17/74 . . . . Preparation
17/745 . . . . [from sulfates]
17/76 . . . . by contact processes
17/762 . . . . [High pressure processes]
17/765 . . . . Multi-stage SO₂-conversion
17/7655 . . . . [with intermediate absorption]
17/77 . . . . Fluidised-bed processes
17/775 . . . . Liquid phase contacting processes or wet catalysis processes
17/78 . . . . characterised by the catalyst used
17/79 . . . . containing vanadium
17/80 . . . . Apparatus
17/803 . . . . [Converters]
17/806 . . . . [Absorbers; Heat exchangers]
17/82 . . . . of sulfuric acid using a nitrogen oxide process
17/84 . . . . Chamber process
17/86 . . . . Tower process
17/88 . . . . Concentration of sulfuric acid
17/90 . . . . Separation; Purification
17/901 . . . . [Recovery from spent acids containing metallic ions, e.g. hydrolysis acids, pickling acids (obtaining sulfur dioxide as an intermediate in sulfur trioxide recovery from sulfates, e.g. iron sulfates C01B 17/501, from spent acids C01B 17/58)]
17/902 . . . . [by dialysis]
17/903 . . . . [by liquid-liquid extraction]
17/904 . . . . [by ion-exchange]
17/905 . . . . [Removal of organic impurities]
17/906 . . . [Removal of mercury]
17/907 . . . . [Removal of arsenic]
17/908 . . . . [Removal of antimony or bismuth]
17/92 . . . . Recovery from acid tar or the like, e.g. alkylation acids (obtaining sulfur dioxide as an intermediate in sulfur trioxide recovery therefrom C01B 17/58)]
17/925 . . . . . . [by processes involving a liquid-liquid extraction]
17/94 . . Recovery from nitration acids
17/96 . . . Methods for the preparation of sulfates in general (particular individual sulfates, see the relevant groups of subclasses C01B - C01G, according to the cation)
17/965 . . . [Pyrosulfates]
17/98 . . Other compounds containing sulfur and oxygen (persulfuric acids C01B 15/06; persulfates C01B 15/08)

19/00 Selenium; Tellurium; Compounds thereof (phosphorus compounds C01B 21/076).
19/001 . . [Preparation involving a liquid-liquid extraction, an adsorption or an ion-exchange]
19/002 . . [Compounds containing, besides selenium or tellurium, more than one element, with -O- and -OH not being considered as anions]
19/004 . . [Oxides; Hydroxides]
19/005 . . . [Halides]
19/007 . . . [Tellurides or selenides of metals (C01B 19/002 takes precedence)]
19/008 . . . [Salts of oxyacids of selenium or tellurium]
19/02 . . . . . . . . . . Elemental selenium or tellurium
19/04 . . Binary compounds [including binary selenium-tellurium compounds (C01B 19/004, C01B 19/005, C01B 19/007 take precedence)]

21/00 Nitrogen; Compounds thereof
21/02 . . Preparation of nitrogen (by decomposition of ammonia [C01B 3/047])
21/04 . . Purification or separation of nitrogen (by liquefying F25J)
21/0405 . . . . [Purification or separation processes]

NOTE
In this group, additional features relating to the purification or separation processes are indexed with codes chosen from C01B 2210/0001 - C01B 2210/0025.

21/06 Binary compounds of nitrogen with metals, with silicon, or with boron, (or with carbon, i.e. nitrides; Compounds of nitrogen with more than one metal, silicon or boron) (azides C01B 21/08)

NOTES
1. Binary compounds, i.e. compounds of nitrogen with only one other element chosen from metals, silicon, boron or carbon, are classified in groups C01B 21/06 or C01B 21/0605 - C01B 21/076. Compounds of nitrogen with more than one element chosen from metals, silicon or boron are classified in C01B 21/0602.

2. Documents relating to several specific binary compounds are classified in C01B 21/06 only and receive the indexing codes chosen from C01B 21/0602 - C01B 21/076 to identify the specific compounds

21/0602 . . . [with two or more other elements chosen from metals, silicon or boron]
21/0605 . . . [Binary compounds of nitrogen with carbon]
21/0607 . . . [with alkali metals]
21/061 . . . . . . . . [with lithium]
21/0612 . . . . . . . . [with alkaline-earth metals, beryllium or magnesium]
21/0615 . . . . . . . . [with transition metals other than titanium, zirconium or hafnium]
21/0617 . . . . . . . . [with vanadium, niobium or tantalum]
21/062 . . . . . . . . . . [with chromium, molybdenum or tungsten]
21/0622 . . . . . . . . . . [with iron, cobalt or nickel]
21/0625 . . . . . . . . . . [with copper]
21/0627 . . . . . . . . . . [with one or more rare earth metals]
21/063 . . . . . . . . . . [with one or more actinides, e.g. UN, PuN]
21/0632 . . . . . . . . . . [with gallium, indium or thallium]
21/0635 . . . . . . . . . . [with germanium, tin or lead]
21/0637 . . . . . . . . . . [with metals not specified in groups C01B 21/0607 - C01B 21/0635, other than aluminium, titanium, zirconium or hafnium]
21/064 . . . . . . . . . . [with boron]
21/0641 . . . . . . . . . . [Preparation by direct nitridation of elemental boron]
21/0643 . . . . . . . . . . [Preparation from boron halides]
21/0645 . . . . . . . . . . [Preparation by carboreductive nitridation]
21/0646 . . . . . . . . . . [Preparation by pyrolysis of boron and nitrogen containing compounds]
21/0648 . . . . . . . . . . [After-treatment, e.g. grinding, purification (transformation of hexagonal into cubic or wurtzitic boron nitride C04B 35/5831)]
21/068 . . . . . . . . . . [with silicon]
21/0682 . . . . . . . . . . [Preparation by direct nitridation of silicon]
21/0685 . . . . . . . . . . [Preparation by carboreductive nitridation]
21/0687 . . . . . . . . . . [After-treatment, e.g. grinding, purification]
21/072 . . . . . . . . . . [with aluminium]
21/0722 . . . . . . . . . . [Preparation by direct nitridation of aluminium]
21/0724 . . . . . . . . . . [using a plasma]
21/0726 . . . . . . . . . . [Preparation by carboreductive nitridation]
Oxygen; Oxides or hydroxides in general; Per-compounds

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21/0728 . . . [After-treatment, e.g. grinding, purification]
21/076 . . . with titanium or zirconium [or hafnium]
21/0761 . . . [Preparation by direct nitration of titanium, zirconium or hafnium]
21/0763 . . . [Preparation from titanium, zirconium or hafnium halides]
21/0765 . . . [Preparation by carboreductive nitration]
21/0766 . . . [Preparation by pyrolysis of nitrogen containing titanium, zirconium or hafnium compounds]
21/0768 . . . [After-treatment, e.g. grinding, purification]
21/08 . . . Hydrazoic acid; Azides; Halogen azides
21/082 . . . Compounds containing nitrogen and non-metals [and optionally metals] (C01B 21/06 take precedence)
21/0821 . . . [Oxynitrides of metals, boron or silicon]
21/0823 . . . [Silicon oxynitrides]
21/0825 . . . [Aluminium oxynitrides]
21/0826 . . . [Silicon aluminium oxynitrides, i.e. sialons]
21/0828 . . . [Carbonitrides or oxy-carbonitrides of metals, boron or silicon]
21/083 . . . containing one or more halogen atoms
21/0832 . . . [Binary compounds of nitrogen with halogens]
21/0835 . . . [Nitrogen trifluoride]
21/0837 . . . . . . (Purification)
21/084 . . . containing also one or more oxygen atoms, e.g. nitrosyl halides
21/0842 . . . . . . [Halides of nitrogen oxides]
21/0844 . . . . . . [Nitrosyl fluoride]
21/0846 . . . . . . [Nitrosyl chloride]
21/0848 . . . . . . [Nitrosyl perchlorate]
21/086 . . . containing one or more sulfur atoms
21/0865 . . . [Binary compounds of nitrogen with sulfur]
21/087 . . . containing one or more hydrogen atoms
21/088 . . . containing also one or more halogen atoms
21/09 . . . . . . [Halogeno-amine, e.g. chloramine]
21/091 . . . . . . [Chloramine, i.e. NH₂Cl or dichloramine, i.e. NHCl₂]
21/092 . . . . . . containing also one or more metal atoms
21/0923 . . . [Metal imides or amides (silicon imides or amides C01B 21/087)]
21/0926 . . . . . . [of alkali metals]
21/093 . . . containing also one or more sulfur atoms
21/0935 . . . [Imidodisulfonic acid; Nitrilotrisulfonic acid; Salts thereof]
21/094 . . . . . . Nitrosyl containing acids
21/096 . . . . . . Amidosulfonic acid; Salts thereof
21/097 . . . containing phosphorus atoms
21/0975 . . . [containing also one or more sulfur atoms]
21/098 . . . [Phosphonitric dihalides; Polymers thereof]
21/0983 . . . [Phosphonitric difluorides; Polymers thereof]
21/0986 . . . [Phosphonitric dichlorides; Polymers thereof]
21/12 . . . . . . Carboxylic acid [or thiocarboxylic acid]; Salts thereof
21/125 . . . . . . [Metal carboxylates]
21/14 . . . . . . Hydroxylamine; Salts thereof
21/1409 . . . [Preparation]
21/1418 . . . [by catalytic reduction of nitrogen oxides or nitrates with hydrocarbons]
Oxygen; Oxides or hydroxides in general; Per-compounds

23/0047 . . .  [characterised by the membrane]
23/0052 . . .  [by adsorption in solids]
23/0057 . . .  [characterised by the adsorbent]
23/0063 . . .  [Carbon based materials]
23/0068 . . .  [Zeolites]
23/0073 . . .  [Other molecular sieve materials]
23/0078 . . .  [Temperature swing adsorption]
23/0084 . . .  [in getters]
23/0089 . . .  [by absorption in liquids]
23/0094 . . .  [Combined chemical and physical processing]

NOTE
In this group, processing steps are indexed with codes chosen from C01B 2210/0001 - C01B 2210/0025

25/00 Phosphorus; Compounds thereof ([C01B 6/00] . C01B 21/00. C01B 23/00) take precedence; perphosphates C01B 15/16
25/003 . . . [Phosphorus]
25/006 . . . [Stabilisation (C01B 25/04 takes precedence)]
25/01 . . . Treating phosphate ores or other raw phosphate materials to obtain phosphorus or phosphorus compounds
25/02 . . . Preparation of phosphorus
25/023 . . . of red phosphorus
25/027 . . . of yellow phosphorus
25/04 . . . Purification of phosphorus
25/043 . . . of red phosphorus
25/047 . . . of yellow phosphorus
25/06 . . . Hydrogen phosphides
25/08 . . . Other phosphides
25/081 . . . [of alkali metals, alkaline-earth metals or magnesium]
25/082 . . . [of boron, aluminium, gallium or indium]
25/084 . . . [of boron]
25/085 . . . [of aluminium]
25/087 . . . [of gallium or indium]
25/088 . . . [containing plural metal]
25/10 . . . Halides or oxyhalides of phosphorus
25/12 . . . Oxides of phosphorus
25/14 . . . Sulfur, selenium, or tellurium compounds of phosphorus
25/16 . . . Oxycacids of phosphorus; Salts thereof (peroxycacids or salts thereof C01B 15/00)
25/161 . . . [containing at least one phosphorus atom with an oxidation number less than five, other than those mentioned below; Salts thereof]
25/163 . . . Phosphorous acid; Salts thereof
25/165 . . . Hypophosphorous acid; Salts thereof
25/168 . . . Pyrophosphorous acid; Salts thereof
25/18 . . . Phosphoric acid
25/185 . . . [Preparation neither from elemental phosphorus or phosphoric anhydride nor by reacting phosphate-containing material with an acid, e.g. by reacting phosphate-containing material with an ion-exchange resin or an acid salt used alone]
25/20 . . . Preparation from elemental phosphorus or phosphoric anhydride
25/22 . . . Preparation by reacting phosphate-containing material with an acid, e.g. wet process
25/2204 . . . [Arrangements of vessels used in reacting phosphate-containing material in wet process]
25/2208 . . . [with an acid or a mixture of acids other than sulfuric acid]
25/2212 . . . [with hydrochloric acid or hydrogen chloride in aqueous medium]
25/2216 . . . [with nitric acid or nitrous vapours in aqueous medium]
25/222 . . . with sulfuric acid, a mixture of acids mainly consisting of sulfuric acid or a mixture of compounds forming it in situ, e.g. a mixture of sulfur dioxide, water and oxygen
25/223 . . . only one form of calcium sulfate being formed
25/2235 . . . . . . [Anhydrite processes]
25/225 . . . . . . Dihydrate process
25/226 . . . . . . Hemihydrate process
25/228 . . . . . . one form of calcium sulfate being formed and then converted to another form
25/2285 . . . . . . [Dihydrate-anhydrite or hemihydrate-anhydrite process]
25/229 . . . . . . Hemihydrate-dihydrate process
25/2295 . . . . . . [the conversion being performed in one or more vessels different from those used for reaction after separation of phosphoric acid]
25/231 . . . . . . Dihydrate-hemihydrate process
25/232 . . . . . . Preparation by reacting phosphate-containing material with concentrated sulfuric acid and subsequently lixiviating the obtained mass, e.g. clinker process
25/234 . . . . . . Purification; Stabilisation; Concentration (purification concomitant with preparation C01B 25/22; preparation involving solvent-solvent extraction C01B 25/46)
25/2343 . . . . . . [Concentration concomitant with purification, e.g. elimination of fluorine]
25/2346 . . . . . . [Concentration]
25/235 . . . . . . Clarification; Stabilisation to prevent post-predissolution of impurities
25/237 . . . . . . Selective elimination of impurities (C01B 25/2343 takes precedence)
25/2372 . . . . . . [Anionic impurities, e.g. silica or boron compounds]
25/2375 . . . . . . [Fluoride or fluosilicate anion]
25/2377 . . . . . . [Sulfate]
25/238 . . . . . . Cationic impurities, e.g. arsenic compounds
25/24 . . . . . . Condensed phosphoric acids
25/26 . . . . . . Phosphates (perphosphates C01B 15/16)
25/265 . . . . . . [General methods for obtaining phosphates]
25/28 . . . . . . Ammonium phosphates
25/30 . . . . . . Alkali metal phosphates
25/301 . . . . . . [Preparation from liquid orthophosphoric acid or from an acid solution or suspension of orthophosphates (using ion-exchangers C01B 25/30)]
25/303 . . . . . . [with elimination of impurities]
25/305 . . . . . . [Preparation from phosphorus-containing compounds by alkaline treatment]
25/306 . . . . . . [from phosphates]
Oxygen; Oxides or hydroxides in general; Per-compounds

25/308 . . . . [Methods for converting an alkali metal orthophosphate into another one; Purification; Decolorasing; Dehydrating; Drying]
25/32 . . . . Phosphates of magnesium, calcium, strontium, or barium
25/321 . . . . [Methods for converting an alkaline earth metal ortho-phosphate into another ortho-phosphate (by reaction, e.g. of phosphate rock with phosphoric acid C01B 25/322)]
25/322 . . . . [Preparation by neutralisation of orthophosphoric acid]
25/324 . . . . [Preparation from a reaction solution obtained by acidifying with an acid other than orthophosphoric acid]
25/325 . . . . [Preparation by double decomposition]
25/327 . . . . [After-treatment (increasing the phosphate content of ores C01B 25/32)]
25/328 . . . . [Defluorination during or after the preparation]
25/34 . . . . Magnesium phosphates
25/36 . . . . Aluminium phosphates
25/37 . . . . Phosphates of heavy metals
25/372 . . . . [of titanium, vanadium, zirconium, niobium, hafnium or tantalum]
25/375 . . . . [of iron]
25/377 . . . . [of manganese]
25/38 . . . . Condensed phosphates
25/385 . . . . [of alkaline-earth metals or magnesium]
25/39 . . . . [of alkali metals]
25/395 . . . . [Preparation and dehydrating]
25/40 . . . . Polyphosphates
25/405 . . . . [of ammonium]
25/41 . . . . [of alkali metals]
25/412 . . . . [Preparation from alkali metal orthophosphates]
25/414 . . . . . . . . [Apparatus]
25/416 . . . . . . . . [Pure alkali metal polyphosphates from impure starting materials]
25/418 . . . . . . . . [After-treatment]
25/42 . . . . Pyrophosphates
25/425 . . . . [of alkali metals]
25/44 . . . . Metaphosphates
25/445 . . . . [of alkali metals]
25/45 . . . . containing plural metal, or metal and ammonium
25/451 . . . . [containing metal and ammonium]
25/453 . . . . [having molecular-sieve properties]

WARNING
Group C01B 25/453 is no longer used for the classification of new documents from May, 1995. The backlog of this group is continuously being reclassified to the appropriate subgroups of C01B 37/00 and C01B 39/00.

25/455 . . . . containing halogen {completely halogenated alkali metal phosphates C01D e.g. lithium hexafluorophosphate C01D 15/005}
25/4555 . . . . [Hypochlorite-phosphate double salts, e.g. 4(Na3PO41H2O), NaOCl or so-called chlorinated trisodium phosphate]

25/46 . . . . Preparation involving solvent-solvent extraction (solvent extraction in general B01D 11/00)
25/461 . . . . [the phosphoric acid present in the medium obtained after reaction being first extracted from the liquid phase formed or separated then re-extracted as free acid by using water or as a phosphate by using a basic compound (selective extraction of impurities contained in acid C01B 25/237)]

NOTES
1. The extracting agent may be diluted with a compound or a mixture of compounds which are not solvents for phosphoric acid, e.g. a hydrocarbon
2. Documents which belong to more than one subgroup of C01B 25/462 - C01B 25/466 are classified by a combination, e.g. C01B 25/462 +B4+B8

25/462 . . . . . . . . [the extracting agent being alcohol or a mixture of alcohols]
25/463 . . . . . . . . [the extracting agent being a ketone or a mixture of ketones]
25/464 . . . . . . . . [the extracting agent being an ether or a mixture of ethers]
25/465 . . . . . . . . [the extracting agent being an ester or a mixture of esters]
25/466 . . . . . . . . [the extracting agent being a nitrogenous solvent or a mixture of nitrogenous solvents such as amines or amides]
25/467 . . . . . . . . [the extracting agent being already present during the phosphate-containing material reaction step]
25/468 . . . . . . . . [the extraction being performed on the reaction slurry itself, i.e. without separating the acid (C01B 25/232 takes precedence)]]

32/00 Carbon; Compounds thereof (C01B 21/00, C01B 23/00 take precedence; percarbonates C01B 15/10; carbon black C09C 1/48)
32/05 . Preparation or purification of carbon not covered by groups C01B 32/15, C01B 32/20, C01B 32/25, C01B 32/30
32/10 . Carbon fluorides, e.g. [CF]r,[C3F8], (graphite intercalation thereof C01B 32/22)
32/15 . Nano-sized carbon materials
32/152 . . . . . . . . Fullerenes

WARNING
Group C01B 32/152 is impacted by reclassification into groups C01B 32/154 and C01B 32/156.
All groups listed in this Warning should be considered in order to perform a complete search.

32/154 . . . . Preparation

WARNING
Group C01B 32/154 is incomplete pending reclassification of documents from group C01B 32/152.
Groups C01B 32/152 and C01B 32/154 should be considered in order to perform a complete search.
Oxygen; Oxides or hydroxides in general; Per-compounds

32/156 . . . After-treatment

**WARNING**

Group C01B 32/156 is incomplete pending reclassification of documents from group C01B 32/152.

Groups C01B 32/152 and C01B 32/156 should be considered in order to perform a complete search.

32/158 . . . Carbon nanotubes

**NOTE**

{In groups C01B 32/158 - C01B 32/18, it is desirable to add indexing codes of C01B 2202/00 - C01B 2202/36 for structural aspects or properties of carbon nanotubes.}

**WARNING**

Group C01B 32/158 is impacted by reclassification into group C01B 32/159.

Groups C01B 32/158 and C01B 32/159 should be considered in order to perform a complete search.

32/159 . . . single-walled

**WARNING**

Group C01B 32/159 is incomplete pending reclassification of documents from group C01B 32/158.

Groups C01B 32/158 and C01B 32/159 should be considered in order to perform a complete search.

32/16 . . . Preparation
32/162 . . . characterised by catalysts
32/164 . . . involving continuous processes
32/166 . . . in liquid phase
32/168 . . . After-treatment
32/17 . . . Purification
32/172 . . . Sorting
32/174 . . . Derivatisation; Solubilisation; Dispersion in solvents
32/176 . . . Cutting
32/178 . . . Opening; Filling
32/18 . . . Nanoonions; Nanoscrolls; Nanohorns; Nanocones; Nanowalls
32/182 . . . Graphene

**WARNING**

Group C01B 32/182 is impacted by reclassification into group C01B 32/198.

Groups C01B 32/182 and C01B 32/198 should be considered in order to perform a complete search.

32/184 . . . Preparation
32/186 . . . by chemical vapour deposition (CVD)
32/188 . . . by epitaxial growth
32/19 . . . by exfoliation
32/192 . . . starting from graphitic oxides
32/194 . . . After-treatment
32/196 . . . Purification

32/198 . . . Graphene oxide

**WARNING**

Group C01B 32/198 is incomplete pending reclassification of documents from group C01B 32/182.

Groups C01B 32/182 and C01B 32/198 should be considered in order to perform a complete search.

32/20 . . . Graphite

**NOTE**

{In groups C01B 32/20 - C01B 32/196, it is desirable to add indexing codes of C01B 2204/00 - C01B 2204/32 for structural aspects or properties of graphene.}

**WARNING**

Group C01B 32/20 is impacted by reclassification into groups C01B 32/205 and C01B 32/21.

All groups listed in this Warning should be considered in order to perform a complete search.

32/205 . . . Preparation

**WARNING**

Group C01B 32/205 is incomplete pending reclassification of documents from group C01B 32/20.

Groups C01B 32/20 and C01B 32/205 should be considered in order to perform a complete search.

32/21 . . . After-treatment
32/215 . . . Purification; Recovery or purification of graphite formed in iron making, e.g. kish graphite
32/22 . . . Intercalation
32/225 . . . Expansion; Exfoliation
32/23 . . . Oxidation
32/25 . . . Diamond

**WARNING**

Group C01B 32/25 is impacted by reclassification into group C01B 32/26.

Groups C01B 32/25 and C01B 32/26 should be considered in order to perform a complete search.
Preparation (by using ultra-high pressure B01J 3/06; by crystal growth C30B 29/04)

**WARNING**

Group C01B 32/26 is incomplete pending reclassification of documents from group C01B 32/25.

Groups C01B 32/25 and C01B 32/26 should be considered in order to perform a complete search.

After-treatment, e.g. purification, irradiation, separation or recovery

**WARNING**

Group C01B 32/30 is impacted by reclassification into groups C01B 32/312 and C01B 32/318.

All groups listed in this Warning should be considered in order to perform a complete search.

Preparation

**WARNING**

Groups C01B 32/312 and C01B 32/318 are incomplete pending reclassification of documents from group C01B 32/30.

All groups listed in this Warning should be considered in order to perform a complete search.

characterised by the starting materials

carbonaceous precursors per se

methods of preparation of active carbon using carbonaceous precursors

compounds with molecular sieve properties

Preparation

**WARNING**

Groups C01B 32/354 and C01B 32/378 should be considered in order to perform a complete search.

Reactivation or regeneration

by physical processes, e.g. by irradiation, by using electric current passing through carbonaceous feedstock or by using recyclable inert heating bodies

Coating; Grafting; Microencapsulation

**WARNING**

Group C01B 32/378 is incomplete pending reclassification of documents from group C01B 32/354.

Groups C01B 32/354 and C01B 32/378 should be considered in order to perform a complete search.

[Making shaped products, e.g. fibres, spheres, membranes or foam]

Granulation

NOTE

In this group, the term “granulation” also covers methods of preparation of active carbon using carbonaceous precursors per se and binders, e.g. pitch.

Apparatus for the preparation thereof

Carbon monoxide

Carbon dioxide

Solidifying

Preparation of carbonates or bicarbonates in general (of percarbonates C01B 15/10; of specific carbonates or bicarbonates according to the cation C01B - C01G)

Compounds containing carbon and sulfur, e.g. thiophosgene

Carbon disulfide

Preparation by reacting sulfur or sulfur compounds with hydrocarbons

Carbon oxysulfide

Phosgene

Carbides

Oxycarbides; Sulfocarbides; Mixture of carbides

Carbides of single elements

Titanium carbide

Carbides of actinides

Carbides of alkali metals, strontium, barium or magnesium

Calcium carbide

Tungsten or molybdenum carbides

Silicon carbide

**WARNING**

Group C01B 32/956 is impacted by reclassification into groups C01B 32/963-C01B 32/991.

All groups listed in this Warning should be considered in order to perform a complete search.

Preparation from compounds containing silicon

**WARNING**

Group C01B 32/963 is incomplete pending reclassification of documents from group C01B 32/956.

Groups C01B 32/956 and C01B 32/963 should be considered in order to perform a complete search.
Oxygen; Oxides or hydroxides in general; Per-compounds

33/00 Silicon; Compounds thereof (C01B 4/00)
   C01B 21/00, C01B 23/00 take precedence; persilicates C01B 15/14; carbides C01B 32/956.

33/02 . . . Silicon (forming single crystals or homogeneous polycrystalline material with defined structure C30B).

33/03 . . . by decomposition of silicon halides or halosilanes or reduction thereof with hydrogen as the only reducing agent

33/04 . . . Hydrides of silicon

33/05 . . . by acidic treatment of aqueous silicate solutions

33/06 . . . Metal silicides (alloys C22)

33/07 . . . Colloidal silica, e.g. dispersions, gels, sols

33/08 . . . Compounds containing halogen

C01B 33/143 . . . Preparation from SiO or SiO₂

WARNING

Groups C01B 32/97, C01B 32/977 and C01B 32/984 are incomplete pending reclassification of documents from group C01B 32/956.

All groups listed in this Warning should be considered in order to perform a complete search.

33/10 . . . Compounds containing silicon, fluorine, and other elements

33/11 . . . [Fluosilicic acid; Salts thereof]

33/12 . . . [Lepidocic acid]

33/13 . . . [Lepidocic acid]

33/14 . . . [Preparation of hydrosols or aqueous dispersions]

33/15 . . . [Preparation of hydroorganosols, organosols or dispersions in an organic medium]

C01B
Oxygen; Oxides or hydroxides in general; Per-compounds

33/146 . . . . After-treatment of sols ([preparation of hydrosols or aqueous dispersions from hydroorganosols, organosols or dispersions in an organic medium \( \text{C01B 33/141} \); preparation of hydroorganosols, organosols or dispersions in an organic medium from hydrosols or aqueous dispersions]
\( \text{C01B 33/145} \))

33/1465 . . . . ["Build-up" of particles using only one sol and a "heel" consisting or not of the sol]

33/148 . . . . Concentration; Drying; Dehydration; Stabilisation; Purification ([C01B 33/1465 takes precedence])

33/1485 . . . . [Stabilisation, e.g. prevention of gelling; Purification]

33/149 . . . . Coating

33/151 . . . . by progressively adding a sol to a different sol, i.e. "build-up" of particles using a "heel"

33/152 . . . . Preparation of hydrogels

33/1525 . . . . [from or via fluosilicic acid or salts thereof]

33/154 . . . . by acidic treatment of aqueous silicate solutions

33/1543 . . . . [using ion exchangers]

33/1546 . . . . [the first formed hydrosol being converted to a hydrogel by introduction into an organic medium immiscible or only partly miscible with water]

33/155 . . . . Preparation of hydroorganogels or organogels

33/157 . . . . After-treatment of gels

33/158 . . . . Purification; Drying; Dehydrating

33/1585 . . . . [Dehydration into aerogels]

33/159 . . . . Coating or hydrophobisation

33/16 . . . . Preparation of silica xerogels

33/163 . . . . [by hydrolysis of organosilicon compounds, e.g. ethyl orthosilicate]

33/166 . . . . [by acidification of silicate in the presence of an inert organic phase]

33/18 . . . . Preparation of finely divided silica neither in sol nor in gel form; After-treatment thereof (preparation of aerogels by dehydrating gels \( \text{C01B 33/158}; \) treatment to enhance the pigmenting or filling properties \( \text{C09C} \))

33/181 . . . . [by a dry process]

33/182 . . . . [by reduction of a siliceous material, e.g. with a carbonaceous reducing agent and subsequent oxidation of the silicon monoxide formed]

33/183 . . . . [by oxidation or hydrolysis in the vapour phase of silicon compounds such as halides, trichlorosilane, monosilane]

33/184 . . . . [by hydrolysis of tetrafluoride]

33/185 . . . . [of crystalline silica-polymermorphs having molecular sieve properties, e.g. silicaties]

33/186 . . . . [from or via fluosilicic acid or salts thereof by a wet process]

33/187 . . . . by acidic treatment of silicates

33/193 . . . . [of aqueous solutions of silicates]

33/20 . . . . Silicates (persilicates \( \text{C01B 15/14}; \) containing aluminium \( \text{C01B 33/26} \))

33/22 . . . . Magnesium silicates

33/24 . . . . Alkaline-earth metal silicates

33/26 . . . . Aluminium-containing silicates, i.e. silico-aluminates

33/28 . . . . [Base exchange silicates, e.g. zeolites (regeneration \( \text{B01J 49/00} \)]

33/2807 . . . . [Zeolitic silicoaluminates with a tridimensional crystalline structure possessing molecular sieve properties; Isomorphous compounds wherein a part of the aluminium ore of the silicon present may be replaced by other elements such as gallium, germanium, phosphorus; Preparation of zeolitic molecular sieves from molecular sieves of another type or from preformed reacting mixtures (not used, see subgroups)]

33/2815 . . . . [of type A (UNION CARBIDE trade name; corresponds to GRACE's types Z-12 and Z-12L)]

33/2823 . . . . [from aqueous solutions of an alkali metal aluminate and an alkali metal silicate excluding any other source of alumina or silica]

33/283 . . . . [from a reaction mixture containing at least one aluminium silicate or aluminosilicate of a clay-type, e.g. kaolin or metakaolin or its exothermic modification or allophane (containing a single clay substantially chemically modified with an acid, i.e. beyond the activation state \( \text{C01B 33/2815} \))]

33/2838 . . . . [of faujasite type, or type X or Y (UNION CARBIDE trade names; correspond to GRACE's types Z-14 and Z-14HS, respectively)]

33/2846 . . . . [of type X]

33/2853 . . . . [of type Y]

33/2861 . . . . [of mordenite type, e.g. ptilolite or dachiardite]

33/2869 . . . . [of other types characterised by an X-ray spectrum and a definite composition]

33/2876 . . . . [from a reacting mixture containing an amine or an organic cation, e.g. a quaternary onium cation-ammonium, phosphonium, stibonium]

33/2884 . . . . [the aluminium or the silicon in the network being partly replaced]

33/2892 . . . . [containing an element or a compound occluded in the pores of the network, e.g. an oxide already present in the starting reaction mixture]

33/32 . . . . Alkali metal silicates ([C01B 33/24]; \( \text{C01B 33/26}; \) take precedence)

33/325 . . . . [After-treatment, e.g. purification or stabilisation of solutions, granulation; Dissolution; Obtaining solid silicate, e.g. from a solution by spray-drying, flashing off water or adding a coagulant]

**NOTE**

In this group, obtaining solid silicate, e.g. as a hydrate of a crystalline silicate, from a solution or a hydrate melt by heating or cooling with or without seeding, is not considered as after-treatment, but classified in group \( \text{C01B 33/32} \)
Oxygen; Oxides or hydroxides in general; Per-compounds

33/36 . . . having base-exchange properties but not having molecular sieve properties (regeneration thereof B01J 49/000)

33/38 . . . Layered base-exchange silicates, e.g. clays, micas or alkali metal silicates of kenyaite or magadiite type ([activation of naturally occurring clays B01J 20/12; pillared layered base-exchange silicates B01J 29/049])

33/40 . . . Clays
33/405 . . . (not containing aluminium)
33/42 . . . Micas; Intersтратified clay-mica products (delaminated mica or vermiculite platelets obtained by a process involving cation-exchange C04B 14/208)
33/425 . . . (not containing aluminium)
33/44 . . . Products obtained from layered base-exchange silicates by ion-exchange with organic compounds such as ammonium, phosphonium or sulfonium compounds or by intercalation of organic compounds, e.g. organoclay material

33/46 . . . Amorphous silicates, e.g. so-called "amorphous zeolites" (crystalline zeolites C01B 39/000)

35/00 Boron; Compounds thereof (monoborane, diborane, metal borohydrides or addition complexes thereof C01B 600; perborates C01B 15/12; binary compounds with nitrogen C01B 21/06; compounds of noble gases C01B 23/0005; phosphides C01B 25/08; carbides C01B 32/950; alloys containing boron C22)

35/02 . . . Boron; Borides
35/023 . . . [Boron]
35/026 . . . [Higher boron hydrides, i.e. containing at least three boron atoms]
35/04 . . . Metal borides
35/06 . . . Boron halogen compounds
35/061 . . . [Halides]
35/063 . . . [Tetrafluoroboric acid; Salts thereof]
35/065 . . . [Tetrafluoroboric acid]
35/066 . . . [Alkali metal tetrafluoroborates]
35/068 . . . [Halogenated hydrides]
35/08 . . . Compounds containing boron and nitrogen, phosphorus, oxygen, sulfur, selenium or tellurium
35/10 . . . Compounds containing boron and oxygen (C01B 35/063 takes precedence)
35/1009 . . . [having molecular-sieve properties]
35/1018 . . . [Carbonyl compounds derived from boron hydrides]
35/1027 . . . [Oxides]
35/1036 . . . [Boric anhydride]
35/1045 . . . [Oxyacids]
35/1054 . . . [Orthoboric acid]
35/1063 . . . [Preparation from boron ores or borates using acids or salts]
35/1072 . . . . . . . . . . [by means of ammonia-carbon dioxide]
35/1081 . . . . . . . . . . [Preparation by working up other natural sources, e.g. seawater]
35/109 . . . . . . . . . . [Purification; Separation; Concentration]
35/112 . . . Borates ([C01B 35/1063 takes precedence])
35/121 . . . . . . . . . . [of alkali metal]
35/122 . . . . . . . . . . [Sodium tetraborates; Hydrates thereof, e.g. borax]

35/123 . . . . . . . . . . [Preparation from boron ores or other borates]
35/124 . . . . . . . . . . [Preparation by working up natural brines, e.g. seawater]
35/125 . . . . . . . . . . [Purification; Concentration; Dehydration; Stabilisation; Other after-treatment]
35/126 . . . . . . . . . . [of alkaline-earth metals, beryllium, aluminium or magnesium]
35/127 . . . . . . . . . . [of heavy metals]
35/128 . . . . . . . . . . [containing plural metal or metal and ammonium]
35/14 . . . Compounds containing boron and nitrogen, phosphorus, sulfur, selenium or tellurium
35/143 . . . . . . . . . . [Phosphates]
35/146 . . . . . . . . . . [Compounds containing boron and nitrogen, e.g. borazole (ammonium tetrafluoborates C01B 35/063; ammonium borates C01B 35/12)]

Compounds characterised primarily by their physical or chemical properties, rather than by their chemical constitution

37/00 Compounds having molecular sieve properties but not having base-exchange properties

NOTE
Compounds classified in main group C01B 37/00 are also classified in other groups of class C01 according to their composition

37/002 . . . [Metallophosphates not containing aluminium, e.g. gallophosphates or silicogallopahsphates]
37/005 . . . [Silicates, i.e. so-called metallosilicates or metallozeolites]
37/007 . . . [Borosilicates]
37/02 . . . Crystalline silica-polymorphs, e.g. silicates (dealuminated aluminosilicate zeolites)
37/04 . . . Aluminophosphates (APO compounds)
37/06 . . . Aluminophosphates containing other elements, e.g. metals, boron
37/065 . . . [the other elements being metals only]
37/08 . . . Silicoaluminophosphates (SAPO compounds), e.g. CoSAPO

39/00 Compounds having molecular sieve and base-exchange properties, e.g. crystalline zeolites; Their preparation; After-treatment, e.g. ion-exchange or dealumination (treatment to modify the sorption properties, e.g. shaping using a binder, B01J 20/10; treatment to modify the catalytic properties, e.g. combination of treatments to make the zeolites appropriate to their use as a catalyst, B01J 29/04; treatment to improve the ion-exchange properties B01J 39/12; regeneration or reactivation of ion-exchange properties B01J 49/00; preparation of stabilised suspensions used in detergents C11D 3/12)

NOTES
1. In this group, the following term is used with the meaning indicated:
   - "zeolites" means:
     i. crystalline aluminosilicates with base-exchange and molecular sieve properties, having three dimensional, microporous lattice framework structure of tetrahedral oxide units;
Compounds characterised primarily by their physical or chemical properties, rather than by their chemical constitution

C01B 39/00 (continued)

ii. compounds isomorphous to those of the former category, wherein the aluminium or silicon atoms in the framework are partly or wholly replaced by atoms of other elements, e.g. by gallium, germanium, phosphorus or boron.

2. Compounds classified in main group C01B 39/00 are also classified in other groups of class C01 according to their composition

39/02 . . Crystalline aluminosilicate zeolites; Isomorphous compounds thereof; Direct preparation thereof; Preparation thereof starting from a reaction mixture containing a crystalline zeolite of another type, or from preformed reactants; After-treatment thereof

39/023 . . [Preparation of physical mixtures or intergrowth products of zeolites chosen from group C01B 39/04 or two or more of groups C01B 39/14 - C01B 39/48]

39/026 . . [After-treatment]

39/04 . . using at least one organic template directing agent, e.g. an ionic quaternary ammonium compound or an aminated compound

39/06 . . Preparation of isomorphous zeolites characterised by measures to replace the aluminium or silicon atoms in the lattice framework by atoms of other elements, i.e. by direct or secondary synthesis

39/065 . . [Galloaluminosilicates; Group IVB-metalloaluminosilicates; Ferroaluminosilicates]

39/08 . . the aluminium atoms being wholly replaced

39/082 . . [Gallosilicates]

39/085 . . [Group IVB-metallosilicates]

39/087 . . [Ferrosilicates]

39/10 . . the replacing atoms being [at least] phosphorus atoms

39/12 . . the replacing atoms being [at least] boron atoms

39/14 . . Type A

39/145 . . [using at least one organic template directing agent]

39/16 . . from aqueous solutions of an alkali metal aluminate and an alkali metal silicate excluding any other source of alumina or silica but seeds [(C01B 39/145 takes precedence)]

39/18 . . from a reaction mixture containing at least one aluminium silicate or aluminosilicate of a clay type, e.g. kaolin or metakaolin or its exothermic modification or allophane [(C01B 39/145 takes precedence)]

39/20 . . Faujasite type, e.g. type X or Y

39/205 . . [using at least one organic template directing agent; Hexagonal faujasite; Intergrowth products of cubic and hexagonal faujasite]

39/22 . . Type X [(C01B 39/205 takes precedence)]

39/24 . . Type Y [(C01B 39/205 takes precedence)]

39/26 . . Mordenite type [(C01B 39/203, C01B 39/206, C01B 39/060 take precedence)]

39/265 . . [using at least one organic template directing agent]

39/28 . . Phillipsite or harmotome type [(C01B 39/023, C01B 39/026, C01B 39/060 take precedence)]

39/30 . . Erionite or offretite type, e.g. zeolite T

39/305 . . [using at least one organic template directing agent]

39/32 . . Type L

39/34 . . Type ZSM-4

39/36 . . Pentasil type, e.g. types ZSM-5, ZSM-8 or ZSM-11

39/365 . . [Type ZSM-8; Type ZSM-11; ZSM 5/11 intermediate]

39/38 . . Type ZSM-5

39/40 . . using at least one organic template directing agent

39/42 . . Type ZSM-12

39/44 . . Ferrierite type, e.g. types ZSM-21, ZSM-35 or ZSM-38

39/445 . . [using at least one organic template directing agent]

39/46 . . Other types characterised by their X-ray diffraction pattern and their defined composition [(C01B 39/023, C01B 39/026, C01B 39/060 take precedence)]

39/48 . . using at least one organic template directing agent

39/50 . . Zeolites wherein inorganic bases or salts occlude channels in the lattice framework, e.g. sodalite, cancrinite, nosean, haunynte [(ultramarine C09C 1/23)]

39/52 . . Sodalites

39/54 . . Phosphates, e.g. APO or SAPO compounds

**NOTE**

Phosphates having either a poorly defined or a weak base-exchange capacity such as MAPO's, SAPO's or BAPO's are classified in C01B 37/00

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**C01B**

**Preparation of ozone by electrical discharge**

**C01B 00**

**Preparation of ozone by electrical discharge**

**C01B 10**

Dischargers used for production of ozone

**C01B 12**

Plate-type dischargers

**C01B 14**

Concentric/tubular dischargers

**C01B 20**

Electrodes used for obtaining electrical discharge

**C01B 22**

Constructional details of the electrodes

**C01B 24**

Composition of the electrodes

**C01B 30**

Dielectrics used in the electrical dischargers

**C01B 32**

Constructional details of the dielectrics

**C01B 34**

Composition of the dielectrics

**C01B 40**

using several dischargers in series

**C01B 50**

Part of the product being recycled

**C01B 60**

Feed streams for electrical dischargers

**C01B 62**

Air

**C01B 64**

Oxygen

**C01B 66**

Pretreatment of the feed

**C01B 70**

Cooling of the discharger; Means for making cooling unnecessary

**C01B 72**

by air

**C01B 74**

by liquid

**C01B 76**

Water

**C01B 80**

Additional processes occurring alongside the electrical discharges, e.g. catalytic processes

**C01B 82**

Treatment with ultraviolet light

**C01B 84**

Treatment with magnetic fields

**C01B 90**

Control of the process

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**C022 00**

**Structure or properties of carbon nanotubes**

**C022 02**

Single-walled nanotubes

**C022 04**

Nanotubes with a specific amount of walls

**C022 06**

Multi-walled nanotubes
Integrated processes for the production of hydrogen or synthesis gas (reactors or details thereof B01J 2203/02 - B01J 2219/00)

- Processes for making hydrogen or synthesis gas
- containing a reforming step
- containing a non-catalytic reforming step
- containing a non-catalytic steam reforming step
- containing a non-catalytic carbon dioxide reforming step
- containing a catalytic reforming step
- the reforming step being a steam reforming step
- the reforming step being a carbon dioxide reforming step
- the reforming step being an autothermal reforming step, e.g. secondary reforming processes
- containing a partial oxidation step
- containing a non-catalytic partial oxidation step
- containing a catalytic partial oxidation step [CPO]
- containing a decomposition step
- containing a non-catalytic decomposition step
- containing a catalytic decomposition step
- containing a CO-shift step, i.e. a water gas shift step
- containing two CO-shift steps
- containing three or more CO-shift steps
- containing a purification step for the hydrogen or the synthesis gas
- Purification by membrane separation
- In-situ membrane purification during hydrogen production
- Purification by absorption in liquids
- Purification by adsorption on solids
- In-situ adsorption process during hydrogen production
- Regenerative adsorption process in two or more beds, one for adsorption, the other for regeneration
- Catalytic purification
- Selective oxidation of carbon monoxide
- Selective methanation
- Purification by catalytic desulphurisation
- Purification by non-catalytic desulphurisation
- Purification by cryogenic separation
- Composition of the impurity
- the impurity being carbon monoxide
- the impurity being carbon dioxide
- the impurity being an organic compound
- the impurity being a sulfur compound
- the impurity being carbon
- the impurity being water
- Integration with other chemical processes
- Methanol production
- Hydrocarbon production, e.g. Fischer-Tropsch process
- Refinery processes
- using hydrotreating, e.g. hydrogenation, hydrodesulphurisation
- with fuel cells
- the reforming process taking place in the fuel cell
- Ammonia synthesis
- Methods of heating or cooling
- Methods of heating the process for making hydrogen or synthesis gas
- by combustion of fuel
- Heating by flames
- the fuel containing hydrogen
- at least part of the fuel being a recycle stream
- Heating by indirect heat exchange with hot fluids, other than combustion gases, product gases or non-combustive exothermic reaction product gases
- by heat exchange with exothermic reactions, other than by combustion of fuel
- the non-combustive exothermic reaction being another reforming reaction as defined in groups C01B 2203/02 - C01B 2203/0294
- by electric heating
- by electromagnetic heating
- by plasma
- by combination of different heating methods
- Methods of cooling
- by direct injection of fluid
- by indirect heat exchange
- by evaporation of a fluid
- Generation of steam
- Catalysts for performing the hydrogen forming reactions
- Arrangement or shape of catalyst
- Packed bed of catalytic structures, e.g. particles, packing elements
- characterised by the form of the structure
- Catalysts in the form of a monolith or honeycomb
- Catalysts in the form of a foam
- Catalyst coated on equipment surfaces, e.g. reactor walls
- Composition of the catalyst
- Group VIII metal catalysts
- Nickel or cobalt catalysts
- Nickel catalysts
- Platinum group metal catalysts
- Platinum catalysts
- Copper or zinc-based catalysts
- Composition of support materials
- Non-supported catalysts
- Promoters or activators
- Feeding the process for making hydrogen or synthesis gas
- Composition of the feed
2203/1211 . . . Organic compounds or organic mixtures used in the process for making hydrogen or synthesis gas
2203/1217 . . . Alcohols
2203/1223 . . . Methanol
2203/1229 . . . Ethanol
2203/1235 . . . Hydrocarbons
2203/1241 . . . Natural gas or methane
2203/1247 . . . Higher hydrocarbons
2203/1252 . . . Cyclic or aromatic hydrocarbons
2203/1258 . . . Pre-treatment of the feed
2203/1264 . . . Catalytic pre-treatment of the feed
2203/127 . . . Catalytic desulphurisation
2203/1276 . . . Mixing of different feed components
2203/1282 . . . using static mixers
2203/1288 . . . Evaporation of one or more of the different feed components
2203/1294 . . . Evaporation by heat exchange with hot process stream
2203/14 . . . Details of the flowsheet
2203/141 . . . At least two reforming, decomposition or partial oxidation steps in parallel
2203/142 . . . At least two reforming, decomposition or partial oxidation steps in series
2203/143 . . . Three or more reforming, decomposition or partial oxidation steps in series
2203/145 . . . At least two purification steps in parallel
2203/146 . . . At least two purification steps in series
2203/147 . . . Three or more purification steps in series
2203/148 . . . involving a recycle stream to the feed of the process for making hydrogen or synthesis gas
2203/16 . . . Controlling the process
2203/1604 . . . Starting up the process
2203/1609 . . . Shutting down the process
2203/1614 . . . Controlling the temperature
2203/1619 . . . Measuring the temperature
2203/1623 . . . Adjusting the temperature
2203/1628 . . . Controlling the pressure
2203/1633 . . . Measuring the pressure
2203/1638 . . . Adjusting the pressure
2203/1642 . . . Controlling the product
2203/1647 . . . Controlling the amount of the product
2203/1652 . . . Measuring the amount of product
2203/1657 . . . the product being hydrogen
2203/1661 . . . the product being carbon monoxide
2203/1666 . . . the product being carbon dioxide
2203/1671 . . . Controlling the composition of the product
2203/1676 . . . Measuring the composition of the product
2203/168 . . . Adjusting the composition of the product
2203/1685 . . . Control based on demand of downstream process
2203/169 . . . Controlling the feed
2203/1695 . . . Adjusting the feed of the combustion
2203/80 . . . Aspect of integrated processes for the production of hydrogen or synthesis gas not covered by groups C01B 2203/02 - C01B 2203/1695
2203/82 . . . Several process steps of C01B 2203/02 - C01B 2203/08 integrated into a single apparatus
2203/84 . . . Energy production
2203/86 . . . Carbon dioxide sequestration

2204/00 Structure or properties of graphene
2204/02 . . . Single layer graphene
2204/04 . . . Specific amount of layers or specific thickness
2204/06 . . . Graphene nanoribbons
2204/065 . . . characterized by their width or by their aspect ratio
2204/20 . . . Graphene characterized by its properties
2204/22 . . . Electronic properties
2204/24 . . . Thermal properties
2204/26 . . . Mechanical properties
2204/28 . . . Solid content in solvents
2204/30 . . . Purity
2204/32 . . . Size or surface area

2210/00 Purification or separation of specific gases
2210/0001 . . . Separation or purification processing
2210/0003 . . . Chemical processing
2210/0004 . . . by oxidation
2210/0006 . . . by reduction
2210/0007 . . . by complexation
2210/0009 . . . Physical processing
2210/001 . . . by making use of membranes
2210/0012 . . . characterised by the membrane
2210/0014 . . . by adsorption in solids
2210/0015 . . . characterised by the adsorbent
2210/0017 . . . . . . Carbon-based materials
2210/0018 . . . . . . Zeolites
2210/002 . . . . . . Other molecular sieve materials
2210/0021 . . . . . . Temperature swing adsorption
2210/0023 . . . . . . in getters
2210/0025 . . . . . . by absorption in liquids
2210/0026 . . . . . . Isotopes of the specific gas
2210/0028 . . . . . . Separation of the specific gas from gas mixtures containing a minor amount of this specific gas
2210/0029 . . . . . . Obtaining noble gases
2210/0031 . . . . . . Helium
2210/0032 . . . . . . Neon
2210/0034 . . . . . . Argon
2210/0035 . . . . . . Krypton
2210/0037 . . . . . . Xenon
2210/0039 . . . . . . Radon
2210/004 . . . . . . Separation of a mixture of noble gases
2210/0042 . . . . . . Making ultrapure specific gas
2210/0043 . . . . . . Impurity removed
2210/0045 . . . . . . Oxygen
2210/0046 . . . . . . Nitrogen
2210/0048 . . . . . . Air
2210/005 . . . . . . Carbon monoxide
2210/0051 . . . . . . Carbon dioxide
2210/0053 . . . . . . Hydrogen
2210/0054 . . . . . . Hydrogen halides
2210/0056 . . . . . . Hydrogen fluoride
2210/0057 . . . . . . Hydrogen chloride
2210/0059 . . . . . . Hydrogen bromide
2210/006 . . . . . . Hydrogen iodide
2210/0062 . . . . . . Water
2210/0064 . . . . . . Hydrogen sulfide
2210/0065 . . . . . . Ammonia
2210/0067 . . . . . . Hydrogen cyanide
2210/0068 . . . . . . Organic compounds
2210/007 . . . . . . Hydrocarbons
2210/0071 . . . . . . Sulfur oxides
2210/0073 . . . . . . Sulfur halides
2210/0075 . . . . . . Nitrogen oxides
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