COOPERATIVE PATENT CLASSIFICATION

PERFORMING OPERATIONS; TRANSPORTING

NOTES omitted

SEPARATING; MIXING

PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL

CHEMICAL OR PHYSICAL PROCESSES, e.g. CATALYSIS OR COLLOID CHEMISTRY; THEIR RELEVANT APPARATUS

NOTES

1. In this subclass, the following terms or expressions are used with the meanings indicated:
   - “solid particles” includes such particles whether catalysts, reactants or inert in solid, semi-solid or pasty state;
   - “fluidised particles” means finely divided solid particles lifted and agitated by a stream of fluid;
   - “fluidised bed-technique” means fluid-solid contacting technique in which finely divided particles are lifted and agitated by a rising stream of fluid, said stream having such a speed as to form a lower dense phase (the “bed”) and an upper dilute fluidised phase of “fluidised particles”;
   - “processes conducted in the presence of solid particles” does not include processes wherein the only solid particles present are formed during the reaction.

2. 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

WARNING

The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

B01J 37/025 covered by B01J 37/02
B01D 15/04 covered by B01J 39/00 - B01J 49/90

2/00 Processes or devices for granulating materials {, e.g. fertilisers} in general; Rendering particulate materials free flowing in general, e.g. making them hydrophobic

2/003 . [followed by coating of the granules to prevent the granules sticking together B01J 2/30]
2/006 . (Coating of the granules without description of the process or the device by which the granules are obtained (to prevent the granules sticking together B01J 2/30)]
2/02 . by dividing the liquid material into drops, e.g. by spraying, and solidifying the drops
2/04 . . in a gaseous medium {if combined with suspending the material in a gas, e.g. fluidised beds B01J 2/16}
2/06 . . in a liquid medium
2/08 . . . Gelation of a colloidal solution
2/10 . in stationary drums or troughs, provided with kneading or mixing appliances
2/12 . in rotating drums
2/14 . in rotating dishes or pans
2/16 . by suspending the powder material in a gas, e.g. in fluidised beds or as a falling curtain

NOTE

For classification in B01J 2/16, the fact that during the process the material is suspended in a gas prevails over the aggregation state of the material at the moment of its suspension in the gas

3/00 Processes of utilising sub-atmospheric or super-atmospheric pressure to effect chemical or physical change of matter; Apparatus therefor (pressure vessels for containing or storing compressed, liquefied or solidified gases F17C)

3/002 . Component parts of these vessels not mentioned in B01J 3/004, B01J 3/006, B01J 3/02 - B01J 3/08; Measures taken in conjunction with the process to be carried out, e.g. safety measures
3/004 . [Sight-glasses therefor (see also G02B)]
3/006 . [Processes utilising sub-atmospheric pressure; Apparatus therefor]
3/008 . [Processes carried out under supercritical conditions]
3/02 . Feed or outlet devices therefor
3/03 . Pressure vessels, or vacuum vessels, having closure members or seals specially adapted therefor
3/04 . Pressure vessels, e.g. autoclaves
3/042 . . {in the form of a tube}
Particles; Apparatus for such processes conducted in the presence of fluids and solid particles; Apparatus therefor, e.g. moulds or dies (B01J 3/04 takes precedence)

3/06 . Processes using ultra-high pressure, e.g. for the formation of diamonds; Apparatus therefor, e.g. moulds or dies (B01J 3/04 takes precedence)

3/05 . Separating solid material from the gas/liquid stream (separation processes per se B01D)

8/004 . (by means of a nozzle)

8/005 . (by means of a rotary device in the flow channel)

8/006 . (using cyclones)

8/007 . (by filtration)

8/008 . (by impingement against stationary members)

8/009 . (by sedimentation)

8/0025 . (by an ascending fluid)

8/003 . (by electrostatic precipitation)

8/02 . (by electrostatic precipitation)

8/027 . (by means of a nozzle)

8/0285 . (by means of a nozzle)

8/0292 . (by means of a nozzle)

8/03 . (by means of a nozzle)

8/0264 . (by means of a nozzle)

8/0271 . (by means of a nozzle)

8/028 . (by means of a nozzle)

8/0278 . (by means of a nozzle)

8/0292 . (by means of a nozzle)

8/03 . (by means of a nozzle)

8/0264 . (by means of a nozzle)

8/0271 . (by means of a nozzle)

8/028 . (by means of a nozzle)

8/0278 . (by means of a nozzle)

8/0292 . (by means of a nozzle)

8/03 . (by means of a nozzle)

8/0264 . (by means of a nozzle)

8/0271 . (by means of a nozzle)

8/028 . (by means of a nozzle)

8/0278 . (by means of a nozzle)

8/0292 . (by means of a nozzle)

8/03 . (by means of a nozzle)

8/0264 . (by means of a nozzle)

8/0271 . (by means of a nozzle)

8/028 . (by means of a nozzle)

8/0278 . (by means of a nozzle)

8/0292 . (by means of a nozzle)
8/0446 . . . [the flow within the beds being predominantly vertical]
8/0449 . . . [in two or more cylindrical beds]
8/0453 . . . (the beds being superimposed one above the other)
8/0457 . . . (the beds being placed in separate reactors)
8/0461 . . . [in two or more cylindrical annular shaped beds]
8/0465 . . . (the beds being concentric)
8/0469 . . . (the beds being superimposed one above the other)
8/0473 . . . (the beds being placed in separate reactors)
8/0476 . . . [in two or more otherwise shaped beds]
8/048 . . . (the beds being superimposed one above the other)
8/0484 . . . (the beds being placed next to each other)
8/0488 . . . (the beds being placed in separate reactors)
8/0492 . . . [Feeding reactive fluids (for solid material, see B01J 8/0015)]
8/0496 . . . [Heating or cooling the reactor]
8/06 . . . in tube reactors; the solid particles being arranged in tubes
8/062 . . . [being installed in a furnace]
8/065 . . . [Feeding reactive fluids]
8/067 . . . [Heating or cooling the reactor (B01J 8/062 takes precedence)]
8/08 . . . with moving particles (with fluidised particles B01J 8/18)
8/082 . . . [Controlling processes]
8/085 . . . [Feeding reactive fluids (for solid material, see B01J 8/0015)]
8/087 . . . [Heating or cooling the reactor]
8/10 . . . moved by stirrers or by rotary drums or rotary receptacles {or endless belts}
8/12 . . . moved by gravity in a downward flow
8/125 . . . [with multiple sections one above the other separated by distribution aids, e.g. reaction and regeneration sections]
8/14 . . . moving in free vortex flow apparatus
8/16 . . . with particles being subjected to vibrations or pulsations (B01J 8/40 takes precedence)
8/18 . . . with fluidised particles {(combustion apparatus with fluidised bed in general F23C 10/00; furnaces with fluidised bed F27B 15/00)}
8/1809 . . . [Controlling processes]
8/1818 . . . [Feeding of the fluidising gas (B01J 8/44 takes precedence)]
8/1827 . . . [the fluidising gas being a reactant]
8/1836 . . . [Heating and cooling the reactor (B01J 8/42 takes precedence)]
8/1845 . . . [with particles moving upwards while fluidised]
8/1854 . . . [followed by a downward movement inside the reactor to form a loop]
8/1863 . . . [followed by a downward movement outside the reactor and subsequently re-entering it]
8/1872 . . . [Details of the fluidised bed reactor (B01J 8/1836 takes precedence)]
8/1881 . . . [with particles moving downwards while fluidised]
8/189 . . . [moving downwards in a zig-zag manner]
8/20 . . . with liquid as a fluidising medium
8/22 . . . gas being introduced into the liquid
8/222 . . . [in the presence of a rotating device only]
8/224 . . . [the particles being subject to a circulatory movement (B01J 8/222 takes precedence)]
8/226 . . . [internally, i.e. the particles rotate within the vessel]
8/228 . . . [externally, i.e. the particles leaving the vessel and subsequently re-entering it]
8/24 . . . according to "fluidised-bed" technique (B01J 8/20 takes precedence)
8/245 . . . [Spouted-bed technique]
8/26 . . . with two or more fluidised beds, e.g. reactor and regeneration installations
8/28 . . . the one above the other
8/30 . . . the edge of a lower bed projecting beyond the edge of the superjacent bed
8/32 . . . with introduction into the fluidised bed of more than one kind of moving particles
8/34 . . . with stationary packing material in the fluidised bed, e.g. bricks, wire rings, baffles
8/36 . . . with fluidised bed through which there is an essentially horizontal flow of particles
8/38 . . . with fluidised bed containing a rotatable device or being subject to rotation {or to a circulatory movement, i.e. leaving a vessel and subsequently re-entering it}
8/382 . . . [with a rotatable device only]
8/384 . . . [being subject to a circulatory movement only (B01J 8/382 takes precedence)]
8/386 . . . [internally, i.e. the particles rotate within the vessel]
8/388 . . . [externally, i.e. the particles leaving the vessel and subsequently re-entering it]
8/40 . . . with fluidised bed subjected to vibrations or pulsations
8/42 . . . with fluidised bed subjected to electric current or to radiations {this sub-group includes the fluidised bed subjected to electric or magnetic fields}
8/44 . . . Fluidisation grids
8/46 . . . for treatment of endless filamentary, band or sheet material

10/00 Chemical processes in general for reacting liquid with gaseous media other than in the presence of solid particles, or apparatus specially adapted therefor (B01J 19/08 takes precedence; separation, e.g. distillation, also combined with chemical reactions B01D, e.g. B01D 3/009)
10/002 . [carried out in foam, aerosol or bubbles]
10/005 . [carried out at high temperatures in the presence of a molten material]
10/007 . [in the presence of catalytically active bodies, e.g. porous plates]
10/02 . of the thin-film type

12/00 Chemical processes in general for reacting gaseous media with gaseous media; Apparatus specially adapted therefor (B01J 3/08, B01J 8/00, B01J 19/08 take precedence)
12/002 . [carried out in the plasma state (generating or handling plasma H05H 1/00)]
12/005 . [carried out at high temperatures, e.g. by pyrolysis]
Colloid chemistry, e.g. the production of colloidal materials or their solutions, not otherwise provided for; Making microcapsules or microballoons

13/004 . . . [Preparation of soles (by physical processes B01J 13/0006, aerosols B01J 13/0005)]
13/0008 . . . [Sols of inorganic materials in water]
13/0013 . . . [from a precipitate]
13/0017 . . . [by extraction of ions from aqueous solutions]
13/0021 . . . [containing a solid organic phase]
13/0026 . . . [containing a liquid organic phase]
13/003 . . . [Preparation from aqueous soles]
13/0034 . . . [Additives, e.g. in view of promoting stabilisation or peptisation]
13/0039 . . . [Post treatment]
13/0043 . . . [containing elemental metal (for medical or diagnostical purposes A61K G01N)]
13/0047 . . . [containing a metal oxide]
13/0052 . . . [Preparation of gels]
13/0056 . . . [containing inorganic material and water]
13/006 . . . [by precipitation, coagulation, hydrolyse coacervation]
13/0065 . . . [containing an organic phase]
13/0069 . . . [Post treatment]
13/0073 . . . [Preparation of non-Newtonian soles, e.g. thixotropic solutions]
13/0078 . . . [containing inorganic material and water]
13/0082 . . . [containing an organic phase]
13/0086 . . . [Preparation of soles by physical processes (colloid mills B02C)]
13/0091 . . . [Preparation of aerogels, e.g. xerogels]
13/0095 . . . [Preparation of aerosols]
13/02 . . . Making microcapsules or microballoons {{(for medical preparations A61K 9/50)}
13/025 . . . [Applications of microcapsules not provided for in other subclasses]
13/04 . . . by physical processes, e.g. drying, spraying
13/043 . . . [Drying and spraying]
13/046 . . . [combined with gelification or coagulation]
13/06 . . . by phase separation
13/08 . . . Simple coacervation, i.e. addition of highly hydrophilic material {{combined with spraying B01J 13/043; combined with mechanical division B01J 13/044)}
13/10 . . . Complex coacervation, i.e. interaction of oppositely charged particles
13/12 . . . removing solvent from the wall-forming material solution
13/125 . . . [by evaporation of the solvent (apparatus therefor B01J 13/043)]
13/14 . . . Polymerisation; cross-linking
13/16 . . . Interfacial polymerisation
13/18 . . . In situ polymerisation with all reactants being present in the same phase
13/185 . . . [in an organic phase]
13/20 . . . After-treatment of capsule walls, e.g. hardening
13/203 . . . [Exchange of core-forming material by diffusion through the capsule wall]
13/206 . . . [Hardening; drying]
19/08 . Processes employing the direct application of electric or wave energy, or particle radiation; Apparatus therefor (application of shock waves B01J 3/08)
19/081 . [employing particle radiation or gamma-radiation]
19/082 . [Gamma-radiation only]
19/084 . [Neutron beams only]
19/085 . [Electron beams only]
19/087 . [employing electric or magnetic energy]
19/088 . [giving rise to electric discharges (for heating purposes H05B 7/00; for the production of ozone C01B 13/11, H01T 19/00)]
19/10 . employing sonic or ultrasonic vibrations
19/12 . employing electromagnetic waves
19/121 . [Coherent waves, e.g. laser beams (lasers per se H01S 3/00)]
19/122 . [Incoherent waves (gamma-radiation B01J 19/082)]
19/123 . [Ultra-violet light]
19/124 . [generated by microwave irradiation]
19/125 . [X-rays]
19/126 . [Microwaves]
19/127 . [Sunlight; Visible light]
19/128 . [Infra-red light]
19/129 . [Radiofrequency]
19/14 . Production of inert gas mixtures; Use of inert gases in general
19/16 . Preventing evaporation or oxidation of non-metallic liquids by applying a floating layer, e.g. of microballoons (in storage tanks B65D 90/42)
19/18 . Stationary reactors having moving elements inside (B01J 19/08, B01J 19/26 take precedence)
19/1806 . [resulting in a turbulent flow of the reactants, such as in centrifugal-type reactors, or having a high Reynolds-number]
19/1812 . [Tubular reactors]
19/1818 . [in series]
19/1825 . [in parallel]
19/1831 . [spirally, concentrically or zigzag wound]
19/1837 . [Loop-type reactors]
19/1843 . [Concentric tube]
19/185 . [of the pulsating type]
19/1856 . [placed in parallel]
19/1862 . [placed in series]
19/1868 . [resulting in a loop-type movement]
19/1875 . [internally, i.e. the mixture circulating inside the vessel such that the upwards stream is separated physically from the downwards stream(s)]
19/1881 . [externally, i.e. the mixture leaving the vessel and subsequently re-entering it]
19/1887 . [forming a thin film]
19/1893 . [Membrane reactors (membranes B01D 71/00; catalytic membranes B01J 35/065)]
19/20 . in the form of helices, e.g. screw reactors
19/22 . in the form of endless belts
19/24 . Stationary reactors without moving elements inside (B01J 19/08, B01J 19/26 take precedence; with stationary particles B01J 8/02)
19/2405 . [provoking a turbulent flow of the reactants, such as in cyclones, or having a high Reynolds-number]
19/241 . [of the pulsating type]
19/2415 . [Tubular reactors]
19/242 . [in series]
19/2425 . [in parallel]
19/243 . [spirally, concentrically or zigzag wound]
19/2435 . [Loop-type reactors]
19/244 . [Concentric tubes]
19/2445 . [placed in parallel]
19/245 . [placed in series]
19/2455 . [provoking a loop type movement of the reactants (tubular loop-type reactors B01J 19/2435; loop reactors having moving elements inside B01J 19/1868)]
19/246 . [internally, i.e. the mixture circulating inside the vessel such that the upward stream is separated physically from the downward stream(s)]
19/2465 . [externally, i.e. the mixture leaving the vessel and subsequently re-entering it]
19/247 . [Suited for forming thin films]
19/2475 . [Membrane reactors]
19/248 . [Reactors comprising multiple separated flow channels]
19/2485 . [Monolithic reactors]
19/249 . [Plate-type reactors]
19/2495 . [Net-type reactors]
19/26 . Nozzle-type reactors, i.e. the distribution of the initial reactants within the reactor is effected by their introduction or injection through nozzles
19/28 . Moving reactors, e.g. rotary drums (B01J 19/08 takes precedence)
19/285 . [Shaking or vibrating reactors; reactions under the influence of low-frequency vibrations or pulsations (for sonic and ultrasonic vibrations B01J 19/10)]
19/30 . Loose or shaped packing elements, e.g. Raschig rings or Berl saddles, for pouring into the apparatus for mass or heat transfer
19/305 . [Supporting elements therefor, e.g. grids, perforated plates]
19/32 . Packing elements in the form of grids or built-up elements for forming a unit or module inside the apparatus for mass or heat transfer
19/325 . [Attachment devices therefor, e.g. hooks, consoles, brackets]

Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

NOTES
1. In groups B01J 70/00 - B01J 31/00, metal salts having an anion composed of metal and oxygen only, e.g. molybdates, are considered as chemically bound mixtures of the component metal oxides.
2. Attention is drawn to the definitions of groups of chemical elements following the title of section C.
3. In group B01J 20/00 and in each set of groups B01J 21/00 - B01J 31/00 and B01J 32/00 - B01J 38/00, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
4. Pure compounds or elements, or their recovery from solid sorbent compositions, filter aid compositions, or catalysts, are classified in the appropriate subclass for chemical compounds or elements. However, when it is explicitly stated that the pure compound
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

or element, in a particular form, is especially useful as a solid sorbent, filter aid, or catalyst, it is further classified in group B01J 20/00 or B01J 35/00.

5. In groups B01J 21/00 - B01J 38/00, the following term is used with the meaning indicated:
   • “catalyst” covers also a carrier forming part of the catalyst.

6. [Classification of the:
   • carriers;
   • forms or physical properties;
   • preparation or activation;
   • regeneration or reactivation of catalysts according to more than one of main groups B01J 21/00 - B01J 31/00 is made in the following general groups:
     • B01J 32/00 for such carriers;
     • B01J 35/00 for such forms or physical properties;
     • B01J 37/00 for such preparation or activation;
     • B01J 38/00 for such regeneration or reactivation.]

20/00 Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Processes for preparing, regenerating or reactivating thereof

20/02 . . . comprising inorganic material
20/0203 . . . [comprising compounds of metals not provided for in B01J 20/04 (oxides or hydroxides thereof B01J 20/06)]

NOTE

Compounds classified in group B01J 20/0203 and subgroups are also classified in B01J 20/0274 according to the type of anion

20/0207 . . . [Compounds of Sc, Y or Lanthanides]
20/0211 . . . [Compounds of Ti, Zr, Hf]
20/0214 . . . [Compounds of V, Nb, Ta]
20/0218 . . . [Compounds of Cr, Mo, W]
20/0222 . . . [Compounds of Mn, Re]
20/0225 . . . [Compounds of Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt]
20/0229 . . . [Compounds of Fe]
20/0233 . . . [Compounds of Cu, Ag, Au]
20/0237 . . . [Compounds of Cu]
20/024 . . . [Compounds of Zn, Cd, Hg]
20/0244 . . . [Compounds of Zn]
20/0248 . . . [Compounds of B, Al, Ga, In, TI (B01J 20/08 takes precedence)]
20/0251 . . . [Compounds of Si, Ge, Sn, Pb (B01J 20/10 takes precedence)]
20/0255 . . . [Compounds of Pb]
20/0259 . . . [Compounds of N, P, As, Sb, Bi]
20/0262 . . . [Compounds of O, S, Se, Te]
20/0266 . . . [Compounds of S]
20/027 . . . [Compounds of F, Cl, Br, I]
20/0274 . . . [characterised by the type of anion]
20/0277 . . . [Carbonates of compounds other than those provided for in B01J 20/043]
20/0281 . . . [Sulfates of compounds other than those provided for in B01J 20/043]
20/0285 . . . [Sulfides of compounds other than those provided for in B01J 20/043]
20/0288 . . . [Halides of compounds other than those provided for in B01J 20/046]
20/0292 . . . [Phosphates of compounds other than those provided for in B01J 20/048]
20/0296 . . . [Nitrates of compounds other than those provided for in B01J 20/04]
20/04 . . . comprising compounds of alkali metals, alkaline earth metals or magnesium
20/041 . . . [Oxides or hydroxides]
20/043 . . . [Carbonates or bicarbonates, e.g. limestone, dolomite, aragonite]
20/045 . . . [containing sulfur, e.g. sulfates, thiosulfates, gypsum]
20/046 . . . [containing halogens, e.g. halides]
20/048 . . . [containing phosphorus, e.g. phosphates, apatites, hydroxyapatites]
20/06 . . . comprising oxides or hydroxides of metals not provided for in group B01J 20/04
20/08 . . . comprising aluminium oxide or hydroxide; comprising bauxite
20/10 . . . comprising silica or silicate
20/103 . . . [comprising silica]
20/106 . . . [Perlite]
20/12 . . . Naturally occurring clays or bleaching earth
20/14 . . . Diatomaceous earth
20/16 . . . Alumino-silicates (B01J 20/12 takes precedence)
20/165 . . . [Natural alumino-silicates, e.g. zeolites]
20/18 . . . Synthetic zeolitic molecular sieves
20/183 . . . [Physical conditioning without chemical treatment, e.g. drying, granulating, coating, irradiation]
20/186 . . . [Chemical treatments in view of modifying the properties of the sieve, e.g. increasing the stability or the activity, also decreasing the activity]
20/20 . . . comprising free carbon; comprising carbon obtained by carbonising processes
20/205 . . . [Carbon nanostructures, e.g. nanotubes, nanohorns, nanocones, nanoballs (carbon nanotubes per se C01B 32/15)]
20/22 . . . comprising organic material
20/223 . . . [containing metals, e.g. organo-metallic compounds, coordination complexes]
20/226 . . . [Coordination polymers, e.g. metal-organic frameworks [MOF], zeolitic imidazolate frameworks [ZIF] (preparation of metal complexes containing carboxylic acid moieties C07C 51/418; MOF's per se C07F)]
20/24 . . . Naturally occurring macromolecular compounds, e.g. humic acids or their derivatives
20/26 . . . Synthetic macromolecular compounds
20/261 . . . [obtained by reactions only involving carbon to carbon unsaturated bonds (macromolecular compounds obtained by reactions only involving carbon-to-carbon unsaturated bonds per se C08F)]
20/262 . . . [obtained otherwise than by reactions only involving carbon to carbon unsaturated bonds, e.g. obtained by polycondensation (macromolecular compounds obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds per se C08G)]
20/264 . . . [derived from different types of monomers, e.g. linear or branched copolymers, block copolymers, graft copolymers]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

B01J

20/265 ... [modified or post-treated polymers (polymer carriers or substrates subjected to further impregnating or coating B01J 20/268)]

20/267 ... [Cross-linked polymers]

20/268 ... [Polymers created by use of a template, e.g. molecularly imprinted polymers]

20/26 ... characterised by their form or physical properties

20/28002 ... [characterised by their physical properties]

20/28004 ... [Sorbent size or size distribution, e.g. particle size]

20/28007 ... [with size in the range 1-100 nanometers, e.g. nanosized particles, nanofibers, nanotubes, nanowires or the like (carbon nanostructures B01J 20/205)]

20/28009 ... [Magnetic properties]

20/28011 ... [Other properties, e.g. density, crush strength]

20/28014 ... [characterised by their form]

20/28016 ... [Particle form]

20/28019 ... [Spherical, ellipsoidal or cylindrical]

20/28021 ... [Hollow particles, e.g. hollow spheres, microspheres or cenospheres]

20/28023 ... [Fibres or filaments (fibres or filaments in the form of membranes B01J 20/2838; B01J 20/28007 takes precedence)]

20/28026 ... [Particles within, immobilised, dispersed, entrapped in or on a matrix, e.g. a resin]

20/28028 ... [Particles immobilised within fibres or filaments]

20/2803 ... [Sorbents comprising a binder, e.g. for forming aggregated, agglomerated or granulated products]

20/28033 ... [Membrane, sheet, cloth, pad, lamellar or mat]

20/28035 ... [with more than one layer, e.g. laminates, separated sheets]

20/28038 ... [Membranes or mats made from fibres or filaments]

20/2804 ... [Sheets with a specific shape, e.g. corrugated, folded, pleated, helical]

20/28042 ... [Shaped bodies; Monolithic structures]

20/28045 ... [Honeycomb or cellular structures; Solid foams or sponges]

20/28047 ... [Gels]

20/2805 ... [Sorbents inside a permeable or porous casing, e.g. inside a container, bag or membrane]

20/28052 ... [Several layers of identical or different sorbents stacked in a housing, e.g. in a column]

20/28054 ... [characterised by their surface properties or porosity]

20/28057 ... [Surface area, e.g. B.E.T specific surface area]

20/28059 ... [being less than 100 m²/g]

20/28061 ... [being in the range 100-500 m²/g]

20/28064 ... [being in the range 500-1000 m²/g]

20/28066 ... [being more than 1000 m²/g]

20/28069 ... [Pore volume, e.g. total pore volume, mesopore volume, micropore volume]

20/28071 ... [being less than 0.5 ml/g]

20/28073 ... [being in the range 0.5-1.0 ml/g]

20/28076 ... [being more than 1.0 ml/g]

20/28078 ... [Pore diameter]

20/2808 ... [being less than 2 nm, i.e. micropores or nanopores]

20/28083 ... [being in the range 2-50 nm, i.e. mesopores]

20/28085 ... [being more than 50 nm, i.e. macropores]

20/28088 ... [Pore-size distribution]

20/2809 ... [Monomodal or narrow distribution, uniform pores]

20/28092 ... [Bimodal, polymodal, different types of pores or different pore size distributions in different parts of the sorbent]

20/28095 ... [Shape or type of pores, voids, channels, ducts]

20/28097 ... [being coated, filled or plugged with specific compounds]

20/281 ... Sorbents specially adapted for preparative, analytical or investigative chromatography

NOTE

In groups B01J 20/281 - B01J 20/292 it is desirable to add indexing codes for aspects relating to sorbents specially adapted for preparative, analytical or investigative chromatography. The indexing codes are chosen from groups B01J 2220/80 - B01J 2220/86

20/282 ... Porous sorbents (ion exchange B01J 39/00 - B01J 41/00)

20/283 ... based on silica

20/284 ... based on alumina

20/285 ... based on polymers

20/286 ... Phases chemically bonded to a substrate, e.g. to silica or to polymers

20/287 ... Non-polar phases; Reversed phases

20/288 ... Polar phases

20/289 ... bonded via a spacer

20/29 ... Chiral phases

20/291 ... Gel sorbents

20/292 ... Liquid sorbents

20/30 ... Processes for preparing, regenerating, or reactivating

20/3007 ... [Moulding, shaping or extruding]

20/3014 ... [Kneading]

20/3021 ... [Milling, crushing or grinding]

20/3028 ... [Granulating, agglomerating or aggregating]

20/3035 ... [Compressing]

20/3042 ... [Use of binding agents; addition of materials ameliorating the mechanical properties of the produced sorbent]

20/305 ... [Addition of material, later completely removed, e.g. as result of heat treatment, leaching or washing, e.g. for forming pores]

20/3057 ... [Use of a templating or imprinting material (molecularly imprinted polymers B01J 20/268); filling pores of a substrate or matrix followed by the removal of the substrate or matrix]

20/3064 ... [Addition of pore forming agents, e.g. pore inducing or porogenic agents]

20/3071 ... [Washing or leaching]

20/3078 ... [Thermal treatment, e.g. calcining or pyrolyzing]

20/3085 ... [Chemical treatments not covered by groups B01J 20/3007 - B01J 20/3078]

20/3092 ... [Packing of a container, e.g. packing a cartridge or column (of chromatography columns B01D 15/206)]

20/32 ... Impregating or coating [; Solid sorbent compositions obtained from processes involving impregating or coating]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

20/3202 . . . . [characterised by the carrier, support or substrate used for impregnation or coating]
20/3204 . . . . [Inorganic carriers, supports or substrates]
20/3206 . . . . [Organic carriers, supports or substrates]
20/3208 . . . . [Polymeric carriers, supports or substrates]
20/321 . . . . [consisting of a polymer obtained by reactions involving only carbon to carbon unsaturated bonds]
20/3212 . . . . [consisting of a polymer obtained by reactions otherwise than involving only carbon to carbon unsaturated bonds]
20/3214 . . . . [characterised by the method for obtaining this coating or impregnating]
20/3217 . . . . [Resulting in a chemical bond between the coating or impregnating layer and the carrier, support or substrate, e.g. a covalent bond]
20/3219 . . . . [involving a particular spacer or linking group, e.g. for attaching an active group]
20/3221 . . . . [the chemical bond being an ionic interaction]
20/3223 . . . . [by means of an adhesive agent]
20/3225 . . . . [involving a post-treatment of the coated or impregnated product]
20/3227 . . . . [by end-capping, i.e. with or after the introduction of functional or ligand groups]
20/3229 . . . . [for preventing leaching, leaking of attached functional or ligand groups]
20/3231 . . . . [characterised by the coating or impregnating layer]
20/3234 . . . . [Inorganic material layers]
20/3236 . . . . [containing metal, other than zeolites, e.g. oxides, hydroxides, sulphides or salts]
20/3238 . . . . [containing any type of zeolite]
20/324 . . . . [containing free carbon, e.g. activated carbon]
20/3242 . . . . [Layers with a functional group, e.g. an affinity material, a ligand, a reactant or a complexing group]
20/3244 . . . . [Non-macromolecular compounds]
20/3246 . . . . [having a well defined chemical structure]
20/3248 . . . . [the functional group or the linking, spacer or anchoring group as a whole comprising at least one type of heteroatom selected from a nitrogen, oxygen or sulfur, these atoms not being part of the carrier as such]
20/3251 . . . . [comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulphur]
20/3253 . . . . [comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures]
20/3255 . . . . [comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. heterocyclic or heteroaromatic structures]
20/3257 . . . . . . . . [the functional group or the linking, spacer or anchoring group as a whole comprising at least one of the heteroatoms nitrogen, oxygen or sulfur together with at least one silicon atom, these atoms not being part of the carrier as such]
20/3259 . . . . . . . . [comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulfur with at least one silicon atom]
20/3261 . . . . . . . . [comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures]
20/3263 . . . . . . . . [comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. a heterocyclic or heteroaromatic structure]
20/3265 . . . . . . . . [with an organic functional group containing a metal, e.g. a metal affinity ligand]
20/3268 . . . . . . . . [Macromolecular compounds]
20/327 . . . . . . . . . [Polymers obtained by reactions involving only carbon to carbon unsaturated bonds]
20/3272 . . . . . . . . . [Polymers obtained by reactions otherwise than involving only carbon to carbon unsaturated bonds]
20/3274 . . . . . . . . . [Proteins, nucleic acids, polysaccharides, antibodies or antigens]
20/3276 . . . . . . . . . [Copolymers]
20/3278 . . . . . . . . . [Polymers being grafted on the carrier]
20/328 . . . . . . . . . . [Polymers on the carrier being further modified]
20/3282 . . . . . . . . . [Crosslinked polymers]
20/3285 . . . . . . . . . [Coating or impregnation layers comprising different type of functional groups or interactions, e.g. different ligands in various parts of the sorbent, mixed mode, dual zone, bimodal, multimodal, ionic or hydrophobic, cationic or anionic, hydrophilic or hydrophobic]
20/3287 . . . . . . . . . [Layers in the form of a liquid]
20/3289 . . . . . . . . . [Coatings involving more than one layer of same or different nature]
20/3291 . . . . . . . . . [Characterised by the shape of the carrier, the coating or the obtained coated product]
20/3293 . . . . . . . . . [Coatings on a core, the core being particle or fiber shaped, e.g. encapsulated particles, coated fibers]
20/3295 . . . . . . . . . [Coatings made of particles, nanoparticles, fibers, nanofibers]
20/3297 . . . . . . . . . [Coatings in the shape of a sheet]
20/34 . . . . . . . . . . . . Regenerating or reactivating
20/3408 . . . . . . . . . . . . [of aluminosilicate molecular sieves]
20/3416 . . . . . . . . . . . . [of sorbents or filter aids comprising free carbon, e.g. activated carbon]
20/3425 . . . . . . . . . . . . [of sorbents or filter aids comprising organic materials]
20/3433 . . . . . . . . . . . . [of sorbents or filter aids other than those covered by B01J 20/3408 - B01J 20/3425]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

B01J

23/00 Catalysts comprising metals or metal oxides or hydroxides, not provided for in group B01J 21/00 (B01J 21/00 takes precedence)

23/002 . . . (Mixed oxides other than spinels, e.g. perovskite)

NOTE

In group B01J 23/002, elements constituting the exemplified mixed oxide are further indexed under the form of a C-set with B01J 2523/00 as base symbol using the relevant classification symbols of B01J 23/10 - B01J 23/847, in numerical order, as further symbols and separated by , e.g. the mixed oxide Mo₆V₅Te₆O₂₇ is classified as (B01J 2523/00, B01J 2523/55, B01J 2523/64, B01J 2523/68).

23/005 . . . (Spinels]

23/007 . . . (Mixed salts]

23/002 . . . of the alkali- or alkaline earth metals or beryllium

23/04 . . . of Alkali metals

23/06 . . . of zinc, cadmium or mercury

23/08 . . . of gallium, indium or thallium

23/10 . . . of rare earths

23/12 . . . of actinides

23/14 . . . of germanium, tin or lead

23/16 . . . of arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

23/18 . . . Arsenic, antimony or bismuth

23/20 . . . Vanadium, niobium or tantalum

23/22 . . . Vanadium

23/24 . . . Chromium, molybdenum or tungsten

23/26 . . . Chromium

23/28 . . . Molybdenum

23/30 . . . Tungsten

23/31 . . . combined with bismuth

23/32 . . . Manganese, technetium or rhenium

23/34 . . . Manganese

23/36 . . . Rhenium

23/38 . . . of noble metals

23/40 . . . of the platinum group metals

23/42 . . . Platinum

23/44 . . . Palladium

23/46 . . . Ruthenium, rhodium, osmium or iridium

23/462 . . . [Ruthenium]

23/464 . . . [Rhodium]

23/466 . . . [Osmium]

23/468 . . . [Iridium]

23/48 . . . Silver or gold

23/50 . . . Silver

23/52 . . . Gold

23/54 . . . combined with metals, oxides or hydroxides provided for in groups B01J 23/02 - B01J 23/36

23/56 . . . Platinum group metals

23/58 . . . with alkali- or alkaline earth metals

23/60 . . . with zinc, cadmium or mercury

23/62 . . . with gallium, indium, thallium, germanium, tin or lead

23/622 . . . [with germanium, tin or lead]

23/624 . . . [with germanium]

23/626 . . . [with tin]

23/628 . . . [with lead]

23/63 . . . with rare earths or actinides

23/64 . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

23/644 . . . Arsenic, antimony or bismuth

23/6442 . . . [Arsenic]

23/6445 . . . [Antimony]

23/6447 . . . [Bismuth]

23/648 . . . Vanadium, niobium or tantalum {or polonium}

23/6482 . . . [Vanadium]

23/6484 . . . [Niobium]

23/6486 . . . [Tantalum]

23/6488 . . . [Polonium]

23/652 . . . Chromium, molybdenum or tungsten

23/6522 . . . [Chromium]

23/6525 . . . [Molybdenum]

23/6527 . . . [Tungsten]

23/656 . . . Manganese, technetium or rhenium

23/6562 . . . [Manganese]

23/6565 . . . [Technetium]

23/6567 . . . [Rhenium]

23/66 . . . Silver or gold

23/68 . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

23/681 . . . [with arsenic, antimony or bismuth]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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23/682 . . . . . (with vanadium, niobium, tantalum or polonium)
23/683 . . . . . (with chromium, molybdenum or tungsten)
23/685 . . . . . (with chromium)
23/686 . . . . . (with molybdenum)
23/687 . . . . . (with tungsten)
23/688 . . . . . (with manganese, technetium or rhenium)
23/70 . . . of the iron group metals or copper
23/72 . . . Copper
23/74 . . . Iron group metals
23/745 . . . Iron
23/75 . . . Cobalt
23/755 . . . Nickel
23/76 . . . combined with metals, oxides or hydroxides provided for in groups B01J 23/02 - B01J 23/36
23/78 . . . with alkali- or alkaline earth metals
23/80 . . . with zinc, cadmium or mercury
23/825 . . . with gallium, indium or thallium
23/83 . . . with rare earths or actinides
23/835 . . . with germanium, tin or lead
23/84 . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
23/843 . . . Arsenic, antimony or bismuth
23/8432 . . . . . . (Arsenic)
23/8435 . . . . . . (Antimony)
23/8437 . . . . . . (Bismuth)
23/847 . . . Vanadium, niobium or tantalum (or polonium)
23/8472 . . . . . . (Vanadium)
23/8474 . . . . . . (Niobium)
23/8476 . . . . . . (Tantalum)
23/8478 . . . . . . (Polonium)
23/85 . . . Chromium, molybdenum or tungsten
23/86 . . . Chromium
23/862 . . . . . . (Iron and chromium)
23/864 . . . . . . (Cobalt and chromium)
23/866 . . . . . . (Nickel and chromium)
23/868 . . . . . . (Copper and chromium)
23/88 . . . . . . Molybdenum
23/881 . . . . . . and iron
23/882 . . . . . . and cobalt
23/883 . . . . . . and nickel
23/885 . . . . . . and copper
23/887 . . . . . . containing in addition other metals, oxides or hydroxides provided for in groups B01J 23/02 - B01J 23/36
23/8871 . . . . . . . (Rare earth metals or actinides)
23/8872 . . . . . . . (Alkali or alkaline earth metals)
23/8873 . . . . . . . (Zinc, cadmium or mercury)
23/8874 . . . . . . . (Gallium, indium or thallium)
23/8875 . . . . . . . (Germanium, tin or lead)
23/8876 . . . . . . . (Arsenic, antimony or bismuth)
23/8877 . . . . . . . (Vanadium, tantalum, niobium or polonium)
23/8878 . . . . . . . (Chromium)
23/888 . . . . . . Tungsten
23/8885 . . . . . . containing also molybdenum
23/889 . . . . . . Manganese, technetium or rhenium
23/8892 . . . . . . (Manganese)
23/8894 . . . . . . (Technetium)
23/8896 . . . . . . (Rhenium)
23/8898 . . . . . . (containing also molybdenum)
23/89 . . . combined with noble metals
23/8906 . . . . . . (Iron and noble metals)
23/8913 . . . . . . (Cobalt and noble metals)
23/892 . . . . . . (Nickel and noble metals)
23/8926 . . . . . . (Copper and noble metals)
23/8933 . . . . . . (also combined with metals, or metal oxides or hydroxides provided for in groups B01J 23/02 - B01J 23/36)
23/894 . . . . . . (with rare earths or actinides)
23/8946 . . . . . . (with alkali or alkaline earth metals)
23/8953 . . . . . . (with zinc, cadmium or mercury)
23/896 . . . . . . (with gallium, indium or thallium)
23/8966 . . . . . . (with germanium, tin or lead)
23/8973 . . . . . . (with arsenic, antimony or bismuth)
23/898 . . . . . . (with vanadium, tantalum, niobium or polonium)
23/8986 . . . . . . (with manganese, technetium or rhenium)
23/8993 . . . . . . (with chromium, molybdenum or tungsten)
23/90 . . . Regeneration or reactivation
23/92 . . . of catalysts comprising metals, oxides or hydroxides provided for in groups B01J 23/02 - B01J 23/36
23/94 . . . of catalysts comprising metals, oxides or hydroxides of the iron group metals or copper
23/96 . . . of catalysts comprising metals, oxides or hydroxides of the noble metals

25/00 Catalysts of the Raney type
25/02 . . . Raney nickel
25/04 . . . Regeneration or reactivation

27/00 Catalysts comprising the elements or compounds of halogens, sulfur, selenium, tellurium, phosphorus or nitrogen; Catalysts comprising carbon compounds

NOTE
Metal catalysts or metal oxide catalysts activated or conditioned by halogens, sulfur or phosphorus, or compounds thereof are classified in the appropriate groups for metal or metal oxide catalysts

27/02 . . . Sulfur, selenium or tellurium; Compounds thereof
27/04 . . . Sulfides
27/043 . . . . . . with iron group metals or platinum group metals
27/045 . . . . . . Platinum group metals
27/047 . . . . . . with chromium, molybdenum, tungsten or polonium
27/049 . . . . . . with iron group metals or platinum group metals
27/051 . . . . . . Molybdenum
27/0515 . . . . . . (with iron group metals or platinum group metals)
27/053 . . . . . . Sulfates
27/055 . . . . . . with alkali metals, copper, gold or silver
27/057 . . . . . . Selenium or tellurium; Compounds thereof
27/0573 . . . . . . (Selenium; Compounds thereof)
27/0576 . . . . . . (Tellurium; Compounds thereof)
27/06 . . . Halogens; Compounds thereof
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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27/08 . . . Halides
27/10 . . . Chlorides
27/12 . . . Fluorides
27/122 . . . of copper
27/125 . . . with scandium, yttrium, aluminium, gallium, indium or thallium
27/128 . . . with iron group metals or platinum group metals
27/13 . . . Platinum group metals
27/132 . . . with chromium, molybdenum, tungsten or polonium
27/135 . . . with titanium, zirconium, hafnium, germanium, tin or lead
27/138 . . . with alkaline earth metals, magnesium, beryllium, zinc, cadmium or mercury
27/14 . . Phosphorus; Compounds thereof
27/16 . . containing oxygen, i.e. acids, anhydrides and their derivates with N, S, B or halogens without carriers or on carriers based on C, Si, Al or Zr; also salts of Si, Al and Zr
27/18 . . with metals (other than Al or Zr)
27/1802 . . . (Salts or mixtures of anhydrides with compounds of other metals than V, Nb, Ta, Cr, Mo, W, Mn, Tc, Re, e.g. phosphates, thiophosphates)
27/1804 . . . (with rare earths or actinides)
27/1806 . . . (with alkaline or alkaline earth metals)
27/1808 . . . (with zinc, cadmium or mercury)
27/1811 . . . (with gallium, indium or thallium)
27/1813 . . . (with germanium, tin or lead)
27/1815 . . . (with arsenic, antimony or bismuth)
27/1817 . . . (with copper, silver or gold)
27/182 . . . with silicon
27/185 . . . with iron group metals or platinum group metals
27/1853 . . . (with iron, cobalt or nickel)
27/1856 . . . (with platinum group metals)
27/186 . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
27/187 . . . with manganese, technetium or rhenium
27/188 . . . with chromium, molybdenum, tungsten or polonium
27/19 . . . Molybdenum
27/192 . . . with bismuth
27/195 . . . with vanadium, niobium or tantalum
27/198 . . . Vanadium
27/199 . . . . with chromium, molybdenum, tungsten or polonium
27/20 . . . Carbon compounds
27/22 . . . Carbies
27/224 . . . Silicon carbide
27/228 . . . with phosphorus, arsenic, antimony or bismuth
27/232 . . . Carbonates
27/236 . . . Hydroxy carbonates
27/24 . . . Nitrogen compounds
27/25 . . . Nitrates
27/26 . . . Cyanides
27/28 . . . Regeneration or reactivation
27/285 . . . {of catalysts comprising compounds of phosphorus}
27/30 . . . of catalysts comprising compounds of sulfur, selenium or tellurium

27/32 . . . of catalysts comprising compounds of halogens
29/00 . . Catalysts comprising molecular compounds of halogens

NOTES

1. In this group, the following term is used with the meaning indicated:
   - "zeolites" means:
     1. crystalline aluminosilicates with base-exchange and molecular sieve properties, having three dimensional, microporous lattice framework structure of tetrahedral oxide units;
     2. 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. If metals are introduced into the framework of the molecular sieve already in the synthesis stage, B01J 29/86 - B01J 29/89 take precedence.

3. Mixtures of molecular sieve are classified in B01J 29/005 or B01J 29/80 and receive indexing codes chosen from groups B01J 29/03 - B01J 29/89 to identify the individual constituents of these mixtures.

29/005 . . . {Mixtures of molecular sieves comprising at least one molecular sieve which is not an aluminosilicate zeolite, e.g. from groups B01J 29/03 - B01J 29/49 or B01J 29/82 - B01J 29/89}
29/03 . . . (B01J 29/005 takes precedence)
29/0308 . . . [Mesoporous materials not having base exchange properties, e.g. Si-MCM-41]
29/0316 . . . [containing iron group metals, noble metals or copper]
29/0325 . . . [Noble metals]
29/0333 . . . [Iron group metals or copper]
29/0341 . . . [containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium]
29/035 . . . [Microporous crystalline materials not having base exchange properties, such as] silica polymorphs, e.g. silicalites
29/0352 . . . [containing iron group metals, noble metals or copper]
29/0354 . . . [Noble metals]
29/0356 . . . [Iron group metals or copper]
29/0358 . . . [containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium]
29/04 . . . having base-exchange properties, e.g. crystalline zeolites (B01J 29/2005 takes precedence)
29/041 . . . [Mesoporous materials having base exchange properties, e.g. Si/Al-MCM-41]
29/042 . . . [containing iron group metals, noble metals or copper]
29/043 . . . [Noble metals]
29/044 . . . [Iron group metals or copper]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

29/045 . . . [containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium]

29/046 . . . [Chromiasilicates; Aluminochromasilicates (B01J 29/005 takes precedence)]

29/047 . . . [Germanosilicates; Aluminogermanosilicates (B01J 29/005 takes precedence)]

29/048 . . . [Zincosilicates, Aluminozincosilicates (B01J 29/005 takes precedence)]

29/049 . . . [Pillared clays]

29/06 . . . Crystalline aluminosilicate zeolites; Isomorphous compounds thereof

29/061 . . . [containing metallic elements added to the zeolite]

2029/062 . . . [Mixtures of different aluminosilicates]

29/064 . . . containing iron group metals, noble metals or copper

29/068 . . . . Noble metals

29/072 . . . . Iron group metals or copper

29/076 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/08 . . . of the faujasite type, e.g. type X or Y

2029/081 . . . [Increasing the silica/alumina ratio; Desalumination]

29/082 . . . . [X-type faujasite]

29/084 . . . . [Y-type faujasite]

29/085 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/087 . . . . [X-type faujasite]

29/088 . . . . [Y-type faujasite]

29/10 . . . containing iron group metals, noble metals or copper

29/103 . . . . [X-type faujasite]

29/106 . . . . [Y-type faujasite]

29/12 . . . . Noble metals

29/123 . . . . [X-type faujasite]

29/126 . . . . [Y-type faujasite]

29/14 . . . . Iron group metals or copper

29/143 . . . . [X-type faujasite]

29/146 . . . . [Y-type faujasite]

29/16 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/163 . . . . [X-type faujasite]

29/166 . . . . [Y-type faujasite]

29/18 . . . . of the mordenite type

29/185 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/20 . . . containing iron group metals, noble metals or copper

29/22 . . . . Noble metals

29/24 . . . . Iron group metals or copper

29/26 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/40 . . . . of the pentasil type, e.g. types ZSM-5, ZSM-8 or ZSM-11, as exemplified by patent documents US3702886, GB1334243 and US3709979, respectively

29/405 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/42 . . . . containing iron group metals, noble metals or copper

29/44 . . . . Noble metals

29/46 . . . . Iron group metals or copper

29/48 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/50 . . . . of the erionite or offretite type, e.g. zeolite T, as exemplified by patent document US2950952

29/505 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/52 . . . . containing iron group metals, noble metals or copper

29/54 . . . . Noble metals

29/56 . . . . Iron group metals or copper

29/58 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/60 . . . . of the type L, as exemplified by patent document US3216789

29/605 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/61 . . . . containing iron group metals, noble metals or copper

29/62 . . . . Noble metals

29/63 . . . . Iron group metals or copper

29/64 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/65 . . . . of the ferrierite type, e.g. types ZSM-21, ZSM-35 or ZSM-38, as exemplified by patent documents US4046859, US4016245 and US4046859, respectively

29/655 . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]

29/66 . . . . containing iron group metals, noble metals or copper

29/67 . . . . Noble metals

29/68 . . . . Iron group metals or copper

29/69 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

29/70 . . . . of types characterised by their specific structure not provided for in groups B01J 29/08 - B01J 29/65

29/7003 . . . [A-type]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

29/7007 . . . . . . . [Zeolite Beta]
29/7011 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/7015 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7019 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7023 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7026 . . . . . . . [MFS-type, e.g. ZSM-57]
29/703 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7034 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7038 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7042 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7046 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/7049 . . . . . . . [containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead]
29/7053 . . . . . . . [A-type]
29/705 . . . . . . . [Zeolite Beta]
29/7061 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/7065 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7069 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7073 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7076 . . . . . . . [MFS-type, e.g. ZSM-57]
29/708 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7084 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7088 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7092 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7096 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/72 . . . . . . . containing iron group metals, noble metals or copper
29/7207 . . . . . . . [A-type]
29/7215 . . . . . . . [Zeolite Beta]
29/7223 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/723 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7238 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7246 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7253 . . . . . . . [MFS-type, e.g. ZSM-57]
29/7261 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7269 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7276 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7284 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7292 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/74 . . . . . . . Noble metals
29/7407 . . . . . . . [A-type]
29/7415 . . . . . . . [Zeolite Beta]
29/7423 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/743 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7438 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7446 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7453 . . . . . . . [MFS-type, e.g. ZSM-57]
29/7461 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7469 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7476 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7484 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7492 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/76 . . . . . . . Iron group metals or copper
29/7607 . . . . . . . [A-type]
29/7615 . . . . . . . [Zeolite Beta]
29/7623 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/763 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7638 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7646 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7653 . . . . . . . [MFS-type, e.g. ZSM-57]
29/7661 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7669 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7676 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7684 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7692 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/78 . . . . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/7807 . . . . . . . [A-type]
29/7815 . . . . . . . [Zeolite Beta]
29/7823 . . . . . . . [MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202]
29/783 . . . . . . . [CHA-type, e.g. Chabazite, LZ-218]
29/7838 . . . . . . . [EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20]
29/7846 . . . . . . . [EUO-type, e.g. EU-1, TPZ-3 or ZSM-50]
29/7853 . . . . . . . [MFS-type, e.g. ZSM-57]
29/7861 . . . . . . . [MRE-type, e.g. ZSM-48]
29/7869 . . . . . . . [MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3]
29/7876 . . . . . . . [MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25]
29/7884 . . . . . . . [TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22]
29/7892 . . . . . . . [MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13]
29/80 . . . . . . . Mixtures of different zeolites
29/82 . . . . . . . Phosphates ((B01J 29/005 takes precedence))
29/83 . . . . . . . Aluminophosphates (APO compounds)
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

NOTES

1. Group B01J 31/003 takes precedence over groups B01J 31/0254; B01J 27/26; B01J 31/24.

2. In this group, the following terms or expressions take precedence over groups B01J 31/02; B01J 31/10; other compounds comprising anionic organonitrogen, organooxygen and organosulfur fragments with a metal bonded to these heteroatoms B01J 31/02 - B01J 31/0254.

3. When classifying in B01J 31/00, additional information for the catalysts is provided as follows:
   - (4-1) the specifically disclosed intended uses are indexed in B01J 2231/00.
   - (4-2) general aspects of the complexes of group B01J 31/16 and the specifically disclosed central metal(s) therein, as well as additional information regarding any special solvents.

31/00 Catalysts comprising hydrides, coordination complexes or organic compounds (catalyst compositions used only in polymerisation reactions C08 (catalytic antibodies C12N 9/0002))

- Aluminophosphates containing other elements, e.g. metals, boron
- Silicoaluminophosphates (SAPO compounds)
- Borosilicates; Aluminoborosilicates (B01J 29/005 takes precedence)
- Gallosilicates; Aluminogalloliosilicates; Galloborosilicates (B01J 29/005 takes precedence)
- Ferrosilicates; Ferroaluminosilicates (B01J 29/005 takes precedence)
- Silicates, aluminosilicates or borosilicates of titanium, zirconium or hafnium (B01J 29/005 takes precedence)
- Regeneration or reactivation

31/00 Catalysts comprising hydrides, coordination complexes or organic compounds (catalyst compositions used only in polymerisation reactions C08 (catalytic antibodies C12N 9/0002))
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

B01J 31/00
(continued)

used for any catalyst system of this group are indexed in B01J 2531/00.
(4-5) Conceptual articles, e.g. reviews, are separately indexed in B01J 2231/005 and B01J 2531/001;
(4-4) Additional information regarding the complexes or ligands classified in B01J 31/16 - B01J 31/24 and indexed in B01J 2540/00, e.g. non-coordinating substituents on the ligand periphery.

31/003 . {containing enzymes}

NOTE
In this group, the presence of water is disregarded for classification purposes.

31/006 . {comprising organic radicals, e.g. TEMPO}
31/02 . containing organic compounds or metal hydrides
31/0201 . {Oxygen-containing compounds}
31/0202 . {Alcohols or phenols}
31/0204 . {Ethers}
31/0205 . {comprising carbonyl groups or oxygen-containing derivatives, e.g. acetics, ketals, cyclic peroxides}
31/0207 . {Aldehydes or acetics}
31/0208 . {Ketones or ketals}
31/0209 . {esters of carboxylic or carboxonic acids}
31/0211 . {with a metal-oxygen link}
31/0212 . {Alkoxylates}
31/0214 . {Aryloxylates, e.g. phenolates}
31/0215 . {Sulfur-containing compounds}
31/0217 . {Mercaptans or thiols}
31/0218 . {Sulfides}
31/022 . {Disulfides}
31/0221 . {Polysulfides}
31/0222 . {comprising sulfonyl groups}
31/0224 . {being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds}
31/0225 . {comprising sulfonic acid groups or the corresponding salts}
31/0227 . {being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds}
31/0228 . {with a metal-sulfur link, e.g. mercaptides}
31/0229 . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0214}
31/0231 . {Halogen-containing compounds}
31/0232 . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0228
(perfluorinated sulfonyl compounds or moieties B01J 31/0224; perfluorosulfonic acids B01J 31/0227)}
31/0234 . {Nitrogen-, phosphorus-, arsenic- or antimony-containing compounds}
31/0235 . {Nitrogen containing compounds}
31/0237 . {Amines}
31/0238 . {with a primary amino group}
31/0239 . {Quaternary ammonium compounds}
31/0241 . {Imines or enamines}
31/0242 . {Enamines}
31/0244 . {with nitrogen contained as ring member in aromatic compounds or moieties, e.g. pyridine}
31/0245 . {being derivatives of carboxylic or carboxonic acids}
31/0247 . {Imides, amides or imidates (R-C=NR(OR))}
31/0248 . {Nitriles}
31/0249 . {Ureas (R2N-C(=O)NR1)}
31/0251 . {Guanidides (R3N-C(=NR)-NR3)}
31/0252 . {with a metal-nitrogen link, e.g. metal amides, metal guanidines}
31/0254 . {on mineral substrates}
31/0255 . {Phosphorus containing compounds}
31/0257 . {Phosphorus acids or phosphorus acid esters}
31/0258 . {Phosphonic acid mono-, di- or triesters ((RO)(OR')2PO2), i.e. R= C, R'= C, H}
31/0259 . {comprising phosphorous acid (-ester) groups ((RO)PO2) or the isomeric phosphonic acid (-ester) groups (R2(RO)P=O), i.e. R= C, R'= C, H}
31/0261 . {comprising phosphonous acid (-ester) groups (R2P(OR')) or the isomeric phosphine oxide groups (R3P=O), i.e. R= C, R'= C, H}
31/0262 . {comprising phosphinous acid (-ester) groups (R2P(OR')) or the isomeric phosphine oxide groups (R3P=O), i.e. R= C, R'= C, H}
31/0264 . {Phosphorus acid amides}
31/0265 . {Phosphazenes, oligomers thereof or the corresponding phosphazenium salts (polyphosphazenes per se C07F 9/067)}
31/0267 . {Phosphines or phosphonium compounds, i.e. phosphorus bonded to at least one carbon atom, including e.g. sp2-hybridised phosphorus compounds such as phosphazenene, the other atoms bonded to phosphorus being either carbon or hydrogen}
31/0268 . {Phosphonium compounds, i.e. phosphine with an additional hydrogen or carbon atom bonded to phosphorous so as to result in a formal positive charge on phosphorus}
31/0269 . {on mineral substrates}
31/0271 . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0214}
31/0272 . {containing elements other than those covered by B01J 31/0201 - B01J 31/0231}
31/0274 . {containing silicon (ligands in coordination complexes B01J 31/1608)}
31/0275 . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0269}
31/0277 . {comprising ionic liquids, as components in catalyst systems or catalysts per se, the ionic liquid compounds being used in the molten state at the respective reaction temperature}
31/0278 . {containing nitrogen as cationic centre}
31/0279 . {the cationic portion being acyclic or nitrogen being a substituent on a ring}
31/0281 . {the nitrogen being a ring member}
31/0282 . {of an aliphatic ring, e.g. morpholinium}
31/0284 . {of an aromatic ring, e.g. pyridinium}
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

B01J

31/0285 . . . . [also containing elements or functional groups covered by B01J 31/0201; B01J 31/0274]
31/0287 . . . . [containing atoms other than nitrogen as cationic centre]
31/0288 . . . . [Phosphorus]
31/0289 . . . . [Sulfur]
31/0291 . . . . [also containing elements or functional groups covered by B01J 31/0201; B01J 31/0274]
31/0292 . . . . [immobilised on a substrate]
31/0294 . . . . [by polar or ionic interaction with the substrate, e.g. glass]
31/0295 . . . . [by covalent attachment to the substrate, e.g. silica]
31/0297 . . . . [the substrate being a soluble polymer, dendrimer or oligomer of characteristic microstructure of groups B01J 31/061; B01J 31/068]
31/0298 . . . . [the ionic liquids being characterised by the counter-anions]
31/04 . . . . containing carboxylic acids or their salts (B01J 31/0277; B01J 31/0298 take precedence; multi-metal carboxylate complexes like Pd (II) acetate, i.e. Pd3 (OAc)6 or Cr (II) acetate, i.e. Cr2(OAc)6, B01J 31/2226)
31/06 . . . . containing polymers [organometallic polymers B01J 31/123; polymer-bound organometallic complexes B01J 31/165; coordination polymers B01J 31/1691]
31/061 . . . . [Chiral polymers]
31/062 . . . . [Polymeric amino acids]
31/063 . . . . [Polymers comprising a characteristic microstructure]
31/064 . . . . [Dendrimers]
31/065 . . . . [Cyclodextrins]
31/066 . . . . [Calixarenes and hetero-analogues, e.g. thiocalixarenes]
31/067 . . . . [Molecularly imprinted polymers (catalytic antibodies C12N 9/0002)]
31/068 . . . . [Polyalkylene glycols]
31/069 . . . . [Hybrid organic-inorganic polymers, e.g. silica derivatized with organic groups (nitrogen containing groups on mineral substrates B01J 31/0254; organometallic polymers B01J 31/123; coordination complexes immobilised on an inorganic support B01J 31/1616; coordination polymers, e.g. metal-organic frameworks B01J 31/1691)]
31/08 . . . . Ion-exchange resins
31/10 . . . . sulfonated
31/12 . . . . containing organo-metallic compounds or metal hydrides
31/121 . . . . [Metal hydrides]
31/122 . . . . [Metal aryl or alkyl compounds]
31/123 . . . . [Organometallic polymers, e.g. comprising C-Si bonds in the main chain or in subunits grafted to the main chain (B01J 31/064; B01J 31/066, B01J 31/067, B01J 31/068 and B01J 31/10 take precedence; polymer-bound organometallic complexes B01J 31/165; coordination polymers B01J 31/1691; catalysts for the preparation of polysiloxanes, e.g. Karstedt catalysts C08G 77/081]
31/124 . . . . [Silicones or siloxanes or comprising such units]
31/125 . . . . [Cyclic siloxanes]
31/126 . . . . [the siloxanes or siloxane units, cyclic or not, comprising an additional Si-H bond, e.g. polyhydromethylsiloxane [PHMS]]
31/127 . . . . [the siloxane units, e.g. silsesquioxane units, being grafted onto other polymers or inorganic supports, e.g. via an organic linker]
31/128 . . . . [Mixtures of organometallic compounds]
31/14 . . . . of aluminium or boron
31/143 . . . . [of aluminium]
31/146 . . . . [of boron]
31/16 . . . containing coordination complexes
31/1608 . . . [the ligands containing silicon]
31/1616 . . . [Coordination complexes, e.g. organometallic complexes, immobilised on an inorganic support, e.g. ship-in-a-bottle type catalysts (catalysts comprising molecular sieves B01J 29/000)]
31/1625 . . . [immobilised by covalent linkages, i.e. pendant complexes with optional linking groups]
31/1633 . . . [covalent linkages via silicon containing groups]
31/1641 . . . [established via a metathesis reaction using a silicon-containing olefin]
31/165 . . . [Polymer immobilised coordination complexes, e.g. organometallic complexes]
31/1658 . . . [immobilised by covalent linkages, i.e. pendant complexes with optional linking groups, e.g. on Wang or Merrifield resins]
31/1666 . . . [the linkage established via an olefin metathesis reaction]
31/1675 . . . [the linkage being to an organometallic polymer covered by groups B01J 31/123; B01J 31/127, e.g. polyhydroxilsloxanes]
31/1683 . . . [the linkage being to a soluble polymer, e.g. PEG or dendrimer, i.e. molecular weight enlarged complexes]
31/1691 . . [Coordination polymers, e.g. metal-organic frameworks [MOF] (preparation of metal complexes containing carboxylic acid moieties C07C 51/418; MOFs per se C07F)]
31/18 . . containing nitrogen, phosphorus, arsenic or antimony (as complexing atoms, e.g. in pyridine ligands, or in resonance therewith, e.g. in isocyanide ligands CaN-R or as complexed central atoms (double metal cyanides B01J 27/26; N-heterocyclic carbenes B01J 31/2265)]
31/1805 . . . [the ligands containing nitrogen]
31/181 . . . [Cyclic ligands, including e.g. non-condensed polycyclic ligands, comprising at least one complexing nitrogen atom as ring member, e.g. pyridine]
31/1815 . . . [with more than one complexing nitrogen atom, e.g. bipyridyl, 2-aminopyridine]
31/182 . . . [comprising aliphatic or saturated rings]
31/1825 . . . [Ligands comprising condensed ring systems, e.g. acridine, carbazole]
31/183 . . . [with more than one complexing nitrogen atom, e.g. phenanthroline]
31/1835 . . . [comprising aliphatic or saturated rings]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

31/223 . . . . . . . (with only nitrogen as heteroatomic ring members, e.g. 1,3-diarylimidazoline-2-yldienes)
31/2278 . . . . . . . (Complexes comprising two carbene ligands differing from each other, e.g. Grubbs second generation catalysts)
31/2282 . . . . . . . (Unsaturated compounds used as ligands)
31/2286 . . . . . . . [Alkynes, e.g. acetylenes]
31/2291 . . . . . . . [Olefins]
31/2295 . . . . . . . [Cyclic compounds, e.g. cyclopentadienyls]
31/24 . . . . . . . Phosphines, i.e. phosphorus bonded to only carbon atoms, to both carbon and hydrogen atoms, including e.g. sp2-hybridised phosphorus compounds such as phosphabenzene, phosphole or anionic phospholide ligands)
31/2404 . . . . . . . [Cyclic ligands, including e.g. non-condensed polycyclic ligands, the phosphine-P atom being a ring member or a substituent on the ring]
31/2409 . . . . . . . (with more than one complexing phosphine-P atom)
31/2414 . . . . . . . (comprising aliphatic or saturated rings)
31/2419 . . . . . . . (comprising P as ring member)
31/2423 . . . . . . . [comprising aliphatic or saturated rings]
31/2428 . . . . . . . (with more than one complexing phosphine-P atom)
31/2433 . . . . . . . [comprising aliphatic or saturated rings]
31/2438 . . . . . . . (and further hetero atoms as ring members, excluding the positions adjacent to P)
31/2442 . . . . . . . [comprising condensed ring systems]
31/2447 . . . . . . . (and phosphine-P atoms as substituents on a ring of the condensed system or on a further attached ring)
31/2452 . . . . . . . (with more than one complexing phosphine-P atom)
31/2457 . . . . . . . (comprising aliphatic or saturated rings, e.g. Xantphos)
31/2461 . . . . . . . (and phosphine-P atoms as ring members in the condensed ring system or in a further ring)
31/2466 . . . . . . . (comprising aliphatic or saturated rings)
31/2471 . . . . . . . (with more than one complexing phosphine-P atom)
31/2476 . . . . . . . (comprising aliphatic or saturated rings)
31/248 . . . . . . . (Bridged ring systems, e.g. 9-phospha bicyclononanes)
31/2485 . . . . . . . [Tricyclic systems, e.g. phosphaadamantanes and hetero analogues]
31/249 . . . . . . . (Spiro-condensed ring systems)
31/2495 . . . . . . . [Ligands comprising a phosphine-P atom and one or more further complexing phosphorus atoms covered by groups B01J 31/1845 - B01J 31/1885, e.g. phosphine/ phosphinate or phospholyl/phosphonate ligands]
31/26 . . . . . . . containing in addition, inorganic metal compounds not provided for in groups B01J 31/02 - B01J 31/24
31/28 . . . . . . . of the platinum group metals, iron group metals or copper
31/30 . . . . . . . Halides
31/32 . . . . . . . of manganese, technetium or rhenium
31/34 . . . . . . . of chromium, molybdenum or tungsten
31/184 . . . . . . . (mixed aromatic/aliphatic ring systems, e.g. indoline)
31/1845 . . . . . . . (the ligands containing phosphorus (phosphines B01J 31/24))
31/185 . . . . . . . [Phosphites ((R)OR), their isomeric phosphonates (R2(RO)P=O) and RO-substitution derivatives thereof]
31/1855 . . . . . . . [Triamide derivatives thereof]
31/186 . . . . . . . [Mono- or diamide derivatives thereof]
31/1865 . . . . . . . [Phosphonites (RP(OR)2), their isomeric phosphinates (R2(RO)P=O) and RO-substitution derivatives thereof]
31/187 . . . . . . . (Amide derivatives thereof)
31/1875 . . . . . . . [Phosphinites (RP=OR), their isomeric phosphoxide oxides (RP=P=O) and RO-substitution derivatives thereof]
31/188 . . . . . . . (Amide derivatives thereof)
31/1885 . . . . . . . [Ligands comprising two different formal oxidation states of phosphorus in one at least bidentate ligand, e.g. phosphate/phosphinite)
31/189 . . . . . . . (containing both nitrogen and phosphorus as complexing atoms, including e.g. phosphino moieties, in one at least bidentate or bridging ligand)
31/1895 . . . . . . . [the ligands containing arsenic or antimony)
31/20 . . . . . . . Carboxyls
31/22 . . . . . . . Organic complexes
31/2204 . . . . . . . [the ligands containing oxygen or sulfur as complexing atoms]
31/2208 . . . . . . . [Oxygen, e.g. acetylacetonates]
31/2213 . . . . . . . (At least two complexing oxygen atoms present in an at least bidentate or bridging ligand)
31/2217 . . . . . . . (At least one oxygen and one nitrogen atom present as complexing atoms in an at least bidentate or bridging ligand)
31/2221 . . . . . . . (At least one oxygen and one phosphorous atom present as complexing atoms in an at least bidentate or bridging ligand)
31/2226 . . . . . . . (Anionic ligands, i.e. the overall ligand carries at least one formal negative charge)
31/223 . . . . . . . (At least two oxygen atoms present in one at least bidentate or bridging ligand)
31/2234 . . . . . . . [Beta-dicarboxyl ligands, e.g. acetylacetonates]
31/2239 . . . . . . . [Bridging ligands, e.g. OAc in Cr2(OAc)6, Pt2(OAc)6 or dicarboxylate ligands]
31/2243 . . . . . . . (At least one oxygen and one nitrogen atom present as complexing atoms in an at least bidentate or bridging ligand)
31/2247 . . . . . . . (At least one oxygen and one phosphorous atom present as complexing atoms in an at least bidentate or bridging ligand)
31/2252 . . . . . . . [Sulfonate ligands]
31/2256 . . . . . . . [being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional ligands]
31/226 . . . . . . . [Sulfur, e.g. thiocarbamates]
31/2265 . . . . . . . [Carbenes or carbynes, i.e.(image)]
31/2269 . . . . . . . [Heterocyclic carbenes]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

31/36 . . . of vanadium, niobium or tantalum
31/38 . . . of titanium, zirconium or hafnium
31/40 . Regeneration or reactivation
31/4007 . . . [of catalysts containing polymers]
31/4015 . . . [of catalysts containing metals]
31/4023 . . . [containing iron group metals, noble metals or copper]
31/403 . . . [containing iron group metals or copper]
31/4038 . . . [containing noble metals]
31/4046 . . . . . . (containing rhodium)
31/4053 . . . [with recovery of phosphorous catalyst system constituents]
31/4061 . . . [involving membrane separation]
31/4069 . . . [involving extraction with coordinating ionic liquids or supercritical fluids, e.g. CO₂]
31/4076 . . . [involving electrochemical processes]
31/4084 . . . [involving electromagnetic wave energy, e.g. UV or visible light]
31/4092 . . . [involving a stripping step, with stripping gas or solvent]
32/00 Catalyst carriers in general
33/00 Protection of catalysts, e.g. by coating
35/00 Catalysts, in general, characterised by their form or physical properties
35/0006 . . . [Catalysts containing parts with different compositions]
35/0013 . . . [Colloids]
35/002 . . . [Catalysts characterised by their physical properties]
35/0026 . . . . . . [Density]
35/0033 . . . [Electric or magnetic properties]
35/004 . . . [Photocatalysts]
35/0046 . . . . . . [Physical properties of the active metal ingredient]
35/0053 . . . . . . [metal surface area]
35/006 . . . . . . [metal crystallite size]
35/0066 . . . . . . [metal dispersion value, e.g. percentage or fraction]
35/0073 . . . . . . [Distribution of the active metal ingredient]
35/008 . . . . . . [egg-shell like]
35/0086 . . . . . . [egg-yolk like]
35/0093 . . . . . . [homogeneous throughout the support particle]
35/02 . . . Solids
35/023 . . . [Catalysts characterised by dimensions, e.g. grain size]
35/026 . . . . . . [Form of the solid particles (B01J 35/08 takes precedence)]
35/04 . . . Foraminous structures, sieves, grids, honeycombs
35/06 . . . Fabrics or filaments
35/065 . . . . . . [Membranes]
35/08 . . . Spheres
35/10 . . . characterised by their surface properties or porosity
35/1004 . . . . . . [Surface area]
35/1009 . . . . . . [less than 10 m²/g]
35/1014 . . . . . . [10-100 m²/g]
35/1019 . . . . . . [100-500 m²/g]
35/1023 . . . . . . [500-1000 m²/g]
35/1028 . . . . . . [more than 1000 m²/g]
35/1033 . . . . . . [Pore volume]
35/1038 . . . . . . [less than 0.5 ml/g]
35/1042 . . . . . . [0.5-1.0 ml/g]
35/1047 . . . . . . [more than 1.0 ml/g]
35/1052 . . . . . . [Pore diameter]
35/1057 . . . . . . [less than 2 nm]
35/1061 . . . . . . [2-50 nm]
35/1066 . . . . . . [50-500 nm]
35/1071 . . . . . . [500-1000 nm]
35/1076 . . . . . . [larger than 1000 nm]
35/108 . . . . . . [Pore distribution]
35/1085 . . . . . . [monomodal]
35/109 . . . . . . [bimodal]
35/1095 . . . . . . [polymodal]
35/12 . . . . . . Liquids or melts
37/00 Processes, in general, for preparing catalysts; Processes, in general, for activation of catalysts
37/0009 . . . . . . [Use of binding agents; Moulding; Pressing; Powdering; Granulating; Addition of materials ameliorating the mechanical properties of the product catalyst]
37/0018 . . . . . . [Addition of a binding agent or of material, later completely removed among others as result of heat treatment, leaching or washing, e.g. forming of pores; protective layer, desintegrating by heat]
37/0027 . . . . . . . [Powdering]
37/0036 . . . . . . . [Grinding]
37/0045 . . . . . . . [Drying a slurry, e.g. spray drying]
37/0054 . . . . . . . [Drying of aerosols]
37/0063 . . . . . . . [Granulating]
37/0072 . . . . . . . [Preparation of particles, e.g. dispersion of droplets in an oil bath]
37/0081 . . . . . . . [Preparation by melting]
37/009 . . . . . . . [Preparation by separation, e.g. by filtration, decantation, screening]
37/02 . . . Impregnation, coating or precipitation
37/0201 . . . . . . . [Impregnation]
37/0203 . . . . . . . [the impregnation liquid containing organic compounds]
37/0205 . . . . . . . [in several steps]
37/0207 . . . . . . . [Pretreatment of the support]
37/0209 . . . . . . . [involving a reaction between the support and a fluid]
37/0211 . . . . . . . [using a colloidal suspension]
37/0213 . . . . . . . [Preparation of the impregnating solution]
37/0215 . . . . . . . [Coating]
37/0217 . . . . . . . [Pretreatment of the substrate before coating]
37/0219 . . . . . . . [the coating containing organic compounds]
37/0221 . . . . . . . [of particles]
37/0223 . . . . . . . [by rotation]
37/0225 . . . . . . . [of metal substrates]
37/0226 . . . . . . . [Oxidation of the substrate, e.g. anodisation]
37/0228 . . . . . . . [in several steps]
37/023 . . . . . . . [using molten compounds]
37/0232 . . . . . . . [by pulverisation]
37/0234 . . . . . . . [Impregnation and coating simultaneously]
37/0236 . . . . . . . [Drying, e.g. preparing a suspension, adding a soluble salt and drying]
37/0238 . . . . . . . [via the gaseous phase-sublimation]
37/024 . . . . . . . [Multiple impregnation or coating]
37/0242 . . . . . . . [Coating followed by impregnation]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

37/0244 . . . [Coatings comprising several layers]
37/0246 . . . [Coatings comprising a zeolite]
37/0248 . . . [Coatings comprising impregnated particles]
37/03 . . . Precipitation; Co-precipitation
37/031 . . . [Precipitation]
37/033 . . . . [Using Hydrolysis]
37/035 . . . . [Precipitation on carriers]
37/036 . . . . [to form a gel or a cogel]
37/038 . . . . [to form slurries or suspensions, e.g. a washcoat]
37/04 . . . Mixing ((B01J 37/0009, B01J 37/0018 take precedence))
37/06 . . . Washing ((B01J 37/0009, B01J 37/0018 take precedence))
37/08 . . . Heat treatment ((B01J 37/0009, B01J 37/0018 take precedence))
37/082 . . . (Decomposition and pyrolysis)
37/084 . . . . [Decomposition of carbon-containing compounds into carbon]
37/086 . . . . [Decomposition of an organometallic compound, a metal complex or a metal salt of a carboxylic acid]
37/088 . . . [Decomposition of a metal salt]
37/10 . . . in the presence of water, e.g. steam
37/105 . . . [Hydropyrolysis]
37/12 . . . Oxidising
37/14 . . . with gases containing free oxygen
37/16 . . . Reducing
37/18 . . . with gases containing free hydrogen
37/20 . . . Sulfiding
37/22 . . . Halogenating
37/24 . . . Chlorinating
37/26 . . . Fluorinating
37/28 . . . Phosphorising
37/30 . . . Ion-exchange
37/32 . . . Freeze drying, i.e. lyophilisation
37/34 . . . Irradiation by, or application of, electric, magnetic or wave energy, e.g. ultrasonic waves {; ionic sputtering; Flame or plasma spraying; Particle radiation]
37/341 . . . [making use of electric or magnetic fields, wave energy or particle radiation (use of flames, plasma or lasers B01J 37/349)]
37/342 . . . [of electric, magnetic or electromagnetic fields, e.g. for magnetic separation]
37/343 . . . [of ultrasonic wave energy]
37/344 . . . [of electromagnetic wave energy]
37/345 . . . [of ultraviolet wave energy]
37/346 . . . [of microwave energy]
37/347 . . . [ionic or cathodic spraying; Electric discharge]
37/348 . . . [Electrochemical processes, e.g. electrochemical deposition or anodisation]
37/349 . . . [making use of electric, plasma or lasers]
37/36 . . . Biochemical methods
38/00 . . . Regeneration or reactivation of catalysts, in general
38/0005 . . . (involving supercritical treatment)
38/02 . . . Heating treatment
38/04 . . . Gas or vapour treating; Treating by using liquids vaporisable upon contacting spent catalyst
38/06 . . . using steam
38/08 . . . using ammonia or derivatives thereof
38/10 . . . using elemental hydrogen
38/12 . . . Treating with free oxygen-containing gas
38/14 . . . with control of oxygen content in oxidation gas
38/16 . . . Oxidation gas comprising essentially steam and oxygen
38/18 . . . with subsequent reactive gas treating
38/20 . . . Plural distinct oxidation stages
38/22 . . . Moving bed, e.g. vertically or horizontally moving bulk
38/24 . . . having mainly transverse, i.e. lateral, flow of oxygen-containing gas and material
38/26 . . . having mainly counter-current flow of oxygen-containing gas and material
38/28 . . . having mainly concurrent flow of oxygen-containing gas and material
38/30 . . . in gaseous suspension, e.g. fluidised bed
38/32 . . . Indirectly heating or cooling material within regeneration zone or prior to entry into regeneration zone
38/34 . . . with plural distinct serial combustion stages
38/36 . . . and with substantially complete oxidation of carbon monoxide to carbon dioxide within regeneration zone
38/38 . . . and adding heat by solid heat carrier
38/40 . . . and forming useful by-products
38/42 . . . using halogen-containing material
38/44 . . . and adding simultaneously or subsequently free oxygen; using oxyhalogen compound
38/46 . . . fluorine-containing
38/48 . . . Liquid treating or treating in liquid phase, e.g. dissolved or suspended
38/485 . . . [Impregnating or reimpregnating with, or deposition of metal compounds or catalytically active elements]
38/50 . . . using organic liquids
38/52 . . . oxygen-containing
38/54 . . . halogen-containing
38/56 . . . Hydrocarbons
38/58 . . . and gas addition thereto
38/60 . . . using acids
38/62 . . . organic
38/64 . . . using alkaline material; using salts
38/66 . . . using ammonia or derivatives thereof
38/68 . . . including substantial dissolution or chemical precipitation of a catalyst component in the ultimate reconstitution of the catalyst
38/70 . . . Wet oxidation of material submerged in liquid
38/72 . . . including segregation of diverse particles
38/74 . . . utilising ion-exchange

Ion-exchange (treatment of milk A23C 9/14; separation by liquid ion-exchangers B01D, e.g. B01D 11/00; separation of isotopes B01D 59/00; compounds or se, see the relevant classes, e.g. C01, C07, C08; treatment of water C02F 1/42; refining of hydrocarbon oils, in the absence of hydrogen, with solid sorbents C10G 25/00; purification of sugar juices C13B 20/14; extraction of sugar from molasses C13B 35/06; extraction of metal compounds from ores or concentrates by wet processes C22B 3/00; using ion-exchange for investigating or analysing materials G01N 30/96; treating radioactively contaminated material G21P 9/12)

NOTES
1. In groups B01J 39/00 - B01J 49/00.
Ion-exchange covers all processes whereby ions are exchanged between the solid exchanger and the liquid to be treated and wherein the exchanger is not soluble in the liquid to be treated.

Ion-exchange processes cover also ion-exchange in combination with complex or chelate forming reactions.

2. In groups B01J 39/00 - B01J 49/00, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.

3. [In groups B01J 39/00 - B01J 49/00, it is desirable to classify other constituents by using Combination sets with symbols chosen from B01J 39/00 and subgroups and B01J 41/00 and subgroups.]

39/00 Cation exchange; Use of material as cation exchangers; Treatment of material for improving the cation exchange properties (ion-exchange chromatography processes B01D 15/36)

39/02 . Processes using inorganic exchangers
39/04 Processes using organic exchangers
39/05 . in the strongly acidic form
39/07 . in the weakly acidic form
39/08 . Use of material as cation exchangers; Treatment of material for improving the cation exchange properties
39/09 . . Inorganic material
39/10 . . Oxides or hydroxides
39/12 . . Compounds containing phosphorus
39/14 . . Base exchange silicates, e.g. zeolites
39/16 . . Organic material
39/17 . . containing also inorganic materials, e.g. inert material coated with an ion-exchange resin
39/18 . . Macromolecular compounds (B01J 39/17 takes precedence)
39/19 . . . obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds
39/20 . . . obtained by reactions only involving unsaturated carbon-to-carbon bonds
39/22 . . . Cellulose or wood; Derivatives thereof
39/24 . . Carbon, coal or tar
39/26 . Cation exchangers for chromatographic processes

41/00 Anion exchange; Use of material as anion exchangers; Treatment of material for improving the anion exchange properties (ion-exchange chromatography processes B01D 15/36)

41/02 . Processes using inorganic exchangers
41/04 Processes using organic exchangers
41/05 . . in the strongly basic form
41/07 . . in the weakly basic form
41/08 . Use of material as anion exchangers; Treatment of material for improving the anion exchange properties
41/09 . . Organic material
41/10 . . Inorganic material
41/12 . . Macromolecular compounds
41/13 . . . obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds
41/14 . . . obtained by reactions only involving unsaturated carbon-to-carbon bonds
41/16 . . . Cellulose or wood; Derivatives thereof
41/18 . . Carbon, coal or tar
41/20 . Anion exchangers for chromatographic processes

43/00 Amphoteric ion-exchange, i.e. using ion-exchangers having cationic and anionic groups; Use of material as amphoteric ion-exchangers; Treatment of material for improving their amphoteric ion-exchange properties (ion-exchange chromatography processes B01D 15/36)

45/00 Ion-exchange in which a complex or a chelate is formed; Use of material as complex or chelate forming ion-exchangers; Treatment of material for improving the complex or chelate forming ion-exchange properties (ion-exchange chromatography processes B01D 15/36)

47/00 Ion-exchange processes in general; Apparatus therefor (ion-exchange chromatography processes or apparatus B01D 15/08)

47/011 . using batch processes
47/012 . using portable ion-exchange apparatus
47/014 . in which the adsorptive properties of the ion-exchanger are involved, e.g. recovery of proteins or other high-molecular compounds
47/015 . Electron-exchangers
47/016 . Modification or after-treatment of ion-exchangers
47/018 . Granulation; Incorporation of ion-exchangers in a matrix; Mixing with inert materials
47/019 . . Mixtures in form of tablets
47/02 . Column or bed processes
47/022 . . characterised by the construction of the column or container
47/024 . . . where the ion-exchangers are in a removable cartridge
47/026 . . using columns or beds of different ion exchange materials in series
47/028 . . . with alternately arranged cationic and anionic exchangers
47/04 . . Mixed-bed processes
47/06 . . during which the ion-exchange material is subjected to a physical treatment, e.g. heat, electric current, irradiation or vibration (electrodialysis or electro-osmosis B01D 61/42)
47/08 . . . subjected to a direct electric current
47/10 . with moving ion-exchange material; with ion-exchange material in suspension or in fluidised-bed form
47/11 . . in rotating beds
47/12 . . characterised by the use of ion-exchange material in the form of ribbons, filaments, fibres or sheets, e.g. membranes (electrodialysis or electro-osmosis B01D 61/42)
47/127 . . . in the form of filaments or fibres
47/133 . . Precocat filters
47/14 . Controlling or regulating
47/15 . . . for obtaining a solution having a fixed pH

49/00 Regeneration or reactivation of ion-exchangers; Apparatus therefor (ion-exchange chromatography processes or apparatus B01D 15/08)

49/05 . of fixed beds
49/06 . . containing cationic exchangers
49/07 . . containing anionic exchangers
49/08 . . containing cationic and anionic exchangers in separate beds
49/09 . . of mixed beds
49/10 . of moving beds
Ion-exchange

49/12 . . . containing cationic exchangers
49/14 . . . containing anionic exchangers
49/16 . . . containing cationic and anionic exchangers in separate beds
49/18 . . . of mixed beds
49/20 . . . of membranes
49/30 . . . Electrical regeneration
49/40 . . . Thermal regeneration
49/45 . . . of amphoteric ion-exchangers
49/50 . . . characterised by the regeneration reagents
49/53 . . . for cationic exchangers
49/57 . . . for anionic exchangers
49/60 . . . Cleaning or rinsing ion-exchange beds
49/70 . . . for large scale industrial processes or applications
49/75 . . . of water softeners
49/80 . . . Automatic regeneration
49/85 . . . Controlling or regulating devices therefor
49/90 . . . having devices which prevent back-flow of the ion-exchange mass during regeneration

2203/00 Processes utilising sub- or super atmospheric pressure

2203/06 . . . High pressure synthesis
2203/0605 . . . Composition of the material to be processed
2203/0661 . . . Graphite
2203/0615 . . . Fullerene
2203/062 . . . Diamond
2203/0625 . . . Carbon
2203/063 . . . Carbides
2203/0635 . . . Silicon carbide
2203/064 . . . Carbonates
2203/0645 . . . Boronitrides
2203/065 . . . Composition of the material produced
2203/0655 . . . Diamond
2203/066 . . . Boronitrides
2203/0665 . . . Gallium nitrides
2203/067 . . . Aluminium nitrides
2203/0675 . . . Structural or physico-chemical features of the materials processed
2203/068 . . . Crystal growth
2203/0685 . . . Crystal sintering
2203/069 . . . Recrystallisation
2203/0695 . . . Colour change

2204/00 Aspects relating to feed or outlet devices; Regulating devices for feed or outlet devices

2204/002 . . . the feeding side being of particular interest
2204/005 . . . the outlet side being of particular interest
2204/007 . . . Aspects relating to the heat-exchange of the feed or outlet devices

2208/00 Processes carried out in the presence of solid particles; Reactors therefor

2208/00008 . . . Controlling the process
2208/00017 . . . Controlling the temperature
2208/00026 . . . Controlling or regulating the heat exchange system
2208/00035 . . . involving measured parameters
2208/00044 . . . Temperature measurement
2208/00053 . . . of the heat exchange medium
2208/00061 . . . of the reactants
2208/0007 . . . Pressure measurement
2208/00079 . . . Fluid level measurement
2208/00088 . . . Flow rate measurement
2208/00097 . . . Mathematical modelling
2208/00106 . . . by indirect heat exchange
2208/00115 . . . with heat exchange elements inside the bed of solid particles
2208/00123 . . . Fingers
2208/00132 . . . Tubes
2208/00141 . . . Coils
2208/0015 . . . Plates; Cylinders
2208/00159 . . . Radially arranged plates
2208/00168 . . . with heat exchange elements outside the bed of solid particles
2208/00176 . . . outside the reactor
2208/00185 . . . Fingers
2208/00194 . . . Tubes
2208/00203 . . . Coils
2208/00212 . . . Plates; Jackets; Cylinders
2208/00221 . . . comprising baffles for guiding the flow of the heat exchange medium
2208/0023 . . . with some catalyst tubes being empty, e.g. dummy tubes or flow-adjusting rods
2208/00238 . . . Adjusting the heat-exchange profile by adapting catalyst tubes or the distribution thereof, e.g. by using inserts in some of the tubes or adding external fins
2208/00247 . . . Reflux columns
2208/00256 . . . in a heat exchanger for the heat exchange medium separate from the reactor
2208/00265 . . . Part of all of the reactants being heated or cooled outside the reactor while recycling
2208/00274 . . . involving reactant vapours
2208/00283 . . . involving reactant liquids
2208/00292 . . . involving reactant solids
2208/003 . . . involving reactant slurries
2208/00309 . . . with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction
2208/00318 . . . Heat exchange inside a feeding nozzle or nozzle reactor
2208/00327 . . . by direct heat exchange
2208/00336 . . . adding a temperature modifying medium to the reactants
2208/00345 . . . Cryogenic coolants
2208/00353 . . . Non-cryogenic fluids
2208/00362 . . . Liquid
2208/00371 . . . gaseous
2208/0038 . . . Solids
2208/00389 . . . using electric heating or cooling elements
2208/00398 . . . inside the reactor bed
2208/00407 . . . outside the reactor bed
2208/00415 . . . electric resistance heaters
2208/00424 . . . Peltier cooling elements
2208/00433 . . . using electromagnetic heating
2208/00442 . . . Microwaves
2208/00451 . . . Sunlight; Visible light
2208/0046 . . . Infrared radiation
2208/00469 . . . Radiofrequency
2208/00477 . . . by thermal insulation means
2208/00486 . . . Vacuum spaces
Details of the reactor or of the particulate material

Features relating to the reactants or products

Feeding means for the reactants

grids, bars, perforated plates

Means for supporting the bed of particles, e.g.

Details of the particulate material

Details of feeding or discharging

Discharging

Controlling static charge

Mathematical modelling

Means for reactor start-up

by measures relating to the particulate material

formation

mixture

Controlling the temperature

Sampling of the particulate material, the reactants or the products

Reactants

Products

Particulate material

Disengagement zone in fluidised-bed reactors

with stationary particles

comprising a plurality of beds with flow of reactants in parallel

Plate-type reactors filled with granular catalyst

Details

Particulate material

Two or more types of catalyst

comprising nanocatalysts

Beds

rotating

details of tube reactors containing solid particles

Heating or cooling the reactor

Chemical, physical or physico-chemical processes in general; Their relevant apparatus

Chemical plants

Scale aspects

Large-scale industrial plants

Pilot-scale plants

Laboratory-scale plants

Miniplants

Scale-up

Construction aspects

Plants assembled from modules joined together

Plants mounted on pallets or skids

Revamping, retrofitting or modernisation of existing plants

Process aspects

Batch processes

Semi-batch or fed-batch processes

Continuous processes

Intermittent processes

Processes in parallel

Processes in series

Features relating to reactants and process fluids

Green chemistry

Ionic liquids

Controlling or regulating processes

Controlling or regulating the heat exchange system

involving measured parameters

Temperature measurement

of the heat exchange medium

of the reactants

Pressure measurement

Liquid level measurement

Flow rate measurement

Mathematical modelling

by indirect heating or cooling employing heat exchange fluids

with heat exchange elements inside the reactor

Fingers

Tubes

Coils
B01J

2219/00085 . . . . Plates; Jackets; Cylinders
2219/00087 . . . . with heat exchange elements outside the reactor
2219/0009 . . . . Coils
2219/00092 . . . . Tubes
2219/00094 . . . . Jackets
2219/00096 . . . . Plates
2219/00099 . . . . the reactor being immersed in the heat exchange medium
2219/00101 . . . . Reflux columns
2219/00103 . . . . in a heat exchanger separate from the reactor
2219/00105 . . . . part or all of the reactants being heated or cooled outside the reactor while recycling
2219/00108 . . . . involving reactant vapours
2219/0011 . . . . involving reactant liquids
2219/00112 . . . . involving reactant solids
2219/00114 . . . . involving reactant slurries
2219/00117 . . . . with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction
2219/00119 . . . . Heat exchange inside a feeding nozzle or nozzle reactor
2219/00121 . . . . by direct heating or cooling
2219/00123 . . . . adding a temperature modifying medium to the reactants
2219/00126 . . . . Cryogenic coolants
2219/00128 . . . . by evaporation of reactants
2219/0013 . . . . by condensation of reactants
2219/00132 . . . . using electric heating or cooling elements
2219/00135 . . . . Electric resistance heaters
2219/00137 . . . . Peltier cooling elements
2219/00139 . . . . using electromagnetic heating
2219/00141 . . . . Microwaves
2219/00144 . . . . Sunlight; Visible light
2219/00146 . . . . Infrared radiation
2219/00148 . . . . Radiofrequency
2219/0015 . . . . by thermal insulation means
2219/00153 . . . . Vacuum spaces
2219/00155 . . . . using insulating materials or refractories
2219/00157 . . . . by means of a burner
2219/00159 . . . . controlling multiple zones along the direction of flow, e.g. pre-heating and after-cooling
2219/00162 . . . . controlling the pressure
2219/00164 . . . . controlling the flow
2219/00166 . . . . controlling the residence time inside the reactor vessel
2219/00168 . . . . controlling the viscosity
2219/00171 . . . . controlling the density
2219/00173 . . . . Physical density
2219/00175 . . . . Optical density
2219/00177 . . . . controlling the pH
2219/0018 . . . . controlling the conductivity
2219/00182 . . . . controlling the level of reactants in the reactor vessel
2219/00184 . . . . controlling the weight of reactants in the reactor vessel
2219/00186 . . . . controlling the composition of the reactive mixture
2219/00189 . . . . controlling the stirring velocity
2219/0019 . . . . Control algorithm
2219/00193 . . . . Sensing a parameter
2219/00195 . . . . of the reaction system
2219/00198 . . . . at the reactor inlet
2219/002 . . . . inside the reactor
2219/00202 . . . . at the reactor outlet
2219/00204 . . . . of the heat exchange system
2219/00207 . . . . other than of the reactor heat exchange system
2219/00209 . . . . transforming a sensed parameter
2219/00211 . . . . comparing a sensed parameter with a pre-set value
2219/00213 . . . . Fixed parameter value
2219/00216 . . . . Parameter value calculated by equations
2219/00218 . . . . Dynamically variable (in-line) parameter values
2219/0022 . . . . calculating difference
2219/00222 . . . . taking actions
2219/00225 . . . . stopping the system or generating an alarm
2219/00227 . . . . modifying the operating conditions
2219/00229 . . . . of the reaction system
2219/00231 . . . . at the reactor inlet
2219/00234 . . . . inside the reactor
2219/00236 . . . . at the reactor outlet
2219/00238 . . . . of the heat exchange system
2219/0024 . . . . other than of the reactor or heat exchange system
2219/00243 . . . . Mathematical modelling
2219/00245 . . . . Avoiding undesirable reactions or side-effects
2219/00247 . . . . Fouling of the reactor or the process equipment
2219/0025 . . . . Foam formation
2219/00252 . . . . Formation of deposits other than coke
2219/00254 . . . . Formation of unwanted polymer, such as “popcorn"
2219/00256 . . . . Leakage
2219/00259 . . . . Preventing runaway of the chemical reaction
2219/00261 . . . . Predicting runaway of the chemical reaction
2219/00263 . . . . Preventing explosion of the chemical mixture
2219/00265 . . . . Preventing flame propagation
2219/00268 . . . . Detecting faulty operations
2219/0027 . . . . Pressure relief
2219/00272 . . . . Addition of reaction inhibitor
2219/00274 . . . . Sequential or parallel reactions; Apparatus and devices for combinatorial chemistry or for making arrays; Chemical library technology
2219/00277 . . . . Apparatus
2219/00279 . . . . Features relating to reactor vessels
2219/00281 . . . . Individual reactor vessels
2219/00283 . . . . Reactor vessels with top opening
2219/00286 . . . . Reactor vessels with top and bottom openings
2219/00288 . . . . in the shape of syringes
2219/0029 . . . . with pistons or plungers
2219/00292 . . . . in the shape of pipette tips
2219/00295 . . . . the reactor vessels having pervious side walls
2219/00297 . . . . “Tea bags”
2219/00299 . . . . Generally cylindrical reactor vessels
2219/00301 . . . . the reactor vessels having impervious side walls
2219/00304 . . . . Pouches
2219/00306 . . . . Reactor vessels in a multiple arrangement
Means for dispensing and evacuation of reagents

Details of the reactor vessels

Closures attached to the reactor vessels

In multiple or parallel arrangements

Movement by linear translation

Hollow needles

Pipettes

Pumps

peristaltic

electrode driven

Nozzles

Acoustic nozzles

Screw-caps

Spheres

bar codes

Walls of reactor vessels

essentially rectangular

essentially square

disks

in the shape of fiber bundles

in the shape of elongated tubes

in a multiple parallel arrangement

in the shape of fibers bundles

in a slurry

in the shape of strings

in the shape of tapes

in the shape of disks

in the shape of cylinders

Means for coding or tagging the apparatus or the reagents

Features relating to the solid phase supports

Replacement of components of the apparatus

Directed sorting

by sparging or bubbling with gases

by sonication or ultrasonication

by shaking, vibrating or oscillating of the reaction vessels

by chemical cleavage from the solid support

by the use of moving stirrers within the reaction vessels

by the use of moving stirrers within the reaction vessels

by centrifugation

by manipulation of individual beads

Means for recovering reactants or products from the solid phase

Means for the recovery of reactants or products from the solid phase

Means for mixing reactants or products in the reaction vessels

Means for mixing reactants or products in the reaction vessels

Means for dispensing and evacuation of reagents
Baffles attached to the stirring means

Purification of compounds synthesised in-situ synthesis on the substrate

Means for controlling the apparatus of the process

Means for quality control

Measurement and control of process parameters

Simulation or virtual synthesis

Processes involving means for analysing and characterising the products

integrated with the reactor apparatus

separated from the reactor apparatus

Type of synthesis

Light-directed synthesis

Electrochemical synthesis

Heat activated synthesis

Type of compounds synthesised

Organic compounds

Nucleotides

Peptides

Glycopeptides

Peptide nucleic acids [PNA]

Saccharides

Lipids

Non-biologic macromolecules, e.g. polymeric compounds

Organic catalysts

Biological products

Cells

Inorganic compounds

Catalysts

Metal based compounds

Alloys

Metal oxides

Other, e.g. van der Waals forces, hydrogen bonding

Introduction of reactive groups to the surface

by reactive plasma treatment

by coating it with another layer

the compounds being trapped in or bound to a porous medium

the porous medium being continuous, e.g. porous oxide substrates

the porous medium being present in discrete locations, e.g. gel pads

the compounds being bound to beads immobilised on the solid supports

the compounds being bound to electrodes embedded in or on the solid supports

the compounds being bound to magnets embedded in or on the solid supports

One-dimensional arrays

Two-dimensional arrays

Electromagnetic means

Magnetic means

Physical means

EEPROM memory devices

Transponder chips

Gas-phase processes

Solid-phase processes

Solution-phase processes

High-pressure processes

Making arrays on substantially continuous surfaces

the compounds being directly bound or immobilised to solid supports

DNA chips

The surface being organic

the surface being inorganic

Delimitation of the attachment areas

by chemical means

using hydrophilic or hydrophobic regions

by physical means, e.g. trenches, raised areas

Immobilation or binding

Covalent

Ionic

Other, e.g. van der Waals forces, hydrogen bonding

Type of compounds synthesised

Type of synthesis

Heat activated synthesis

Type of compounds synthesised

Organic compounds

Nucleotides

Peptides

Glycopeptides

Peptide nucleic acids [PNA]

Saccharides

Lipids

Non-biologic macromolecules, e.g. polymeric compounds

Organic catalysts

Biological products

Cells

Inorganic compounds

Catalysts

Metal based compounds

Alloys

Metal oxides

Compositions, e.g. coatings, crystals, formulations

Purification of compounds synthesised
Aspects relating to microreactors

Feeding or evacuation: Mixing (micromixers B01F 13/0059)

Heat exchange

Additional features

Materials of construction

Means to assemble

comprising a form other than a stack of plates

Three-dimensional assemblies, i.e. the reactor comprising a stack of plates

Laminate assemblies, i.e. the reactor comprising a stack of plates

Pulsating flow

Macro-to-Micro (M2M)

Vacuum spaces

Macroporous materials

Vacuum spaces

Thin film heaters

Electromagnetic heating

Peltier-type elements

Metal oxides

佣 (micromixers B01F 13/0059)

Deflection means for heat or irradiation

Microwave heating

Feeding or evacuation

More than two inlets

Changing inlet or outlet cross-section, e.g. pressure-drop compensation

Macro-to-Micro (M2M)

Pulsating flow
Processes employing the direct application of electric or wave energy, or particle radiation; Apparatus therefor

Controlling the process

employing electric or magnetic energy
giving rise to electric discharges

involving electrodes

employing two or more electrodes

employing three electrodes

employing four electrodes

involving stationary electrodes

involving moving electrodes

Rotating electrodes

Sliding electrodes

The electrode being consumed

Details relating to the shape of the electrodes

essentially linear

Wires

cylindrical

essentially toroidal

forming part of a full circle

substantially flat

Details relating to the material of the electrodes

Carbon

Metal

Ceramic

Details relating to the type of discharge

Corona pulse discharge

creating magnetic fields

employing permanent magnets

employing electromagnets

employing a combination of permanent and electromagnets

employing moving elements

Moving (electro)magnets

employing multiple (electro)magnets

Three (electro)magnets

Four (electro)magnets

Six or more (electro)magnets

Feeding or evacuating the reactor

Heating or cooling of the reactor

Materials to be treated

Gas

Liquid

Solid

Two or more materials

Gas-gas

Gas-liquid

Gas-solid

Liquid-liquid

Liquid-solid

involving catalytically active material

Processes carried out in the presence of a plasma

Cold plasma

Hot plasma

Processes employing electromagnetic waves

Incoherent waves

Microwaves

Features relating to the reactor or vessel

Arrangements of the reactor or the reactors

Single reactor

Multiple reactors

the reactor per se

Form of the reactor

Reactors comprising tubes with open ends

Vessels in the form of a cup

Closure means, such as lids, caps, seals (B01J 3/03 takes precedence; pressure relief systems in the lid, e.g. rupture discs B01J 2219/0027)

Frames for holding the lid in place

Means for feeding and evacuation

Materials of construction

Parts of the reactor being microwave absorbing, dielectric

Features relating to the microwave cavity

Support for the reaction vessel

Static supports

Rotating supports

in the form of a closed housing

in the form of a open housing or stand

Microwave deflecting parts

Microwave guides

Materials of construction

Controlling the microwave irradiation variables

Time

Frequency

Intensity

Features relating to the microwave source

Arrangements thereof

Single source

Multiple sources

Details relating to the spatial orientation of the reactor

horizontal

vertical

inclined at an angle to the horizontal or to the vertical plane

Details relating to the geometry of the reactor

polygonal

triangular

square or square-derived

prismatic

pyramidal

hexagonal

round

circular or disk-shaped

spherical

cylindrical
Stationary reactors without moving elements inside
Reactors comprising multiple separate flow channels
Monolithic-type reactors
Plate-type reactors
oval or ellipsoidal
Other constructional details
Construction materials
reactor
Separation means, e.g. membrane inside the monolith or placed in the channel
Mixing means, e.g. fins or baffles attached to the monolith or placed in the channel
Heat exchange aspects
The reactant being in indirect heat exchange with a non reacting heat exchange medium
Independent temperature control in various sections of the monolith
Two reactions in indirect heat exchange
The same reactant stream undergoing different reactions, endothermic or exothermic
Additional heat exchange means, e.g. electric resistance heater, coils
Direct heat exchange
Feeding means
for the reactants
for the catalysts
Mixing means, e.g. fins or baffles attached to the monolith or placed in the channel
Separation means, e.g. membrane inside the reactor
Wall-flow filter, e.g. adjacent cells closed alternatively at their end to force the reactant stream through the walls of the monolith
Basic shape of the elements
Saddle
spiral
toroidal
conical
oval or egg-shaped
Moving elements in the monolith reactor
Plate-type reactors
Geometry of the reactor
Plastics
Glass
Ceramics
Metal oxides
Steel
Catalysts in granular form in the channels
Catalyst in granular form in the channels
Monoliths having catalytic activity on its own
of the monoliths
Metals or alloys
Steel
Metal oxides
Ceramics
Glass
Plastics
Other constructional details
Assembling means of monolith modules
Size aspects
Sizes
Cell density
Additional structures inserted in the channels
Moving elements in the monolith reactor
Plate-type reactors
Geometry of the reactor
Plates arranged in parallel
Plates arranged concentrically
Plates arranged radially
Geometry of the plates
Flat plates, i.e. plates which are not corrugated or otherwise structured, e.g. plates with cylindrical shape
Corrugated plates
Perforated plates
Heat exchange aspects
the reactants being in indirect heat exchange with a non reacting heat exchange medium
Independent temperature control in various sections of the reactor
Two reactions in indirect heat exchange with each other
The same reactant stream undergoing different reactions, endothermic or exothermic
Additional heat exchange means, e.g. electric resistance heaters, coils
Feeding means
Feeding means for the reactants
Feeding means for the catalyst
the catalyst being exchangeable on inserts other than plates, e.g. in bags
Mixing means, e.g. fins or baffles attached to the plates
Separation means, e.g. membranes inside the reactor
Construction materials
of the catalysts
Catalysts coated on the surface of plates or inserts
Catalysts in granular from between plates
Catalytically active foils; Plates having catalytically activity on their own
of the plates
Metals or alloys
Steel
Ceramics
Glass
Plastics
Other constructional details
Assembling means
Means for assembling plates together, e.g. sealing means, screws, bolts
the plates being assembled interchangeably or in a disposable way
Means for assembling modules together, e.g. casings, holders, fluidic connectors
Size aspects, i.e. concrete sizes are being mentioned in the classified document
Additional structures inserted in the channels, e.g. plates, catalyst holding meshes
Details relating to random packing elements
Basic shape of the elements
Saddle
Details relating to packing elements in the form of grids or built-up elements for forming a unit of module inside the apparatus for mass or heat transfer

Manufacturing aspects

- Basic shape of the elements
- Sheets
- Flat sheets
- Corrugated sheets
- Plurality of essentially parallel sheets
- with sheets having corrugations which intersect at an angle of 90 degrees
- with sheets having corrugations which intersect at an angle different from 90 degrees
- characterised by the orientation of the sheet
- Vertical orientation
- Horizontal orientation
- Inclined orientation
- Sheets comprising apertures or perforations
- Louvres
- Essentially circular apertures
- Sheets comprising areas that are raised or sunken from the plane of the sheet
- Dimples, bossages, protrusions
- Other details of the sheets
- Details relating to the extremities of the sheets, such as a change in corrugation geometry or sawtooth edges
- Dimensions or size aspects
- relating to blocks in the same horizontal level
- relating to blocks in superimposed layers
- Mounting or joining of the blocks or sheets within the column or vessel
- Tubes or cylinders
- Rods or bars
- Grids or lattices
- Stretched materials
- Cubes or cubic blocks
- Honeycombs
- Composition or microstructure of the elements
- Metal
- Ceramic
- Carbon
- Glass
- Wood
- Cork
- Rubber
- Plastics
- Fibrous materials
- Foam like materials
- filling or discharging the elements into or from packed columns
- Orientation of the packing elements within the column or vessel
- Random or dumped packing elements
- Ordered or stacked packing elements
- Filling of the packing elements into the column or vessel, e.g. using a tube
- Emptying of the packing elements from the column or vessel, e.g. using a tube
- Size details
- Sizes
- Two or more types of packing elements or packing elements of different sizes present in the column
- Manufacturing aspects
- Pleating
- Molding
- Pressing
- Sintering
- Extruding
- Mathematical modelling
- Details relating to packing elements in the form of grids or built-up elements for forming a unit of module inside the apparatus for mass or heat transfer

- Sheet
- Composition or microstructure of the elements
- Metal
- Ceramic
- Carbon
- Glass
- Wood
- Foam like materials
- Fibrous materials
- Plastic
- Filling or discharging the elements into or from packed columns
- Orientation of the packing elements within the column or vessel
- Random or dumped packing elements
- Ordered or stacked packing elements
- Filling of the packing elements into the column or vessel, e.g. using a tube
- Emptying of the packing elements from the column or vessel, e.g. using a tube
- Size details
- Sizes
- Two or more types of packing elements or packing elements of different sizes present in the column
- Manufacturing aspects
- Pleating
- Molding
- Pressing
- Sintering
- Extruding
- Mathematical modelling
- Details relating to packing elements in the form of grids or built-up elements for forming a unit of module inside the apparatus for mass or heat transfer
Aspects relating to sorbent materials

- Materials comprising a mixture of inorganic materials (materials coated or impregnated on a carrier B01J 20/32)

- Materials comprising a mixture of organic materials (materials coated or impregnated on a carrier B01J 20/32)

- comprising a mixture of polymers

- Materials comprising a mixture of inorganic and organic materials (materials coated or impregnated on a carrier B01J 20/32)

- Sorbents characterised by the starting material used for their preparation

- the starting material being of inorganic character

- the starting material being of organic character

- Natural rubber

- Polysaccharides or cellulose materials, e.g. starch, chitin, sawdust, wood, straw, cotton

- having been subjected to further processing, e.g. paper, cellulose pulp

- Lignin

- Algae, aquatic plants or sea vegetables, e.g. seaweeds, eelgrass

- Plants or land vegetals, e.g. cereals, wheat, corn, rice, sphagnum, peat moss

- Proteins, DNA

- Feathers

- Cells, spores, bacteria

- the starting material being a waste, residue or of undefined composition

- Residues from shells, e.g. eggshells, mollusk shells

- Residues, wastes, e.g. garbage, municipal or industrial sludges, compost, animal manure; fly-ashes

- Residues derived from used synthetic products, e.g. rubber from used tyres

- Materials comprising an indicator, e.g. colour indicator, pH-indicator

- Aspects relating to the use of sorbent or filter aid materials

- Sorbents specially adapted for preparative chromatography

- Sorbents specially adapted for analytical or investigative chromatography

- Use in the form of a bed

- Use in a single column

- Use in several different columns

- serially disposed columns

- parallel disposed columns

- In a cartridge

- In a syringe, pipette, e.g. tip or in a tube, e.g. test-tube or u-shape tube (in columns B01J 2220/58)

- Other type of housings or containers not covered by B01J 2220/58 - B01J 2220/64

- Superabsorbents

Aspects of molecular sieve catalysts not covered by B01J 29/00

- After treatment, characterised by the effect to be obtained

- to alter the outside of the crystallites, e.g. selectivation

- in order to deactivate outer surface

- in order to reduce the pore-mouth size

- to alter the inside of the molecular sieve channels

- to increase the Si/Al ratio; Dealumination

- to introduce other elements into or onto the molecular sieve itself

- in framework positions

- not in framework positions

- to introduce other elements in the catalyst composition comprising the molecular sieve, but not specially in or on the molecular sieve itself

- to destroy the molecular sieve structure or part thereof

- to stabilize the molecular sieve structure

- to stabilize the total catalyst structure

- After treatment, characterised by the means used

- Reaction with silicon compounds, e.g. TEOS, siliconfluoride

- Reaction with organic or organometallic compounds (with organo-silicium compounds B01J 2229/32)

- Steaming

- Acid treatment

- Base treatment

- Special temperature treatment, i.e. other than just for template removal

- Addition of matrix or binder particles

- Synthesis on support

- in or on other molecular sieves

- in or on refractory materials

- on metal supports

Catalytic reactions performed with catalysts classified in B01J 31/00

NOTE

In this group indexing is done according to the specific catalytic reaction. In case of multiple catalytic activities only those are indexed which are specifically exemplified, i.e. by ways of worked examples, specific claims or explicit alternatives therein.

General concepts, e.g. reviews, relating to methods of using catalyst systems, the concept being defined by a common method or theory, e.g. microwave heating or multiple stereoselectivity
Polymersisation reactions involving at least dual use catalysts, e.g. for both oligomerisation and polymerisation

Olefin polymerisation or copolymerisation

Cationic (co)polymerisation, e.g. single-site or Ziegler-Natta type

Radical (co)polymerisation, e.g. mediators therefor

Anionic (co)polymerisation

Other (co) polymerisation, e.g. of lactides, epoxides ("ROMP", i.e. ring-opening metathesis polymerisation B01J 2231/54)

Olefin oligomerisation or telomerisation

Addition reactions at carbon centres, i.e. to either C-C or C-X multiple bonds

Addition reactions to C==C or C-C triple bonds

Hydroformylation, metalformylation, carbonylation or hydroaminomethylation

Hydrocyanation

Hydrometallation, e.g. bor-, alumin-, silyl-, zirconation or analogous reactions like carbometalation, hydrocarboration

Cyclisations via conversion of C-C multiple to single or less multiple bonds, e.g. cycloadditions

Cyclopropanations

Diels-Alder or other [4+2] cycloadditions, e.g. hetero-analogues

Dipolar cycloadditions

Cycloadditions involving more than 2 components or moieties, e.g. intra-/intermolecular [2+2+2] or [2+2+1], e.g. Pauson-Khand type

Other additions, e.g. Monsanto-type carbonylations, addition to 1,2-C=X or 1,2-C-X triplebonds, additions to 1,4-C=C-C=X or 1,4-C=C-X triple bonds with X, e.g. O, S, NH/N

1,2-additions, e.g. aldol or Knoevenagel condensations

Aldol type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues, to aldehydes or ketones

to prepare cyanhydrines, e.g. by adding HCN or TMSCHN

Boronation, e.g. by adding R-B(OR)2

with organometallic complexes, e.g. by adding ZnR2

Mannich type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues to aldmines or ketimines

via cationic intermediates, e.g. bisphenol A type processes

1,4-additions, e.g. conjugate additions

1,2- or 1,4-additions in combination with further or prior reactions by the same catalyst, i.e. tandem or domino reactions, e.g. hydrogenation or further addition reactions

Substitution reactions at carbon centres, e.g. C-C or C-X, i.e. carbon-hetero atom, cross-coupling, C-H activation or ring-opening reactions

Catalytic cross-coupling, i.e. connection of previously not connected C-atoms or C- and X-atoms without rearrangement

C-C cross-coupling, e.g. metal catalyzed or Friedel-Crafts type

Suzuki-type, i.e. RY + R’Br(OR)2, in which R, R’ are optionally substituted alkyl, alkenyln, aryl, acyl and Y is the leaving group

with R= alkyl

with R’= alkyl

with Y= Cl

Kumada-type, i.e. RY + R’MgZ, in which R, R’ is optionally substituted alkyl, alkenyln, aryl, Y is the leaving group and Z is halide or R’

Negishi-type, i.e. RY + R’ZnZ, in which R, R’ is optionally substituted alkyl, alkenyln, aryl, Y is the leaving group and Z is halide or R’

Heck-type, i.e. RY + C≡C, in which R is aryl, aryl, R’ is alkyl and R’=H, alkyl or aryl

Sonogashira-type, i.e. RY + HC-CR’ triple bonds, in which R=aryl, alkenyln, alkyl and R’=H, alkyl or aryl

via enolates oraza-analogues, added as such or made in-situ, e.g. ArY + R2C=C(OM)Z - > ArR2C-C(O)Z, in which R is H or alkyl, M is Na, K or SiMe3, Y is the leaving group, Z is Ar or OR’ and R’ is alkyl

C-X Cross-coupling, e.g. nucleophilic aromatic amination, alkoxylation or analogues

using N nucleophiles, e.g. Buchwald-Hartwig amination

using O nucleophiles, e.g. alcohols, carboxylates, esters

using S nucleophiles, e.g. thiols

Allylic alkylation, amination, alkoxylation or analogues

C-H or C-C activation

Ring-opening reactions

asymmetric reactions, e.g. kinetic resolution of racemates

kinetic resolution of epoxide racemates

by hydrolysis

Esterification or transesterification

Redistribution or isomerisation reactions of C-C, C=C or C-C triple bonds

Isomerisation reactions

Metathesis reactions, e.g. olefin metathesis

alkene metathesis

alkyne metathesis

Reduction reactions, e.g. hydrogenation

Reactions in general of inorganic substrates, e.g. formal hydrogenation, e.g. of N2

Reductions in general of inorganic substrates, e.g. hydride reductions or hydrogenations

Hydrogenation of organic substrates, i.e. H2 or H-transfer hydrogenations, e.g. Fischer-Tropsch processes
Constitutive chemical elements of heterogeneous catalysts

2523/00  . . . of Group I (IA or IB) of the Periodic Table
2523/10  . . . Lithium
2523/11  . . . Sodium
2523/12  . . . Potassium
2523/13  . . . Rubidium
2523/14  . . . Caesium
2523/15  . . . Francium
2523/16  . . . Copper
2523/17  . . . Silver
2523/18  . . . Gold
2523/19  . . . of Group II (IIA or IIB) of the Periodic Table
2523/20  . . . Beryllium
2523/21  . . . Magnesium
2523/22  . . . Calcium
2523/23  . . . Strontium
2523/24  . . . Barium
2523/25  . . . Radium
2523/26  . . . Zinc
2523/27  . . . Cadmium
2523/28  . . . Mercury
2523/29  . . . of Group III (IIIA or IIIB) of the Periodic Table
2523/30  . . . Boron
2523/31  . . . Aluminium
2523/32  . . . Gallium
2523/33  . . . Indium
2523/34  . . . Thallium
2523/35  . . . Scandium
2523/36  . . . Yttrium
2523/37  . . . Lanthanides
2523/370  . . . Lanthanum
2523/3712 . . . Cerium
2523/3718 . . . Praseodymium
2523/3725 . . . Neodymium
2523/3731 . . . Promethium
2523/3737 . . . Samarium
2523/3743 . . . Europium
2523/375  . . . Gadolinium
2523/3756 . . . Terbium
2523/3762 . . . Dysprosium
2523/3768 . . . Holmium
2523/3775 . . . Erbium
2523/3781 . . . Thulium
2523/3787 . . . Ytterbium
2523/3793 . . . Lutetium
2523/39  . . . Actinides
2523/392 . . . Actinium
2523/395 . . . Thorium
2523/397 . . . Uranium
2523/40  . . . of Group IV (IVA or IVB) of the Periodic Table
2523/41  . . . Silicon
2523/42  . . . Germanium
2523/43  . . . Tin
2523/44  . . . Lead
2523/47  . . . Titanium
2523/48  . . . Zirconium
2523/49  . . . Hafnium
2523/50  . . . of Group V (VA or VB) of the Periodic Table
2523/51  . . . Phosphorus
2523/52  . . . Arsenic
2523/53  . . . Antimony
2523/54  . . . Bismuth
2523/55  . . . Vanadium
2523/56  . . . Niobium
2523/57  . . . Tantalum
2523/60  . . . of Group VI (VIA or VIB) of the Periodic Table
2523/62  . . . Sulfur
2523/63  . . . Selenium
2523/64  . . . Tellurium
2523/65  . . . Polonium
2523/67  . . . Chromium
2523/68  . . . Molybdenum
2523/69  . . . Tungsten
2523/70  . . . of Group VII (VIIA or VIIB) of the Periodic Table
2523/72  . . . Manganese
2523/73  . . . Technetium
2523/74  . . . Rhenium
2523/80  . . . of Group VIII of the Periodic Table
2523/82  . . . Metals of the platinum group
2523/821 . . . Ruthenium
2523/822 . . . Rhodium
2523/824 . . . Palladium
2523/825 . . . Osmium
2523/827 . . . Iridium
2523/828 . . . Platinum
2523/84  . . . Metals of the iron group
2523/842 . . . Iron
2523/845 . . . Cobalt
2523/847 . . . Nickel

2531/00  Additional information regarding catalytic systems classified in B01J 31/00

NOTE

In this group the term "Metals" refers to the central metal in the coordination complexes ( B01J 31/16 - B01J 31/24 ), as used for the respective catalytic reaction, excluding carboxylates ( see B01J 31/04 ) and other simple salts or organometallic compounds ( see B01J 31/12 ). As to components, only those metals or solvents are indexed which are explicitly mentioned in the claims or the worked examples. As to compositional aspects, only those are provided for in the scheme below and are intended to be indexed, which provide additional information regarding the complexes and/or ligands classified in
2531/001 . General concepts, e.g. reviews, relating to catalyst systems and methods of making them, the concept being defined by a common material or method/ theory

**NOTE**

When indexing in this group, only the focus is indexed in B01J 2531/004 - B01J 2531/007 and only if groups with closely related members are concerned, e.g. N-heterocyclic carbenes (B01J 2531/004), Pd-complexes (B01J 2531/005), added halide (B01J 2531/007). Otherwise the main code B01J 2531/002 is used.

2531/002 . . Materials
2531/004 . . Ligands
2531/005 . . Catalytic metals
2531/007 . . Promoter-type Additives
2531/008 . . Methods or theories
2531/02 . . Compositional aspects of complexes used, e.g. polynuclearity
2531/0202 . . Polynuclearity
2531/0205 . . Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(L)xZr-imidazole-Zr(L)xCp
2531/0208 . . Bimetallic complexes, i.e. comprising one or more units of two metals, with metal-metal bonds but no all-metal (M)n rings, e.g. Cr2(OAc)4
2531/0211 . . Metal clusters, i.e. complexes comprising 3 to about 1000 metal atoms with metal-metal bonds to provide one or more all-metal (M)n rings, e.g. Rh4(CO)12
2531/0213 . . Complexes without C-metal linkages
2531/0216 . . Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(L)xZrimidazole-Zr(L)xCp
2531/0219 . . Bimetallic complexes, i.e. comprising one or more units of two metals, with metal-metal bonds but no all-metal (M)n rings, e.g. Cr2(OAc)4
2531/0222 . . Metal clusters, i.e. complexes comprising 3 to about 1000 metal atoms with metal-metal bonds to provide one or more all-metal (M)n rings, e.g. Rh4(CO)12
2531/0225 . . Complexes comprising pentahapto-cyclopentadienyl analogues
2531/0227 . . Carbollide ligands, i.e. [nido-CnB(11-n)H11] (4-n)- in which n is 1-3

2531/023 . . Phospholyl ligands, i.e. [CnP(5-n)Rn]- in which n is 0-4 and R is H or hydrocarbyl, or analogous condensed ring systems
2531/0233 . . Aza-Cp ligands, i.e. [CnN(5-n)Rn]- in which n is 0-4 and R is H or hydrocarbyl, or analogous condensed ring systems
2531/0236 . . Azaborolyl ligands, e.g. 1,2-azaborolyl
2531/0238 . . Complexes comprising multidentate ligands, i.e. more than 2 ionic or coordinative bonds from the central metal to the ligand, the latter having at least two donor atoms, e.g. N, O, S, P
2531/0241 . . Rigid ligands, e.g. extended sp2-carbon frameworks or geminal di- or trisubstitution
2531/0244 . . Pincer-type complexes, i.e. consisting of a tridentate skeleton bound to a metal, e.g. by one to three metal-carbon sigma-bonds
2531/0247 . . Tripodal ligands, e.g. comprising the tris(pyrazolyl)borate skeleton, "tpz", neutral analogues thereof by CH/BH exchange or anionic analogues of the latter by exchange of one of the pyrazolyl groups for an anionic complexing group such as carboxylate or -R-Cp
2531/025 . . Ligands with a porphyrin ring system or analogues thereof, e.g. phthalocyanines, coronoles
2531/0252 . . Salen ligands or analogues, e.g. derived from ethylenediamine and salicylaldehyde
2531/0255 . . Ligands comprising the N2S2 or N2P2 donor atom set, e.g. diimidodihalides or diiminodiphosphines with complete pi-conjugation between all donor centres
2531/0258 . . Flexible ligands, e.g. mainly sp3-carbon framework as exemplified by the "tedicyc" ligand, i.e. cis-cis-cis-1,2,3,4-tetrakis(diphenylphosphinomethyl)cyclopentane
2531/0261 . . Complexes comprising ligands with non-tetrahedral chirality
2531/0263 . . Planar chiral ligands, e.g. derived from donor-substituted paracyclopahanes and metallocenes or from substituted arenes
2531/0266 . . Axially chiral or atropisomeric ligands, e.g. bulky biaryls such as donor-substituted binaphthalenes, e.g. "BINAP" or "BINOL"
2531/0269 . . Complexes comprising ligands derived from the natural chiral pool or otherwise having a characteristic structure or geometry
2531/0272 . . derived from carbohydrates, including e.g. tartrates or DIOP
2531/0275 . . derived from amino acids
2531/0277 . . derived from fullerenes and analogues, e.g. buckybowls or Cp5Sc
2531/028 . . comprising affinity tags, e.g. for recovery (self-associating or modular catalysts B01J 2531/0291)
2531/0283 . . The bonding to the affinity counterpart occurring via hydrogen bonding
2531/0286 . . Complexes comprising ligands or other components characterized by their function
2531/0288 . . Sterically demanding or shielding ligands
2531/0291 . . Ligands adapted to form modular catalysts, e.g. self-associating building blocks as exemplified in the patent document EP-A-1 479 439
“Non-innocent” or “non-spectator” ligands, i.e. ligands described as, or evidently, taking part in the catalytic reaction beyond merely stabilizing the central metal as spectator or ancillary ligands, e.g. by electron transfer to or from the central metal or by intra-/intermolecular chemical reactions, e.g. disulfide coupling, H-abstraction

Non-coordinating anions

Complexes comprising metals of Group I (IA or IB) as the central metal

Lithium
Sodium
Potassium
Rubidium
Caesium
Copper
Silver
Gold

Complexes comprising metals of Group II (IIA or III) as the central metal

Beryllium
Magnesium
Calcium
Strontium
Barium
Zinc
Cadmium
Mercury

Complexes comprising metals of Group III (IIIA or IIB) as the central metal

Aluminium
Gallium
Indium
Thallium
Scandium
Yttrium
Lanthanum
Lanthanides other than lanthanum
Actinides

Complexes comprising metals of Group IV (IVA or IVB) as the central metal

Tin
Lead
Titanium
Zirconium
Hafnium

Complexes comprising metals of Group V (VA or VB) as the central metal

Antimony
Bismuth
Vanadium
Niobium
Tantalum

Complexes comprising metals of Group VI (VIA or VIB) as the central metal

Chromium
Molybdenum
Tungsten

Complexes comprising metals of Group VII (VIIIB) as the central metal

Manganese

Complexes comprising metals of Group VIII as the central metal

Rhenium

Metals of the platinum group
Ruthenium
Rhodium
Palladium
Osmium
Iridium
Platinum

Metals of the iron group
Iron
Cobalt
Nickel

Catalytic systems characterized by the solvent or solvent system used

Supercritical solvents
Carbon dioxide (scCO₂)
Supercritical water (scH₂O)

Mixtures of ionic liquids with supercritical solvents
Fluorinated solvents
Water

Phase-transfer catalysis in a mixed solvent system containing at least 2 immiscible solvents or solvent phases

In a water / organic solvent system

Compositional aspects of coordination complexes or ligands in catalyst systems

Non-coordinating groups comprising only oxygen beside carbon or hydrogen

Carboxylic acid groups

Non-coordinating groups comprising halogens

Comprising fluorine, e.g. trifluoroacetate

Non-coordinating groups comprising sulfur

Sulfonic acid groups or their salts

being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional groups

Sulfonyl groups

being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional groups

Quaternary ammonium groups

being derivatives of carboxylic or carbonic acids, e.g. amide (RC(=O)-NR₂, RC(=O)-NR-C(=O)R), nitrile, urea (R₂N-C(=O)-NR₂), guanidino (R₂N-C(=N)-NR₂) and amidine (R₂N-C(=N)-NR₂) groups

being amidine or imidate groups (R-C≡N=NR(OR))

Nitrile groups

Urea groups

Guanidine groups

Non-coordinating groups comprising phosphorus

Phosphorus acid or phosphorus acid ester groups

being phosphoric acid mono-, di- or triester groups ((RO)(R'O)₂P=O), i.e. R= C, R'= C, H
being phosphorous acid (-ester) groups 
((RO)P(OR')2) or the isomeric phosphonic acid (-ester) groups (R'(RO)(2P=O)), i.e. R= C, R'= C, H

being phosphonous acid (-ester) groups 
(RP(OR')2) or the isomeric phosphinic acid (-ester) groups (R2(RO)(P=O)), i.e. R= C, R'= C, H

Quaternary phosphonium groups
Groups characterized by their function
Activating groups
Solubility enhancing groups
Linker or spacer groups
Associating groups, e.g. with a second ligand or a substrate molecule via non-covalent interactions such as hydrogen bonds