COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING
(NOTES omitted)

SEPARATING; MIXING

B01 PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL

B01J 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

WARNINGS
1. 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
   B01J 32/00 covered by B01J 21/00 - B01J 29/90, B01J 33/00 - B01J 38/74

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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

2/18 . using a vibrating apparatus

2/20 . by expressing the material, e.g. through sieves and fragmenting the extruded length

2/22 . by pressing in moulds or between rollers

2/24 . Obtaining flakes by scraping a solid layer from a surface

2/26 . on endless conveyor belts

2/28 . using special binding agents

2/30 . using agents to prevent the granules sticking together; Rendering particulate materials free flowing in general, e.g. making them hydrophobic

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]
Feed (or outlet) devices; Feed or outlet control devices (feed or outlet devices for pressure vessels B01J 3/02 ; feeding of particles into and evacuation of particles out of the reactor B01J 8/0015)

4/00

4/01 . (Feed or outlet devices as such, e.g. feeding tubes)
4/02 . (Nozzle-type elements (nozzle-type reactors B01J 19/26))
4/04 . (Sparger-type elements)
4/05 . (provided with baffles)
4/07 . (provided with moving parts)
4/08 . (Feed or outlet control devices)
4/02 . for feeding measured [, i.e. prescribed] quantities of reagents
4/04 . using osmotic pressure [using membranes, porous plates]
6/00 (Heat treatments such as) Calcing; Fusing (Pyrolysis (furnaces F27D))
6/01 . (Calcing)
6/02 . (using rotating drums)
6/04 . (using hot gas streams in which the material is moved)
6/05 . (Fusing)
6/07 . (in crucibles)
6/08 . (Pyrolysis reactions (of hydrocarbons C10G 9/00))
7/00 Apparatus for generating gases (production of inert gas mixtures B01J 19/14; for generating specific gases, see the relevant subclasses, e.g. C01B, C10J [, in "air bags" on vehicles B60R 21/26; for starter gas F02C 7/26; blasting cartridges for producing gas under pressure F42B 2/04])
7/02 . by wet methods
8/00 Chemical or physical processes in general, conducted in the presence of fluids and solid particles; Apparatus for such processes
8/0005 . (Catalytic processes under superatmospheric pressure (non-catalytic processes B01J 3/00))
8/001 . (Controlling catalytic processes (B01J 8/1809 takes precedence))
8/0015 . (Feeding of the particles in the reactor; Evacuation of the particles out of the reactor)
8/002 . (with a moving instrument)
8/0025 . (by an ascending fluid)
8/003 . (in a downward flow)
8/0035 . (Periodical feeding or evacuation)
8/004 . (by means of a nozzle)
8/0045 . (by means of a rotary device in the flow channel)
8/005 . (Separating solid material from the gas/liquid stream (separation processes per se B01D))
8/0055 . (using cyclones)
8/006 . (by filtration)
8/0065 . (by impingement against stationary members)
8/007 . (by sedimentation)
8/0075 . (by electrostatic precipitation)
8/008 . (Details of the reactor or of the particulate material; Processes to increase or to retard the rate of reaction (B01J 8/0285, B01J 8/067, B01J 8/087, B01J 8/1836 take precedence))
8/0085 . (promoting uninterrupted fluid flow, e.g. by filtering out particles in front of the catalyst layer)
8/009 . (Membranes, e.g. feeding or removing reactants or products to or from the catalyst bed through a membrane)
8/0095 . (in which two different types of particles react with each other)
8/02 . with stationary particles, e.g. in fixed beds
8/0207 . (the fluid flow within the bed being predominantly horizontal)
8/0214 . (in a cylindrical annular shaped bed)
8/0221 . (in a cylindrical shaped bed (B01J 8/0214 takes precedence))
8/0228 . (in a conically shaped bed)
8/0235 . (in a spiral shaped bed)
8/0242 . (the fluid flow within the bed being predominantly vertical)
8/025 . (in a cylindrical shaped bed)
8/0257 . (in a cylindrical annular shaped bed)
8/0264 . (in a conically shaped bed)
8/0271 . (in a spiral shaped bed)
8/0278 . (Feeding reactive fluids (for solid material B01J 8/0015))
8/0285 . ( Heating or cooling the reactor (for tubular reactors in furnaces B01J 8/062))
8/0292 . (with stationary packing material in the bed, e.g. bricks, wire rings, baffles)
8/04 . the fluid passing successively through two or more beds
8/0403 . (the fluid flow within the beds being predominantly horizontal)
8/0407 . (through two or more cylindrical annular shaped beds)
8/0411 . (the beds being concentric)
8/0415 . (the beds being superimposed one above the other (B01J 8/0434 takes precedence))
8/0419 . (the beds being placed in separate reactors)
8/0423 . (through two or more otherwise shaped beds)
8/0426 . . . . . (the beds being superimposed one above the other)
8/043 . . . . . . in combination with one cylindrical annular shaped bed
8/0434 . . . . . . in combination with two or more cylindrical annular shaped beds
8/0438 . . . . . . (the beds being placed next to each other)
8/0442 . . . . . . (the beds being placed in separate reactors)
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)

12/007 (in the presence of catalytically active bodies, e.g. porous plates)

12/02 for obtaining at least one reaction product which, at normal temperature, is in the solid state

13/00 Colloid chemistry, e.g. the production of colloidal materials or their solutions, not otherwise provided for; Making microcapsules or microballoons

13/0004 (Preparation of sols (by physical processes B01J 13/0086, aerosols B01J 13/0095))

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 sols)

13/0034 (Additives, e.g. in view of promoting stabilisation or peptisation)

13/0039 (Post treatment)

13/0043 (containing elemental metal (for medical or diagnostic 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 sols, e.g. thixotropic solutions)

13/0078 (containing inorganic material and water)

13/0082 (containing an organic phase)

13/0086 (Preparation of sols 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 13/04)

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]

13/22 . . . Coating

14/00 Chemical processes in general for reacting liquids with solids; Apparatus specially adapted therefor (B01J 8/00, B01J 19/08 take precedence)

14/005 (in the presence of catalytically active bodies, e.g. porous plates)

15/00 Chemical processes in general for reacting gaseous media with non-particulate solids, e.g. sheet material; Apparatus specially adapted therefor (B01J 19/08 takes precedence)

15/005 (in the presence of catalytically active bodies, e.g. porous plates)

16/00 Chemical processes in general for reacting liquids with non-particulate solids, e.g. sheet material; Apparatus specially adapted therefor (B01J 19/08 takes precedence)

16/005 (in the presence of catalytically active bodies, e.g. porous plates)

19/00 Chemical, physical or physico-chemical processes in general; Their relevant apparatus

19/0006 (Controlling or regulating processes (controlling or regulating in general G01))

19/0013 (Controlling the temperature of the process)

19/002 (Avoiding undesirable reactions or side-effects, e.g. avoiding explosions, or improving the yield by suppressing side-reactions)

19/0026 (Avoiding carbon deposits (inhibiting incrustation in general, C23F 14/00, C23F 15/00))

19/0033 (Optimisation processes, i.e. processes with adaptive control systems (adaptive control systems per se G05B 13/00))

19/004 (Multifunctional apparatus for automatic manufacturing of various chemical products (sequential reactions B01J 19/0046))

19/0046 (Sequential or parallel reactions, e.g. for the synthesis of polypeptides or polynucleotides; Apparatus and devices for combinatorial chemistry or for making molecular arrays (synthesis methods per se C40B 50/00))

19/0053 (Details of the reactor)

19/006 (Baffles)

19/0066 (Stirrers (mixing per se B01F))

19/0073 (Sealings (sealings for pressure vessels per se F16J 15/00))

19/008 (Processes for carrying out reactions under cavitation conditions)

19/0086 (Processes carried out with a view to control or to change the pH-value; Applications of buffer salts; Neutralisation reactions)
19/0093 . [Microreactors, e.g. miniaturised or microfabricated reactors (laboratory containers with capillary fluid transport in microfabricated channels or chambers B01L 3/5027)]
19/02 . Apparatus characterised by being constructed of material selected for its chemically-resistant properties
19/06 . Solidifying liquids (making microcapsules B01J 13/02)
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 see 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 B06D 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 . . . [Suit 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 20/00 - 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 33/00 - 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 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:
a. 'catalyst' covers also a carrier-forming part of the catalyst.

6. Classification of the:
   • 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 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 20/004 (oxides or hydroxides thereof B01J 20/006)]

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 20/008 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 20/045]
20/0285 . . . . . [Sulfides of compounds other than those provided for in B01J 20/045]
20/028 . . . . . [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 . . . . . [Nitrites 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 20/004
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)]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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]

20/265 . . . [modified or post-treated polymers (polymer carriers or substrates subjected to further impregnating or coating B01J 20/3208)]

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

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

20/28 . . . 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 20/2805)]

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 censpheres]

20/28023 . . . [Fibres or filaments (fibres or filaments in the form of membranes B01J 20/28038; 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]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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 . . Impregnating or coating ; Solid sorbent compositions obtained from processes involving impregnating or coating
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 . . . . [. . . resulting by the method for obtaining this coating or impregnating]
20/3217 . . . . [. . . 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]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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]
20/3441 . . . [Regeneration or reactivation by electric current, ultrasonics or irradiation, e.g. electromagnetic radiation such as X-rays, UV, light, microwaves]
20/345 . . . [using a particular desorbing compound or mixture (elution or regeneration of stationary phases in liquid chromatography B01D 15/08)]
20/3458 . . . . [in the gas phase]
20/3466 . . . . . [with steam]
20/3475 . . . . . [in the liquid phase]
20/3483 . . . . [by thermal treatment not covered by groups B01J 20/3441 - B01J 20/3475, e.g. by heating or cooling]
20/3491 . . . . [by pressure treatment]

21/00 Catalysts comprising the elements, oxides, or hydroxides of magnesium, boron, aluminium, carbon, silicon, titanium, zirconium, or hafnium

**WARNING**

Groups B01J 21/00 - B01J 21/20 are incomplete pending reclassification of documents from group B01J 32/00.

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

21/005 . . . [Spinels]
21/02 . . . Boron or aluminium; Oxides or hydroxides thereof
21/04 . . . . Alumina
21/06 . . . Silicon, titanium, zirconium or hafnium; Oxides or hydroxides thereof
21/063 . . . . [Titanium; Oxides or hydroxides thereof]
21/066 . . . . [Zirconium or hafnium; Oxides or hydroxides thereof]
21/08 . . . Silica
21/10 . . . Magnesium; Oxides or hydroxides thereof
21/12 . . . . Silica and alumina
21/14 . . . Silica and magnesia
21/16 . . . . Clays or other mineral silicates
21/18 . . . Carbon
21/185 . . . . [Carbon nanotubes (carbon nanotubes per se C01B 32/15)]
21/20 . . . Regeneration or reactivation

23/00 Catalysts comprising metals or metal oxides or hydroxides, not provided for in group B01J 21/00 (B01J 21/16 takes precedence)

**WARNING**

Groups B01J 23/00 - B01J 23/06 are incomplete pending reclassification of documents from group B01J 32/00.

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

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 2523/10 - B01J 2523/847, in numerical order, as further symbols and separated by ";". e.g. the mixed oxide Mo3VTeO, is classified as (B01J 2523/00, B01J 2523/55, B01J 2523/64, B01J 2523/68).

23/005 . . . [Spinels]
23/007 . . . [Mixed salts]
23/02 . . . of the alkali- or alkaline earth metals or beryllium
23/04 . . . 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
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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]

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

**Catalysts of the Raney type**

**WARNING**

Groups **B01J 25/00 - B01J 25/04** are incomplete pending reclassification of documents from group **B01J 32/00**.

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

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**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.

**WARNING**

Groups **B01J 27/00 - B01J 27/32** are incomplete pending reclassification of documents from group **B01J 32/00**.

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

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**Catalysts comprising molecular sieves** ([molecular sieves per se C01B])

**NOTES**

1. In this group, the following term is used with the meaning indicated:
   - "zeolites" means:
     i. crystalline aluminosilicates with base-exchange and molecular sieve properties, having three dimensional, microporous lattice framework structure of tetrahedral oxide units;
     ii. compounds isomorphous to those of the former category, wherein the aluminium or
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Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

B01J 29/00

(continued)
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 sieves 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.

WARNING

Groups B01J 29/00 - B01J 29/90 are incomplete pending reclassification of documents from group B01J 32/00. All groups listed in this Warning should be considered in order to perform a complete search.

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 29/049 or B01J 29/82 - B01J 29/89)

29/03 . . not having base-exchange properties (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 29/005 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]

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

B01J

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 ferrierite 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
29/703 . . . . . . [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 . . . . . . [MFS-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]
29/7057 . . . . . . [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 . . . . . . [MFS-type, e.g. ZSM-57]
29/7099 . . . . . . [MRE-type, e.g. ZSM-48]
29/712 . . . . . . 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]
29/7224 . . . . . . [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 . . . . . . [MFS-type, e.g. ZSM-57]
29/729 . . . . . . 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]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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, MU-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, MU-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, MU-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)
29/84 . . . . . . Aluminophosphates containing other elements, e.g. metals, boron
29/85 . . . . . . Silicoaluminophosphates (SAPO compounds)
29/86 . . . . . . Borosilicates; Aluminoborosilicates (B01J 29/005 takes precedence)
29/87 . . . . . . Gallosilicates; Aluminogallosilicates; Galloborosilicates (B01J 29/005 takes precedence)
29/88 . . . . . . Ferrosilicates; Ferroaluminosilicates (B01J 29/005 takes precedence)
29/89 . . . . . . Silicates, aluminosilicates or borosilicates of titanium, zirconium or hafnium (B01J 29/005 takes precedence)
29/90 . . . . . . 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))

NOTES
1. Group B01J 31/003 takes precedence over groups B01J 31/02 - B01J 31/24 (catalytic antibodies C12N 9/0002)
2. In this group, the following terms or expressions are used with the meanings indicated:
   • "Organic compound" a compound in which carbon is bonded to
     (1) a second carbon; (2) at least one atom of hydrogen or halogen; or (3) nitrogen by a single or double bond; except cyanic acid (HOCN), cyanogen (NCCN), cyanamide (H2NCN), cyanogen halide (HalCN), hydrocyanic acid (HCN) isocyanic acid (HNCN) fulminic acid (HCNO) and metal carboxylates (MCCM) catalysts comprising any of these exceptions or their salts B01J 27/20 - B01J 27/26.
   • "Organometallic compounds" includes all organic compounds wherein a metal or metalloid atom is bonded directly to a carbon fragment, the latter being formally anionic, no further neutral ligands being coordinated to the metal and the compound requiring no further cations for charge balance; e.g. M(1- CR3)n with M= main group metal, n= valency of metal and R= H or hydrocarbyl. (Compounds comprising anionic organonitrogen, organooxygen and organosulfur fragments, excluding carboxylates, with a metal bonded to these heteroatoms B01J 31/02 - B01J 31/0254; unsaturated carbon fragments in combination with transition metals B01J 31/2282)
   • "Coordination complexes" includes any donor-acceptor compounds or complex ions comprising organic or inorganic, anionic or neutral Lewis basic ligands, attached to a Lewis acid central metal or metal ion through one or several complexing donor atoms with at least one lone-pair of electrons, e.g. N, O, S, P, to provide at least a Sigma-bond. Typically the maximum number of same or different ligands according to the coordination number, spatial requirements of the ligand and electronic configuration of the metal is bound in a predictable geometry. Complexes of neutral, cationic or anionic hydrocarbon ligands with delocalised charge and/or bonding site, e.g. M(1- CR3)n with M= main group metal, n= valency of metal and R= H or hydrocarbyl. (Compounds containing organonitrogen, organooxygen and organosulfur fragments).
B01J 31/00

(continued)

with a metal bonded to these heteroatoms

B01J 31/02 - B01J 31/0254.

• "Organometallic complexes" includes all coordination

complexes comprising a M-C

bond, e.g. metal carbonyls (complex cyanides

such as M4[Fe(CN)6] B01J 27/26).Included are

furthermore complexes which are not

strictly organometallic per se, e.g. comprising

only N, O, S and/or P coordinated ligands, but

are described as involving, or known to involve,

organometallic intermediates and/or transition

states during use, e.g. Group 8-10 metal

complexes for a variety of catalytic reactions or

steps thereof, such as oxidative addition,

epoxidation, etc.

• "Organic complexes" includes all coordination

complexes comprising organic ligands (groups

B01J 31/1608 - B01J 31/1895 take precedence).

• "Polymer" includes any macromolecular

substance (typically M>10000 g/mol), which

comprises repeating units made up of one or

several kinds of atoms or groups of atoms,

which are identically connected to one another.

Oligomers, i.e. more than two identical

repeating units connected to one another and

typically 500<M<10000 g/mol, are grouped

with the respective polymers (polymers per se

are disregarded for classification purposes.

In this group, the presence of water is

disregarded for classification purposes

B01J 31/006

• [containing enzymes]

NOTE

In this group, organic radicals, e.g. TEMPO

B01J 31/02

• containing organic compounds or metal hydrides

B01J 31/0201 . . . . [Oxygen-containing compounds]

B01J 31/0202 . . . . [Alcohols or phenols]

B01J 31/0204 . . . . [Ethers]

B01J 31/0205 . . . . [containing carbonyl groups or oxygen-

containing derivatives, e.g. acetics, ketals,

cyclic peroxides]

B01J 31/0207 . . . . [Aldehydes or acetics]

B01J 31/0208 . . . . [Ketones or ketals]

B01J 31/0209 . . . . [Esters of carboxylic or carbonic acids]

B01J 31/0211 . . . . [with a metal-oxygen link]

B01J 31/0212 . . . . [Alkoxylates]

B01J 31/0214 . . . . [Aryloxylates, e.g. phenolates]

B01J 31/0215 . . . . [Sulfur-containing compounds]

B01J 31/0217 . . . . [Mercaptans or thiols]

B01J 31/0218 . . . . [Sulfides]

B01J 31/022 . . . . [Disulfides]

B01J 31/0221 . . . . [Polysulfides]

B01J 31/0222 . . . . [containing sulfonyl groups]

B01J 31/0224 . . . . [being perfluorinated, i.e. comprising at least

one perfluorinated moiety as substructure in

case of polyfunctional compounds]

B01J 31/0225 . . . . [containing sulfonic acid groups or the

corresponding salts]

B01J 31/0227 . . . . [being perfluorinated, i.e. comprising at least

one perfluorinated moiety as substructure in

case of polyfunctional compounds]

B01J 31/0228 . . . . [with a metal-sulfur link, e.g. mercaptides]

B01J 31/0229 . . . . [also containing elements or functional groups

covered by B01J 31/0201 - B01J 31/0214]

B01J 31/0231 . . . . [Halogen-containing compounds]

B01J 31/0232 . . . . [also containing elements or functional groups

covered by B01J 31/0201 - B01J 31/0228

(perfluorinated sulfonyl compounds or

moeities B01J 31/0224; perfluorosulfonic acids

B01J 31/0227)]

B01J 31/0234 . . . . [Nitrogen-, phosphorus-, arsenic- or antimony-

containing compounds]

B01J 31/0235 . . . . [Nitrogen containing compounds]

B01J 31/0237 . . . . [Amines]

B01J 31/0238 . . . . [with a primary amino group]

B01J 31/0239 . . . . [Quaternary ammonium compounds]

B01J 31/0241 . . . . [Imines or enamines]

B01J 31/0242 . . . . . . [Enamines]

B01J 31/0244 . . . . [with nitrogen contained as ring member

in aromatic compounds or moieties, e.g.

pyridine]

B01J 31/0245 . . . . [being derivatives of carboxylic or carbonic

acids]

B01J 31/0247 . . . . [Imides, amides or imidates (R-

C≡NR(OR))]

B01J 31/0248 . . . . [Nitriles]

B01J 31/0249 . . . . [Ureas (R2N-C(O)-NR2)]

B01J 31/0251 . . . . [Guanidines (R2N-C(NR)-NR2)]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

31/0252 . . . . [with a metal-nitrogen link, e.g. metal amides, metal guanidides]
31/0254 . . . . [on mineral substrates]
31/0255 . . . . [Phosphorus containing compounds]
31/0257 . . . . [Phosphorus acids or phosphorus acid esters]
31/0258 . . . . [Phosphoric acid mono-, di- or triesters ((RO)2P=O), i.e. R= C, R’= C, H]
31/0259 . . . . [comprising phosphoric acid (-ester) groups ((RO)2P(OR’)2) 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 (RP(OR’)2) or the isomeric phosphinic acid (-ester) groups (R2(R’O)P=O), i.e. R= C, R’= C, H]
31/0262 . . . . [comprising phosphinous acid (-ester) groups (R2P(OR’)) or the isomeric phospine oxide groups (R3P=O), i.e. R= C, R’= C, H]
31/0264 . . . . [Phosphorus acid amides]
31/0265 . . . . [Phosphazenes, oligomers thereof or the corresponding phospheinium salts (polyphosphaenazenes 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 phosphabenzene, 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 phosphorous]
31/0269 . . . . [on mineral substrates]
31/0271 . . . . [also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0231]
31/0272 . . . . [containing elements other than those covered by B01J 31/0201 - B01J 31/0255]
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]
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-ions]
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 31/122; 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 (n) containing 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 31/08 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 77/08)]
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. polyhydroxymethylsiloxane (PHMMS)]
31/127 . . . . [the siloxane units, e.g. silsesquioxane units, being grafted onto other polymers or inorganic supports, e.g. via an organic linker]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

31/128 . . . . . [Mixtures of organometallic compounds]
31/14 . . . . . of aluminum or boron
31/143 . . . . . [of aluminum]
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 29/00)]
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. polyhydrosloxanes]
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; MOF’s per se C07E)]
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 C=N-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-aminopyrididine]
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]
31/184 . . . . . . [mixed aromatic/aliphatic ring systems, e.g. indoline]
31/1845 . . . . . [the ligands containing phosphorus (phosphines B01J 31/24)]
31/185 . . . . . [Phosphites (R2PO), 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 . . . . . [Phosphinites (RP(OR)2), their isomeric phosphinates (R2(RO)P=O) and RO-substitution derivatives thereof]
31/187 . . . . . . [Amide derivatives thereof]
31/1875 . . . . . [Phosphites (RP(OR), their isomeric phosphine oxides (RP=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. phosphite/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-dicarbonyl ligands, e.g. acetylacetonates]
31/2239 . . . . . [Bridging ligands, e.g. OAc in Cr2(OAc)6, Pd(OAc)2 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. thio carbamates]
31/2265 . . . . . [Carbenes or carbones, i.e. (image)]
31/2269 . . . . . [Heterocyclic carbenes]
31/2273 . . . . . [with only nitrogen as heteroatomic ring members, e.g. 1,3-diarylimidazoline-2-ylidenes]
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. acetyldienes]
31/2291 . . . . . [Olefins]
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

31/2295 . . . . (Cyclic compounds, e.g. cyclopentadienyls)
31/24 . . Phosphines, i.e. phosphorus bonded to only carbon atoms, or 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. Xanthophos)
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-phosphaadamantane)
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 phosphonate/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
31/36 . . 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

(WARNING) Group B01J 32/00 is no longer used for the classification of documents as of May 1, 2020.

The content of this group is being reclassified into groups B01J 21/00 - B01J 29/90 and B01J 33/00 - B01J 38/74.

Groups B01J 32/00, B01J 21/00 - B01J 29/90, and B01J 33/00 - B01J 38/74 should be considered in order to perform a complete search.

33/00 Protection of catalysts, e.g. by coating

(WARNING) Group B01J 33/00 is incomplete pending reclassification of documents from group B01J 32/00.

Groups B01J 32/00 and B01J 33/00 should be considered in order to perform a complete search.

35/00 Catalysts, in general, characterised by their form or physical properties

(WARNING) Groups B01J 35/00 - B01J 35/12 are incomplete pending reclassification of documents from group B01J 32/00.

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

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)
35/002 . . . . Solids
35/0023 . . . . (Catalysts characterised by dimensions, e.g. grain size)
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

37/00 Processes, in general, for preparing catalysts; Processes, in general, for activation of catalysts

WARNING

Groups B01J 37/00 - B01J 37/36 are incomplete pending reclassification of documents from group B01J 32/00.

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

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)
37/0089 . . . . (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)
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 . . . . Sulphiding
37/22 . . . . Halogenating
37/24 . . . . Chlorinating
37/26 . . . . Fluorinating
37/28 . . . . Phosphorising
37/30 . . . . Ion-exchange
37/32 . . . . Freeze drying, i.e. lyophilisation
Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts

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 . . . [of ionic or cathodic spraying; Electric discharge]
37/348 . . [Electrochemical processes, e.g. electrochemical deposition or anodisation]
37/349 . . [making use of flames, plasmas or lasers]
37/36 . Biochemical methods
38/00 Regeneration or reactivation of catalysts, in general

WARNING
Groups B01J 38/00 - B01J 38/74 are incomplete pending reclassification of documents from group B01J 32/00.
All groups listed in this warning should be considered in order to perform a complete search.

2038/005 . [involving supercritical treatment]
38/02 . Heat treatment
38/04 . Gas or vapour treating; Treating by using liquids vapourisable 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 oxohalogen 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 er 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 G21F 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
Ion-exchange

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 adsorbent 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 . Precoat 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
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
2203/061 . Graphite
2203/0615 . Fullerene
2203/062 . Diamond
2203/0625 . Carbon
2203/063 . Carbides
2204/00 Aspects relating to feed or outlet devices; Reactors therefor

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

- Controlling the process
- Controlling the temperature
- Controlling or regulating the heat exchange system
- involving measured parameters
- Temperature measurement
- of the heat exchange medium
- of the reactants
- Pressure measurement
- Fluid level measurement
- Flow rate measurement
- Mathematical modelling
- by indirect heat exchange
- with heat exchange elements inside the bed of solid particles
- Fingers
- Tubes
- Coils
- Plates; Cylinders
- Radially arranged plates
- with heat exchange elements outside the bed of solid particles
- outside the reactor
- Fingers
- Tubes
- Coils
- Plates; Jackets; Cylinders
- comprising baffles for guiding the flow of the heat exchange medium
- with some catalyst tubes being empty, e.g. dummy tubes or flow-adjusting rods
- 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
- Reflux columns
- in a heat exchanger for the heat exchange medium separate from the reactor

- Part of all of the reactants being heated or cooled outside the reactor while recycling
- involving reactant vapours
- involving reactant liquids
- involving reactant solids
- involving reactant slurries
- with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction
- Heat exchange inside a feeding nozzle or nozzle reactor
- by direct heat exchange
- adding a temperature modifying medium to the reactants
- Cryogenic coolants
- Non-cryogenic fluids
- Liquid
- gaseous
- Solids
- using electric heating or cooling elements
- inside the reactor bed
- outside the reactor bed
- electric resistance heaters
- Peltier cooling elements
- using electromagnetic heating
- Microwaves
- Sunlight; Visible light
- Infrared radiation
- Radiofrequency
- by thermal insulation means
- Vacuum spaces
- using insulating materials or refractories
- by means of a burner
- using inert heat absorbing solids in the bed
- using inert heat absorbing solids outside the bed
- Controlling multiple zones along the direction of flow, e.g. pre-heating and after-cooling
- Pressure
- Flow
- controlling the residence time inside the reactor vessel
- Pulsated flow
- Controlling the viscosity
- Controlling the density
- Controlling the pH
- Controlling the conductivity
- Controlling the level
- Controlling the weight
- Controlling the composition of the reactive mixture
- Means for starting up the reaction
- by measures relating to the particulate material
- Concentration
- Particle size selection
- Agglomeration
- Attrition
- Moisture content regulation
- Fouling

B01J
in general; Their relevant apparatus

Chemical, physical or physico-chemical processes

Details of tube reactors containing solid particles

Chemical plants

Plants mounted on pallets or skids

Plants assembled from modules joined together

by condensation of reactants

by evaporation of reactants

adding a temperature modifying medium to

reactor being immersed in the heat exchange medium

in a heat exchanger separate from the reactor

part or all of the reactants being heated or cooled outside the reactor while recycling

involving reactant vapours

involving reactant liquids

involving reactant solids

involving reactant slurries

with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction

Heat exchange inside a feeding nozzle or reaction

Heat exchange in heat exchange with an exothermic reactor

asymmetrically boiling reactors

using electric heating or cooling elements
Avoiding undesirable reactions or side-effects
Mathematical modelling controlling the composition of the reactive vessel
controlling the weight of reactants in the reactor vessel
controlling the conductivity
controlling the level of reactants in the reactor vessel
controlling the viscosity
controlling the density
Physical density
Optical density
controlling the pH
controlling the conductivity
controlling the level of reactants in the reactor vessel
controlling the weight of reactants in the reactor vessel
controlling the composition of the reactive mixture
controlling the stirring velocity
Control algorithm
Sensing a parameter
of the reaction system
at the reactor inlet
inside the reactor
at the reactor outlet
of the heat exchange system
other than of the reactor heat exchange system
transferring a sensed parameter
comparing a sensed parameter with a pre-set value
Fixed parameter value
Parameter value calculated by equations
Dynamically variable (in-line) parameter values

calculating difference

taking actions

stopping the system or generating an alarm
modifying the operating conditions
of the reaction system
at the reactor inlet
inside the reactor
at the reactor outlet
of the heat exchange system
other than of the reactor or heat exchange system
Mathematical modelling
Avoiding undesirable reactions or side-effects
Foam formation
Formation of deposits other than coke

Formation of deposits other than coke
Foam formation
Fouling of the reactor or the process equipment
Vacuum spaces

Physical density
Reactor vessels with top and bottom openings
the reactor vessels having impervious side walls
the reactor vessels having pervious side walls
the reactor vessels being formed by arrays of wells in blocks
the blocks being mounted in stacked arrangements
the individual reactor vessels being arranged serially in stacks
the reactor vessels or wells being arranged in plates moving in parallel to each other
Movement by rotation
Movement by linear translation
Details of the reactor vessels
Closures attached to the reactor vessels
Septa
Valves
in the shape of a ball or sphere
rotary
Caps
Screw-caps
Spheres
Means for dispensing and evacuation of reagents
Pumps
Peristaltic
Electrode driven
Means for pressurising the reaction vessels
by shaking, vibrating or oscillating of the
reaction vessels

by the use of moving stirrers within the
reaction vessels
by sonication or ultrasonication
for direct application of reagents, e.g.
through openings in a shutter
in multiple or parallel arrangements
in the shape of cylinders
in the shape of plates
in the shape of disks
in the shape of vessels

Chemical means
Magnetic means
Physical means

D. Fabian

M. W. R. de Koningh
Type of compounds synthesised

Type of synthesis

Means for controlling the apparatus of the process

Means for quality control

Synthesis control routines, e.g. using computer programs

Measurement and control of process parameters

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

Lips

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

Details of the reactor

Baffles

Baffles attached to the reactor wall

vertical

inclined

in a helix

in the form of cones

horizontal

Baffles attached to the stirring means

Aspects relating to microreactors

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

Geometry of the plates

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

Monolith-base structure

One or more tube-shaped elements

Spiral-shaped

Concentric tubes

Cup-shaped

Means to assemble

Plurality of plates

Frames

Sealing means

Plurality of modules

Fluidic connections

Electric connections

Support structures

Materials of construction

Metal

Ceramic

Quartz

Silicon wafers or plates

Glass

Plastic

Comprising catalytically active material

comprising coatings other than catalytically active coatings

For changing surface tension

For protection channel surface, e.g. corrosion protection

Comprising porous material

comprising nanostructures, e.g. nanotubes
2219/00849 . . . . . . comprising packing elements, e.g. glass beads
2219/00851 . . . . . . Additional features
2219/00853 . . . . . . Employing electrode arrangements
2219/00855 . . . . . . Surface features
2219/00858 . . . . . . Aspects relating to the size of the reactor
2219/0086 . . . . . . Dimensions of the flow channels
2219/00862 . . . . . . Dimensions of the reaction cavity itself
2219/00864 . . . . . . Channel sizes in the nanometer range, e.g. nanoreactors
2219/00867 . . . . . . Microreactors placed in series, on the same or on different supports
2219/00869 . . . . . . Microreactors placed in parallel, on the same or on different supports
2219/00871 . . . . . . Modular assembly
2219/00873 . . . . . . Heat exchange
2219/00876 . . . . . . Insulation elements
2219/00878 . . . . . . Vacuum spaces
2219/0088 . . . . . . Peltier-type elements
2219/00882 . . . . . . Electromagnetic heating
2219/00885 . . . . . . Thin film heaters
2219/00887 . . . . . . Deflection means for heat or irradiation
2219/00889 . . . . . . Mixing (micromixers B01F 13/0059)
2219/00891 . . . . . . Feeding or evacuation
2219/00894 . . . . . . More than two inlets
2219/00896 . . . . . . Changing inlet or outlet cross-section, e.g. pressure-drop compensation
2219/00898 . . . . . . Macro-to-Micro (M2M)
2219/00909 . . . . . . Pulsating flow
2219/00903 . . . . . . Segmented flow
2219/00905 . . . . . . Separation
2219/00907 . . . . . . using membranes
2219/00909 . . . . . . using filters
2219/00912 . . . . . . by electrophoresis
2219/00914 . . . . . . by dielectrophoresis
2219/00916 . . . . . . by colorimetry
2219/00918 . . . . . . by adsorption
2219/00921 . . . . . . by absorption
2219/00923 . . . . . . by surface tension
2219/00925 . . . . . . Irradiation
2219/00927 . . . . . . Particle radiation or gamma-radiation
2219/0093 . . . . . . Electric or magnetic energy
2219/0093 . . . . . . Electric or magnetic energy
2219/00932 . . . . . . Sonic or ultrasonic vibrations
2219/00934 . . . . . . Electromagnetic waves
2219/00936 . . . . . . UV-radiations
2219/00939 . . . . . . X-rays
2219/00941 . . . . . . Microwaves
2219/00943 . . . . . . Visible light, e.g. sunlight
2219/00945 . . . . . . Infra-red light
2219/00948 . . . . . . Radiofrequency
2219/0095 . . . . . . Control aspects
2219/00952 . . . . . . Sensing operations
2219/00954 . . . . . . Measured properties
2219/00957 . . . . . . Compositions or concentrations
2219/00959 . . . . . . Flow
2219/00961 . . . . . . Temperature
2219/00963 . . . . . . Pressure
2219/00966 . . . . . . pH
2219/00968 . . . . . . Type of sensors
2219/0097 . . . . . . Optical sensors
2219/00972 . . . . . . Visible light
2219/00975 . . . . . . Ultraviolet light
2219/00977 . . . . . . Infrared light
2219/00979 . . . . . . Acoustic sensors
2219/00981 . . . . . . Gas sensors
2219/00984 . . . . . . Residence time
2219/00986 . . . . . . Microprocessor
2219/00988 . . . . . . Leakage
2219/0099 . . . . . . Cleaning
2219/00993 . . . . . . Design aspects
2219/00995 . . . . . . Mathematical modeling
2219/00997 . . . . . . Strategical arrangements of multiple microreactor systems
2219/02 . . . . . . Apparatus characterised by their chemically-resistant properties
2219/0204 . . . . . . comprising coatings on the surfaces in direct contact with the reactive components
2219/0209 . . . . . . of glass
2219/0213 . . . . . . of enamel
2219/0218 . . . . . . of ceramic
2219/0222 . . . . . . of porcelain
2219/0227 . . . . . . of graphite
2219/0231 . . . . . . of diamond
2219/0236 . . . . . . Metal based
2219/024 . . . . . . Metal oxides
2219/0245 . . . . . . of synthetic organic material
2219/025 . . . . . . characterised by the construction materials of the reactor vessel proper
2219/0254 . . . . . . Glass
2219/0259 . . . . . . Enamel
2219/0263 . . . . . . Ceramic
2219/0268 . . . . . . Porcelain
2219/0272 . . . . . . Graphite
2219/0277 . . . . . . Metal based
2219/0281 . . . . . . Metal oxides
2219/0286 . . . . . . Steel
2219/029 . . . . . . Non-ferrous metals
2219/0295 . . . . . . Synthetic organic materials
2219/03 . . . . . . Processes employing the direct application of electric or wave energy, or particle radiation; Apparatus therefor
2219/0801 . . . . . . Controlling the process
2219/0803 . . . . . . employing electric or magnetic energy
2219/0805 . . . . . . giving rise to electric discharges
2219/0807 . . . . . . involving electrodes
2219/0809 . . . . . . employing two or more electrodes
2219/0811 . . . . . . employing three electrodes
2219/0813 . . . . . . employing four electrodes
2219/0815 . . . . . . involving stationary electrodes
2219/0816 . . . . . . involving moving electrodes
2219/0818 . . . . . . Rotating electrodes
2219/082 . . . . . . Sliding electrodes
2219/0822 . . . . . . The electrode being consumed
2219/0824 . . . . . . Details relating to the shape of the electrodes
2219/0826 . . . . . . essentially linear
2219/0828 . . . . . . Wires
2219/083 . . . . . . Cylindrical
2219/0832 . . . . . . essentially toroidal
2219/0833 . . . . . . forming part of a full circle
2219/0835 . . . . . . substantially flat
2219/0837 . . . . . . Details relating to the material of the electrodes
2219/0839 . . . . . . Carbon
2219/0841 . . . . . . Metal
Processes carried out in the presence of a plasma

Materials to be treated

Heating or cooling of the reactor

Feeding or evacuating the reactor

Incoherent waves

Hot plasma

Processes employing electromagnetic waves

Processes carried out in the presence of a plasma

Processes employing catalytically active material

Processes carried out in the presence of a plasma

Liquid-liquid

Liquid-solid

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes employing multiple (electro)magnets

Processes involving catalytically active material

Processes carried out in the presence of a plasma

Cold plasma

Processes employing electromagnetic waves

Incoherent waves

Microwaves

Features relating to the reactor or vessel

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

spiral

toroidal

conical

oval or ellipsoidal

ovoid or egg-shaped

Stationary reactors without moving elements inside

Reactors comprising multiple separate flow channels

Monolithic-type reactors

Geometry of the channels

Polygonal

Rectangular

Square

Circular or ellipsoidal

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 alternately at their end to force the reactant stream through the walls of the monolith

Construction materials
Catalysts coated on the surface of the monolith channels
Nanocatalysts
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
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
Nanocatalysts
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
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
Sphere
Egg, ovoid or ellipse
Toroid or ring
Disk
Cylinder
Cone or truncated cone
Triangle
Hexagon
Tetrahedron
Star
Square or square-derived
Cube
Pyramid
Wire
twisted
Spiral
Brush
Cross
Sheet
stretched
twisted
folded
rolled up
Other shapes
Composition or microstructure of the elements
Metal
Ceramic
Carbon
Glass
Wood
Cork
Rubber
Details relating to packing elements in the form of grids or built-up elements for forming a unit.

- 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, bosses, 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
- characterised by the orientation of blocks of sheets
- 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

Aspects relating to sorbent materials

- Aspects relating to the composition of sorbent or filter aid 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 vegetals, e.g. seaweeds, eelgrass
- Plants or land vegetals, e.g. cereals, wheat, corn, rice, sphagnum, peat moss
- Proteins, DNA
- Feathers
Aspects of molecular sieve catalysts not covered by B01J 2229/00

2229/10 . . . . . . . . . . . . After treatment, characterised by the effect to be obtained
2229/12 . . . . . . . . . . . . to alter the outside of the crystallites, e.g. selectivation
2229/123 . . . . . . . . . . . . in order to deactivate outer surface
2229/126 . . . . . . . . . . . . in order to reduce the pore-mouth size
2229/14 . . . . . . . . . . . . to alter the inside of the molecular sieve channels
2229/16 . . . . . . . . . . . . to increase the Si/Al ratio; Dealumination
2229/18 . . . . . . . . . . . . to introduce other elements into or onto the molecular sieve itself
2229/183 . . . . . . . . . . . . in framework positions
2229/186 . . . . . . . . . . . . not in framework positions
2229/20 . . . . . . . . . . . . to introduce other elements in the catalyst composition comprising the molecular sieve, but not specially in or on the molecular sieve itself
2229/22 . . . . . . . . . . . . to destroy the molecular sieve structure or part thereof
2229/24 . . . . . . . . . . . . to stabilize the molecular sieve structure
2229/26 . . . . . . . . . . . . to stabilize the total catalyst structure
2229/30 . . . . . . . . . . . . After treatment, characterised by the means used
2229/32 . . . . . . . . . . . . Reaction with silicon compounds, e.g. TEOS, siliconfluoride

Relevant Section

CPC - 2020.08
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2231/421</td>
<td>Mannich type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues to alddehydes or ketones</td>
</tr>
<tr>
<td>2231/423</td>
<td>Other additions, e.g. Monsanto-type carboxylation, addition to 1,2-C=C-X or 1,2-C-X triplebonds, additions to 1,4-C=C-C=X or 1,4-C=C-C-X triple bonds with X, e.g. O, S, NH/N, NH/Me</td>
</tr>
<tr>
<td>2231/424</td>
<td>Aldol type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues, to alddehydes or ketones</td>
</tr>
<tr>
<td>2231/426</td>
<td>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</td>
</tr>
<tr>
<td>2231/427</td>
<td>Catalytic cross-coupling, i.e. connection of previously not connected C-atoms or C- and X-atoms without rearrangement</td>
</tr>
<tr>
<td>2231/428</td>
<td>Suzuki-type, i.e. RY + R'B(OR)2, in which R, R' are optionally substituted alky1, alkenyl, aryl, acyl and Y is the leaving group</td>
</tr>
<tr>
<td>2231/429</td>
<td>Catalytic cross-coupling, e.g. metal catalyzed or Friedel-Crafts type</td>
</tr>
<tr>
<td>2231/430</td>
<td>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</td>
</tr>
<tr>
<td>2231/431</td>
<td>Other additions, e.g. aldol or Knoevenagel condensations</td>
</tr>
<tr>
<td>2231/432</td>
<td>via cationic intermediates, e.g. bisphenol A type processes</td>
</tr>
<tr>
<td>2231/433</td>
<td>1.4-additions, e.g. conjugate additions</td>
</tr>
<tr>
<td>2231/434</td>
<td>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</td>
</tr>
<tr>
<td>2231/435</td>
<td>1,2-additions, e.g. aldol or Knoevenagel condensations</td>
</tr>
<tr>
<td>2231/436</td>
<td>via cationic intermediates, e.g. bisphenol A type processes</td>
</tr>
<tr>
<td>2231/437</td>
<td>1,2-additions, e.g. aldol or Knoevenagel condensations</td>
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<tr>
<td>2231/438</td>
<td>1,4-additions, e.g. conjugate additions</td>
</tr>
<tr>
<td>2231/439</td>
<td>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</td>
</tr>
<tr>
<td>2231/440</td>
<td>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</td>
</tr>
<tr>
<td>2231/441</td>
<td>via cationic intermediates, e.g. bisphenol A type processes</td>
</tr>
<tr>
<td>2231/442</td>
<td>1,2-additions, e.g. aldol or Knoevenagel condensations</td>
</tr>
<tr>
<td>2231/443</td>
<td>1,4-additions, e.g. conjugate additions</td>
</tr>
<tr>
<td>2231/444</td>
<td>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</td>
</tr>
<tr>
<td>2231/445</td>
<td>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</td>
</tr>
<tr>
<td>2231/446</td>
<td>via cationic intermediates, e.g. bisphenol A type processes</td>
</tr>
<tr>
<td>2231/447</td>
<td>1,2-additions, e.g. aldol or Knoevenagel condensations</td>
</tr>
<tr>
<td>2231/448</td>
<td>1,4-additions, e.g. conjugate additions</td>
</tr>
<tr>
<td>2231/449</td>
<td>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</td>
</tr>
</tbody>
</table>
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 B01J 31/16 - B01J 31/24; indexing codes B01J 2531/0286 - B01J 2531/0297 are only used if these aspects are described as essential. Indexing codes B01J 2531/0213 - B01J 2531/0277 characterise the complexes on the basis of bond-type (linkage-type) thereby specifying the structural geometry of the complexes, while classification entries B01J 31/16 - B01J 31/24 are purely compositional subdivisions. The individual metals, the compositional aspects of complexes used and the solvents are indexed for each explicit alternative, according to the guideline above...
Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(Lx)Zr-Imidazole-Zr(Lx)Cp

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. Cr3(OAc)12

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. Ru6(CO)12

Complexes without C-metal linkages

Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(Lx)Zr-Imidazole-Zr(Lx)Cp

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. Cr3(OAc)12

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. Ru6(CO)12

Complexes comprising pentahapto-cyclopentadienyl analogues

Carbollide ligands, i.e. [nido-CnB(11-n)H11] (4-n)- in which n is 1-3

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

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

Azaborolyl ligands, e.g. 1,2-azaborolyl

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

Rigid ligands, e.g. extended sp2-carbon frameworks or geminal di- or trisubstitution

Pincer-type complexes, i.e. consisting of a tridentate skeleton bound to a metal, e.g. by one to three metal-carbon sigma-bonds

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 -RCp

Ligands with a porphyrin ring system or analogues thereof, e.g. phthalocyanines, corroles

Salen ligands or analogues, e.g. derived from ethylenediamine and salicylaldehyde

Ligands comprising the N2S2 or N2P2 donor atom set, e.g. diiminodithiolates or diiminodiphosphines with complete pi-conjugation between all donor centres

Flexible ligands, e.g. mainly sp3-carbon framework as exemplified by the "tedicyp" ligand, i.e. cis-cis-cis-1,2,3,4-tetrakis(diphenylphosphinomethyl)cyclopentane

Complexes comprising ligands with non-tetrahedral chirality

Planar chiral ligands, e.g. derived from donor-substituted paracyclophanes and metalloccenes or from substituted arenes

Axially chiral or atropisomeric ligands, e.g. bulky biaryl such as donor-substituted binaphthalenes, e.g. "BINAP" or "BINOL" Complexes comprising ligands derived from the natural chiral pool or otherwise having a characteristic structure or geometry

Derived from carbohydrates, including e.g. tartrates or DIOP

Derived from amino acids

Derived from fullerenes and analogues, e.g. buckybowl/s or Cp5Cp

Comprising affinity tags, e.g. for recovery (self-associating or modular catalysts B01J 2531/0291)

The bonding to the affinity counterpart occurring via hydrogen bonding

Complexes comprising ligands or other components characterized by their function

Sterically demanding or shielding ligands

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

Silver

Gold

Complexes comprising metals of Group II (IIA or IIB) 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
2531/36 . . . Yttrium
2531/37 . . . Lanthanum
2531/38 . . . Lanthanides other than lanthanum
2531/39 . . . Actinides
2531/40 . . . Complexes comprising metals of Group IV (IVA or IVB) as the central metal
2531/42 . . . Tin
2531/44 . . . Lead
2531/46 . . . Titanium
2531/48 . . . Zirconium
2531/49 . . . Hafnium
2531/50 . . . Complexes comprising metals of Group V (VA or VB) as the central metal
2531/52 . . . Antimony
2531/54 . . . Bismuth
2531/56 . . . Vanadium
2531/57 . . . Niobium
2531/58 . . . Tantalum
2531/59 . . . Complexes comprising metals of Group VI (VIA or VIB) as the central metal
2531/60 . . . Complexes comprising metals of Group VII (VIIIB) as the central metal
2531/62 . . . Chromium
2531/64 . . . Molybdenum
2531/66 . . . Tungsten
2531/70 . . . Complexes comprising metals of Group VIII as the central metal
2531/72 . . . Manganese
2531/74 . . . Rhenium
2531/80 . . . Complexes comprising metals of the platinum group
2531/82 . . . Metals of the platinum group
2531/821 . . . Ruthenium
2531/822 . . . Rhodium
2531/824 . . . Palladium
2531/825 . . . Osmium
2531/827 . . . Iridium
2531/828 . . . Platinum
2531/84 . . . Metals of the iron group
2531/842 . . . Iron
2531/845 . . . Cobalt
2531/847 . . . Nickel
2531/90 . . . Catalytic systems characterized by the solvent or solvent system used
2531/92 . . . Supercritical solvents
2531/922 . . . Carbon dioxide (scCO2)
2531/925 . . . Supercritical water (scH2O)
2531/927 . . . Mixtures of ionic liquids with supercritical solvents
2531/94 . . . Fluorinated solvents
2531/96 . . . Water
2531/98 . . . Phase-transfer catalysis in a mixed solvent system containing at least 2 immiscible solvents or solvent phases
2531/985 . . . in a water / organic solvent system

2540/00 Compositional aspects of coordination complexes or ligands in catalyst systems
2540/10 . . . Non-coordinating groups comprising only oxygen beside carbon or hydrogen
2540/12 . . . Carboxylic acid groups
2540/20 . . . Non-coordinating groups comprising halogens
2540/22 . . . comprising fluorine, e.g. trifluoroacetate
2540/225 . . . comprising perfluoroalkyl groups or moieties
2540/30 . . . Non-coordinating groups comprising sulfur
2540/32 . . . Sulfonic acid groups or their salts
2540/325 . . . being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional groups
2540/34 . . . Sulfonyl groups
2540/345 . . . being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional groups
2540/40 . . . Non-coordinating groups comprising nitrogen
2540/42 . . . Quaternary ammonium groups
2540/44 . . . 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(NR)-NR2) groups
2540/442 . . . Amide groups or imidato groups (RC=NR/OR))
2540/444 . . . Nitrile groups
2540/446 . . . Urea groups
2540/448 . . . Guanidino groups
2540/50 . . . Non-coordinating groups comprising phosphorus
2540/52 . . . Phosphorus acid or phosphorus acid ester groups
2540/522 . . . being phosphoric acid mono-, di- or triester groups ((RO)(R'O)2P=O), i.e. R= C, R'= C, H
2540/525 . . . 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
2540/527 . . . being phosphonous acid (-ester) groups
2540/54 . . . Quaternary phosphonium groups
2540/60 . . . Groups characterized by their function
2540/62 . . . Activating groups
2540/64 . . . Solubility enhancing groups
2540/66 . . . Linker or spacer groups
2540/68 . . . Associating groups, e.g. with a second ligand or a substrate molecule via non-covalent interactions such as hydrogen bonds