CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SEPARATING; MIXING

B01 PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL (furnaces, kilns, ovens, retorts in general F27)

B01J CHEMICAL OR PHYSICAL PROCESSES, e.g. CATALYSIS, COLLOID CHEMISTRY; THEIR RELEVANT APPARATUS (processes or apparatus for specific applications, see the relevant places for these processes or apparatus, e.g. F26B 3/08)

NOTES

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

WARNING

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

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

2/00 **Processes or devices for granulating materials, {e.g. fertilisers} in general** (granulating metals B22F 9/00, {granulating slag C21B 3/06} , ores or scrap C22B 1/14; mechanical aspects of working of plastics or substances in a plastic state to make granules B29B 9/00; processes for granulating fertilisers characterised by their chemical constitution, see the relevant groups in C05B - C05G; chemical aspects of powdering or granulating of macromolecular substances C08J 3/12)**; 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** (apparatus for compacting or sintering of metal powders B22F 3/00; pressure vessels in general F16J 12/00; pressure vessels for containing or storing compressed, liquefied or solidified gases F17C; pressure vessels for nuclear reactors G21C)

3/002 . {Component parts of these vessels not mentioned in B01J 3/004, B01J 3/006, B01J 3/02 - B01J 3/08; Measures taken in conjunction with the process to be carried out, e.g. safety measures}

3/004 . {Sight-glasses therefor (see also G02B)}

3/006 . {Processes utilising sub-atmospheric pressure; Apparatus therefor}

3/008 . {Processes carried out under supercritical conditions}

3/02 . Feed or outlet devices therefor

3/03 . Pressure vessels, or vacuum vessels, having closure members or seals specially adapted therefor

3/04 . Pressure vessels, e.g. autoclaves

3/042 . . {in the form of a tube}

3/044 . . {in the form of a loop}

3/046 . . {Pressure-balanced vessels}

3/048 . . {Multiwall, strip or filament wound vessels (for pressurised gas vessels F17C 1/06; for making them B29)}

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

3/062 . . {characterised by the composition of the materials to be processed}

3/065 . . {Presses for the formation of diamonds or boronitrides}

3/067 . . . {Presses using a plurality of pressing members working in different directions}

3/08 . . Application of shock waves for chemical reactions or for modifying the crystal structure of substances {, e.g. reactions carried out by explosions or in a combustion engine-type reactor}

4/00 **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})

4/001 . {Feed or outlet devices as such, e.g. feeding tubes}

4/002 . . {Nozzle-type elements (nozzle-type reactors B01J 19/26)}

4/004 . . {Sparger-type elements}

4/005 . . {provided with baffles}

4/007 . . {provided with moving parts}

4/008 . {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} Calcining; Fusing {Pyrolysis** (furnaces F27D)**}**

6/001 . {Calcining}

6/002 . . {using rotating drums}

6/004 . . {using hot gas streams in which the material is moved}

6/005 . {Fusing}

6/007 . . {in crucibles}

6/008 . {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 3/04})

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** (processes or devices for granulating material B01J 2/00; furnaces F27B{; heat exchange apparatus F28C 3/10; F28D 13/00, F28D 17/00, F28D 19/00})

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 (free vortex flow apparatus in general B04C)
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; combustion apparatus in which combustion takes place in a fluidised bed of fuel or other particles F23C 10/00)
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 (use of substances as emulsifying, wetting, dispersing or foam producing agents B01F 17/00)
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 diagnostical purposes A61K, G01N)}
13/0047 . . {containing a metal oxide}
13/0052 . {Preparation of gels}
13/0056 . . {containing inorganic material and water}
13/006 . . . {by precipitation, coagulation, hydrolyse coacervation}
13/0065 . . {containing an organic phase}
13/0069 . . {Post treatment}
13/0073 . {Preparation of non-Newtonian 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 liquids; 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 (physical treatment of fibres, threads, yarns, fabrics, feathers or fibrous goods made from such materials, see the relevant places for such treatment, e.g. D06M 10/00)**; Their relevant apparatus** (packings, fillings or grids specially adapted for biological treatment of water, waste water or sewage C02F 3/10; splashing boards or grids specially adapted for trickle coolers F28F 25/08)
19/0006 . {Controlling or regulating processes (controlling or regulating in general G05)}
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 . . {Optimalisation 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 (for auxiliary pretreatment of gases or vapours to be cleaned B01D 51/08; for cleaning B08B 3/12{; for degasification of liquids B01D 19/0073; for mixing purposes B01F 11/02})
19/12 . . employing electromagnetic waves
19/121 . . . {Coherent waves, e.g. laser beams (lasers per se H01S 3/00)}
19/122 . . . {Incoherent waves (gamma-radiation B01J 19/082)}
19/123 . . . . {Ultra-violet light}
19/124 . . . . . {generated by microwave irradiation}
19/125 . . . . {X-rays}
19/126 . . . . {Microwaves}
19/127 . . . . {Sunlight; Visible light}
19/128 . . . . {Infra-red light}
19/129 . . . . {Radiofrequency}
19/14 . Production of inert gas mixtures; Use of inert gases in general (apparatus for generating gases B01J 7/00; separation of gases or vapours B01D 53/00 {; application in storage tanks B65D 90/44})
19/16 . Preventing evaporation or oxidation of non-metallic liquids by applying a floating layer, e.g. of microballoons {(in storage tanks B65D 90/42)}
19/18 . Stationary reactors having moving elements inside (B01J 19/08, B01J 19/26 take precedence)
19/1806 . . {resulting in a turbulent flow of the reactants, such as in centrifugal-type reactors, or having a high Reynolds-number}
19/1812 . . {Tubular reactors}
19/1818 . . . {in series}
19/1825 . . . {in parallel}
19/1831 . . . {spirally, concentrically or zigzag wound}
19/1837 . . . {Loop-type reactors}
19/1843 . . . {Concentric tube}
19/185 . . {of the pulsating type}
19/1856 . . {placed in parallel}
19/1862 . . {placed in series}
19/1868 . . {resulting in a loop-type movement}
19/1875 . . . {internally, i.e. the mixture circulating inside the vessel such that the upwards stream is separated physically from the downwards stream(s)}
19/1881 . . . {externally, i.e. the mixture leaving the vessel and subsequently re-entering it}
19/1887 . . {forming a thin film}
19/1893 . . {Membrane reactors (membranes B01D 71/00; catalytic membranes B01J 35/065)}
19/20 . . in the form of helices, e.g. screw reactors (thin-film reactors B01J 10/02)
19/22 . . in the form of endless belts
19/24 . Stationary reactors without moving elements inside (B01J 19/08, B01J 19/26 take precedence; with stationary particles B01J 8/02)
19/2405 . . {provoking a turbulent flow of the reactants, such as in cyclones, or having a high Reynolds-number}
19/241 . . {of the pulsating type}
19/2415 . . {Tubular reactors}
19/242 . . . {in series}
19/2425 . . . {in parallel}
19/243 . . . {spirally, concentrically or zigzag wound}
19/2435 . . . {Loop-type reactors}
19/244 . . . {Concentric tubes}
19/2445 . . {placed in parallel}
19/245 . . {placed in series}
19/2455 . . {provoking a loop type movement of the reactants (tubular loop-type reactors B01J 19/2435; loop reactors having moving elements inside B01J 19/1868)}
19/246 . . . {internally, i.e. the mixture circulating inside the vessel such that the upward stream is separated physically from the downward stream(s)}
19/2465 . . . {externally, i.e. the mixture leaving the vessel and subsequently re-entering it}
19/247 . . {Suited for forming thin films}

19/2475 . . {Membrane reactors}
19/248 . . {Reactors comprising multiple separated flow channels}
19/2485 . . . {Monolithic reactors}
19/249 . . . {Plate-type reactors}
19/2495 . . . {Net-type reactors}
19/26 . Nozzle-type reactors, i.e. the distribution of the initial reactants within the reactor is effected by their introduction or injection through nozzles
19/28 . Moving reactors, e.g. rotary drums (B01J 19/08 takes precedence; rotary drum furnaces F27B 7/00)
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 32/00 - B01J 38/00, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
4. Pure compounds or elements, or their recovery from solid sorbent compositions, filter aid compositions, or catalysts, are classified in the appropriate subclass for chemical compounds or elements. However, when it is explicitly stated that the pure compound or element, in a particular form, is especially useful as a solid sorbent, filter aid, or catalyst, it is further classified in group B01J 20/00 or B01J 35/00.
5. {In groups B01J 21/00 - B01J 38/00, the following term is used with the meaning indicated:
   – "catalyst" covers also a carrier forming part of the catalyst.}
6. {Classification of the:
   – carriers;
   – forms or physical properties;
   – preparation or activation;
   – regeneration or reactivation of catalysts according to more than one of main groups B01J 21/00 - B01J 31/00 is made in the following general groups:
     – B01J 32/00 for such carriers;
     – B01J 35/00 for such forms or physical properties;
     – B01J 37/00 for such preparation or activation;
     – B01J 38/00 for such regeneration or reactivation.}

20/00 Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Processes for preparing, regenerating or reactivating thereof (use of sorbent compositions in liquid separation B01D 15/00, use of filter aid compositions B01D 37/02; use of sorbent compositions in gas separation B01D 53/02, B01D 53/14)

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

NOTE

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

20/0207 . . . {Compounds of Sc, Y or Lanthanides}
20/0211 . . . {Compounds of Ti, Zr, Hf}
20/0214 . . . {Compounds of V, Nb, Ta}
20/0218 . . . {Compounds of Cr, Mo, W}
20/0222 . . . {Compounds of Mn, Re}
20/0225 . . . {Compounds of Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt}
20/0229 . . . . {Compounds of Fe}
20/0233 . . . {Compounds of Cu, Ag, Au}
20/0237 . . . . {Compounds of Cu}
20/024 . . . {Compounds of Zn, Cd, Hg}
20/0244 . . . . {Compounds of Zn}
20/0248 . . . {Compounds of B, Al, Ga, In, Tl (B01J 20/08 takes precedence)}
20/0251 . . . {Compounds of Si, Ge, Sn, Pb (B01J 20/10 takes precedence)}
20/0255 . . . . {Compounds of Pb}
20/0259 . . . {Compounds of N, P, As, Sb, Bi}
20/0262 . . . {Compounds of O, S, Se, Te}
20/0266 . . . . {Compounds of S}
20/027 . . . {Compounds of F, Cl, Br, I}
20/0274 . . . {characterised by the type of anion}
20/0277 . . . . {Carbonates of compounds other than those provided for in B01J 20/043}
20/0281 . . . . {Sulfates of compounds other than those provided for in B01J 20/045}
20/0285 . . . . {Sulfides of compounds other than those provided for in B01J 20/045}
20/0288 . . . . {Halides of compounds other than those provided for in B01J 20/046}
20/0292 . . . . {Phosphates of compounds other than those provided for in B01J 20/048}
20/0296 . . . . {Nitrates of compounds other than those provided for in B01J 20/04}
20/04 . . comprising compounds of alkali metals, alkaline earth metals or magnesium
20/041 . . . {Oxides or hydroxides}
20/043 . . . {Carbonates or bicarbonates, e.g. limestone, dolomite, aragonite}
20/045 . . . {containing sulfur, e.g. sulfates, thiosulfates, gypsum}
20/046 . . . {containing halogens, e.g. halides}
20/048 . . . {containing phosphorus, e.g. phosphates, apatites, hydroxyapatites}

20/06 . . comprising oxides or hydroxides of metals not provided for in group B01J 20/04
20/08 . . . comprising aluminium oxide or hydroxide; comprising bauxite
20/10 . . comprising silica or silicate
20/103 . . . {comprising silica}
20/106 . . . . {Perlite}
20/12 . . . Naturally occurring clays or bleaching earth
20/14 . . . Diatomaceous earth
20/16 . . . Alumino-silicates (B01J 20/12 takes precedence)
20/165 . . . . {Natural alumino-silicates, e.g. zeolites}
20/18 . . . . Synthetic zeolitic molecular sieves
20/183 . . . . . {Physical conditioning without chemical treatment, e.g. drying, granulating, coating, irradiation}
20/186 . . . . . {Chemical treatments in view of modifying the properties of the sieve, e.g. increasing the stability or the activity, also decreasing the activity}
20/20 . . comprising free carbon; comprising carbon obtained by carbonising processes (active carbon C01B 32/30)
20/205 . . . {Carbon nanostructures, e.g. nanotubes, nanohorns, nanocones, nanoballs (carbon nanotubes per se C01B 32/15)}
20/22 . comprising organic material
20/223 . . {containing metals, e.g. organo-metallic compounds, coordination complexes}
20/226 . . . {Coordination polymers, e.g. metal-organic frameworks [MOF], zeolitic imidazolate frameworks [ZIF] (preparation of metal complexes containing carboxylic acid moieties C07C 51/418; MOF's per se C07F)}
20/24 . . Naturally occurring macromolecular compounds, e.g. humic acids or their derivatives
20/26 . . Synthetic macromolecular compounds
20/261 . . . {obtained by reactions only involving carbon to carbon unsaturated bonds (macromolecular compounds obtained by reactions only involving carbon-to-carbon unsaturated bonds per se C08F)}
20/262 . . . {obtained otherwise than by reactions only involving carbon to carbon unsaturated bonds, e.g. obtained by polycondensation (macromolecular compounds obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds per se C08G)}
20/264 . . . {derived from different types of monomers, e.g. linear or branched copolymers, block copolymers, graft copolymers}
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 20/205)}
20/28009 . . . {Magnetic properties}
20/28011 . . . {Other properties, e.g. density, crush strength}
20/28014 . . {characterised by their form}
20/28016 . . . {Particle form}
20/28019 . . . . {Spherical, ellipsoidal or cylindrical}
20/28021 . . . . {Hollow particles, e.g. hollow spheres, microspheres or cenospheres}
20/28023 . . . {Fibres or filaments (fibres or filaments in the form of membranes B01J 20/28038; 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 fibers or filaments}
20/2804 . . . . {Sheets with a specific shape, e.g. corrugated, folded, pleated, helical}
20/28042 . . . {Shaped bodies; Monolithic structures}
20/28045 . . . . {Honeycomb or cellular structures; Solid foams or sponges}
20/28047 . . . {Gels}
20/2805 . . . {Sorbents inside a permeable or porous casing, e.g. inside a container, bag or membrane}
20/28052 . . . {Several layers of identical or different sorbents stacked in a housing, e.g. in a column}
20/28054 . . {characterised by their surface properties or porosity}
20/28057 . . . {Surface area, e.g. B.E.T specific surface area}
20/28059 . . . . {being less than 100 m2/g}
20/28061 . . . . {being in the range 100-500 m2/g}
20/28064 . . . . {being in the range 500-1000 m2/g}
20/28066 . . . . {being more than 1000 m2/g}
20/28069 . . . {Pore volume, e.g. total pore volume, mesopore volume, micropore volume}
20/28071 . . . . {being less than 0.5 ml/g}
20/28073 . . . . {being in the range 0.5-1.0 ml/g}
20/28076 . . . . {being more than 1.0 ml/g}
20/28078 . . . {Pore diameter}
20/2808 . . . . {being less than 2 nm, i.e. micropores or nanopores}
20/28083 . . . . {being in the range 2-50 nm, i.e. mesopores}
20/28085 . . . . {being more than 50 nm, i.e. macropores}
20/28088 . . . {Pore-size distribution}
20/2809 . . . . {Monomodal or narrow distribution, uniform pores}
20/28092 . . . . {Bimodal, polymodal, different types of pores or different pore size distributions in different parts of the sorbent}
20/28095 . . . {Shape or type of pores, voids, channels, ducts}
20/28097 . . . . {being coated, filled or plugged with specific compounds}

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

NOTE

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

20/282 . . Porous sorbents (ion exchange B01J 39/00 - B01J 41/00)
20/283 . . . based on silica
20/284 . . . based on alumina
20/285 . . . based on polymers
20/286 . . Phases chemically bonded to a substrate, e.g. to silica or to polymers
20/287 . . . Non-polar phases; Reversed phases
20/288 . . . Polar phases
20/289 . . . bonded via a spacer
20/29 . . Chiral phases
20/291 . . Gel sorbents
20/292 . . Liquid sorbents
20/30 . Processes for preparing, regenerating, or reactivating
20/3007 . . {Moulding, shaping or extruding}
20/3014 . . {Kneading}
20/3021 . . {Milling, crushing or grinding}
20/3028 . . {Granulating, agglomerating or aggregating}
20/3035 . . {Compressing}
20/3042 . . {Use of binding agents; addition of materials ameliorating the mechanical properties of the produced sorbent}
20/305 . . {Addition of material, later completely removed, e.g. as result of heat treatment, leaching or washing, e.g. for forming pores}
20/3057 . . . {Use of a templating or imprinting material (molecularly imprinted polymers B01J 20/268); filling pores of a substrate or matrix followed by the removal of the substrate or matrix}
20/3064 . . . {Addition of pore forming agents, e.g. pore inducing or porogenic agents}
20/3071 . . {Washing or leaching}
20/3078 . . {Thermal treatment, e.g. calcining or pyrolizing}
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 . . . {characterised by the method for obtaining this coating or impregnating}
20/3217 . . . . {Resulting in a chemical bond between the coating or impregnating layer and the carrier, support or substrate, e.g. a covalent bond}
20/3219 . . . . . {involving a particular spacer or linking group, e.g. for attaching an active group}
20/3221 . . . . . {the chemical bond being an ionic interaction}
20/3223 . . . . {by means of an adhesive agent}
20/3225 . . . . {involving a post-treatment of the coated or impregnated product}
20/3227 . . . . . {by end-capping, i.e. with or after the introduction of functional or ligand groups}
20/3229 . . . . . {for preventing leaching, leaking of attached functional or ligand groups}
20/3231 . . . {characterised by the coating or impregnating layer}
20/3234 . . . . {Inorganic material layers}
20/3236 . . . . . {containing metal, other than zeolites, e.g. oxides, hydroxides, sulphides or salts}
20/3238 . . . . . {containing any type of zeolite}
20/324 . . . . . {containing free carbon, e.g. activated carbon}
20/3242 . . . . {Layers with a functional group, e.g. an affinity material, a ligand, a reactant or a complexing group}
20/3244 . . . . . {Non-macromolecular compounds}
20/3246 . . . . . {having a well defined chemical structure}
20/3248 . . . . . {the functional group or the linking, spacer or anchoring group as a whole comprising at least one type of heteroatom selected from a nitrogen, oxygen or sulfur, these atoms not being part of the carrier as such}
20/3251 . . . . . {comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulphur}
20/3253 . . . . . {comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures}
20/3255 . . . . . {comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. heterocyclic or heteroaromatic structures}
20/3257 . . . . . {the functional group or the linking, spacer or anchoring group as a whole comprising at least one of the heteroatoms nitrogen, oxygen or sulfur together with at least one silicon atom, these atoms not being part of the carrier as such}
20/3259 . . . . . {comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulfur with at least one silicon atom}

20/3261 . . . . . {comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures}
20/3263 . . . . . {comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. an heterocyclic or heteroaromatic structure}
20/3265 . . . . . {with an organic functional group containing a metal, e.g. a metal affinity ligand}
20/3268 . . . . {Macromolecular compounds}
20/327 . . . . . {Polymers obtained by reactions involving only carbon to carbon unsaturated bonds}
20/3272 . . . . . {Polymers obtained by reactions otherwise than involving only carbon to carbon unsaturated bonds}
20/3274 . . . . . {Proteins, nucleic acids, polysaccharides, antibodies or antigens}
20/3276 . . . . . {Copolymers}
20/3278 . . . . . {Polymers being grafted on the carrier}
20/328 . . . . . {Polymers on the carrier being further modified}
20/3282 . . . . . {Crosslinked polymers}
20/3285 . . . . {Coating or impregnation layers comprising different type of functional groups or interactions, e.g. different ligands in various parts of the sorbent, mixed mode, dual zone, bimodal, multimodal, ionic or hydrophobic, cationic or anionic, hydrophilic or hydrophobic}
20/3287 . . . . {Layers in the form of a liquid}
20/3289 . . . . {Coatings involving more than one layer of same or different nature}
20/3291 . . . {Characterised by the shape of the carrier, the coating or the obtained coated product}
20/3293 . . . . {Coatings on a core, the core being particle or fiber shaped, e.g. encapsulated particles, coated fibers}
20/3295 . . . . {Coatings made of particles, nanoparticles, fibers, nanofibers}
20/3297 . . . . {Coatings in the shape of a sheet}
20/34 . . Regenerating or reactivating
20/3408 . . . {of aluminosilicate molecular sieves}
20/3416 . . . {of sorbents or filter aids comprising free carbon, e.g. activated carbon}
20/3425 . . . {of sorbents or filter aids comprising organic materials}
20/3433 . . . {of sorbents or filter aids other than those covered by B01J 20/3408 - B01J 20/3425}
20/3441 . . . {Regeneration or reactivation by electric current, ultrasound 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

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)

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 $Mo_aV_bTe_cO_x$ 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
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

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

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

NOTE

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

27/02 . Sulfur, selenium or tellurium; Compounds thereof
27/04 . . Sulfides
27/043 . . . with iron group metals or platinum group metals
27/045 . . . . Platinum group metals
27/047 . . . with chromium, molybdenum, tungsten or polonium
27/049 . . . . with iron group metals or platinum group metals
27/051 . . . . Molybdenum
27/0515 . . . . . {with iron group metals or platinum group metals}
27/053 . . Sulfates
27/055 . . . with alkali metals, copper, gold or silver
27/057 . . Selenium or tellurium; Compounds thereof
27/0573 . . . {Selenium; Compounds thereof}
27/0576 . . . {Tellurium; Compounds thereof}
27/06 . Halogens; Compounds thereof
27/08 . . Halides
27/10 . . . Chlorides
27/12 . . . Fluorides
27/122 . . . of copper
27/125 . . with scandium, yttrium, aluminium, gallium, indium or thallium
27/128 . . with iron group metals or platinum group metals
27/13 . . . Platinum group metals
27/132 . . with chromium, molybdenum, tungsten or polonium
27/135 . . with titanium, zirconium, hafnium, germanium, tin or lead
27/138 . . with alkaline earth metals, magnesium, beryllium, zinc, cadmium or mercury
27/14 . Phosphorus; Compounds thereof
27/16 . . containing oxygen {, i.e. acids, anhydrides and their derivates with N, S, B or halogens without carriers or on carriers based on C, Si, Al or Zr; also salts of Si, Al and Zr}
27/18 . . . with metals {other than Al or Zr}
27/1802 . . . . {Salts or mixtures of anhydrides with compounds of other metals than V, Nb, Ta, Cr, Mo, W, Mn, Tc, Re, e.g. phosphates, thiophosphates}
27/1804 . . . . . {with rare earths or actinides}
27/1806 . . . . . {with alkaline or alkaline earth metals}
27/1808 . . . . . {with zinc, cadmium or mercury}
27/1811 . . . . . {with gallium, indium or thallium}
27/1813 . . . . . {with germanium, tin or lead}
27/1815 . . . . . {with arsenic, antimony or bismuth}
27/1817 . . . . . {with copper, silver or gold}
27/182 . . with silicon
27/185 . . with iron group metals or platinum group metals
27/1853 . . . {with iron, cobalt or nickel}
27/1856 . . . {with platinum group metals}
27/186 . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
27/187 . . . with manganese, technetium or rhenium
27/188 . . . with chromium, molybdenum, tungsten or polonium
27/19 . . . . Molybdenum
27/192 . . . . . with bismuth
27/195 . . . with vanadium, niobium or tantalum
27/198 . . . . Vanadium
27/199 . . . . . with chromium, molybdenum, tungsten or polonium
27/20 . Carbon compounds
27/22 . . Carbides
27/224 . . . Silicon carbide
27/228 . . . . with phosphorus, arsenic, antimony or bismuth
27/232 . . Carbonates
27/236 . . . Hydroxy carbonates
27/24 . Nitrogen compounds
27/25 . . Nitrates
27/26 . . Cyanides
27/28 . Regeneration or reactivation
27/285 . . {of catalysts comprising compounds of phosphorus}
27/30 . . of catalysts comprising compounds of sulfur, selenium or tellurium
27/32 . . of catalysts comprising compounds of halogens

29/00 Catalysts comprising molecular sieves {(molecular sieves per se C01B)}

NOTES

1. In this group, the following term is used with the meaning indicated:
– "zeolites" means:

B01J 29/00 (continued)

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 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

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; Aluminochromosilicates (B01J 29/005 takes precedence)}

29/047 . . {Germanosilicates; Aluminogermanosilicates (B01J 29/005 takes precedence)}

29/048 . . {Zincosilicates, Aluminozincosilicates (B01J 29/005 takes precedence)}

29/049 . . {Pillared clays}

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

29/061 . . . {containing metallic elements added to the zeolite}

2029/062 . . . {Mixtures of different aluminosilicates}

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

29/068 . . . . Noble metals

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

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

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

2029/081 . . . . {Increasing the silica/alumina ratio; Desalumination}

29/082 . . . . {X-type faujasite}

29/084 . . . . {Y-type faujasite}

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

29/087 . . . . . {X-type faujasite}

29/088 . . . . . {Y-type faujasite}

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

29/103 . . . . . {X-type faujasite}

29/106 . . . . . {Y-type faujasite}

29/12 . . . . . Noble metals

29/123 . . . . . {X-type faujasite}

29/126 . . . . . {Y-type faujasite}

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

29/143 . . . . . {X-type faujasite}

29/146 . . . . . {Y-type faujasite}

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

29/163 . . . . . {X-type faujasite}

29/166 . . . . . {Y-type faujasite}

29/18 . . . of the mordenite type

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

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

29/22 . . . . . Noble metals

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

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

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

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

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

29/44 . . . . . Noble metals
29/46 . . . . . Iron group metals or copper
29/48 . . . . containing arsenic, antimony, bismuth, vanadium, niobium tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/50 . . . of the erionite or offretite type, e.g. zeolite T, as exemplified by patent document US2950952
29/505 . . . . {containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead}
29/52 . . . . containing iron group metals, noble metals or copper
29/54 . . . . . Noble metals
29/56 . . . . . Iron group metals or copper
29/58 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/60 . . . of the type L, as exemplified by patent document US3216789
29/605 . . . . {containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead}
29/61 . . . . containing iron group metals, noble metals or copper
29/62 . . . . . Noble metals
29/63 . . . . . Iron group metals or copper
29/64 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/65 . . . of the ferrierite type, e.g. types ZSM-21, ZSM-35 or ZSM-38, as exemplified by patent documents US4046859, US4016245 and US4046859, respectively
29/655 . . . . {containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead}
29/66 . . . . containing iron group metals, noble metals or copper
29/67 . . . . . Noble metals
29/68 . . . . . Iron group metals or copper
29/69 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/70 . . . of types characterised by their specific structure not provided for in groups B01J 29/08 - B01J 29/65
29/7003 . . . . {A-type}
29/7007 . . . . {Zeolite Beta}
29/7011 . . . . {MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202}
29/7015 . . . . {CHA-type, e.g. Chabazite, LZ-218}
29/7019 . . . . {EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20}
29/7023 . . . . {EUO-type, e.g. EU-1, TPZ-3 or ZSM-50}
29/7026 . . . . {MFS-type, e.g. ZSM-57}
29/703 . . . . {MRE-type, e.g. ZSM-48}
29/7034 . . . . {MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3}
29/7038 . . . . {MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25}
29/7042 . . . . {TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22}
29/7046 . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/7049 . . . . {containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead}
29/7053 . . . . . {A-type}
29/7057 . . . . . {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 . . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/72 . . . . containing iron group metals, noble metals or copper
29/7207 . . . . . {A-type}
29/7215 . . . . . {Zeolite Beta}
29/7223 . . . . . {MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202}
29/723 . . . . . {CHA-type, e.g. Chabazite, LZ-218}
29/7238 . . . . . {EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20}
29/7246 . . . . . {EUO-type, e.g. EU-1, TPZ-3 or ZSM-50}
29/7253 . . . . . {MFS-type, e.g. ZSM-57}
29/7261 . . . . . {MRE-type, e.g. ZSM-48}
29/7269 . . . . . {MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3}
29/7276 . . . . . {MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25}
29/7284 . . . . . {TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22}
29/7292 . . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/74 . . . . . Noble metals
29/7407 . . . . . {A-type}
29/7415 . . . . . {Zeolite Beta}
29/7423 . . . . . {MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202}
29/743 . . . . . {CHA-type, e.g. Chabazite, LZ-218}
29/7438 . . . . . {EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20}
29/7446 . . . . . {EUO-type, e.g. EU-1, TPZ-3 or ZSM-50}
29/7453 . . . . . {MFS-type, e.g. ZSM-57}
29/7461 . . . . . {MRE-type, e.g. ZSM-48}

29/7469 . . . . . {MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3}
29/7476 . . . . . {MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25}
29/7484 . . . . . {TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22}
29/7492 . . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/76 . . . . Iron group metals or copper
29/7607 . . . . . {A-type}
29/7615 . . . . . {Zeolite Beta}
29/7623 . . . . . {MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202}
29/763 . . . . . {CHA-type, e.g. Chabazite, LZ-218}
29/7638 . . . . . {EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20}
29/7646 . . . . . {EUO-type, e.g. EU-1, TPZ-3 or ZSM-50}
29/7653 . . . . . {MFS-type, e.g. ZSM-57}
29/7661 . . . . . {MRE-type, e.g. ZSM-48}
29/7669 . . . . . {MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3}
29/7676 . . . . . {MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25}
29/7684 . . . . . {TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22}
29/7692 . . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/78 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
29/7807 . . . . . {A-type}
29/7815 . . . . . {Zeolite Beta}
29/7823 . . . . . {MAZ-type, e.g. Mazzite, Omega, ZSM-4 or LZ-202}
29/783 . . . . . {CHA-type, e.g. Chabazite, LZ-218}
29/7838 . . . . . {EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20}
29/7846 . . . . . {EUO-type, e.g. EU-1, TPZ-3 or ZSM-50}
29/7853 . . . . . {MFS-type, e.g. ZSM-57}
29/7861 . . . . . {MRE-type, e.g. ZSM-48}
29/7869 . . . . . {MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3}
29/7876 . . . . . {MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25}
29/7884 . . . . . {TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22}
29/7892 . . . . . {MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13}
29/80 . . . Mixtures of different zeolites
29/82 . Phosphates {(B01J 29/005 takes precedence)}
29/83 . . Aluminophosphates (APO compounds)
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 (HNCO) fulminic acid (HCNO)and metal carbides (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. Pd-olefin complexes or metallocenes, are also included (the following groups take precedence: simple hydrocarbyl metal compounds, e.g. of main group metal(loids) B01J 31/12; oxoacid salts B01J 31/04 - B01J 31/10; other compounds comprising anionic 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, e.g. of ArX, hydrogenation, carbonylation, 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 C08).

3. In this group, if two or more aspects are of equal importance, these are each classified, e.g. two components in a catalyst system such as:
   - support and pendant or otherwise immobilised coordination complex; or
   - coordination complex and essential additive.

   However, if two components, even if separately added, are described as forming, or known to form, a coordination complex, only the latter is classified, e.g. phosphine and Group 8-10 metal such as rhodium. The groups B01J 31/26 - B01J 31/38 are not to be used for the central metals in coordination complexes but rather for separately added further inorganic ingredients.

   Each specifically disclosed alternative is separately classified, i.e. specifically disclosed by ways of worked examples, specific claims and/or explicit alternatives therein.
4. {When classifying in B01J 31/00, additional information for the catalysts is provided as follows:

   (4-1) the specifically disclosed intended uses are indexed in B01J 2231/00;

   (4-2) general aspects of the complexes of group B01J 31/16 and the specifically disclosed central metal(s) therein, as well as additional information regarding any special solvents used for any catalyst system of this group are indexed in B01J 2531/00.

   (4-3) conceptual articles, e.g. reviews, are separately indexed in B01J 2231/005 and B01J 2531/001;

   (4-4) additional information regarding the complexes or ligands classified in B01J 31/16 - B01J 31/24 and indexed in B01J 2531/00 is indexed in B01J 2540/00, e.g. non-coordinating substituents on the ligand periphery}

31/003 . {containing enzymes}

NOTE

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

31/006 . {comprising organic radicals, e.g. TEMPO}
31/02 . containing organic compounds or metal hydrides
31/0201 . . {Oxygen-containing compounds}
31/0202 . . . {Alcohols or phenols}
31/0204 . . . {Ethers}
31/0205 . . . {comprising carbonyl groups or oxygen-containing derivatives, e.g. acetals, ketals, cyclic peroxides}
31/0207 . . . . {Aldehydes or acetals}
31/0208 . . . . {Ketones or ketals}
31/0209 . . . {Esters of carboxylic or carbonic acids}
31/0211 . . . {with a metal-oxygen link}
31/0212 . . . . {Alkoxylates}
31/0214 . . . . {Aryloxylates, e.g. phenolates}
31/0215 . . {Sulfur-containing compounds}
31/0217 . . . {Mercaptans or thiols}
31/0218 . . . {Sulfides}
31/022 . . . . {Disulfides}
31/0221 . . . . {Polysulfides}
31/0222 . . . {comprising sulfonyl groups}
31/0224 . . . . {being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds}
31/0225 . . . {comprising sulfonic acid groups or the corresponding salts}
31/0227 . . . . {being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds}
31/0228 . . . {with a metal-sulfur link, e.g. mercaptides}
31/0229 . . . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0214}
31/0231 . . {Halogen-containing compounds}
31/0232 . . . {also containing elements or functional groups covered by B01J 31/0201 - B01J 31/0228 (perfluorinated sulfonyl compounds or moieties B01J 31/0224; perfluorosulfonic acids B01J 31/0227)}
31/0234 . . {Nitrogen-, phosphorus-, arsenic- or antimony-containing compounds}
31/0235 . . . {Nitrogen containing compounds}
31/0237 . . . . {Amines}
31/0238 . . . . . {with a primary amino group}
31/0239 . . . . {Quaternary ammonium compounds}
31/0241 . . . . {Imines or enamines}
31/0242 . . . . . {Enamines}
31/0244 . . . . {with nitrogen contained as ring member in aromatic compounds or moieties, e.g. pyridine}
31/0245 . . . . {being derivatives of carboxylic or carbonic acids}
31/0247 . . . . . {Imides, amides or imidates (R-C=NR(OR))}
31/0248 . . . . . {Nitriles}
31/0249 . . . . . {Ureas (R_2N-C(=O)-NR_2)}
31/0251 . . . . . {Guanidides (R_2N-C(=NR)-NR_2)}

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)(R'O)2P=O), i.e. R= C, R'= C, H}
31/0259 . . . . . {comprising phosphorous acid (-ester) groups ((RO)P(OR')2) or the isomeric phosphonic acid (-ester) groups (R(R'O)2P=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 phosphine oxide groups (R3P=O) , i.e. R= C, R'= C, H}
31/0264 . . . . {Phosphorus acid amides}
31/0265 . . . . . {Phosphazenes, oligomers thereof or the corresponding phosphazenium salts (polyphosphazenes per se C07F 9/067)}
31/0267 . . . . {Phosphines or phosphonium compounds, i.e. phosphorus bonded to at least one carbon atom, including 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-anions}
31/04 . . containing carboxylic acids or their salts {(B01J 31/0277 - B01J 31/0298 take precedence; multi-metal carboxylate complexes like Pd (II) acetate, i.e. Pd3 (OAc) 6 or Cr(II)acetate, i.e. $Cr_2(OAc)_4$ B01J 31/2226)}
31/06 . . containing polymers {(organometallic polymers B01J 31/123; polymer-bound organometallic complexes B01J 31/165; coordination polymers B01J 31/1691)}
31/061 . . . {Chiral polymers}
31/062 . . . . {Polymeric amino acids}
31/063 . . . {Polymers comprising a characteristic microstructure}
31/064 . . . . {Dendrimers}
31/065 . . . . {Cyclodextrins}
31/066 . . . . {Calixarenes and hetero-analogues, e.g. thiacalixarenes}
31/067 . . . . {Molecularly imprinted polymers (catalytic antibodies C12N 9/0002)}
31/068 . . . {Polyalkylene glycols}
31/069 . . . {Hybrid organic-inorganic polymers, e.g. silica derivatized with organic groups (nitrogen containing groups on mineral substrates B01J 31/0254; organometallic polymers B01J 31/123; coordination complexes immobilised on an inorganic support B01J 31/1616; coordination polymers, e.g. metal-organic frameworks B01J 31/1691)}
31/08 . . . Ion-exchange resins
31/10 . . . . sulfonated
31/12 . . containing organo-metallic compounds or metal hydrides
31/121 . . . {Metal hydrides}
31/122 . . . {Metal aryl or alkyl compounds}
31/123 . . . {Organometallic polymers, e.g. comprising C-Si bonds in the main chain or in subunits grafted to the main chain (B01J 31/064, B01J 31/066, B01J 31/067, B01J 31/08 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. polyhydromethylsiloxane [PHMS]}
31/127 . . . . . {the siloxane units, e.g. silsesquioxane units, being grafted onto other polymers or inorganic supports, e.g. via an organic linker}

31/128 . . . {Mixtures of organometallic compounds}
31/14 . . . of aluminium or boron
31/143 . . . . {of aluminium}
31/146 . . . . {of boron}
31/16 . containing coordination complexes
31/1608 . . {the ligands containing silicon}
31/1616 . . {Coordination complexes, e.g. organometallic complexes, immobilised on an inorganic support, e.g. ship-in-a-bottle type catalysts (catalysts comprising molecular sieves B01J 29/00)}
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. polyhydrosiloxanes}
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 C07F)}
31/18 . . containing nitrogen, phosphorus, arsenic or antimony {as complexing atoms, e.g. in pyridine ligands, or in resonance therewith, e.g. in isocyanide ligands 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 non-condensed polycyclic ligands, comprising at least one complexing nitrogen atom as ring member, e.g. pyridine}
31/1815 . . . . . {with more than one complexing nitrogen atom, e.g. bipyridyl, 2-aminopyridine}
31/182 . . . . . {comprising aliphatic or saturated rings}
31/1825 . . . . . {Ligands comprising condensed ring systems, e.g. acridine, carbazole}
31/183 . . . . . {with more than one complexing nitrogen atom, e.g. phenanthroline}
31/1835 . . . . . {comprising aliphatic or saturated rings}
31/184 . . . . . {mixed aromatic/aliphatic ring systems, e.g. indoline}
31/1845 . . . {the ligands containing phosphorus (phosphines B01J 31/24)}
31/185 . . . . {Phosphites ((RO)3P) , their isomeric phosphonates (R(RO)2P=O) and RO-substitution derivatives thereof}
31/1855 . . . . . {Triamide derivatives thereof}
31/186 . . . . . {Mono- or diamide derivatives thereof}
31/1865 . . . . {Phosphonites (RP(OR)2) , their isomeric phosphinates (R2(RO)P=O) and RO-substitution derivatives thereof}
31/187 . . . . . {Amide derivatives thereof}
31/1875 . . . . {Phosphinites ($R_2P(OR)$, their isomeric phosphine oxides ($R_3P=O$) 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 phosphino moieties, in one at least bidentate ligand}
31/1895 . . . {the ligands containing arsenic or antimony}
31/20 . . Carbonyls
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 $Cr_2(OAc)_4$, $Pt_4(OAc)_8$ or dicarboxylate ligands}
31/2243 . . . . . {At least one oxygen and one nitrogen atom present as complexing atoms in an at least bidentate or bridging ligand}
31/2247 . . . . . {At least one oxygen and one phosphorous atom present as complexing atoms in an at least bidentate or bridging ligand}
31/2252 . . . . . {Sulfonate ligands}
31/2256 . . . . . {being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional ligands}
31/226 . . . . {Sulfur, e.g. thiocarbamates}
31/2265 . . . {Carbenes or carbynes, i.e.(image)}
31/2269 . . . . {Heterocyclic carbenes}
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. acetylides}
31/2291 . . . . {Olefins}
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 sp2-hybridised phosphorus compounds such as phosphabenzene, phosphole or anionic phospholide ligands (complexes with parent phosphine PH_3 B01J 31/1845)}
31/2404 . . . {Cyclic ligands, including non-condensed polycyclic ligands, the phosphine-P atom being a ring member or a substituent on the ring}
31/2409 . . . . {with more than one complexing phosphine-P atom}
31/2414 . . . . . {comprising aliphatic or saturated rings}
31/2419 . . . . {comprising P as ring member}
31/2423 . . . . . {comprising aliphatic or saturated rings}
31/2428 . . . . . {with more than one complexing phosphine-P atom}
31/2433 . . . . . {comprising aliphatic or saturated rings}
31/2438 . . . . . {and further hetero atoms as ring members, excluding the positions adjacent to P}
31/2442 . . . . {comprising condensed ring systems}
31/2447 . . . . . {and phosphine-P atoms as substituents on a ring of the condensed system or on a further attached ring}
31/2452 . . . . . {with more than one complexing phosphine-P atom}
31/2457 . . . . . {comprising aliphatic or saturated rings, e.g. Xantphos}
31/2461 . . . . . {and phosphine-P atoms as ring members in the condensed ring system or in a further ring}
31/2466 . . . . . {comprising aliphatic or saturated rings}
31/2471 . . . . . {with more than one complexing phosphine-P atom}
31/2476 . . . . . {comprising aliphatic or saturated rings}
31/248 . . . . . {Bridged ring systems, e.g. 9-phosphabicyclononane}
31/2485 . . . . . {Tricyclic systems, e.g. phosphaadamantanes and hetero analogues}
31/249 . . . . . {Spiro-condensed ring systems}
31/2495 . . . {Ligands comprising a phosphine-P atom and one or more further complexing phosphorus atoms covered by groups B01J 31/1845 - B01J 31/1885, e.g. phosphine/phosphinate or phospholyl/phosphonate ligands}
31/26 . containing in addition, inorganic metal compounds not provided for in groups B01J 31/02 - B01J 31/24
31/28 . . of the platinum group metals, iron group metals or copper
31/30 . . . Halides
31/32 . . of manganese, technetium or rhenium
31/34 . . of chromium, molybdenum or tungsten
31/36 . . 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. CO_2}
31/4076 . . . {involving electrochemical processes}
31/4084 . . . {involving electromagnetic wave energy, e.g. UV or visible light}
31/4092 . . . {involving a stripping step, with stripping gas or solvent}

32/00 Catalyst carriers in general

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

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

35/0006 . {Catalysts containing parts with different compositions}
35/0013 . {Colloids}
35/002 . {Catalysts characterised by their physical properties}
35/0026 . . {Density}
35/0033 . . {Electric or magnetic properties}
35/004 . . {Photocatalysts}
35/0046 . . {Physical properties of the active metal ingredient}
35/0053 . . . {metal surface area}
35/006 . . . {metal crystallite size}
35/0066 . . . {metal dispersion value, e.g. percentage or fraction}
35/0073 . . {Distribution of the active metal ingredient}
35/008 . . . {egg-shell like}
35/0086 . . . {egg-yolk like}
35/0093 . . . {homogeneous throughout the support particle}
35/02 . Solids
35/023 . . {Catalysts characterised by dimensions, e.g. grain size}
35/026 . . {Form of the solid particles (B01J 35/08 takes precedence)}
35/04 . . Foraminous structures, sieves, grids, honeycombs
35/06 . . Fabrics or filaments
35/065 . . . {Membranes}
35/08 . . Spheres
35/10 . . characterised by their surface properties or porosity
35/1004 . . . {Surface area}
35/1009 . . . . {less than 10 m2/g}
35/1014 . . . . {10-100 m2/g}
35/1019 . . . . {100-500 m2/g}
35/1023 . . . . {500-1000 m2/g}
35/1028 . . . . {more than 1000 m2/g}
35/1033 . . . {Pore volume}
35/1038 . . . . {less than 0.5 ml/g}
35/1042 . . . . {0.5-1.0 ml/g}
35/1047 . . . . {more than 1.0 ml/g}
35/1052 . . . {Pore diameter}
35/1057 . . . . {less than 2 nm}
35/1061 . . . . {2-50 nm}
35/1066 . . . . {50-500 nm}
35/1071 . . . . {500-1000 nm}
35/1076 . . . . {larger than 1000 nm}
35/108 . . . {Pore distribution}

35/1085 . . . . {monomodal}
35/109 . . . . {bimodal}
35/1095 . . . . {polymodal}
35/12 . Liquids or melts

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

37/0009 . {Use of binding agents; Moulding; Pressing; Powdering; Granulating; Addition of materials ameliorating the mechanical properties of the product catalyst}
37/0018 . . {Addition of a binding agent or of material, later completely removed among others as result of heat treatment, leaching or washing,(e.g. forming of pores; protective layer, desintegrating by heat)}
37/0027 . . {Powdering}
37/0036 . . . {Grinding}
37/0045 . . . {Drying a slurry, e.g. spray drying}
37/0054 . . . {Drying of aerosols}
37/0063 . . {Granulating}
37/0072 . {Preparation of particles, e.g. dispersion of droplets in an oil bath}
37/0081 . {Preparation by melting}
37/009 . {Preparation by separation, e.g. by filtration, decantation, screening}
37/02 . Impregnation, coating or precipitation ({B01J 37/0009 and B01J 37/0018 take precedence } ; protection by coating B01J 33/00)
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 . Sulfiding
37/22 . Halogenating
37/24 . . Chlorinating
37/26 . . Fluorinating
37/28 . Phosphorising
37/30 . Ion-exchange
37/32 . Freeze drying, i.e. lyophilisation
37/34 . Irradiation by, or application of, electric, magnetic or wave energy, e.g. ultrasonic waves{; Ionic sputtering; Flame or plasma spraying; Particle radiation}
37/341 . . {making use of electric or magnetic fields, wave energy or particle radiation (use of flames, plasma or lasers B01J 37/349)}
37/342 . . . {of electric, magnetic or electromagnetic fields, e.g. for magnetic separation}
37/343 . . . {of ultrasonic wave energy}
37/344 . . . {of electromagnetic wave energy}
37/345 . . . . {of ultraviolet wave energy}
37/346 . . . . {of microwave energy}
37/347 . . . {Ionic or cathodic spraying; Electric discharge}
37/348 . . {Electrochemical processes, e.g. electrochemical deposition or anodisation}
37/349 . . {making use of flames, plasmas or lasers}
37/36 . Biochemical methods

38/00 Regeneration or reactivation of catalysts, in general

2038/005 . {involving supercritical treatment}
38/02 . Heat treatment
38/04 . Gas or vapour treating; Treating by using liquids vaporisable upon contacting spent catalyst
38/06 . . using steam
38/08 . . using ammonia or derivatives thereof
38/10 . . using elemental hydrogen
38/12 . . Treating with free oxygen-containing gas
38/14 . . . with control of oxygen content in oxidation gas
38/16 . . . Oxidation gas comprising essentially steam and oxygen
38/18 . . . with subsequent reactive gas treating
38/20 . . . Plural distinct oxidation stages

38/22 . . . Moving bed, e.g. vertically or horizontally moving bulk
38/24 . . . . having mainly transverse, i.e. lateral, flow of oxygen-containing gas and material
38/26 . . . . having mainly counter-current flow of oxygen-containing gas and material
38/28 . . . . having mainly concurrent flow of oxygen-containing gas and material
38/30 . . . in gaseous suspension, e.g. fluidised bed
38/32 . . . . Indirectly heating or cooling material within regeneration zone or prior to entry into regeneration zone
38/34 . . . . with plural distinct serial combustion stages
38/36 . . . . and with substantially complete oxidation of carbon monoxide to carbon dioxide within regeneration zone
38/38 . . . and adding heat by solid heat carrier
38/40 . . . and forming useful by-products
38/42 . . using halogen-containing material
38/44 . . . and adding simultaneously or subsequently free oxygen; using oxyhalogen compound
38/46 . . . fluorine-containing
38/48 . Liquid treating or treating in liquid phase, e.g. dissolved or suspended
38/485 . . {Impregnating or reimpregnating with, or deposition of metal compounds or catalytically active elements}
38/50 . . using organic liquids
38/52 . . . oxygen-containing
38/54 . . . halogen-containing
38/56 . . . Hydrocarbons
38/58 . . . and gas addition thereto
38/60 . . using acids
38/62 . . . organic
38/64 . . using alkaline material; using salts
38/66 . . . using ammonia or derivatives thereof
38/68 . . including substantial dissolution or chemical precipitation of a catalyst component in the ultimate reconstitution of the catalyst
38/70 . . Wet oxidation of material submerged in liquid
38/72 . including segregation of diverse particles
38/74 . utilising ion-exchange

Ion-exchange (treatment of milk A23C 9/14; separation by liquid ion-exchangers B01D, e.g. B01D 11/00; separation of isotopes B01D 59/00; compounds 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
39/18 . . . Macromolecular compounds (B01J 39/17 takes precedence)
39/19 . . . . obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds
39/20 . . . . obtained by reactions only involving unsaturated carbon-to-carbon bonds
39/22 . . . . Cellulose or wood; Derivatives thereof
39/24 . . Carbon, coal or tar
39/26 . Cation exchangers for chromatographic processes

41/00 **Anion exchange; Use of material as anion exchangers; Treatment of material for improving the anion exchange properties** (ion-exchange chromatography processes B01D 15/36)
41/02 . Processes using inorganic exchangers
41/04 . Processes using organic exchangers
41/05 . . in the strongly basic form
41/07 . . in the weakly basic form
41/08 . Use of material as anion exchangers; Treatment of material for improving the anion exchange properties
41/09 . . Organic material
41/10 . . Inorganic material
41/12 . . Macromolecular compounds
41/13 . . . obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds
41/14 . . . obtained by reactions only involving unsaturated carbon-to-carbon bonds
41/16 . . . Cellulose or wood; Derivatives thereof
41/18 . . Carbon, coal or tar
41/20 . Anion exchangers for chromatographic processes

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

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

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

47/011 . using batch processes
47/012 . using portable ion-exchange apparatus
47/014 . in which the 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

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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
2203/0635 . . . . Silicon carbide
2203/064 . . . Carbonates
2203/0645 . . . Boronitrides
2203/065 . . Composition of the material produced
2203/0655 . . . Diamond
2203/066 . . . Boronitrides
2203/0665 . . . Gallium nitrides
2203/067 . . . Aluminium nitrides
2203/0675 . . Structural or physico-chemical features of the materials processed
2203/068 . . . Crystal growth
2203/0685 . . . Crystal sintering
2203/069 . . . Recrystallisation
2203/0695 . . . Colour change

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

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

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

2208/00008 . Controlling the process
2208/00017 . . Controlling the temperature
2208/00026 . . . Controlling or regulating the heat exchange system
2208/00035 . . . . involving measured parameters
2208/00044 . . . . . Temperature measurement
2208/00053 . . . . . of the heat exchange medium
2208/00061 . . . . . of the reactants
2208/0007 . . . . . Pressure measurement
2208/00079 . . . . . Fluid level measurement
2208/00088 . . . . . Flow rate measurement
2208/00097 . . . . . Mathematical modelling
2208/00106 . . . by indirect heat exchange

2208/00115 . . . . with heat exchange elements inside the bed of solid particles
2208/00123 . . . . . Fingers
2208/00132 . . . . . Tubes
2208/00141 . . . . . Coils
2208/0015 . . . . . Plates; Cylinders
2208/00159 . . . . . Radially arranged plates
2208/00168 . . . . with heat exchange elements outside the bed of solid particles
2208/00176 . . . . . outside the reactor
2208/00185 . . . . . Fingers
2208/00194 . . . . . Tubes
2208/00203 . . . . . Coils
2208/00212 . . . . . Plates; Jackets; Cylinders
2208/00221 . . . . . comprising baffles for guiding the flow of the heat exchange medium
2208/0023 . . . . . with some catalyst tubes being empty, e.g. dummy tubes or flow-adjusting rods
2208/00238 . . . . . Adjusting the heat-exchange profile by adapting catalyst tubes or the distribution thereof, e.g. by using inserts in some of the tubes or adding external fins
2208/00247 . . . . . Reflux columns
2208/00256 . . . . . in a heat exchanger for the heat exchange medium separate from the reactor
2208/00265 . . . . Part of all of the reactants being heated or cooled outside the reactor while recycling
2208/00274 . . . . . involving reactant vapours
2208/00283 . . . . . involving reactant liquids
2208/00292 . . . . . involving reactant solids
2208/003 . . . . . involving reactant slurries
2208/00309 . . . . with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction
2208/00318 . . . . Heat exchange inside a feeding nozzle or nozzle reactor
2208/00327 . . . by direct heat exchange
2208/00336 . . . . adding a temperature modifying medium to the reactants
2208/00345 . . . . . Cryogenic coolants
2208/00353 . . . . . Non-cryogenic fluids
2208/00362 . . . . . Liquid
2208/00371 . . . . . gaseous
2208/0038 . . . . . Solids
2208/00389 . . . using electric heating or cooling elements
2208/00398 . . . . inside the reactor bed
2208/00407 . . . . outside the reactor bed
2208/00415 . . . . electric resistance heaters
2208/00424 . . . . Peltier cooling elements
2208/00433 . . . using electromagnetic heating
2208/00442 . . . . Microwaves
2208/00451 . . . . Sunlight; Visible light
2208/0046 . . . . Infrared radiation
2208/00469 . . . . Radiofrequency
2208/00477 . . . by thermal insulation means
2208/00486 . . . . Vacuum spaces
2208/00495 . . . . using insulating materials or refractories
2208/00504 . . . by means of a burner
2208/00513 . . . using inert heat absorbing solids in the bed
2208/00522 . . . using inert heat absorbing solids outside the bed
2208/0053 . . . Controlling multiple zones along the direction of flow, e.g. pre-heating and after-cooling
2208/00539 . . Pressure
2208/00548 . . Flow
2208/00557 . . . controlling the residence time inside the reactor vessel
2208/00566 . . . Pulsated flow
2208/00575 . . Controlling the viscosity
2208/00584 . . Controlling the density
2208/00592 . . Controlling the pH
2208/00601 . . Controlling the conductivity
2208/0061 . . Controlling the level
2208/00619 . . Controlling the weight
2208/00628 . . Controlling the composition of the reactive mixture
2208/00637 . . . Means for stopping or slowing down the reaction
2208/00646 . . . Means for starting up the reaction
2208/00654 . . by measures relating to the particulate material
2208/00663 . . . Concentration
2208/00672 . . . Particle size selection
2208/00681 . . . Agglomeration
2208/0069 . . . Attrition
2208/00699 . . . Moisture content regulation
2208/00707 . . . Fouling
2208/00716 . . Means for reactor start-up
2208/00725 . . Mathematical modelling
2208/00734 . . Controlling static charge
2208/00743 . Feeding or discharging of solids
2208/00752 . . Feeding
2208/00761 . . Discharging
2208/00769 . . Details of feeding or discharging
2208/00778 . . . Kinetic energy reducing devices in the flow channel
2208/00787 . . . Bringing the solid in the form of a slurry before feeding it to the reactor
2208/00796 . Details of the reactor or of the particulate material
2208/00805 . . Details of the particulate material
2208/00814 . . . the particulate material being provides in prefilled containers
2208/00823 . . Mixing elements
2208/00831 . . . Stationary elements
2208/0084 . . . . inside the bed, e.g. baffles
2208/00849 . . . . outside the bed, e.g. baffles
2208/00858 . . . Moving elements
2208/00867 . . . . inside the bed, e.g. rotary mixer
2208/00876 . . . . outside the bed, e.g. rotary mixer
2208/00884 . . Means for supporting the bed of particles, e.g. grids, bars, perforated plates
2208/00893 . . Feeding means for the reactants
2208/00902 . . . Nozzle-type feeding elements
2208/00911 . . . Sparger-type feeding elements
2208/0092 . . . Perforated plates
2208/00929 . . . Provided with baffles
2208/00938 . . Flow distribution elements
2208/00946 . . Features relating to the reactants or products
2208/00955 . . . Sampling of the particulate material, the reactants or the products
2208/00964 . . . . Reactants
2208/00973 . . . . Products
2208/00982 . . . . Particulate material
2208/00991 . . Disengagement zone in fluidised-bed reactors

2208/02 . with stationary particles
2208/021 . . comprising a plurality of beds with flow of reactants in parallel
2208/022 . . . Plate-type reactors filled with granular catalyst
2208/023 . . Details
2208/024 . . . Particulate material
2208/025 . . . . Two or more types of catalyst
2208/026 . . . . comprising nanocatalysts
2208/027 . . . Beds
2208/028 . . . . rotating
2208/06 . Details of tube reactors containing solid particles
2208/065 . . Heating or cooling the reactor

2219/00 Chemical, physical or physico-chemical processes in general; Their relevant apparatus

2219/00002 . Chemical plants
2219/00004 . . Scale aspects
2219/00006 . . . Large-scale industrial plants
2219/00009 . . . Pilot-scale plants
2219/00011 . . . Laboratory-scale plants
2219/00013 . . . . Miniplants
2219/00015 . . . Scale-up
2219/00018 . . Construction aspects
2219/0002 . . . Plants assembled from modules joined together
2219/00022 . . . Plants mounted on pallets or skids
2219/00024 . . . Revamping, retrofitting or modernisation of existing plants
2219/00027 . . Process aspects
2219/00029 . . . Batch processes
2219/00031 . . . Semi-batch or fed-batch processes
2219/00033 . . . Continuous processes
2219/00036 . . . Intermittent processes
2219/00038 . . . Processes in parallel
2219/0004 . . . Processes in series
2219/00042 . . Features relating to reactants and process fluids
2219/00045 . . . Green chemistry
2219/00047 . . . Ionic liquids
2219/00049 . Controlling or regulating processes
2219/00051 . . Controlling the temperature
2219/00054 . . . Controlling or regulating the heat exchange system
2219/00056 . . . . involving measured parameters
2219/00058 . . . . . Temperature measurement
2219/0006 . . . . . of the heat exchange medium
2219/00063 . . . . . of the reactants
2219/00065 . . . . . Pressure measurement
2219/00067 . . . . . Liquid level measurement
2219/00069 . . . . . Flow rate measurement
2219/00072 . . . . Mathematical modelling
2219/00074 . . . by indirect heating or cooling employing heat exchange fluids
2219/00076 . . . . with heat exchange elements inside the reactor
2219/00078 . . . . . Fingers
2219/00081 . . . . . Tubes
2219/00083 . . . . . Coils
2219/00085 . . . . . Plates; Jackets; Cylinders
2219/00087 . . . . with heat exchange elements outside the reactor
2219/0009 . . . . . Coils
2219/00092 . . . . . Tubes
2219/00094 . . . . . Jackets
2219/00096 . . . . . Plates
2219/00099 . . . . . the reactor being immersed in the heat exchange medium
2219/00101 . . . . . Reflux columns
2219/00103 . . . . . in a heat exchanger separate from the reactor
2219/00105 . . . . part or all of the reactants being heated or cooled outside the reactor while recycling
2219/00108 . . . . . involving reactant vapours
2219/0011 . . . . . involving reactant liquids
2219/00112 . . . . . involving reactant solids
2219/00114 . . . . . involving reactant slurries
2219/00117 . . . . with two or more reactions in heat exchange with each other, such as an endothermic reaction in heat exchange with an exothermic reaction
2219/00119 . . . . Heat exchange inside a feeding nozzle or nozzle reactor
2219/00121 . . . by direct heating or cooling
2219/00123 . . . . adding a temperature modifying medium to the reactants
2219/00126 . . . . . Cryogenic coolants
2219/00128 . . . . by evaporation of reactants
2219/0013 . . . . by condensation of reactants
2219/00132 . . . using electric heating or cooling elements
2219/00135 . . . . Electric resistance heaters
2219/00137 . . . . Peltier cooling elements
2219/00139 . . . using electromagnetic heating
2219/00141 . . . . Microwaves
2219/00144 . . . . Sunlight; Visible light
2219/00146 . . . . Infrared radiation
2219/00148 . . . . Radiofrequency
2219/0015 . . . by thermal insulation means
2219/00153 . . . . Vacuum spaces
2219/00155 . . . . using insulating materials or refractories
2219/00157 . . . by means of a burner
2219/00159 . . . controlling multiple zones along the direction of flow, e.g. pre-heating and after-cooling
2219/00162 . . controlling the pressure
2219/00164 . . controlling the flow
2219/00166 . . . controlling the residence time inside the reactor vessel
2219/00168 . . controlling the viscosity
2219/00171 . . controlling the density
2219/00173 . . . Physical density
2219/00175 . . . Optical density
2219/00177 . . controlling the pH
2219/0018 . . controlling the conductivity
2219/00182 . . controlling the level of reactants in the reactor vessel
2219/00184 . . controlling the weight of reactants in the reactor vessel
2219/00186 . . controlling the composition of the reactive mixture
2219/00189 . . controlling the stirring velocity
2219/00191 . . Control algorithm
2219/00193 . . . Sensing a parameter
2219/00195 . . . . of the reaction system
2219/00198 . . . . . at the reactor inlet
2219/002 . . . . . inside the reactor
2219/00202 . . . . . at the reactor outlet
2219/00204 . . . . of the heat exchange system

2219/00207 . . . . other than of the reactor heat exchange system
2219/00209 . . . transforming a sensed parameter
2219/00211 . . . comparing a sensed parameter with a pre-set value
2219/00213 . . . . Fixed parameter value
2219/00216 . . . . Parameter value calculated by equations
2219/00218 . . . . Dynamically variable (in-line) parameter values
2219/0022 . . . . calculating difference
2219/00222 . . . taking actions
2219/00225 . . . . stopping the system or generating an alarm
2219/00227 . . . . modifying the operating conditions
2219/00229 . . . . . of the reaction system
2219/00231 . . . . . . at the reactor inlet
2219/00234 . . . . . . inside the reactor
2219/00236 . . . . . . at the reactor outlet
2219/00238 . . . . . of the heat exchange system
2219/0024 . . . . . other than of the reactor or heat exchange system
2219/00243 . . Mathematical modelling
2219/00245 . . Avoiding undesirable reactions or side-effects
2219/00247 . . . Fouling of the reactor or the process equipment
2219/0025 . . . Foam formation
2219/00252 . . . Formation of deposits other than coke
2219/00254 . . . Formation of unwanted polymer, such as "pop-corn"
2219/00256 . . . Leakage
2219/00259 . . . Preventing runaway of the chemical reaction
2219/00261 . . . . Predicting runaway of the chemical reaction
2219/00263 . . . . Preventing explosion of the chemical mixture
2219/00265 . . . . Preventing flame propagation
2219/00268 . . . Detecting faulty operations
2219/0027 . . . Pressure relief
2219/00272 . . . Addition of reaction inhibitor
2219/00274 . Sequential or parallel reactions; Apparatus and devices for combinatorial chemistry or for making arrays; Chemical library technology
2219/00277 . . Apparatus
2219/00279 . . . Features relating to reactor vessels
2219/00281 . . . . Individual reactor vessels
2219/00283 . . . . . Reactor vessels with top opening
2219/00286 . . . . . Reactor vessels with top and bottom openings
2219/00288 . . . . . . in the shape of syringes
2219/0029 . . . . with pistons or plungers
2219/00292 . . . . . . in the shape of pipette tips
2219/00295 . . . . . the reactor vessels having pervious side walls
2219/00297 . . . . . . "Tea bags"
2219/00299 . . . . . . Generally cylindrical reactor vessels
2219/00301 . . . . . the reactor vessels having impervious side walls
2219/00304 . . . . . . Pouches
2219/00306 . . . . Reactor vessels in a multiple arrangement
2219/00308 . . . . . interchangeably mounted in racks or blocks
2219/0031 . . . . . . the racks or blocks being mounted in stacked arrangements
2219/00313 . . . . . the reactor vessels being formed by arrays of wells in blocks
2219/00315 . . . . . . Microtiter plates
2219/00317 . . . . Microwell devices, i.e. having large numbers of wells
2219/00319 . . . . . . the blocks being mounted in stacked arrangements
2219/00322 . . . . . the individual reactor vessels being arranged serially in stacks
2219/00324 . . . . . the reactor vessels or wells being arranged in plates moving in parallel to each other
2219/00326 . . . . . . Movement by rotation
2219/00328 . . . . . . Movement by linear translation
2219/00331 . . . . Details of the reactor vessels
2219/00333 . . . . . Closures attached to the reactor vessels
2219/00335 . . . . . . Septa
2219/00337 . . . . . . Valves
2219/0034 . . . . in the shape of a ball or sphere
2219/00342 . . . . rotary
2219/00344 . . . . . . Caps
2219/00346 . . . . Screw-caps
2219/00349 . . . . . . Spheres
2219/00351 . . . Means for dispensing and evacuation of reagents
2219/00353 . . . . Pumps
2219/00355 . . . . . peristaltic
2219/00358 . . . . . electrode driven
2219/0036 . . . . Nozzles
2219/00362 . . . . . Acoustic nozzles
2219/00364 . . . . Pipettes
2219/00367 . . . . . capillary
2219/00369 . . . . . in multiple or parallel arrangements
2219/00371 . . . . . comprising electrodes
2219/00373 . . . . Hollow needles
2219/00376 . . . . . in multiple or parallel arrangements
2219/00378 . . . . Piezo-electric or ink jet dispensers
2219/0038 . . . . Drawing
2219/00382 . . . . Stamping
2219/00385 . . . . Printing
2219/00387 . . . . Applications using probes
2219/00389 . . . . Feeding through valves
2219/00391 . . . . . Rotary valves
2219/00394 . . . . . . in multiple arrangements
2219/00396 . . . . . Membrane valves
2219/00398 . . . . . . in multiple arrangements
2219/004 . . . . . Pinch valves
2219/00403 . . . . . . in multiple arrangements
2219/00405 . . . . . Sliding valves
2219/00407 . . . . . . In multiple arrangements
2219/00409 . . . . . Solenoids in combination with valves
2219/00412 . . . . . . In multiple arrangements
2219/00414 . . . . using suction
2219/00416 . . . . . Vacuum
2219/00418 . . . . using pressure
2219/00421 . . . . using centrifugation
2219/00423 . . . . using filtration, e.g. through porous frits
2219/00425 . . . . using decantation
2219/00427 . . . . using masks
2219/0043 . . . . . for direct application of reagents, e.g. through openings in a shutter
2219/00432 . . . . . Photolithographic masks
2219/00434 . . . . . Liquid crystal masks
2219/00436 . . . . Maskless processes
2219/00439 . . . . . using micromirror arrays
2219/00441 . . . . . using lasers

2219/00443 . . . . . Thin film deposition
2219/00445 . . . . . Ion implantation
2219/00448 . . . . . using microlens arrays
2219/0045 . . . . . using optical fibres
2219/00452 . . . Means for the recovery of reactants or products
2219/00454 . . . . by chemical cleavage from the solid support
2219/00457 . . . Dispensing or evacuation of the solid phase support
2219/00459 . . . . Beads
2219/00461 . . . . . Beads and reaction vessel together
2219/00463 . . . . . . Directed sorting
2219/00466 . . . . . in a slurry
2219/00468 . . . . . by manipulation of individual beads
2219/0047 . . . . Pins
2219/00472 . . . . . Replaceable crowns
2219/00475 . . . . Sheets
2219/00477 . . . Means for pressurising the reaction vessels
2219/00479 . . . Means for mixing reactants or products in the reaction vessels
2219/00481 . . . . by the use of moving stirrers within the reaction vessels
2219/00484 . . . . by shaking, vibrating or oscillating of the reaction vessels
2219/00486 . . . . . by sonication or ultrasonication
2219/00488 . . . . by rotation of the reaction vessels
2219/0049 . . . . . by centrifugation
2219/00493 . . . . by sparging or bubbling with gases
2219/00495 . . . Means for heating or cooling the reaction vessels
2219/00497 . . . Features relating to the solid phase supports
2219/005 . . . . Beads
2219/00502 . . . . Particles of irregular geometry
2219/00504 . . . . Pins
2219/00506 . . . . . with removable crowns
2219/00509 . . . . . Microcolumns
2219/00511 . . . . Walls of reactor vessels
2219/00513 . . . . Essentially linear supports
2219/00515 . . . . . in the shape of strings
2219/00518 . . . . . in the shape of tapes
2219/0052 . . . . . in the shape of elongated tubes
2219/00522 . . . . . . in a multiple parallel arrangement
2219/00524 . . . . . in the shape of fiber bundles
2219/00527 . . . . Sheets
2219/00529 . . . . . DNA chips
2219/00531 . . . . . essentially square
2219/00533 . . . . . essentially rectangular
2219/00536 . . . . . in the shape of disks
2219/00538 . . . . . in the shape of cylinders
2219/0054 . . . Means for coding or tagging the apparatus or the reagents
2219/00542 . . . . Alphanumeric characters
2219/00545 . . . . Colours
2219/00547 . . . . Bar codes
2219/00549 . . . . . 2-dimensional
2219/00551 . . . . . 3-dimensional
2219/00554 . . . . Physical means
2219/00556 . . . . . Perforations
2219/00558 . . . . . Cuts-out
2219/0056 . . . . . Raised or sunken areas
2219/00563 . . . . Magnetic means
2219/00565 . . . . Electromagnetic means
2219/00567 . . . . . Transponder chips
2219/00569 . . . . . EEPROM memory devices
2219/00572 . . . . Chemical means
2219/00574 . . . . . radioactive
2219/00576 . . . . . fluorophore
2219/00578 . . . . . electrophoric
2219/00581 . . . . . Mass
2219/00583 . . Features relative to the processes being carried out
2219/00585 . . . Parallel processes
2219/00587 . . . . High throughput processes
2219/0059 . . . Sequential processes
2219/00592 . . . Split-and-pool, mix-and-divide processes
2219/00594 . . . Gas-phase processes
2219/00596 . . . Solid-phase processes
2219/00599 . . . Solution-phase processes
2219/00601 . . . High-pressure processes
2219/00603 . . . Making arrays on substantially continuous surfaces
2219/00605 . . . . the compounds being directly bound or immobilised to solid supports
2219/00608 . . . . . DNA chips
2219/0061 . . . . . The surface being organic
2219/00612 . . . . . the surface being inorganic
2219/00614 . . . . . Delimitation of the attachment areas
2219/00617 . . . . . by chemical means
2219/00619 . . . . . using hydrophilic or hydrophobic regions
2219/00621 . . . . . by physical means, e.g. trenches, raised areas
2219/00623 . . . . . Immobilisation or binding
2219/00626 . . . . . Covalent
2219/00628 . . . . . Ionic
2219/0063 . . . . . Other, e.g. van der Waals forces, hydrogen bonding
2219/00632 . . . . . Introduction of reactive groups to the surface
2219/00635 . . . . . by reactive plasma treatment
2219/00637 . . . . . by coating it with another layer
2219/00639 . . . . the compounds being trapped in or bound to a porous medium
2219/00641 . . . . . the porous medium being continuous, e.g. porous oxide substrates
2219/00644 . . . . . the porous medium being present in discrete locations, e.g. gel pads
2219/00646 . . . . the compounds being bound to beads immobilised on the solid supports
2219/00648 . . . . . by the use of solid beads
2219/0065 . . . . . by the use of liquid beads
2219/00653 . . . . the compounds being bound to electrodes embedded in or on the solid supports
2219/00655 . . . . the compounds being bound to magnets embedded in or on the solid supports
2219/00657 . . . . One-dimensional arrays
2219/00659 . . . . Two-dimensional arrays
2219/00662 . . . . . Two-dimensional arrays within two-dimensional arrays
2219/00664 . . . . Three-dimensional arrays
2219/00666 . . . . . One-dimensional arrays within three-dimensional arrays
2219/00668 . . . . . Two-dimensional arrays within three-dimensional arrays
2219/00671 . . . . . Three-dimensional arrays within three-dimensional arrays

2219/00673 . . . . Slice arrays
2219/00675 . . . . In-situ synthesis on the substrate
2219/00677 . . . . Ex-situ synthesis followed by deposition on the substrate
2219/0068 . . Means for controlling the apparatus of the process
2219/00682 . . . Manual means
2219/00684 . . . Semi-automatic means
2219/00686 . . . Automatic
2219/00689 . . . . using computers
2219/00691 . . . . using robots
2219/00693 . . . Means for quality control
2219/00695 . . . Synthesis control routines, e.g. using computer programs
2219/00698 . . . Measurement and control of process parameters
2219/007 . . . Simulation or vitual synthesis
2219/00702 . . . Processes involving means for analysing and characterising the products
2219/00704 . . . . integrated with the reactor apparatus
2219/00707 . . . . separated from the reactor apparatus
2219/00709 . . Type of synthesis
2219/00711 . . . Light-directed synthesis
2219/00713 . . . Electrochemical synthesis
2219/00716 . . . Heat activated synthesis
2219/00718 . . Type of compounds synthesised
2219/0072 . . . Organic compounds
2219/00722 . . . . Nucleotides
2219/00725 . . . . Peptides
2219/00727 . . . . Glycopeptides
2219/00729 . . . . Peptide nucleic acids [PNA]
2219/00731 . . . . Saccharides
2219/00734 . . . . Lipids
2219/00736 . . . . Non-biologic macromolecules, e.g. polymeric compounds
2219/00738 . . . . Organic catalysts
2219/0074 . . . . Biological products
2219/00743 . . . . . Cells
2219/00745 . . . Inorganic compounds
2219/00747 . . . . Catalysts
2219/0075 . . . . Metal based compounds
2219/00752 . . . . . Alloys
2219/00754 . . . . . Metal oxides
2219/00756 . . . Compositions, e.g. coatings, crystals, formulations
2219/00759 . . Purification of compounds synthesised
2219/00761 . Details of the reactor
2219/00763 . . Baffles
2219/00765 . . . Baffles attached to the reactor wall
2219/00768 . . . . vertical
2219/0077 . . . . inclined
2219/00772 . . . . . in a helix
2219/00774 . . . . . in the form of cones
2219/00777 . . . . horizontal
2219/00779 . . . Baffles attached to the stirring means
2219/00781 . Aspects relating to microreactors
2219/00783 . . Laminate assemblies, i.e. the reactor comprising a stack of plates
2219/00786 . . . Geometry of the plates
2219/00788 . . Three-dimensional assemblies, i.e. the reactor comprising a form other than a stack of plates
2219/0079 . . . Monolith-base structure
2219/00792 . . . One or more tube-shaped elements
2219/00795 . . . . Spiral-shaped
2219/00797 . . . . Concentric tubes
2219/00799 . . . Cup-shaped
2219/00801 . . Means to assemble
2219/00804 . . . Plurality of plates
2219/00806 . . . . Frames
2219/00808 . . . . Sealing means
2219/0081 . . . Plurality of modules
2219/00813 . . . . Fluidic connections
2219/00815 . . . . Electric connections
2219/00817 . . . . Support structures
2219/00819 . . Materials of construction
2219/00822 . . . Metal
2219/00824 . . . Ceramic
2219/00826 . . . . Quartz
2219/00828 . . . . Silicon wafers or plates
2219/00831 . . . Glass
2219/00833 . . . Plastic
2219/00835 . . . Comprising catalytically active material
2219/00837 . . . comprising coatings other than catalytically active coatings
2219/0084 . . . . For changing surface tension
2219/00842 . . . . For protection channel surface, e.g. corrosion protection
2219/00844 . . . Comprising porous material
2219/00846 . . . 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)
2219/009 . . . 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 chromatography
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
2219/00932 . . . 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
2219/08 . 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
2219/0843 . . . . . Ceramic
2219/0845 . . . . Details relating to the type of discharge
2219/0847 . . . . . Glow discharge
2219/0849 . . . . . Corona pulse discharge
2219/085 . . . creating magnetic fields
2219/0852 . . . . employing permanent magnets
2219/0854 . . . . employing electromagnets
2219/0856 . . . . employing a combination of permanent and electromagnets
2219/0858 . . . . employing moving elements
2219/086 . . . . . Moving (electro)magnets
2219/0862 . . . . employing multiple (electro)magnets
2219/0864 . . . . . Three (electro)magnets
2219/0866 . . . . . Four (electro)magnets
2219/0867 . . . . . Six or more (electro)magnets
2219/0869 . . Feeding or evacuating the reactor
2219/0871 . . Heating or cooling of the reactor
2219/0873 . . Materials to be treated
2219/0875 . . . Gas
2219/0877 . . . Liquid
2219/0879 . . . Solid
2219/0881 . . . Two or more materials
2219/0883 . . . . Gas-gas
2219/0884 . . . . Gas-liquid
2219/0886 . . . . Gas-solid
2219/0888 . . . . Liquid-liquid
2219/089 . . . . Liquid-solid
2219/0892 . . . involving catalytically active material
2219/0894 . . Processes carried out in the presence of a plasma
2219/0896 . . . Cold plasma
2219/0898 . . . Hot plasma
2219/12 . . Processes employing electromagnetic waves
2219/1203 . . . Incoherent waves
2219/1206 . . . . Microwaves
2219/1209 . . . . . Features relating to the reactor or vessel

2219/1212 . . . . . Arrangements of the reactor or the reactors
2219/1215 . . . . . Single reactor
2219/1218 . . . . . Multiple reactors
2219/1221 . . . . . the reactor per se
2219/1224 . . . . . Form of the reactor
2219/1227 . . . . . Reactors comprising tubes with open ends
2219/123 . . . . . Vessels in the form of a cup
2219/1233 . . . . . 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)
2219/1236 . . . . . Frames for holding the lid in place
2219/1239 . . . . . Means for feeding and evacuation
2219/1242 . . . . . Materials of construction
2219/1245 . . . . . Parts of the reactor being microwave absorbing, dielectric
2219/1248 . . . . . Features relating to the microwave cavity
2219/1251 . . . . . Support for the reaction vessel
2219/1254 . . . . . Static supports
2219/1257 . . . . . Rotating supports
2219/126 . . . . . in the form of a closed housing
2219/1263 . . . . . in the form of a open housing or stand
2219/1266 . . . . . Microwave deflecting parts
2219/1269 . . . . . Microwave guides
2219/1272 . . . . . Materials of construction
2219/1275 . . . . . Controlling the microwave irradiation variables
2219/1278 . . . . . Time
2219/1281 . . . . . Frequency
2219/1284 . . . . . Intensity
2219/1287 . . . . . Features relating to the microwave source
2219/129 . . . . . Arrangements thereof
2219/1293 . . . . . Single source
2219/1296 . . . . . Multiple sources
2219/18 . Details relating to the spatial orientation of the reactor
2219/182 . . horizontal
2219/185 . . vertical
2219/187 . . inclined at an angle to the horizontal or to the vertical plane
2219/19 . Details relating to the geometry of the reactor
2219/192 . . polygonal
2219/1921 . . . triangular
2219/1923 . . . square or square-derived
2219/1925 . . . . prismatic
2219/1926 . . . . pyramidal
2219/1928 . . . hexagonal
2219/194 . . round
2219/1941 . . . circular or disk-shaped
2219/1942 . . . . spherical
2219/1943 . . . . cylindrical
2219/1944 . . . . spiral
2219/1945 . . . . toroidal
2219/1946 . . . . conical
2219/1947 . . . oval or ellipsoidal
2219/1948 . . . . ovoid or egg-shaped
2219/24 . Stationary reactors without moving elements inside
2219/2401 . . Reactors comprising multiple separate flow channels
2219/2402 . . . Monolithic-type reactors
2219/2403 . . . . Geometry of the channels
2219/2404 . . . . . Polygonal
2219/2406 . . . . . Rectangular
2219/2407 . . . . . Square
2219/2408 . . . . . Circular or ellipsoidal
2219/2409 . . . . Heat exchange aspects
2219/2411 . . . . . The reactant being in indirect heat exchange with a non reacting heat exchange medium
2219/2412 . . . . . Independent temperature control in various sections of the monolith
2219/2413 . . . . . Two reactions in indirect heat exchange
2219/2414 . . . . . The same reactant stream undergoing different reactions, endothermic or exothermic
2219/2416 . . . . . Additional heat exchange means, e.g. electric resistance heater, coils
2219/2417 . . . . . Direct heat exchange
2219/2418 . . . . Feeding means
2219/2419 . . . . . for the reactants
2219/242 . . . . . for the catalysts
2219/2422 . . . . Mixing means, e.g. fins or baffles attached to the monolith or placed in the channel
2219/2423 . . . . Separation means, e.g. membrane inside the reactor
2219/2424 . . . . . Wall-flow filter, e.g. adjacent cells closed alternatively at their end to force the reactant stream through the walls of the monolith
2219/2425 . . . . Construction materials
2219/2427 . . . . . Catalysts
2219/2428 . . . . . Catalysts coated on the surface of the monolith channels
2219/2429 . . . . . Nanocatalysts
2219/243 . . . . . Catalyst in granular form in the channels
2219/2432 . . . . . Monoliths having catalytic activity on its own
2219/2433 . . . . . of the monoliths
2219/2434 . . . . . Metals or alloys
2219/2435 . . . . . Steel
2219/2437 . . . . . Metal oxides
2219/2438 . . . . . Ceramics
2219/2439 . . . . . Glass
2219/244 . . . . . Plastics
2219/2441 . . . . Other constructional details
2219/2443 . . . . . Assembling means of monolith modules
2219/2444 . . . . . Size aspects
2219/2445 . . . . . Sizes
2219/2446 . . . . . Cell density
2219/2448 . . . . . Additional structures inserted in the channels
2219/2449 . . . . . Moving elements in the monolith reactor
2219/245 . . . Plate-type reactors
2219/2451 . . . . Geometry of the reactor
2219/2453 . . . . . Plates arranged in parallel
2219/2454 . . . . . Plates arranged concentrically
2219/2455 . . . . . Plates arranged radially
2219/2456 . . . . . Geometry of the plates

2219/2458 . . . . . Flat plates, i.e. plates which are not corrugated or otherwise structured, e.g. plates with cylindrical shape
2219/2459 . . . . . Corrugated plates
2219/246 . . . . . Perforated plates
2219/2461 . . . . Heat exchange aspects
2219/2462 . . . . . the reactants being in indirect heat exchange with a non reacting heat exchange medium
2219/2464 . . . . . Independent temperature control in various sections of the reactor
2219/2465 . . . . . Two reactions in indirect heat exchange with each other
2219/2466 . . . . . The same reactant stream undergoing different reactions, endothermic or exothermic
2219/2467 . . . . . Additional heat exchange means, e.g. electric resistance heaters, coils
2219/2469 . . . . Feeding means
2219/247 . . . . . Feeding means for the reactants
2219/2471 . . . . . Feeding means for the catalyst
2219/2472 . . . . . the catalyst being exchangeable on inserts other than plates, e.g. in bags
2219/2474 . . . . Mixing means, e.g. fins or baffles attached to the plates
2219/2475 . . . . Separation means, e.g. membranes inside the reactor
2219/2476 . . . . Construction materials
2219/2477 . . . . . of the catalysts
2219/2479 . . . . . Catalysts coated on the surface of plates or inserts
2219/248 . . . . . Nanocatalysts
2219/2481 . . . . . Catalysts in granular from between plates
2219/2482 . . . . . Catalytically active foils; Plates having catalytically activity on their own
2219/2483 . . . . . of the plates
2219/2485 . . . . . Metals or alloys
2219/2486 . . . . . Steel
2219/2487 . . . . . Ceramics
2219/2488 . . . . . Glass
2219/249 . . . . . Plastics
2219/2491 . . . . Other constructional details
2219/2492 . . . . . Assembling means
2219/2493 . . . . . Means for assembling plates together, e.g. sealing means, screws, bolts
2219/2495 . . . . . the plates being assembled interchangeably or in a disposable way
2219/2496 . . . . . Means for assembling modules together, e.g. casings, holders, fluidic connectors
2219/2497 . . . . . Size aspects, i.e. concrete sizes are being mentioned in the classified document
2219/2498 . . . . . Additional structures inserted in the channels, e.g. plates, catalyst holding meshes
2219/30 . Details relating to random packing elements
2219/302 . . Basic shape of the elements
2219/30203 . . . Saddle
2219/30207 . . . Sphere
2219/30211 . . . . Egg, ovoid or ellipse
2219/30215 . . . Toroid or ring
2219/30219 . . . Disk
2219/30223 . . . Cylinder
2219/30226 . . . Cone or truncated cone
2219/3023 . . . Triangle
2219/30234 . . . . Hexagon
2219/30238 . . . Tetrahedron
2219/30242 . . . Star
2219/30246 . . . Square or square-derived
2219/30249 . . . . Cube
2219/30253 . . . . Pyramid
2219/30257 . . . Wire
2219/30261 . . . . twisted
2219/30265 . . . . Spiral
2219/30269 . . . Brush
2219/30273 . . . Cross
2219/30276 . . . Sheet
2219/3028 . . . . stretched
2219/30284 . . . . twisted
2219/30288 . . . . folded
2219/30292 . . . . rolled up
2219/30296 . . . Other shapes
2219/304 . . Composition or microstructure of the elements
2219/30408 . . . Metal
2219/30416 . . . Ceramic
2219/30425 . . . . Carbon
2219/30433 . . . Glass
2219/30441 . . . Wood
2219/3045 . . . Cork
2219/30458 . . . Rubber
2219/30466 . . . Plastics
2219/30475 . . . comprising catalytically active material
2219/30483 . . . Fibrous materials
2219/30491 . . . Foam like materials
2219/308 . . filling or discharging the elements into or from packed columns
2219/3081 . . . Orientation of the packing elements within the column or vessel
2219/3083 . . . . Random or dumped packing elements
2219/3085 . . . . Ordered or stacked packing elements
2219/3086 . . . Filling of the packing elements into the column or vessel, e.g. using a tube
2219/3088 . . . Emptying of the packing elements from the column or vessel, e.g. using a tube
2219/31 . . Size details
2219/312 . . . Sizes
2219/315 . . . Two or more types of packing elements or packing elements of different sizes present in the column
2219/318 . . Manufacturing aspects
2219/3181 . . . Pleating
2219/3183 . . . Molding
2219/3185 . . . Pressing
2219/3186 . . . Sintering
2219/3188 . . . Extruding
2219/319 . . Mathematical modelling
2219/32 . Details relating to packing elements in the form of grids or built-up elements for forming a unit of module inside the apparatus for mass or heat transfer
2219/322 . . Basic shape of the elements
2219/32203 . . . Sheets
2219/32206 . . . . Flat sheets
2219/3221 . . . . Corrugated sheets

2219/32213 . . . . Plurality of essentially parallel sheets
2219/32217 . . . . . with sheets having corrugations which intersect at an angle of 90 degrees
2219/3222 . . . . . with sheets having corrugations which intersect at an angle different from 90 degrees
2219/32224 . . . . characterised by the orientation of the sheet
2219/32227 . . . . . Vertical orientation
2219/32231 . . . . . Horizontal orientation
2219/32234 . . . . . Inclined orientation
2219/32237 . . . . Sheets comprising apertures or perforations
2219/32241 . . . . . Louvres
2219/32244 . . . . . Essentially circular apertures
2219/32248 . . . . Sheets comprising areas that are raised or sunken from the plane of the sheet
2219/32251 . . . . . Dimples, bossages, protrusions
2219/32255 . . . . Other details of the sheets
2219/32258 . . . . . Details relating to the extremities of the sheets, such as a change in corrugation geometry or sawtooth edges
2219/32262 . . . . . Dimensions or size aspects
2219/32265 . . . . characterised by the orientation of blocks of sheets
2219/32268 . . . . . relating to blocks in the same horizontal level
2219/32272 . . . . . relating to blocks in superimposed layers
2219/32275 . . . . Mounting or joining of the blocks or sheets within the column or vessel
2219/32279 . . . Tubes or cylinders
2219/32282 . . . Rods or bars
2219/32286 . . . Grids or lattices
2219/32289 . . . . Stretched materials
2219/32293 . . . Cubes or cubic blocks
2219/32296 . . . Honeycombs
2219/324 . . Composition or microstructure of the elements
2219/32408 . . . Metal
2219/32416 . . . . fibrous
2219/32425 . . . Ceramic
2219/32433 . . . . Carbon
2219/32441 . . . Glass
2219/3245 . . . Wood
2219/32458 . . . Paper
2219/32466 . . . comprising catalytically active material
2219/32475 . . . . involving heat exchange
2219/32483 . . . Plastics
2219/32491 . . . Woven or knitted materials
2219/326 . . Mathematical modelling
2219/328 . . Manufacturing aspects
2219/3281 . . . Pleating
2219/3282 . . . Molding
2219/3284 . . . Pressing
2219/3285 . . . Sintering
2219/3287 . . . Extruding
2219/3288 . . . Punching
2219/33 . . Details relating to the packing elements in general
2219/3306 . . . Dimensions or size aspects
2219/3313 . . . Revamping
2219/332 . . Details relating to the flow of the phases
2219/3322 . . . Co-current flow
2219/3325 . . . Counter-current flow
2219/3327 . . . Cross-current flow

2220/00 Aspects relating to sorbent materials
2220/40 . Aspects relating to the composition of sorbent or filter aid materials
2220/42 . . Materials comprising a mixture of inorganic materials (materials coated or impregnated on a carrier B01J 20/32)
2220/44 . . Materials comprising a mixture of organic materials (materials coated or impregnated on a carrier B01J 20/32)
2220/445 . . . comprising a mixture of polymers
2220/46 . . Materials comprising a mixture of inorganic and organic materials (materials coated or impregnated on a carrier B01J 20/32)
2220/48 . . Sorbents characterised by the starting material used for their preparation
2220/4806 . . . the starting material being of inorganic character
2220/4812 . . . the starting material being of organic character
2220/4818 . . . . Natural rubber
2220/4825 . . . . Polysaccharides or cellulose materials, e.g. starch, chitin, sawdust, wood, straw, cotton
2220/4831 . . . . . having been subjected to further processing, e.g. paper, cellulose pulp
2220/4837 . . . . Lignin
2220/4843 . . . . Algae, aquatic plants or sea vegetals, e.g. seeweeds, eelgrass
2220/485 . . . . Plants or land vegetals, e.g. cereals, wheat, corn, rice, sphagnum, peat moss
2220/4856 . . . . Proteins, DNA
2220/4862 . . . . Feathers
2220/4868 . . . . Cells, spores, bacteria
2220/4875 . . . the starting material being a waste, residue or of undefined composition
2220/4881 . . . . Residues from shells, e.g. eggshells, mollusk shells
2220/4887 . . . . Residues, wastes, e.g. garbage, municipal or industrial sludges, compost, animal manure; fly-ashes
2220/4893 . . . . Residues derived from used synthetic products, e.g. rubber from used tyres
2220/49 . . Materials comprising an indicator, e.g. colour indicator, pH-indicator
2220/50 . Aspects relating to the use of sorbent or filter aid materials
2220/52 . . Sorbents specially adapted for preparative chromatography
2220/54 . . Sorbents specially adapted for analytical or investigative chromatography
2220/56 . . Use in the form of a bed
2220/58 . . Use in a single column
2220/60 . . Use in several different columns
2220/603 . . . serially disposed columns
2220/606 . . . parallel disposed columns
2220/62 . . In a cartridge
2220/64 . . In a syringe, pipette, e.g. tip or in a tube, e.g. test-tube or u-shape tube (in columns B01J 2220/58)
2220/66 . . Other type of housings or containers not covered by B01J 2220/58 - B01J 2220/64
2220/68 . . Superabsorbents
2220/80 . Aspects related to sorbents specially adapted for preparative, analytical or investigative chromatography
2220/82 . . Shaped bodies, e.g. monoliths, plugs, tubes, continuous beds

2220/825 . . . comprising a cladding or external coating
2220/84 . . Capillaries
2220/86 . . Sorbents applied to inner surfaces of columns or capillaries

2229/00 Aspects of molecular sieve catalysts not covered by B01J 29/00

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
2229/34 . . Reaction with organic or organometallic compounds (with organo-silicium compounds B01J 2229/32)
2229/36 . . Steaming
2229/37 . . Acid treatment
2229/38 . . Base treatment
2229/40 . . Special temperature treatment, i.e. other than just for template removal
2229/42 . . Addition of matrix or binder particles
2229/60 . Synthesis on support
2229/62 . . in or on other molecular sieves
2229/64 . . in or on refractory materials
2229/66 . . on metal supports

2231/00 Catalytic reactions performed with catalysts classified in B01J 31/00

NOTE

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

2231/005 . General concepts, e.g. reviews, relating to methods of using catalyst systems, the concept being defined by a common method or theory, e.g. microwave heating or multiple stereoselectivity
2231/10 . Polymerisation reactions involving at least dual use catalysts, e.g. for both oligomerisation and polymerisation
2231/12 . . Olefin polymerisation or copolymerisation
2231/122 . . . Cationic (co)polymerisation, e.g. single-site or Ziegler-Natta type
2231/125 . . . Radical (co)polymerisation, e.g. mediators therefor
2231/127 . . . Anionic (co)polymerisation
2231/14 . . Other (co) polymerisation, e.g. of lactides, epoxides ("ROMP", i.e. ring-opening metathesis polymerisation B01J 2231/54)
2231/20 . Olefin oligomerisation or telomerisation
2231/30 . Addition reactions at carbon centres, i.e. to either C-C or C-X multiple bonds
2231/32 . . Addition reactions to C=C or C-C triple bonds
2231/321 . . . Hydroformylation, metalformylation, carbonylation or hydroaminomethylation
2231/322 . . . Hydrocyanation
2231/323 . . . Hydrometalation, e.g. bor-, alumin-, silyl-, zirconation or analoguous reactions like carbometalation, hydrocarbation
2231/324 . . . Cyclisations via conversion of C-C multiple to single or less multiple bonds, e.g. cycloadditions
2231/325 . . . . Cyclopropanations
2231/326 . . . . Diels-Alder or other [4+2] cycloadditions, e.g. hetero-analogues
2231/327 . . . . Dipolar cycloadditions
2231/328 . . . . Cycloadditions involving more than 2 components or moieties, e.g. intra-/intermolecualar [2+2+2] or [2+2+1], e.g. Pauson-Khand type
2231/34 . . Other additions, e.g. Monsanto-type carbonylations, 1,2-C=X1,2-C=X or -C-X triple bonds, 1,4-C=C-C=X or -C-X triple bonds with X= O, S, NH/N or analogues
2231/341 . . . 1,2-additions, e.g. aldol or Knoevenagel condensations
2231/342 . . . . Aldol type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues, to aldehydes or ketones
2231/343 . . . . . to prepare cyanhydrines, e.g. by adding HCN or TMSCN
2231/344 . . . . . Boronation, e.g. by adding R-B(OR)2
2231/345 . . . . . with organometallic complexes, e.g. by adding ZnR_2
2231/346 . . . . Mannich type reactions, i.e. nucleophilic addition of C-H acidic compounds, their R3Si- or metal complex analogues to aldimines or ketimines
2231/347 . . . . via cationic intermediates, e.g. bisphenol A type processes
2231/348 . . . 1,4-additions, e.g. conjugate additions
2231/349 . . . 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
2231/40 . 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
2231/42 . . Catalytic cross-coupling, i.e. connection of previously not connected C-atoms or C- and X-atoms without rearrangement
2231/4205 . . . C-C cross-coupling, e.g. metal catalyzed or Friedel-Crafts type
2231/4211 . . . . Suzuki-type, i.e. RY + R'B(OR)2, in which R, R' are optionally substituted alkyl, alkenyl, aryl, acyl and Y is the leaving group

2231/4216 . . . . . with R= alkyl
2231/4222 . . . . . with R'= alkyl
2231/4227 . . . . . with Y= Cl
2231/4233 . . . . Kumada-type, i.e. RY + R'MgZ, in which Ris optionally substituted alkyl, alkenyl, aryl, Y is the leaving group and Z is halide
2231/4238 . . . . Negishi-type, i.e. RY + R'ZnZ, in which R, R' is optionally substituted alkyl, alkenyl, alkynyl, aryl, Y is the leaving group and Z is halide or R'
2231/4244 . . . . . with R= alkyl
2231/425 . . . . . with R'= alkyl
2231/4255 . . . . Stille-type, i.e. RY + R'3SnR", in which R is alkenyl, aryl, R' is alkyl and R" is alkenyl or aryl
2231/4261 . . . . Heck-type, i.e. RY + C=C, in which R is aryl
2231/4266 . . . . Sonogashira-type, i.e. RY + HC-CR' triple bonds, in which R=aryl, alkenyl, alkyl and R'=H, alkyl or aryl
2231/4272 . . . . via enolates or aza-analogues, added as such or made in-situ, e.g. ArY + R2C=C(OM)Z -> ArR2C-C(O)Z, in which R is H or alkyl, M is Na, K or SiMe3, Y is the leaving group, Z is Ar or OR' and R' is alkyl
2231/4277 . . . C-X Cross-coupling, e.g. nucleophilic aromatic amination, alkoxylation or analogues
2231/4283 . . . . using N nucleophiles, e.g. Buchwald-Hartwig amination
2231/4288 . . . . using O nucleophiles, e.g. alcohols, carboxylates, esters
2231/4294 . . . . using S nucleophiles, e.g. thiols
2231/44 . . Allylic alkylation, amination, alkoxylation or analogues
2231/46 . . C-H or C-C activation
2231/48 . . Ring-opening reactions
2231/482 . . . asymmetric reactions, e.g. kinetic resolution of racemates
2231/485 . . . . kinetic resolution of epoxide racemates
2231/487 . . . . . by hydrolysis
2231/49 . . Esterification or transesterification
2231/50 . Redistribution or isomerisation reactions of C-C, C=C or C-C triple bonds
2231/52 . . Isomerisation reactions
2231/54 . . Metathesis reactions, e.g. olefin metathesis
2231/543 . . . alkene metathesis
2231/546 . . . alkyne metathesis
2231/60 . Reduction reactions, e.g. hydrogenation
2231/62 . . Reductions in general of inorganic substrates, e.g. formal hydrogenation, e.g. of N_2
2231/625 . . . of CO_2
2231/64 . . Reductions in general of organic substrates, e.g. hydride reductions or hydrogenations
2231/641 . . . Hydrogenation of organic substrates, i.e. H_2 or H-transfer hydrogenations, e.g. Fischer-Tropsch processes
2231/643 . . . . of R2C=O or R2C=NR (R= C, H)
2231/645 . . . . of C=C or C-C triple bonds
2231/646 . . . . of aromatic or heteroaromatic rings
2231/648 . . . . Fischer-Tropsch-type reactions
2231/70 . Oxidation reactions, e.g. epoxidation, (di)hydroxylation, dehydrogenation and analogues
2231/72 . . Epoxidation
2231/74 . . Aziridination
2231/76 . . Dehydrogenation (transfer-dehydrogenation of CH-XH B01J 2231/641; transfer-dehydrogenation of -CHRCHR- via C-H activation B01J 2231/46)
2231/763 . . . mof -CH-XH (X= O, NH/N, S) to -C=X or -C-X triple bond species
2231/766 . . . of -CH-CH- or -C=C- to -C=C- or -C-C- triple bond species

2523/00 Constitutive chemical elements of heterogeneous catalysts

2523/10 . of Group I (IA or IB) of the Periodic Table
2523/11 . . Lithium
2523/12 . . Sodium
2523/13 . . Potassium
2523/14 . . Rubidium
2523/15 . . Caesium
2523/16 . . Francium
2523/17 . . Copper
2523/18 . . Silver
2523/19 . . Gold
2523/20 . of Group II (IIA or IIB) of the Periodic Table
2523/21 . . Beryllium
2523/22 . . Magnesium
2523/23 . . Calcium
2523/24 . . Strontium
2523/25 . . Barium
2523/26 . . Radium
2523/27 . . Zinc
2523/28 . . Cadmium
2523/29 . . Mercury
2523/30 . of Group III (IIIA or IIIB) of the Periodic Table
2523/305 . . Boron
2523/31 . . Aluminium
2523/32 . . Gallium
2523/33 . . Indium
2523/34 . . Thallium
2523/35 . . Scandium
2523/36 . . Yttrium
2523/37 . . Lanthanides
2523/3706 . . . Lanthanum
2523/3712 . . . Cerium
2523/3718 . . . Praseodymium
2523/3725 . . . Neodymium
2523/3731 . . . Promethium
2523/3737 . . . Samarium
2523/3743 . . . Europium
2523/375 . . . Gadolinium
2523/3756 . . . Terbium
2523/3762 . . . Dysprosium
2523/3768 . . . Holmium
2523/3775 . . . Erbium
2523/3781 . . . Thulium
2523/3787 . . . Ytterbium
2523/3793 . . . Lutetium
2523/39 . . Actinides
2523/392 . . . Actinium
2523/395 . . . Thorium
2523/397 . . . Uranium
2523/40 . of Group IV (IVA or IVB) of the Periodic Table
2523/41 . . Silicon
2523/42 . . Germanium
2523/43 . . Tin

2523/44 . . Lead
2523/47 . . Titanium
2523/48 . . Zirconium
2523/49 . . Hafnium
2523/50 . of Group V (VA or VB) of the Periodic Table
2523/51 . . Phosphorus
2523/52 . . Arsenic
2523/53 . . Antimony
2523/54 . . Bismuth
2523/55 . . Vanadium
2523/56 . . Niobium
2523/57 . . Tantalum
2523/60 . of Group VI (VIA or VIB) of the Periodic Table
2523/62 . . Sulfur
2523/63 . . Selenium
2523/64 . . Tellurium
2523/65 . . Polonium
2523/67 . . Chromium
2523/68 . . Molybdenum
2523/69 . . Tungsten
2523/70 . of Group VII (VIIB) of the Periodic Table
2523/72 . . Manganese
2523/73 . . Technetium
2523/74 . . Rhenium
2523/80 . of Group VIII of the Periodic Table
2523/82 . . Metals of the platinum group
2523/821 . . . Ruthenium
2523/822 . . . Rhodium
2523/824 . . . Palladium
2523/825 . . . Osmium
2523/827 . . . Iridium
2523/828 . . . Platinum
2523/84 . . Metals of the iron group
2523/842 . . . Iron
2523/845 . . . Cobalt
2523/847 . . . Nickel

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

NOTE

In this group the term "Metals" refers to the central metal in the coordination complexes (B01J 31/16 - B01J 31/24), as used for the respective catalytic reaction, excluding carboxylates (see B01J 31/04) and other simple salts or organometallic compounds (see B01J 31/12). As to components, only those metals or solvents are indexed which are explicitly mentioned in the claims or the worked examples. As to compositional aspects, only those are provided for in the scheme below and are intended to be indexed, which provide additional information regarding the complexes and/or ligands classified in 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

2531/001 . General concepts, e.g. reviews, relating to catalyst systems and methods of making them, the concept being defined by a common material or method/ theory

NOTE

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

2531/002 . . Materials
2531/004 . . . Ligands
2531/005 . . . Catalytic metals
2531/007 . . . Promoter-type Additives
2531/008 . . Methods or theories
2531/02 . Compositional aspects of complexes used, e.g. polynuclearity
2531/0202 . . Polynuclearity
2531/0205 . . . Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(Lx)Zr-imidazole-Zr(Lx)Cp
2531/0208 . . . Bimetallic complexes, i.e. comprising one or more units of two metals, with metal-metal bonds but no all-metal (M)n rings, e.g. $Cr_2(OAc)_4$
2531/0211 . . . Metal clusters, i.e. complexes comprising 3 to about 1000 metal atoms with metal-metal bonds to provide one or more all-metal (M)n rings, e.g. $Rh_4(CO)_{12}$
2531/0213 . . Complexes without C-metal linkages
2531/0216 . . . Bi- or polynuclear complexes, i.e. comprising two or more metal coordination centres, without metal-metal bonds, e.g. Cp(Lx)Zr-imidazole-Zr(Lx)Cp
2531/0219 . . . Bimetallic complexes, i.e. comprising one or more units of two metals, with metal-metal bonds but no all-metal (M)n rings, e.g. $Cr_2(OAc)_4$
2531/0222 . . . Metal clusters, i.e. complexes comprising 3 to about 1000 metal atoms with metal-metal bonds to provide one or more all-metal (M)n rings, e.g. $Rh_4(CO)_{12}$
2531/0225 . . Complexes comprising pentahapto-cyclopentadienyl analogues
2531/0227 . . . Carbollide ligands, i.e. [nido-CnB(11-n)H11] (4-n)- in which n is 1-3
2531/023 . . . Phospholyl ligands, i.e. [CnP(5-n)Rn]- in which n is 0-4 and R is H or hydrocarbyl, or analogous condensed ring systems
2531/0233 . . . Aza-Cp ligands, i.e. [CnN(5-n)Rn]- in which n is 0-4 and R is H or hydrocarbyl, or analogous condensed ring systems
2531/0236 . . . Azaborolyl ligands, e.g. 1,2-azaborolyl

2531/0238 . . Complexes comprising multidentate ligands, i.e. more than 2 ionic or coordinative bonds from the central metal to the ligand, the latter having at least two donor atoms, e.g. N, O, S, P
2531/0241 . . . Rigid ligands, e.g. extended sp2-carbon frameworks or geminal di- or trisubstitution
2531/0244 . . . . Pincer-type complexes, i.e. consisting of a tridentate skeleton bound to a metal, e.g. by one to three metal-carbon sigma-bonds
2531/0247 . . . . Tripodal ligands, e.g. comprising the tris(pyrazolyl)borate skeleton, "tpz", neutral analogues thereof by CH/BH exchange or anionic analogues of the latter by exchange of one of the pyrazolyl groups for an anionic complexing group such as carboxylate or -R-Cp
2531/025 . . . . Ligands with a porphyrin ring system or analogues thereof, e.g. phthalocyanines, corroles
2531/0252 . . . . Salen ligands or analogues, e.g. derived from ethylenediamine and salicylaldehyde
2531/0255 . . . . Ligands comprising the N2S2 or N2P2 donor atom set, e.g. diiminodithiolates or diiminodiphosphines with complete pi-conjugation between all donor centres
2531/0258 . . . 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
2531/0261 . . Complexes comprising ligands with non-tetrahedral chirality
2531/0263 . . . Planar chiral ligands, e.g. derived from donor-substituted paracyclophanes and metallocenes or from substituted arenes
2531/0266 . . . Axially chiral or atropisomeric ligands, e.g. bulky biaryls such as donor-substituted binaphthalenes, e.g. "BINAP" or "BINOL"
2531/0269 . . Complexes comprising ligands derived from the natural chiral pool or otherwise having a characteristic structure or geometry
2531/0272 . . . derived from carbohydrates, including tartrates, e.g. DIOP
2531/0275 . . . derived from amino acids
2531/0277 . . . derived from fullerenes and analogues, e.g. buckybowls or Cp5Cp
2531/028 . . . comprising affinity tags, e.g. for recovery (self-associating or modular catalysts B01J 2531/0291)
2531/0283 . . . . The bonding to the affinity counterpart occurring via hydrogen bonding
2531/0286 . . Complexes comprising ligands or other components characterized by their function
2531/0288 . . . Sterically demanding or shielding ligands
2531/0291 . . . Ligands adapted to form modular catalysts, e.g. self-associating building blocks as exemplified in the patent document EP-A-1 479 439
2531/0294 . . . "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 ancilliary ligands, e.g. by electron transfer to or from the central metal or by intra-/intermolecular chemical reactions, e.g. disulfide coupling, H-abstraction
2531/0297 . . . Non-coordinating anions
2531/10 . Complexes comprising metals of Group I (IA or IB) as the central metal
2531/11 . . Lithium
2531/12 . . Sodium
2531/13 . . Potassium
2531/14 . . Rubidium
2531/15 . . Caesium
2531/16 . . Copper
2531/17 . . Silver
2531/18 . . Gold
2531/20 . Complexes comprising metals of Group II (IIA or IIB) as the central metal
2531/21 . . Beryllium
2531/22 . . Magnesium
2531/23 . . Calcium
2531/24 . . Strontium
2531/25 . . Barium
2531/26 . . Zinc
2531/27 . . Cadmium
2531/28 . . Mercury
2531/30 . Complexes comprising metals of Group III (IIIA or IIIB) as the central metal
2531/31 . . Aluminium
2531/32 . . Gallium
2531/33 . . Indium
2531/34 . . Thallium
2531/35 . . 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
2531/60 . Complexes comprising metals of Group VI (VIA or VIB) as the central metal
2531/62 . . Chromium
2531/64 . . Molybdenum
2531/66 . . Tungsten
2531/70 . Complexes comprising metals of Group VII (VIIB) as the central metal
2531/72 . . Manganese
2531/74 . . Rhenium
2531/80 . Complexes comprising metals of Group VIII as the central metal
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 ($scCO_2$)
2531/925 . . . Supercritical water (scH_2O)
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 (R-C=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(R'O)2P=O), i.e. R= C, R'= C, H
2540/527 . . . being 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
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