ECLA EUROPEAN CLASSIFICATION

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. F26B3/08)

[N: **WARNING**
[C2012.08]>

1. The following IPC groups are not used in the internal ECLA classification scheme. Subject matter covered by these groups is classified in the following ECLA groups: B01J37/025 covered by B01J37/02

2.
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Notes

1. In this subclass, the following terms or expressions are used with the meanings indicated :

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- "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.
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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

[N: **Note**
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B01J2/00 **Processes or devices for granulating materials,** [N: e.g. fertilisers] **in general** (granulating metals B22F9/00, [N: granulating slag C21B3/06], ores or scrap C22B1/14; mechanical aspects of working of plastics or substances in a plastic state to make granules B29B9/00; processes for granulating fertilisers characterised by their chemical constitution, see the relevant groups in C05B to C05G; chemical aspects of powdering or granulating of macromolecular substances C08J3/12)**; Rendering particulate materials free flowing in general, e.g. making them hydrophobic**

B01J2/00B . [N: followed by coating of the granules (to prevent the granules sticking together B01J2/30)]

B01J2/00D . [N: Coating of the granules without description of the process or the device by which the granules are obtained (to prevent the granules sticking together B01J2/30)]

B01J2/02 . by dividing the liquid material into drops, e.g. by spraying, and solidifying the drops (evaporating by spraying B01D1/16)

B01J2/04 . . in a gaseous medium [N: (if combined with suspending the material in a gas, e.g. fluidised beds B01J2/16)]

B01J2/06 . . in a liquid medium

B01J2/08 . . . Gelation of a colloidal solution

B01J2/10 . in stationary drums or troughs, provided with kneading or mixing appliances

B01J2/12 . in rotating drums

B01J2/14 . in rotating dishes or pans

B01J2/16 . by suspending the powder material in a gas, e.g. in fluidised beds or as a falling curtain [C0509]

[N: **Note**
For classification in B01J2/16, 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
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B01J2/18 . using a vibrating apparatus

B01J2/20 . by expressing the material, e.g. through sieves and fragmenting the extruded length

B01J2/22 . by pressing in moulds or between rollers

B01J2/24 . Obtaining flakes by scraping a solid layer from a surface

B01J2/26 . on endless conveyer belts

B01J2/28 . using special binding agents

B01J2/30 . using agents to prevent the granules sticking together; Rendering particulate materials free flowing in general, e.g. making them hydrophobic

B01J3/00 **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 B22F3/00; pressure vessels in general F16J12/00; pressure vessels for containing or storing compressed, liquefied or solidified gases F17C; pressure vessels for nuclear reactors G21C)

B01J3/00B . [N: Component parts of these vessels not mentioned in B01J3/00D, B01J3/00F, B01J3/02 to B01J3/08; Measures taken in conjunction with the process to be carried out, e.g. safety measures]

B01J3/00D . [N: Sight-glasses therefor (see also G02B)]

B01J3/00F . [N: Processes utilising sub-atmospheric pressure; Apparatus therefor]

B01J3/00S . [N: Processes carried out under supercritical conditions] [N9901]

B01J3/02 . Feed or outlet devices therefor

B01J3/03 . Pressure vessels, or vacuum vessels, having closure members or seals specially adapted therefor

B01J3/04 . Pressure vessels, e.g. autoclaves
B01J3/04B . . [N: in the form of a tube]
B01J3/04D . . [N: in the form of a loop]
B01J3/04P . . [N: Pressure-balanced vessels] [N9901]
B01J3/04R . . [N: Multiwall, strip or filament wound vessels (for pressurised gas vessels F17C1/06; for making them B29)]

B01J3/06 . Processes using ultra high pressure, e.g. for the formation of diamonds; Apparatus therefor, e.g. moulds, dies (B01J3/04 takes precedence; presses in general B30B)
B01J3/06B . . [N: characterised by the composition of the materials to be processed]
B01J3/06D . . [N: Presses for the formation of diamonds or boronitrides]
B01J3/06D2 . . . [N: Presses using a plurality of pressing members working in different directions]
B01J3/08 . . Application of shock-waves for chemical reactions or for modifying the crystal structure of substances, [N: e.g. reactions carried out by explosions or in a combustion engine-type reactor] (blasting F42D)

B01J4/00 **Feed** [N: or outlet] **devices; Feed or outlet regulating devices** (feed or outlet devices for pressure vessels B01J3/02; [N: feeding of particles into and evacuation of particles out of the reactor B01J8/00F])

B01J4/00B . [N: Feed or outlet devices as such, e.g. feeding tubes] [C1004]
B01J4/00B2 . . [N: Nozzle-type elements (nozzle-type reactors B01J19/26)] [N1004] [C1201]
B01J4/00B4 . . [N: Sparger-type elements] [N1004] [C1201]
B01J4/00B6 . . [N: provided with baffles] [N1004]
B01J4/00B8 . . [N: provided with moving parts] [N1004]

B01J4/00D . [N: Feed or outlet regulating or controlling devices] [C1004]

B01J4/02 . for feeding measured [i.e. prescribed] quantities of reagents [C1004]

B01J4/04 . using osmotic pressure [N: using membranes, porous plates]

B01J6/00 [N: Heat treatments such as] **Calcining; Fusing** [N: Pyrolysis (furnaces F27D)]

B01J6/00C . [N: Calcining]
B01J6/00C2 . . [N: using rotating drums]
B01J6/00C4 . . [N: using hot gas streams in which the material is moved]

B01J6/00F . [N: Fusing]
B01J6/00F2 . . [N: in crucibles]

B01J6/00P . [N: Pyrolysis reactions (of hydrocarbons C10G9/00)]

B01J7/00 **Apparatus for generating gases** (production of inert gas mixtures B01J19/14; for generating specific gases, see the relevant subclasses, e.g. C01B, C10J; [N: in "air bags" on vehicles B60R21/26; for starter gas F02C7/26; blasting cartridges for producing gas under pressure F42B3/04]) [C9409]

B01J7/02 . by wet methods

B01J8/00 **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 B01J2/00; furnaces F27B; [N: heat exchange apparatus F28C3/10; F28D13/00, F28D17/00, F28D19/00])

B01J8/00B . [N: Catalytic processes under superatmospheric pressure (non-catalytic processes B01J3/00)]

B01J8/00D . [N: Controlling catalytic processes (B01J8/18D takes precedence)] [C1202]

B01J8/00F . [N: Feeding of the particles in the reactor; Evacuation of the particles out of the reactor]

B01J8/00F2 . . [N: with a moving instrument]

B01J8/00F4 . . [N: by an ascending fluid]

B01J8/00F6 . . [N: in a downward flow]

B01J8/00F8 . . [N: Periodical feeding or evacuation]

B01J8/00F10 . . [N: by means of a nozzle] [N0103]

B01J8/00F12 . . [N: by means of a rotary device in the flow channel] [N0302]

B01J8/00J . [N: Separating solid material from the gas/liquid stream (separation processes per se B01D)]

B01J8/00J2 . . [N: using cyclones] [N9907]

B01J8/00J4 . . [N: by filtration] [N9907]

B01J8/00J6 . . [N: by impingement against stationary members] [N9907]

B01J8/00J8 . . [N: by sedimentation] [N9907]

B01J8/00J10 . . [N: by electrostatic precipitation] [N0103]

B01J8/00L . [N: Details of the reactor or of the particulate material; Processes to increase or to retard the rate of reaction (B01J8/02H, B01J8/06H, B01J8/08H, B01J8/18H take precedence)]

B01J8/00L2 . . [N: promoting uninterrupted fluid flow, e.g. by filtering out particles in front of the catalyst layer]

B01J8/00L4 . . [N: Membranes, e.g. feeding or removing reactants or products to or from the catalyst bed through a membrane][N0302]

B01J8/00N . [N: in which two different types of particles react with each other]

B01J8/02 . with stationary particles, e.g. in fixed beds

B01J8/02B . . [N: the fluid flow within the bed being predominantly horizontal] [C9901]

B01J8/02B2 . . . [N: in a cylindrical annular shaped bed] [N9901]

B01J8/02B4 . . . [N: in a cylindrical shaped bed (B01J8/02B2 takes precedence)] [N0103]

B01J8/02B5 . . . [N: in a conically shaped bed] [N0302]
B01J8/02B6 . . . [N: in a spiral shaped bed] [N0002]
B01J8/02D . . [N: the fluid flow within the bed being predominantly vertical] [N9907]
B01J8/02D2 . . . [N: in a cylindrical shaped bed] [N9907]
B01J8/02D4 . . . [N: in a cylindrical annular shaped bed] [N0002]
B01J8/02D5 . . . [N: in a conically shaped bed] [N0302]
B01J8/02D6 . . . [N: in a spiral shaped bed] [N0002]
B01J8/02F . . [N: Feeding reactive fluids (for solid material B01J8/00F)]
B01J8/02H . . [N: Heating or cooling the reactor (for tubular reactors in furnaces B01J8/06B)]
B01J8/02L . . [N: with stationary packing material in the bed, e.g. bricks, wire rings, baffles] [N0002]
B01J8/04 . . the fluid passing successively through two or more beds
B01J8/04B . . . [N: the fluid flow within the beds being predominantly horizontal]
B01J8/04B2 . . . . [N: through two or more cylindrical annular shaped beds] [N9901]
B01J8/04B2B . . . . . [N: the beds being concentric] [N9901]
B01J8/04B2D . . . . . [N: the beds being superimposed one above the other (B01J8/04B4B4 takes precedence)] [N9901] [C9907]
B01J8/04B2F . . . . . [N: the beds being placed in separate reactors] [N0103]
B01J8/04B4 . . . . [N: through two or more otherwise shaped beds] [N9907]
B01J8/04B4B . . . . . [N: the beds being superimposed one above the other] [N9907]
B01J8/04B4B2 . . . . . [N: in combination with one cylindrical annular shaped bed] [N9907]
B01J8/04B4B4 . . . . . [N: in combination with two or more cylindrical annular shaped beds] [N9907]
B01J8/04B4D . . . . . [N: the beds being placed next to each other] [N9907]
B01J8/04B4F . . . . . [N: the beds being placed in separate reactors] [N9907]
B01J8/04D . . . [N: the flow within the beds being predominantly vertical] [N9907]
B01J8/04D2 . . . . [N: in two or more cylindrical beds] [N9907]
B01J8/04D2D . . . . . [N: the beds being superimposed one above the other] [N9907]
B01J8/04D2F . . . . . [N: the beds being placed in separate reactors] [N0103]
B01J8/04D3 . . . . [N: in two or more cylindrical annular shaped beds] [N0002]
B01J8/04D3B . . . . . [N: the beds being concentric] [N0002]
B01J8/04D3D . . . . . [N: the beds being superimposed one above the other] [N0002]
B01J8/04D3F . . . . . [N: the beds being placed in separate reactors] [N0002]
B01J8/04D4 . . . . [N: in two or more otherwise shaped beds] [N9907]
B01J8/04D4B . . . . . [N: the beds being superimposed one above the other] [N9907]
B01J8/04D4D . . . . . [N: the beds being placed next to each other] [N9907]
B01J8/04D4F . . . . . [N: the beds being placed in separate reactors] [N9907]
B01J8/04F . . . [N: Feeding reactive fluids (for solid material, see B01J8/00F)]
B01J8/04H . . . [N: Heating or cooling the reactor] [N0002]
B01J8/06 . . in tube reactors; the solid particles being arranged in tubes
B01J8/06B . . . [N: being installed in a furnace]
B01J8/06F . . . [N: Feeding reactive fluids] [N0002]
B01J8/06H . . . [N: Heating or cooling the reactor (B01J8/06B takes precedence)]

B01J8/08 . with moving particles (with fluidised particles B01J8/18)
B01J8/08D . . [N: Controlling processes]
B01J8/08F . . [N: Feeding reactive fluids (for solid material, see B01J8/00F)]
B01J8/08H . . [N: Heating or cooling the reactor]
B01J8/10 . . moved by stirrers or by rotary drums or rotary receptacles [N: or endless belts]
B01J8/12 . . moved by gravity in a downward flow
B01J8/12B . . . [N: with multiple sections one above the other separated by distribution aids, e.g. reaction and regeneration sections]
B01J8/14 . . moving in free vortex flow apparatus (free vortex flow apparatus in general B04C)

B01J8/16 . with particles being subjected to vibrations or pulsations (B01J8/40 takes precedence)

B01J8/18 . with fluidised particles [N: (combustion apparatus with fluidised bed in general F23C10/00; furnaces with fluidised bed F27B15/00)]
B01J8/18D . . [N: Controlling processes]
B01J8/18G . . [N: Feeding of the fluidising gas (B01J8/44 takes precedence)] [N1201]
B01J8/18G2 . . . [N: the fluidising gas being a reactant] [N1201]
B01J8/18H . . [N: Heating and cooling the reactor (B01J8/42 takes precedence)]
B01J8/18K . . [N: with particles moving upwards while fluidised]
B01J8/18K2 . . . [N: followed by a downward movement inside the reactor to form a loop]
B01J8/18K4 . . . [N: followed by a downward movement outside the reactor and subsequently re-entering it]
B01J8/18L . . [N: Details of the fluidised bed reactor (B01J8/18H takes precedence)] [N1201]
B01J8/18M . . [N: with particles moving downwards while fluidised]
B01J8/18M2 . . . [N: moving downwards in a zig-zag manner]
B01J8/20 . . with liquid as a fluidising medium
B01J8/22 . . . gas being introduced into the liquid
B01J8/22B . . . . [N: in the presence of a rotating device only]
B01J8/22D . . . . [N: the particles being subject to a circulatory movement (B01J8/22B takes precedence)]
B01J8/22D2 . . . . . [N: internally, i.e. the particles rotate within the vessel]
B01J8/22D4 . . . . . [N: externally, i.e. the particles leaving the vessel and subsequently re-entering it]
B01J8/24 . . according to "fluidised-bed" technique (B01J8/20 takes precedence; combustion apparatus in which combustion takes place in a fluidised bed of fuel or other particles F23C10/00) [C0803]
B01J8/24B . . . [N: Spouted-bed technique]
B01J8/26 . . . with two or more fluidised beds, e.g. reactor and regeneration installations
B01J8/28 . . . . the one above the other
B01J8/30 . . . . . the edge of a lower bed projecting beyond the edge of the superjacent bed
B01J8/32 . . . with introduction into the fluidised bed of more than one kind of moving particles
B01J8/34 . . . with stationary packing material in the fluidised bed, e.g. bricks, wire rings, baffles
B01J8/36 . . . with fluidised bed through which there is an essentially horizontal flow of

particles

B01J8/38 . . . with fluidised bed containing a rotatable device or being subject to rotation [N: or to a circulatory movement, i.e. leaving a vessel and subsequently re-entering it]

B01J8/38B . . . . [N: with a rotatable device only]

B01J8/38D . . . . [N: being subject to a circulatory movement only (B01J8/38B takes precedence)]

B01J8/38D2 . . . . . [N: internally, i.e. the particles rotate within the vessel]

B01J8/38D4 . . . . . [N: externally, i.e. the particles leaving the vessel and subsequently re-entering it]

B01J8/40 . . . with fluidised bed subjected to vibrations or pulsations

B01J8/42 . . . with fluidised bed subjected to electric current or to radiations [N: this sub-group includes the fluidised bed subjected to electric or magnetic fields]

B01J8/44 . . . Fluidisation grids

B01J8/46 . . . for treatment of endless filamentary, band or sheet material

B01J10/00 **Chemical processes in general for reacting liquid with gaseous media other than in the presence of solid particles, or apparatus specially adapted therefor** (B01J19/08 takes precedence; separation, e.g. distillation, also combined with chemical reactions B01D, [N: e.g. B01D3/00R])

B01J10/00J . [N: carried out in foam, aerosol or bubbles]

B01J10/00L . [N: carried out at high temperatures in the presence of a molten material]

B01J10/00P . [N: in the presence of catalytically active bodies, e.g. porous plates]

B01J10/02 . of the thin-film type

B01J12/00 **Chemical processes in general for reacting gaseous media with gaseous media; Apparatus specially adapted therefor** (B01J3/08, B01J8/00, B01J19/08 take precedence)

B01J12/00B . [N: carried out in the plasma state (generating or handling plasma H05H1/00)]

B01J12/00D . [N: carried out at high temperatures, e.g. by pyrolysis]

B01J12/00P . [N: in the presence of catalytically active bodies, e.g. porous plates]

B01J12/02 . for obtaining at least one reaction product which, at normal temperature, is in the solid state

B01J13/00 **Colloid chemistry, e.g. the production of colloidal materials or their solutions, not otherwise provided for; Making micro-capsules or micro-balloons** (use of substances as emulsifying, wetting, dispersing or foam producing agents B01F17/00)

B01J13/00B . [N: Preparation of sols (by physical processes B01J13/00K, aerosols B01J13/00P)]

B01J13/00B2 . . [N: Sols of inorganic materials in water]

B01J13/00B2B . . . [N: from a precipitate]

B01J13/00B2D . . . [N: by extraction of ions from aqueous solutions]
B01J13/00B4 . . [N: containing a solid organic phase]
B01J13/00B6 . . [N: containing a liquid organic phase]
B01J13/00B6B . . . [N: Preparation from aqueous sols]
B01J13/00B8 . . [N: Additives, e.g. in view of promoting stabilisation or peptisation]
B01J13/00B10 . . [N: Post treatment]
B01J13/00B12 . . [N: containing elemental metal (for medical or diagnostical purposes A61K, G01N)]
B01J13/00B14 . . [N: containing a metal oxide]

B01J13/00D . [N: Preparation of gels]
B01J13/00D2 . . [N: containing inorganic material and water]
B01J13/00D2B . . . [N: by precipitation, coagulation, hydrolyse coacervation]
B01J13/00D6 . . [N: containing an organic phase]
B01J13/00D8 . . [N: Post treatment]

B01J13/00F . [N: Preparation of non-Newtonian sols, e.g. thixotropic solutions]
B01J13/00F2 . . [N: containing inorganic material and water]
B01J13/00F4 . . [N: containing an organic phase]

B01J13/00K . [N: Preparation of sols by physical processes (colloid mills B02C)]

B01J13/00N . [N: Preparation of aerogels, e.g. xerogels]

B01J13/00P . [N: Preparation of aerosols]

B01J13/02 . Making micro-capsules or micro-balloons [N: for medical preparations A61K9/50]
B01J13/02M . . [N: Applications of micro-capsules not provided for in other subclasses]
B01J13/04 . . by physical processes, e.g. drying, spraying
B01J13/04B . . . [N: Drying and spraying]
B01J13/04D . . . [N: combined with gelification or coagulation]
B01J13/06 . . by phase separation
B01J13/08 . . . Simple coacervation, i.e. addition of highly hydrophilic material [N: (combined with spraying B01J13/04B; combined with mechanical division B01J13/04)]
B01J13/10 . . . Complex coacervation, i.e. interaction of oppositely charged particles
B01J13/12 . . . removing solvent from the wall-forming material solution
B01J13/12B . . . . [N: by evaporation of the solvent (apparatus therefor B01J13/04B)]
B01J13/14 . . . Polymerisation; cross-linking
B01J13/16 . . . . Interfacial polymerisation
B01J13/18 . . . . In situ polymerisation with all reactants being present in the same phase
B01J13/18B . . . . . [N: in an organic phase]
B01J13/20 . . After-treatment of capsule walls, e.g. hardening
B01J13/20B . . . [N: Exchange of core-forming material by diffusion through the capsule wall]
B01J13/20D . . . [N: Hardening; drying]
B01J13/22 . . . Coating

B01J14/00 Chemical processes in general for reacting liquids with liquids; Apparatus

y adapted therefor (B01J8/00, B01J19/08 take precedence)

B01J14/00P . [N: in the presence of catalytically active bodies, e.g. porous plates]

B01J15/00 **Chemical processes in general for reacting gaseous media with non-particulate solids, e.g. sheet material; Apparatus specially adapted therefor** (B01J19/08 takes precedence)

B01J15/00P . [N: in the presence of catalytically active bodies, e.g. porous plates]

B01J16/00 **Chemical processes in general for reacting liquids with non- particulate solids, e.g. sheet material; Apparatus specially adapted therefor** (B01J19/08 takes precedence)

B01J16/00P . [N: in the presence of catalytically active bodies, e.g. porous plates]

B01J19/00 **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. D06M10/00)**; Their relevant apparatus** (packings, fillings or grids specially adapted for biological treatment of water, waste water or sewage C02F3/10; splashing boards or grids specially adapted for trickle coolers F28F25/08)

B01J19/00B . [N: Controlling or regulating processes (controlling or regulating in general G05)]

B01J19/00B2 . . [N: Controlling the temperature of the process]

B01J19/00B4 . . [N: Avoiding undesirable reactions or side-effects, e.g. avoiding explosions, or improving the yield by suppressing side-reactions]

B01J19/00B4B . . . [N: Avoiding carbon deposits (inhibiting incrustation in general, C23F14/00, C23F15/00)]

B01J19/00B6 . . [N: Optimalisation processes, i.e. processes with adaptive control systems (adaptive control systems per se G05B13/00)]

B01J19/00B10 . . [N: Multifunctional apparatus for automatic manufacturing of various chemical products (sequential reactions B01J19/00C)] [C1204]

B01J19/00C . [N: 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 C07B61/00L)] [N9907]

B01J19/00D . [N: Details of the reactor]

B01J19/00D2 . . [N: Baffles] [N0103]

B01J19/00D4 . . [N: Stirrers (mixing per se B01F)] [N1110]

B01J19/00D6 . . [N: Sealings (sealings for pressure vessels per se F16J15/00)] [N1110]

B01J19/00K . [N: Processes for carrying out reactions under cavitation conditions]

B01J19/00N . [N: Processes carried out with a view to control or to change the pH-value; Applications of buffer salts; Neutralisation reactions]

B01J19/00R . [N: Microreactors, e.g. miniaturised or micro-fabricated reactors(laboratory containers with capillary fluid transport in microfabricated channels or

N9707]

B01J19/02 . Apparatus characterised by being constructed of material selected for its chemically-resistant properties (refractory details of furnaces F27D)

B01J19/06 . Solidifying liquids (making microcapsules B01J13/02)

B01J19/08 . Processes employing the direct application of electric or wave energy, or particle radiation; Apparatus therefor (application of shock waves B01J3/08; generating or handling plasma H05H1/00)

B01J19/08B . . [N: employing particle radiation or gamma-radiation]

B01J19/08B2 . . . [N: Gamma-radiation only]

B01J19/08B4 . . . [N: Neutron beams only]

B01J19/08B6 . . . [N: Electron beams only]

B01J19/08D . . [N: employing electric or magnetic energy]

B01J19/08D2 . . . [N: giving rise to electric discharges (for heating purposes H05B7/00; for the production of ozone C01B13/11, H01T19/00)]

B01J19/10 . . employing sonic or ultrasonic vibrations (for auxiliary pretreatment of gases or vapours to be cleaned B01D51/08; for cleaning B08B3/12; [N: for degasification of liquids B01D19/00V; for mixing purposes B01F11/02]) [C9807]

B01J19/12 . . employing electromagnetic waves

B01J19/12B . . . [N: Coherent waves, e.g. laser beams (lasers per se H01S3/00)]

B01J19/12D . . . [N: Incoherent waves (gamma-radiation B01J19/08B2)] [C9901]

B01J19/12D2 . . . . [N: Ultra-violet light]

B01J19/12D2B . . . . . [N: generated by microwave irradiation] [N9907]

B01J19/12D4 . . . . [N: X-rays]

B01J19/12D6 . . . . [N: Microwaves]

B01J19/12D8 . . . . [N: Sunlight; Visible light] [N9901]

B01J19/12D10 . . . . [N: Infra-red light] [N9901]

B01J19/12D12 . . . . [N: Radiofrequency] [N9907]

B01J19/14 . Production of inert gas mixtures; Use of inert gases in general (apparatus for generating gases B01J7/00; separation of gases or vapours B01D53/00 [N: application in storage tanks B65D90/44])

B01J19/16 . Preventing evaporation or oxidation of non-metallic liquids by applying a floating layer, e.g. of micro-balloons [N: (in storage tanks B65D90/42)]

B01J19/18 . Stationary reactors having moving elements inside (B01J19/08, B01J19/26 take precedence)

B01J19/18B . . [N: resulting in a turbulent flow of the reactants, such as in centrifugal-type reactors, or having a high Reynolds-number]

B01J19/18C . . [N: Tubular reactors] [N0302]

B01J19/18C2 . . . [N: in series] [N0302]

B01J19/18C4 . . . [N: in parallel] [N0302]

B01J19/18C6 . . . [N: spirally, concentrically or zigzag wound] [N0302]

B01J19/18C8 . . . [N: Loop-type reactors] [N0302]

B01J19/18C10 . . . [N: Concentric tube] [N0302]
B01J19/18D . . [N: of the pulsating type]
B01J19/18E . . [N: placed in parallel] [N0103]
B01J19/18F . . [N: placed in series]
B01J19/18J . . [N: resulting in a loop-type movement]
B01J19/18J2 . . . [N:internally, i.e.the mixture circulating inside the vessel such that the upwards stream is separated physically from the downwards stream(s)]
B01J19/18J4 . . . [N: externally, i.e. the mixture leaving the vessel and subsequently re-entering it]
B01J19/18M . . [N: forming a thin film]
B01J19/18P . . [N: Membrane reactors (membranes B01D71/00; catalytic membranes B01J35/06B)] [N9901]
B01J19/20 . . in the form of helices, e.g. screw reactors (thin-film reactors B01J10/02)
B01J19/22 . . in the form of endless belts

B01J19/24 . Stationary reactors without moving elements inside (B01J19/08, B01J19/26 take precedence; with stationary particles B01J8/02)
B01J19/24B . . [N: provoking a turbulent flow of the reactants, such as in cyclones, or having a high Reynolds-number]
B01J19/24C . . [N: of the pulsating type] [N1110]
B01J19/24D . . [N: Tubular reactors]
B01J19/24D2 . . . [N: in series]
B01J19/24D4 . . . [N: in parallel]
B01J19/24D6 . . . [N: spirally, concentrically or zigzag wound]
B01J19/24D8 . . . [N: Loop-type reactors]
B01J19/24D10 . . . [N: Concentric tubes] [N0302]
B01J19/24E . . [N: placed in parallel] [N0103]
B01J19/24F . . [N: placed in series]
B01J19/24J . . [N: provoking a loop type movement of the reactants (tubular loop-type reactors B01J19/24D8; loop reactors having moving elements inside B01J19/18J)] [N9901]
B01J19/24J2 . . . [N: internally, i.e. the mixture circulating inside the vessel such that the upward stream is separated physically from the downward stream(s)] [N9901]
B01J19/24J4 . . . [N: externally, i.e. the mixture leaving the vessel and subsequently re-entering it] [N9901]
B01J19/24M . . [N: Suited for forming thin films] [N0002]
B01J19/24P . . [N: Membrane reactors] [N9901]
B01J19/24R . . [N: Reactors comprising multiple separated flow channels] [N0002]
B01J19/24R2 . . . [N: Monolithic reactors] [N0002]
B01J19/24R4 . . . [N: Plate-type reactors] [N0002]
B01J19/24R6 . . . [N: Net-type reactors] [N0302]

B01J19/26 . Nozzle-type reactors, i.e. the distribution of the initial reactants within the reactor is effected by their introduction or injection through nozzles

B01J19/28 . Moving reactors, e.g. rotary drums (B01J19/08 takes precedence; centrifuges B04B; rotary drum furnaces [N: B01J6/00C2], F27B7/00) [C9807]

B01J19/28B . . [N: Shaking or vibrating reactors; reactions under the influence of low-frequency vibrations or pulsations (for sonic and ultrasonic vibrations B01J19/10)]

B01J19/30 . Loose or shaped packing elements, e.g. Raschig rings or Berl saddles, for pouring into the apparatus for mass or heat transfer

B01J19/30B . . [N: Supporting elements therefor, e.g. grids, perforated plates]

B01J19/32 . 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

B01J19/32B . . [N: Attachment devices therefor, e.g. hooks, consoles, brackets]

Guide heading: **Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Catalysts**

Notes

1. In groups B01J20/00 to B01J31/00, 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. In groups B01J21/00 to B01J38/00, the following term is used with the meaning indicated:

   - "catalyst" covers also a carrier forming part of the catalyst

3. Attention is drawn to the definitions of groups of chemical elements following the title of section C

4. In group B01J20/00 and in each set of groups B01J21/00 to B01J31/00 and B01J32/00 to B01J38/00, in the absence of an indication to the contrary, classification is made in the last appropriate place

5. Classification of the:

   - carriers;
   - forms or physical properties;
   - preparation or activation;
   - regeneration or reactivation of catalysts according to more than one of main groups B01J21/00 to B01J31/00 is made in the following general groups:
     . B01J32/00 for such carriers;
     . B01J35/00 for such forms or physical properties;
     . B01J37/00 for such preparation or activation;
     . B01J38/00 for such regeneration or reactivation

6. 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 B01J20/00 or B01J35/00

B01J20/00 **Solid sorbent compositions or filter aid compositions; Sorbents for chromatography; Processes for preparing, regenerating or reactivating thereof** (use of sorbent compositions in liquid separation B01D15/00, use of filter aid compositions B01D37/02; use of sorbent compositions in gas separation B01D53/02, B01D53/14) [C0409]

B01J20/02 . comprising inorganic material

B01J20/02B . . [N: comprising compounds of metals not provided for in B01J20/04 (oxides or hydroxides thereof B01J20/06)] [N1208]

[N: **Note**
Compounds classified in group B01J20/02B and subgroups are also classified in B01J20/02B50 according to the type of anion [N1208]
]

B01J20/02B2 . . . [N: Compounds of Sc, Y or Lanthanides] [N1208]

B01J20/02B4 . . . [N: Compounds of Ti, Zr, Hf] [N1208]

B01J20/02B6 . . . [N: Compounds of V, Nb, Ta] [N1208]

B01J20/02B8 . . . [N: Compounds of Cr, Mo, W] [N1208]

B01J20/02B10 . . . [N: Compounds of Mn, Re] [N1208]

B01J20/02B12 . . . [N: Compounds of Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt] [N1208]

B01J20/02B12B . . . . [N: Compounds of Fe] [N1208]

B01J20/02B14 . . . [N: Compounds of Cu, Ag, Au] [N1208]

B01J20/02B14B . . . . [N: Compounds of Cu] [N1208]

B01J20/02B16 . . . [N: Compounds of Zn, Cd, Hg] [N1208]

B01J20/02B16B . . . . [N: Compounds of Zn] [N1208]

B01J20/02B18 . . . [N: Compounds of B, Al, Ga, In, Tl (B01J20/08 takes precedence)] [N1208]

B01J20/02B20 . . . [N: Compounds of Si, Ge, Sn, Pb (B01J20/10 takes precedence)] [N1208]

B01J20/02B20B . . . . [N: Compounds of Pb] [N1208]

B01J20/02B21 . . . [N: Compounds of N, P, As, Sb, Bi] [N1208]

B01J20/02B24 . . . [N: Compounds of O, S, Se, Te] [N1208]

B01J20/02B24B . . . . [N: Compounds of S] [N1208]

B01J20/02B26 . . . [N: Compounds of F, Cl, Br, I] [N1208]

B01J20/02B50 . . . [N: characterised by the type of anion] [N1208]

B01J20/02B50D . . . . [N: Carbonates of compounds other than those provided for in B01J20/04D] [N1208]

B01J20/02B50F . . . . [N: Sulfates of compounds other than those provided for in B01J20/04F] [N1208]

B01J20/02B50G . . . . [N: Sulfides of compounds other than those provided for in B01J20/04F] [N1208]

B01J20/02B50H . . . . [N: Halides of compounds other than those provided for in B01J20/04H] [N1208]

B01J20/02B50K . . . . [N: Phosphates of compounds other than those provided for in B01J20/04K] [N1208]

B01J20/02B50M . . . . [N: Nitrates of compounds other than those provided for in B01J20/04] [N1208]

B01J20/04 . . comprising compounds of alkali metals, alkaline earth metals or magnesium

[N: **WARNING**[N1105]
Groups B01J20/04B to B01J20/04K are not complete, pending a reorganisation. See also B01J20/04
]

B01J20/04B . . . [N: Oxides or hydroxides] [N1105]

B01J20/04D . . . [N: Carbonates or bicarbonates, e.g. limestone, dolomite, aragonite] [N1105]

B01J20/04F . . . [N: containing sulfur, e.g. sulfates, thiosulfates, gypsum] [N1105]

B01J20/04H . . . [N: containing halogens, e.g. halides] [N1105]

B01J20/04K . . . [N: containing phosphorus, e.g. phosphates, apatites, hydroxyapatites] [N1106]

B01J20/06 . . comprising oxides or hydroxides of metals not provided for in group 20/04

B01J20/08 . . . comprising aluminium oxide or hydroxide; comprising bauxite

B01J20/10 . . comprising silica or silicate

B01J20/10B . . . [N: comprising silica]

B01J20/10B2 . . . . [N: Perlite] [N1208]

B01J20/12 . . . Naturally occurring clays or bleaching earth

B01J20/14 . . . Diatomaceous earth

B01J20/16 . . . Alumino-silicates (B01J20/12 takes precedence)

B01J20/16B . . . . [N: Natural alumino-silicates, e.g. zeolites] [N1208]

B01J20/18 . . . . Synthetic zeolitic molecular sieves

B01J20/18B . . . . . [N: Physical conditioning without chemical treatment, e.g. drying, granulating, coating, irradiation]

B01J20/18D . . . . . [N: Chemical treatments in view of modifying the properties of the sieve, e.g. increasing the stability or the activity, also decreasing the activity]

B01J20/20 . . comprising free carbon; comprising carbon obtained by carbonising processes (active carbon C01B31/08)

B01J20/20D . . . [N: Carbon nanostructures, e.g. nanotubes, nanohorns, nanocones, nanoballs (carbon nanotubes per se C01B31/02B)] [N1208]

B01J20/22 . comprising organic material

[N: **WARNING**
[N1111]Groups B01J20/22D and B01J20/22D2 are not complete, pending a reorganisation. See also B01J20/22
]

B01J20/22D . . [N: containing metals, e.g. organo-metallic compounds, coordination complexes] [N1111]

B01J20/22D2 . . . [N: Coordination polymers, e.g. metal-organic frameworks (MOF), zeolitic imidazolate frameworks (ZIF) (preparation of metal complexes containing carboxylic acid moieties C07C51/41F; MOF's per se C07F)] [N1111]

B01J20/24 . . Naturally occurring macromolecular compounds, e.g. humic acids or their derivatives

B01J20/26 . . Synthetic macromolecular compounds

[N: **WARNING**
[N1111] Groups B01J20/26B to B01J20/26N are not complete, pending a reorganisation. See also this group
]

B01J20/26B . . . [N: 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)] [N1111]

B01J20/26E . . . [N: 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)] [N1111]

B01J20/26H . . . [N: derived from different types of monomers, e.g. linear or branched copolymers, block copolymers, graft copolymers] [N1111]

B01J20/26K . . . [N: modified or post-treated polymers (polymer carriers or substrates subjected to further impregnating or coating B01J20/32B8D)] [N1111]

B01J20/26K4 . . . . [N: Cross-linked polymers] [N1111]

B01J20/26N . . . [N: Polymers created by use of a template, e.g. molecularly imprinted polymers] [N1111]

B01J20/28 . characterised by their form or physical properties

[N: **WARNING**
Groups B01J20/281 to B01J20/29 might be incomplete. A number of documents presently classified in G01N30/48 and G01N30/48A1 still need reclassification to one or more of these groups
]

B01J20/28B . . [N: characterised by their physical properties] [N1009]

B01J20/28B4 . . . [N: Sorbent size or size distribution, e.g. particle size] [N1009] [C1009]

B01J20/28B4D . . . . [N: with size in the range 1-100 nanometers, e.g. nano-sized particles, nanofibers, nanotubes, nanowires or the like (carbon nanostructures B01J20/20D)] [N1009] [C1208]

B01J20/28B8 . . . [N: Magnetic properties] [N1009]

B01J20/28B12 . . . [N: Other properties, e.g. density, crush strength] [N1009]

B01J20/28D . . [N: characterised by their form] [N1009]

B01J20/28D4 . . . [N: Particle form] [N1009]

B01J20/28D4B . . . . [N: Spherical, ellipsoidal or cylindrical] [N1009]

B01J20/28D4D . . . . [N: Hollow particles, e.g. hollow spheres, micro-spheres or cenospheres] [N1009]

B01J20/28D8 . . . [N: Fibres or filaments (fibres or filaments in the form of membranes B01J20/28D24C; B01J20/28B4D takes precedence)] [N1009] [C1208]

B01J20/28D12 . . . [N: Particles within, immobilised, dispersed, entrapped in or on a matrix, e.g. a resin] [N1009]

B01J20/28D16 . . . [N: Particles immobilised within fibres or filaments] [N1009]

B01J20/28D20 . . . [N: Sorbents comprising a binder, e.g. for forming aggregated, agglomerated or granulated products] [N1009]

B01J20/28D24 . . . [N: Membrane, sheet, cloth, pad, lamellar or mat] [N1009]

B01J20/28D24A . . . . [N: with more than one layer, e.g. laminates, separated sheets] [N1208]

B01J20/28D24C . . . . [N: Membranes or mats made from fibers or filaments] [N1208]

B01J20/28D24G . . . . [N: Sheets with a specific shape, e.g. corrugated, folded, pleated, helical] [N1208]

B01J20/28D28 . . . [N: Shaped bodies; Monolithic structures] [N1009]

B01J20/28D28B . . . . [N: Honeycomb or cellular structures; Solid foams or sponges] [N1009]

B01J20/28D32 . . . [N: Gels] [N1009]

B01J20/28D36 . . . [N: Sorbents inside a permeable or porous casing e.g. inside a container, bag or membrane] [N1009]

B01J20/28D40 . . . [N: Several layers of identical or different sorbents stacked in a housing, e.g. in a column] [N1009]

B01J20/28F . . [N: characterised by their surface properties or porosity] [N1009]

B01J20/28F4 . . . [N: Surface area, e.g. B.E.T specific surface area] [N1009]

B01J20/28F4B . . . . [N: being less than 100 m2/g] [N1009]
B01J20/28F4D . . . . [N: being in the range 100-500 m2/g] [N1009]
B01J20/28F4F . . . . [N: being in the range 500-1000 m2/g] [N1009]
B01J20/28F4H . . . . [N: being more than 1000 m2/g] [N1009]
B01J20/28F8 . . . [N: Pore volume, e.g. total pore volume, mesopore volume, micropore volume] [N1009]
B01J20/28F8B . . . . [N: being less than 0.5 ml/g] [N1009]
B01J20/28F8D . . . . [N: being in the range 0.5-1.0 ml/g] [N1009]
B01J20/28F8F . . . . [N: being more than 1.0 ml/g] [N1009]
B01J20/28F12 . . . [N: Pore diameter] [N1009]
B01J20/28F12B . . . . [N: being less than 2 nm, i.e. micropores or nanopores] [N1009]
B01J20/28F12D . . . . [N: being in the range 2-50 nm, i.e. mesopores] [N1009]
B01J20/28F12F . . . . [N: being more than 50 nm, i.e. macropores] [N1009]
B01J20/28F16 . . . [N: Pore-size distribution] [N1009]
B01J20/28F16B . . . . [N: Monomodal or narrow distribution, uniform pores] [N1009]
B01J20/28F16D . . . . [N: Bimodal, polymodal, different types of pores or different pore size distributions in different parts of the sorbent] [N1009]
B01J20/28F20 . . . [N: Shape or type of pores, voids, channels, ducts] [N1009]
B01J20/28F20B . . . . [N: being coated, filled or plugged with specific compounds] [N1009]

B01J20/281 . Sorbents specially adapted for preparative, analytical or investigative chromatography [N0409]

[N: **Note** [N1208]
In groups B01J20/281 to B01J20/292 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 L01J220/80 to L01J220/86
]

B01J20/282 . . Porous sorbents (ion exchange B01J39/00 to B01J41/00) [N0409]
B01J20/283 . . . based on silica [N0409]
B01J20/284 . . . based on alumina [N0409]
B01J20/285 . . . based on polymers [N0409]
B01J20/286 . . Phases chemically bonded to a substrate, e.g. to silica or to polymers [N0409]
B01J20/287 . . . Non-polar phases; Reversed phases [N0409]
B01J20/288 . . . Polar phases [N0409]
B01J20/289 . . . bonded via a spacer [N0409]
B01J20/29 . . Chiral phases [N0409]
B01J20/291 . . Gel sorbents [N0409]
B01J20/292 . . Liquid sorbents [N0409]

B01J20/30 . Processes for preparing, regenerating, or reactivating

[N: **WARNING** [N1205]
Groups B01J20/30B to B01J20/30R are not complete, pending a reorganisation. See also B01J20/30
]

B01J20/30B . . [N: Moulding, shaping or extruding] [N1204]

B01J20/30D . . [N: Kneading] [N1204]

B01J20/30F . . [N: Milling, crushing or grinding] [N1204]

B01J20/30G . . [N: Granulating, agglomerating or aggregating] [N1204]

B01J20/30H . . [N: Compressing] [N1204]

B01J20/30J . . [N: Use of binding agents; addition of materials ameliorating the mechanical properties of the produced sorbent] [N1204]

B01J20/30K . . [N: Addition of material, later completely removed, e.g. as result of heat treatment, leaching or washing, e.g. for forming pores] [N1204]

B01J20/30K2 . . . [N: Use of a templating or imprinting material (molecularly imprinted polymers B01J20/26N); filling pores of a substrate or matrix followed by the removal of the substrate or matrix] [N1204]

B01J20/30K4 . . . [N: Addition of pore forming agents, e.g. pore inducing or porogenic agents] [N1204]

B01J20/30M . . [N: Washing or leaching] [N1204]

B01J20/30P . . [N: Thermal treatment, e.g. calcining or pyrolizing] [N1204]

B01J20/30Q . . [N: Chemical treatments not covered by groups B01J20/30B-B01J20/30P] [N1204]

B01J20/30R . . [N: Packing of a container, e.g. packing a cartridge or column (of chromatography columns B01D15/20P)] [N1204]

B01J20/32 . . Impregnating or coating; [N: Solid sorbent compositions obtained from processes involving impregnating or coating] [C1012]

[N: **WARNING** [N1012]
Groups B01J20/32B to B01J20/32H12 are not complete, pending a reorganization. See also B01J20/32
]

B01J20/32B . . . [N: characterised by the carrier, support or substrate used for impregnation or coating] [N1012]

B01J20/32B4 . . . . [N: Inorganic carriers, supports or substrates] [N1012]

B01J20/32B8 . . . . [N: Organic carriers, supports or substrates] [N1012]

B01J20/32B8D . . . . . [N: Polymeric carriers, supports or substrates] [N1012]

B01J20/32B8D4 . . . . . [N: consisting of a polymer obtained by reactions involving only carbon to carbon unsaturated bonds] [N1012]

B01J20/32B8D8 . . . . . [N: consisting of a polymer obtained by reactions otherwise than involving only carbon to carbon unsaturated bonds] [N1012]

B01J20/32D . . . [N: characterised by the method for obtaining this coating or impregnating] [N1012]

B01J20/32D4 . . . . [N: Resulting in a chemical bond between the coating or impregnating layer and the carrier, support or substrate, e.g. a covalent bond] [N1012]

B01J20/32D4B . . . . . [N: involving a particular spacer or linking group, e.g. for attaching an active group] [N1012]

B01J20/32D4D . . . . . [N: the chemical bond being an ionic interaction] [N1012]

B01J20/32D12 . . . . [N: by means of an adhesive agent] [N1012]

B01J20/32D24 . . . . [N: involving a post-treatment of the coated or impregnated product] [N1012]

B01J20/32D24D . . . . . [N: by end-capping, i.e. with or after the introduction of functional or ligand groups] [N1012]

B01J20/32D24H . . . . . [N: for preventing leaching, leaking of attached functional or ligand groups] [N1012]

B01J20/32F . . . [N: characterised by the coating or impregnating layer] [N1012]

B01J20/32F4 . . . . [N: Inorganic material layers] [N1012]

B01J20/32F4D . . . . . [N: containing metal, other than zeolites, e.g. oxides, hydroxides, sulphides or salts] [N1012]

B01J20/32F4H . . . . . [N: containing any type of zeolite] [N1012]

B01J20/32F4L . . . . . [N: containing free carbon, e.g. activated carbon] [N1012]

B01J20/32F8 . . . . [N: Layers with a functional group, e.g. an affinity material, a ligand, a reactant or a complexing group] [N1012]

B01J20/32F8B . . . . . [N: Non-macromolecular compounds] [N1012]

B01J20/32F8B4 . . . . . [N: having a well defined chemical structure] [N1012]

B01J20/32F8B4F . . . . . {7 dots} [N: 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] [N1012]

B01J20/32F8B4F4 . . . . . {8 dots} [N: comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulphur] [N1012]

B01J20/32F8B4F8 . . . . . {8 dots} [N: comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures] [N1012]

B01J20/32F8B4F12 . . . . . {8 dots} [N: comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. heterocyclic or heteroaromatic structures] [N1012]

B01J20/32F8B4J . . . . . {7 dots} [N: 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] [N1012]

B01J20/32F8B4J4 . . . . . {8 dots} [N: comprising at least two different types of heteroatoms selected from nitrogen, oxygen or sulfur with at least one silicon atom] [N1012]

B01J20/32F8B4J8 . . . . . {8 dots} [N: comprising a cyclic structure not containing any of the heteroatoms nitrogen, oxygen or sulfur, e.g. aromatic structures] [N1012]

B01J20/32F8B4J12 . . . . . {8 dots} [N: comprising a cyclic structure containing at least one of the heteroatoms nitrogen, oxygen or sulfur, e.g. an heterocyclic or heteroaromatic structure] [N1012]

B01J20/32F8B8 . . . . . [N: with an organic functional group containing a metal, e.g. a metal affinity ligand] [N1012]

B01J20/32F8F . . . . . [N: Macromolecular compounds] [N1012]

B01J20/32F8F4 . . . . . [N: Polymers obtained by reactions involving only carbon to carbon unsaturated bonds] [N1012]

B01J20/32F8F8 . . . . . [N: Polymers obtained by reactions otherwise than involving only carbon to carbon unsaturated bonds] [N1012]

B01J20/32F8F8B . . . . . {7 dots} [N: Proteins, nucleic acids, polysaccharides, antibodies or antigens] [N1012]

B01J20/32F8F12 . . . . . [N: Copolymers] [N1012]

B01J20/32F8F16 . . . . . [N: Polymers being grafted on the carrier] [N1012]

B01J20/32F8F20 . . . . . [N: Polymers on the carrier being further modified] [N1012]

B01J20/32F8F20B . . . . . {7 dots} [N: Crosslinked polymers] [N1012]

B01J20/32F8J . . . . . [N: 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] [N1012]

B01J20/32F12 . . . . [N: Layers in the form of a liquid] [N1012]

B01J20/32F16 . . . . [N: Coatings involving more than one layer of same or different nature] [N1012]

B01J20/32H . . . [N: Characterised by the shape of the carrier, the coating or the obtained coated product] [N1012]

B01J20/32H4 . . . . [N: Coatings on a core, the core being particle or fiber shaped, e.g. encapsulated particles, coated fibers] [N1012]

B01J20/32H8 . . . . [N: Coatings made of particles, nanoparticles, fibers, nanofibers] [N1012]

B01J20/32H12 . . . . [N: Coatings in the shape of a sheet] [N1012]

B01J20/34 . . Regenerating or reactivating

B01J20/34B . . . [N: of aluminosilicate molecular sieves]

[N: **WARNING** [N1205]
Groups B01J20/34E to B01J20/34T are not complete, pending a reorganisation. See also B01J20/34
]

B01J20/34E . . . [N: of sorbents or filter aids comprising free carbon, e.g. activated carbon] [N1204]

B01J20/34H . . . [N: of sorbents or filter aids comprising organic materials] [N1204]

B01J20/34K . . . [N: of sorbents or filter aids other than those covered by B01J20/34B-B01J20/34H] [N1204]

B01J20/34N . . . [N: Regeneration or reactivation by electric current, ultrasound or irradiation, e.g. electromagnetic radiation such as X-rays, UV, light, microwaves] [N1204]

B01J20/34P . . . [N: using a particular desorbing compound or mixture (elution or regeneration of stationary phases in liquid chromatography B01D15/08)] [N1204]

B01J20/34P4 . . . . [N: in the gas phase] [N1204]

B01J20/34P4B . . . . . [N: with steam] [N1204]

B01J20/34P8 . . . . [N: in the liquid phase] [N1204]

B01J20/34S . . . [N: by thermal treatment not covered by groups B01J20/34N-B01J20/34P8, e.g. by heating or cooling] [N1204]

B01J20/34T . . . [N: by pressure treatment] [N1204]

B01J21/00 **Catalysts comprising the elements, oxides, or hydroxides of magnesium, boron, aluminium, carbon, silicon, titanium, zirconium, or hafnium**

B01J21/00S . [N: Spinels]

B01J21/02 . Boron or aluminium; Oxides or hydroxides thereof

B01J21/04 . . Alumina

B01J21/06 . Silicon, titanium, zirconium or hafnium; Oxides or hydroxides thereof

B01J21/06T . . [N: Titanium; Oxides or hydroxides thereof] [N1103]

B01J21/06W . . [N: Zirconium or hafnium; Oxides or hydroxides thereof] [N1103]

B01J21/08 . . Silica

B01J21/10 . Magnesium; Oxides or hydroxides thereof

B01J21/12 . Silica and alumina

B01J21/14 . Silica and magnesia

B01J21/16 . Clays or other mineral silicates

B01J21/18 . Carbon

B01J21/18C . . [N: Carbon nanotubes (carbon nanotubes per se C01B31/02B)] [N0611]

B01J21/20 . Regeneration or reactivation

B01J23/00 **Catalysts comprising metals or metal oxides or hydroxides, not provided for in group B01J21/00** (B01J21/16 takes precedence)

B01J23/00B . [N: Mixed oxides other than spinels, e.g. perovskite]

[N: **Note** [C1202]
In group B01J23/00B, elements constituting the exemplified mixed oxide are further indexed with L01J523/00 as base symbol using the relevant classification symbols of L01J523/00 to L01J523/84F, in numerical order without L01J523 and preceded by the sign "+", e.g. Moa Vb Tec Ox is classified as L01J523/00+/55+/64+/68
]

B01J23/00S . [N: Spinels]

B01J23/00Z . [N: Mixed salts]

B01J23/02 . of the alkali- or alkaline earth metals or beryllium

B01J23/04 . . Alkali metals

B01J23/06 . of zinc, cadmium or mercury

B01J23/08 . of gallium, indium or thallium

B01J23/10 . of rare earths

B01J23/12 . of actinides

B01J23/14 . of germanium, tin or lead

B01J23/16 . of arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

B01J23/18 . . Arsenic, antimony or bismuth

B01J23/20 . . Vanadium, niobium or tantalum

B01J23/22 . . . Vanadium

B01J23/24 . . Chromium, molybdenum or tungsten

B01J23/26 . . . Chromium

B01J23/28 . . . Molybdenum

B01J23/30 . . . Tungsten

B01J23/31 . . . combined with bismuth
B01J23/32 . . Manganese, technetium or rhenium
B01J23/34 . . . Manganese
B01J23/36 . . . Rhenium

B01J23/38 . of noble metals
B01J23/40 . . of the platinum group metals
B01J23/42 . . . Platinum
B01J23/44 . . . Palladium
B01J23/46 . . . Ruthenium, rhodium, osmium or iridium
B01J23/46B . . . . [N: Ruthenium]
B01J23/46D . . . . [N: Rhodium]
B01J23/46E . . . . [N: Osmium]
B01J23/46F . . . . [N: Iridium]
B01J23/48 . . Silver or gold
B01J23/50 . . . Silver
B01J23/52 . . . Gold
B01J23/54 . . combined with metals, oxides or hydroxides provided for in groups B01J23/02 to B01J23/36
B01J23/56 . . . Platinum group metals
B01J23/58 . . . . with alkali- or alkaline earth metals
B01J23/60 . . . . with zinc, cadmium or mercury
B01J23/62 . . . . with gallium, indium, thallium, germanium, tin or lead
B01J23/62H . . . . . [N: with germanium, tin or lead]
B01J23/62H2 . . . . . [N: with germanium]
B01J23/62H4 . . . . . [N: with tin]
B01J23/62H6 . . . . . [N: with lead]
B01J23/63 . . . . with rare earths or actinides [N9511]
B01J23/64 . . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
B01J23/644 . . . . . Arsenic, antimony or bismuth [N9511]
B01J23/644B . . . . . [N: Arsenic] [N9511]
B01J23/644D . . . . . [N: Antimony] [N9511]
B01J23/644H . . . . . [N: Bismuth] [N9511]
B01J23/648 . . . . . Vanadium, niobium or tantalum [N: or polonium] [N9511]
B01J23/648B . . . . . [N: Vanadium] [N9511]
B01J23/648D . . . . . [N: Niobium] [N9511]
B01J23/648H . . . . . [N: Tantalum] [N9511]
B01J23/648K . . . . . [N: Polonium] [N9511]
B01J23/652 . . . . . Chromium, molybdenum or tungsten [N9511]
B01J23/652B . . . . . [N: Chromium] [N9511]
B01J23/652D . . . . . [N: Molybdenum] [N9511]
B01J23/652H . . . . . [N: Tungsten] [N9511]

B01J23/656 . . . . . Manganese, technetium or rhenium [N9511]
B01J23/656B . . . . . [N: Manganese] [N9511]
B01J23/656D . . . . . [N: Technetium] [N9511]
B01J23/656H . . . . . [N: Rhenium] [N9511]
B01J23/66 . . . Silver or gold
B01J23/68 . . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
B01J23/68K . . . . . [N: with arsenic, antimony or bismuth]
B01J23/68L . . . . . [N: with vanadium, niobium, tantalum or polonium]
B01J23/68M . . . . . [N: with chromium, molybdenum or tungsten]
B01J23/68M2 . . . . . [N: with chromium]
B01J23/68M4 . . . . . [N: with molybdenum]
B01J23/68M6 . . . . . [N: with tungsten]
B01J23/68R . . . . . [N: with manganese, technetium or rhenium]

B01J23/70 . of the iron group metals or copper
B01J23/72 . . Copper
B01J23/74 . . Iron group metals
B01J23/745 . . . Iron [N9511]
B01J23/75 . . . Cobalt [N9511]
B01J23/755 . . . Nickel [N9511]
B01J23/76 . . combined with metals, oxides or hydroxides provided for in groups B01J23/02 to B01J23/36
B01J23/78 . . . with alkali- or alkaline earth metals
B01J23/80 . . . with zinc, cadmium or mercury
B01J23/825 . . . with gallium, indium or thallium [N0806]
B01J23/83 . . . with rare earths or actinides [N9511]
B01J23/835 . . . with germanium, tin or lead [N9511]
B01J23/84 . . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
B01J23/843 . . . . Arsenic, antimony or bismuth [N9511]
B01J23/843B . . . . . [N: Arsenic] [N9511]
B01J23/843D . . . . . [N: Antimony] [N9511]
B01J23/843H . . . . . [N: Bismuth] [N9511]
B01J23/847 . . . . Vanadium, niobium or tantalum [N: or polonium] [N9511]
B01J23/847B . . . . . [N: Vanadium] [N9511]
B01J23/847D . . . . . [N: Niobium] [N9511]
B01J23/847H . . . . . [N: Tantalum] [N9511]
B01J23/847K . . . . . [N: Polonium] [N9511]
B01J23/85 . . . . Chromium, molybdenum or tungsten
B01J23/86 . . . . . Chromium
B01J23/86B . . . . . [N: Iron and chromium]
B01J23/86C . . . . . [N: Cobalt and chromium]

B01J23/86D . . . . . [N: Nickel and chromium]
B01J23/86F . . . . . [N: copper and chromium]
B01J23/88 . . . . . Molybdenum
B01J23/881 . . . . . and iron [N9511]
B01J23/882 . . . . . and cobalt [N9511]
B01J23/883 . . . . . and nickel [N9511]
B01J23/885 . . . . . and copper [N9511]
B01J23/887 . . . . . containing in addition other metals, oxides or hydroxides provided for in groups B01J23/02 to B01J23/36 [N9511]
B01J23/887B . . . . . {7 dots} [N: Rare earth metals or actinides] [N9511]
B01J23/887C . . . . . {7 dots} [N: Alkali or alkaline earth metals] [N9511]
B01J23/887D . . . . . {7 dots} [N: Zinc, cadmium or mercury] [N9511]
B01J23/887F . . . . . {7 dots} [N: Gallium, indium or thallium] [N9511]
B01J23/887G . . . . . {7 dots} [N: Germanium, tin or lead] [N9511]
B01J23/887H . . . . . {7 dots} [N: Arsenic, antimony or bismuth] [N9511]
B01J23/887K . . . . . {7 dots} [N: Vanadium, tantalum, niobium or polonium] [N9511]
B01J23/887M . . . . . {7 dots} [N: Chromium] [N9511]
B01J23/888 . . . . . Tungsten [N9511]
B01J23/888M . . . . . [N: containing also molybdenum] [N9511]
B01J23/889 . . . . Manganese, technetium or rhenium [N9511]
B01J23/889B . . . . . [N: Manganese] [N9511]
B01J23/889D . . . . . [N: Technetium] [N9511]
B01J23/889H . . . . . [N: Rhenium] [N9511]
B01J23/889M . . . . . [N: containing also molybdenum] [N0806]
B01J23/89 . . combined with noble metals
B01J23/89B . . . [N: Iron and noble metals]
B01J23/89C . . . [N: Cobalt and noble metals]
B01J23/89D . . . [N: Nickel and noble metals]
B01J23/89F . . . [N: Copper and noble metals]
B01J23/89G . . . [N: also combined with metals, or metal oxides or hydroxides provided for in groups B01J23/02 to B01J23/36]
B01J23/89G2 . . . . [N: with rare earths or actinides]
B01J23/89G4 . . . . [N: with alkali or alkaline earth metals]
B01J23/89G6 . . . . [N: with zinc, cadmium or mercury]
B01J23/89G8 . . . . [N: with gallium, indium or thallium]
B01J23/89G10 . . . . [N: with germanium, tin or lead]
B01J23/89G12 . . . . [N: with arsenic, antimony or bismuth]
B01J23/89G14 . . . . [N: with vanadium, tantalum, niobium or polonium]
B01J23/89G16 . . . . [N: with manganese, technetium or rhenium]
B01J23/89G18 . . . . [N: with chromium, molybdenum or tungsten]

B01J23/90 . Regeneration or reactivation
B01J23/92 . . of catalysts comprising metals, oxides or hydroxides provided for in groups

3/02 to B01J23/36

B01J23/94 . . of catalysts comprising metals, oxides or hydroxides of the iron group metals or copper

B01J23/96 . . of catalysts comprising metals, oxides or hydroxides of the noble metals

B01J25/00 Catalysts of the Raney type

B01J25/02 . Raney nickel

B01J25/04 . Regeneration or reactivation

B01J27/00 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

B01J27/02 . Sulfur, selenium or tellurium; Compounds thereof
B01J27/04 . . Sulfides
B01J27/043 . . . with iron group metals or platinum group metals
B01J27/045 . . . . Platinum group metals
B01J27/047 . . . with chromium, molybdenum, tungsten or polonium
B01J27/049 . . . . with iron group metals or platinum group metals
B01J27/051 . . . . Molybdenum
B01J27/051A . . . . . [N: with iron group metals or platinum group metals]
B01J27/053 . . Sulfates
B01J27/055 . . . with alkali metals, copper, gold or silver
B01J27/057 . . Selenium or tellurium; Compounds thereof
B01J27/057S . . . [N: Selenium; Compounds thereof]
B01J27/057T . . . [N: Tellurium; Compounds thereof]

B01J27/06 . Halogens; Compounds thereof
B01J27/08 . . Halides
B01J27/10 . . . Chlorides
B01J27/12 . . . Fluorides
B01J27/122 . . . of copper
B01J27/125 . . with scandium, yttrium, aluminium, gallium, indium or thallium
B01J27/128 . . with iron group metals or platinum group metals
B01J27/13 . . . Platinum group metals
B01J27/132 . . with chromium, molybdenum, tungsten or polonium
B01J27/135 . . with titanium, zirconium, hafnium, germanium, tin or lead
B01J27/138 . . with alkaline earth metals, magnesium, beryllium, zinc, cadmium or mercury

B01J27/14 . Phosphorus; Compounds thereof

B01J27/16 . . containing oxygen [N: 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]
B01J27/18 . . . with metals [N: other than Al or Zr]
B01J27/18D . . . . [N: Salts or mixtures of anhydrides with compounds of other metals than V, Nb, Ta, Cr, Mo, W, Mn, Tc, Re, e.g. phosphates, thiophosphates]
B01J27/18D2 . . . . . [N: with rare earths or actinides]
B01J27/18D4 . . . . . [N: with alkaline or alkaline earth metals]
B01J27/18D6 . . . . . [N: with zinc, cadmium or mercury]
B01J27/18D8 . . . . . [N: with gallium, indium or thallium]
B01J27/18D10 . . . . . [N: with germanium, tin or lead]
B01J27/18D12 . . . . . [N: with arsenic, antimony or bismuth]
B01J27/18D20 . . . . . [N: with copper, silver or gold]
B01J27/182 . . with silicon
B01J27/185 . . with iron group metals or platinum group metals
B01J27/185A . . . [N: with iron, cobalt or nickel]
B01J27/185B . . . [N: with platinum group metals]
B01J27/186 . . with arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
B01J27/187 . . . with manganese, technetium or rhenium
B01J27/188 . . . with chromium, molybdenum, tungsten or polonium
B01J27/19 . . . . Molybdenum
B01J27/192 . . . . . with bismuth
B01J27/195 . . . with vanadium, niobium or tantalum
B01J27/198 . . . . Vanadium
B01J27/199 . . . . . with chromium, molybdenum, tungsten or polonium

B01J27/20 . Carbon compounds
B01J27/22 . . Carbides
B01J27/224 . . . Silicon carbide
B01J27/228 . . . . with phosphorus, arsenic, antimony or bismuth
B01J27/232 . . Carbonates
B01J27/236 . . . Hydroxy carbonates

B01J27/24 . Nitrogen compounds
B01J27/25 . . Nitrates
B01J27/26 . . Cyanides

B01J27/28 . Regeneration or reactivation
B01J27/28P . . [N: of catalysts comprising compounds of phosphorus]
B01J27/30 . . of catalysts comprising compounds of sulfur, selenium or tellurium
B01J27/32 . . of catalysts comprising compounds of halogens

B01J29/00 **Catalysts comprising molecular sieves** [N: (molecular sieves per se C01B)] [C0306]

Note
[C0306]In this group, the following term is used with the meaning indicated:

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- "zeolites" means:
  (i)  crystalline aluminosilicates with base-exchange
       and molecular sieve properties, having three dimensional,
       microporous lattice framework structure of tetrahedral
       oxide units;
  (ii) compounds isomorphous to those of the former category,
       wherein the aluminium or silicon atoms in the framework
       are partly or wholly replaced by atoms of other elements,
e.g. by
       gallium, germanium, phosphorus or boron.
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[N: **Notes**
[C1201]

1. If metals are introduced into the framework of the molecular sieve already in the synthesis stage, B01J29/86 to B01J29/89 take precedence.

2. Mixtures of molecular sieves are classified in B01J29/00M or B01J29/80 and receive indexing codes chosen from groups L01J29/03 to L01J29/89 to identify the individual constituents of these mixtures

]

B01J29/00M	.	[N: Mixtures of molecular sieves comprising at least one molecular sieve which is not an aluminosilicate zeolite, e.g. from groups B01J29/03 to B01J29/04P or B01J29/82 to B01J29/89] [N0306] [C1201]
B01J29/03	.	not having base-exchange properties [N: (B01J29/00M takes precedence)] [N0306]
B01J29/03A	. .	[N: Mesoporous materials not having base exchange properties, e.g. Si-MCM-41] [N0306]
B01J29/03A2	. . .	[N: containing iron group metals, noble metals or copper] [N1103]
B01J29/03A2B	. . . .	[N: Noble metals] [N1103]
B01J29/03A2D	. . . .	[N: Iron group metals or copper] [N1103]
B01J29/03A4	. . .	[N: containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium] [N1103]
B01J29/035	. .	[N: Microporous crystalline materials not having base exchange properties, such as] silica polymorphs, e.g. silicalites [N0306]
B01J29/035B	. . .	[N: containing iron group metals, noble metals or copper] [N1103]
B01J29/035B2	. . . .	[N: Noble metals] [N1103]
B01J29/035B4	. . . .	[N: Iron group metals or copper] [N1103]
B01J29/035D	. . .	[N: containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium] [N1103]
B01J29/04	.	having base-exchange properties, e.g. crystalline zeolites [N: (B01J29/00M takes precedence)] [C0306]
B01J29/04A	. .	[N: Mesoporous materials having base exchange properties, e.g. Si/Al-MCM-41] [N0306]

B01J29/04A2 . . . [N: containing iron group metals, noble metals or copper] [N1103]
B01J29/04A2B . . . . [N: Noble metals] [N1103]
B01J29/04A2D . . . . [N: Iron group metals or copper] [N1103]
B01J29/04A4 . . . [N: containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium] [N1103]
B01J29/04C . . [N: Chromiasilicates; Aluminochromosilicates (B01J29/00M takes precedence)] [N1201]
B01J29/04G . . [N: Germanosilicates; Aluminogermanosilicates (B01J29/00M takes precedence)] [N1103]
B01J29/04J . . [N: Zincosilicates, Aluminozincosilicates (B01J29/00M takes precedence)] [N1103]
B01J29/04P . . [N: Pillared clays] [N0306]
B01J29/06 . . Crystalline aluminosilicate zeolites; Isomorphous compounds thereof [C0306]
B01J29/06D . . . [N: containing metallic elements added to the zeolite]
B01J29/064 . . . containing iron group metals, noble metals or copper [N0401]
B01J29/068 . . . . Noble metals [N0401]
B01J29/072 . . . . Iron group metals or copper [N0401]
B01J29/076 . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0401]
B01J29/08 . . . of the faujasite type, e.g. type X or Y [C0306]
B01J29/08W . . . . [N: X-type faujasite]
B01J29/08Y . . . . [N: Y-type faujasite]
B01J29/08Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]
B01J29/08Z1 . . . . . [N: X-type faujasite] [N0306]
B01J29/08Z2 . . . . . [N: Y-type faujasite] [N0306]
B01J29/10 . . . . containing iron group metals, noble metals or copper
B01J29/10W . . . . . [N: X-type faujasite]
B01J29/10Y . . . . . [N: Y-type faujasite]
B01J29/12 . . . . . Noble metals
B01J29/12W . . . . . [N: X-type faujasite]
B01J29/12Y . . . . . [N: Y-type faujasite]
B01J29/14 . . . . . Iron group metals or copper
B01J29/14W . . . . . [N: X-type faujasite]
B01J29/14Y . . . . . [N: Y-type faujasite]
B01J29/16 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium
B01J29/16W . . . . . [N: X-type faujasite]
B01J29/16Y . . . . . [N: Y-type faujasite]
B01J29/18 . . . of the mordenite type [C0306]
B01J29/18Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]
B01J29/20 . . . . containing iron group metals, noble metals or copper
B01J29/22 . . . . . Noble metals

B01J29/24 . . . . . Iron group metals or copper

B01J29/26 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium

B01J29/40 . . . of the pentasil type, e.g. types ZSM-5, ZSM-8 or ZSM-11, as exemplified by patent documents US3702886, GB1334243 and US3709979, respectively [N0306]

B01J29/40Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]

B01J29/42 . . . . containing iron group metals, noble metals or copper [N0306]

B01J29/44 . . . . . Noble metals [N0306]

B01J29/46 . . . . . Iron group metals or copper [N0306]

B01J29/48 . . . . containing arsenic, antimony, bismuth, vanadium, niobium tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0306]

B01J29/50 . . . of the erionite or offretite type, e.g. zeolite T, as exemplified by patent document US2950952 [N0306]

B01J29/50Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]

B01J29/52 . . . . containing iron group metals, noble metals or copper [N0306]

B01J29/54 . . . . . Noble metals [N0306]

B01J29/56 . . . . . Iron group metals or copper [N0306]

B01J29/58 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0306]

B01J29/60 . . . of the type L, as exemplified by patent document US3216789 [N0306]

B01J29/60Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]

B01J29/61 . . . . containing iron group metals, noble metals or copper [N0306]

B01J29/62 . . . . . Noble metals [N0306]

B01J29/63 . . . . . Iron group metals or copper [N0306]

B01J29/64 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0306]

B01J29/65 . . . of the ferrierite type, e.g. types ZSM-21, ZSM-35 or ZSM-38, as exemplified by patent documents US4046859, US4016245 and US4046859, respectively [N0306]

B01J29/65Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]

B01J29/66 . . . . containing iron group metals, noble metals or copper [N0306]

B01J29/67 . . . . . Noble metals [N0306]

B01J29/68 . . . . . Iron group metals or copper [N0306]

B01J29/69 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0306]

B01J29/70 . . . of types characterised by their specific stucture not provided for in groups B01J29/08 to B01J29/65 [N0306]

B01J29/70A . . . . [N: A-type] [N0306]

B01J29/70B . . . . [N: Zeolite Beta] [N0306]
B01J29/70C . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [C1103]
B01J29/70D . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/70E . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/70F . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/70G . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/70H . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/70K . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/70L . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/70T . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/70W . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/70Z . . . . [N: containing rare earth elements, titanium, zirconium, hafnium, zinc, cadmium, mercury, gallium, indium, thallium, tin or lead] [N0306]
B01J29/70Z2 . . . . . [N: A-type] [N0306]
B01J29/70Z4 . . . . . [N: Zeolite Beta] [N0306]
B01J29/70Z6 . . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [C1103]
B01J29/70Z8 . . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/70Z10 . . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/70Z12 . . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/70Z14 . . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/70Z16 . . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/70Z18 . . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/70Z20 . . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/70Z22 . . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/70Z24 . . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/72 . . . . containing iron group metals, noble metals or copper [N0306]
B01J29/72A . . . . . [N: A-type] [N0306]
B01J29/72B . . . . . [N: Zeolite Beta] [N0306]
B01J29/72C . . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [N1103]
B01J29/72D . . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/72E . . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/72F . . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/72G . . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/72H . . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/72K . . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/72L . . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/72T . . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/72W . . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/74 . . . . . Noble metals [N0306]
B01J29/74A . . . . . [N: A-type] [N0306]
B01J29/74B . . . . . [N: Zeolite Beta] [N0306]
B01J29/74C . . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [C1103]

B01J29/74D . . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/74E . . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/74F . . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/74G . . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/74H . . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/74K . . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/74L . . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/74T . . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/74W . . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/76 . . . . . Iron group metals or copper [N0306]
B01J29/76A . . . . . [N: A-type] [N0306]
B01J29/76B . . . . . [N: Zeolite Beta] [N0306]
B01J29/76C . . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [C1103]
B01J29/76D . . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/76E . . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/76F . . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/76G . . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/76H . . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/76K . . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/76L . . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/76T . . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/76W . . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/78 . . . . containing arsenic, antimony, bismuth, vanadium, niobium, tantalum, polonium, chromium, molybdenum, tungsten, manganese, technetium or rhenium [N0306]
B01J29/78A . . . . . [N: A-type] [N0306]
B01J29/78B . . . . . [N: Zeolite Beta] [N0306]
B01J29/78C . . . . . [N: MAZ-type, e.g.Mazzite, Omega, ZSM-4 or LZ-202] [N0306] [C1103]
B01J29/78D . . . . . [N: CHA-type, e.g. Chabazite, LZ-218] [N1103]
B01J29/78E . . . . . [N: EMT-type, e.g. EMC-2, ECR-30, CSZ-1, ZSM-3 or ZSM-20] [N1103]
B01J29/78F . . . . . [N: EUO-type, e.g. EU-1, TPZ-3 or ZSM-50] [N1103]
B01J29/78G . . . . . [N: MFS-type, e.g. ZSM-57] [N1103]
B01J29/78H . . . . . [N: MRE-type, e.g. ZSM-48] [N1103]
B01J29/78K . . . . . [N: MTW-type, e.g. ZSM-12, NU-13, TPZ-12 or Theta-3] [N1103]
B01J29/78L . . . . . [N: MWW-type, e.g. MCM-22, ERB-1, ITQ-1, PSH-3 or SSZ-25] [N1103]
B01J29/78T . . . . . [N: TON-type, e.g. Theta-1, ISI-1, KZ-2, NU-10 or ZSM-22] [N1103]
B01J29/78W . . . . . [N: MTT-type, e.g. ZSM-23, KZ-1, ISI-4 or EU-13] [N1104]
B01J29/80 . . . Mixtures of different zeolites [N0306]

B01J29/82 . Phosphates [N: (B01J29/00M takes precedence)] [N0306]

B01J29/83 . . Aluminophosphates (APO compounds) [N0306]

B01J29/84 . . Aluminophosphates containing other elements, e.g. metals, boron [N0306]

B01J29/85 . . . Silicoaluminophosphates (SAPO compounds) [N0306]

B01J29/86 . Borosilicates; Aluminoborosilicates [N: (B01J29/00M takes precedence)] [N0306]

B01J29/87 . Gallosilicates; Aluminogallosilicates; Galloborosilicates [N: (B01J29/00M takes precedence)] [N0306]

B01J29/88 . Ferrosilicates; Ferroaluminosilicates [N: (B01J29/00M takes precedence)] [N0306]

B01J29/89 . Silicates, aluminosilicates or borosilicates of titanium, zirconium or hafnium [N: (B01J29/00M takes precedence)] [N0306]

B01J29/90 . Regeneration or reactivation [N0306]

B01J31/00 **Catalysts comprising hydrides, coordination complexes or organic compounds** (catalyst compositions used only in polymerisation reactions C08; [N: (catalytic antibodies C12N9/00B)]) [C0508]

[N: **Notes**
[C1203]
1. Group B01J31/00E takes precedence over groups B01J31/02 to B01J31/24 (catalytic antibodies C12N9/00B)
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 B01J27/20 to B01J27/26. -"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 B01J31/02 to B01J31/02E2B; unsaturated carbon fragments in combination with transition metals B01J31/22D. -"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) B01J31/12; oxoacid salts B01J31/04 to B01J31/10; other compounds comprising anionic organonitrogen, organooxygen and organosulfur fragments with a metal bonded to these heteroatoms B01J31/02 to B01J31/02E2B. -"Organometallic complexes" includes all coordination complexes comprising a M-C bond, e.g. metal carbonyls (complex cyanides such as M4[Fe(CN)6] B01J27/26).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 B01J31/16B to B01J31/18G 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 B01J31/26 to B01J31/38 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 B01J31/00, additional information for the catalysts is provided as follows:
(4-1) the specifically disclosed intended uses are indexed in L01J231/00;
(4-2) general aspects of the complexes of group B01J31/16 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 L01J531/00.
(4-3) conceptual articles, e.g. reviews, are separately indexed in L01J231/00C and L01J531/00C;
(4-4) additional information regarding the complexes or ligands classified in B01J31/16 to 31/24 and indexed in L01J531/00 is indexed in L01J540/00, e.g. non-coordinating substituents on the ligand periphery]]

B01J31/00E . [N: containing enzymes] [C9411]

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

B01J31/00R . [N: comprising organic radicals, e.g. TEMPO] [N1201]

B01J31/02 . containing organic compounds or metal hydrides

B01J31/02B . . [N: Oxygen-containing compounds]

B01J31/02B4 . . . [N: Alcohols or phenols] [N1201]

B01J31/02B6 . . . [N: Ethers] [N1201]

B01J31/02B8 . . . [N: comprising carbonyl groups or oxygen-containing derivatives, e.g. acetals, ketals, cyclic peroxides] [N1201]

B01J31/02B8B . . . . [N: Aldehydes or acetals] [N1201]

B01J31/02B8D . . . . [N: Ketones or ketals] [N1201]

B01J31/02B10 . . . [N: Esters of carboxylic or carbonic acids] [N1201]

B01J31/02B12 . . . [N: with a metal-oxygen link] [N1201]

B01J31/02B12B . . . . [N: Alkoxylates] [N1201]

B01J31/02B12D . . . . [N: Aryloxylates, e.g. phenolates] [N1201]

B01J31/02C . . [N: Sulfur-containing compounds]

B01J31/02C4 . . . [N: Mercaptans or thiols] [N1201]

B01J31/02C6 . . . [N: Sulfides] [N1201]
B01J31/02C6B . . . . [N: Disulfides] [N1201]
B01J31/02C6D . . . . [N: Polysulfides] [N1201]
B01J31/02C8 . . . [N: comprising sulfonyl groups] [N1201]
B01J31/02C8B . . . . [N: being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds] [N1201] [C1203]
B01J31/02C10 . . . [N: comprising sulfonic acid groups or the corresponding salts] [N1201]
B01J31/02C10B . . . . [N: being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional compounds] [N1201] [C1203]
B01J31/02C12 . . . [N: with a metal-sulfur link, e.g. mercaptides] [N1201]
B01J31/02C14 . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02B12D] [N1201]
B01J31/02D . . [N: Halogen-containing compounds]
B01J31/02D2 . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02C12 (perfluorinated sulfonyl compounds or moieties B01J31/02C8B; perfluorosulfonic acids B01J31/02C10B)] [N1201]
B01J31/02E . . [N: Nitrogen-, phosphorus-, arsenic- or antimony-containing compounds]
B01J31/02E2 . . . [N: Nitrogen containing compounds]
B01J31/02E2D . . . . [N: Amines] [N1201]
B01J31/02E2D2 . . . . . [N: with a primary amino group] [N1201]
B01J31/02E2F . . . . [N: Quaternary ammonium compounds] [N1201]
B01J31/02E2H . . . . [N: Imines or enamines] [N1201]
B01J31/02E2H2 . . . . . [N: Enamines] [N1201]
B01J31/02E2J . . . . [N: with nitrogen contained as ring member in aromatic compounds or moieties, e.g. pyridine] [N1201]
B01J31/02E2L . . . . [N: being derivatives of carboxylic or carbonic acids] [N1201]
B01J31/02E2L2 . . . . . [N: Imides, amides or imidates (R-C=NR(OR))] [N1201] [C1203]
B01J31/02E2L4 . . . . . [N: Nitriles] [N1201]
B01J31/02E2L6 . . . . . [N: Ureas (R2N-C(=O)-NR2)] [N1201]
B01J31/02E2L8 . . . . . [N: Guanidides (R2N-C(=NR)-NR2)] [N1201]
B01J31/02E2M . . . . [N: with a metal-nitrogen link, e.g. metal amides, metal guanidides] [N1201]
B01J31/02E2S . . . . [N: on mineral substrates] [N1201]
B01J31/02E4 . . . [N: Phosphorus containing compounds]
B01J31/02E4B . . . . [N: Phosphorus acids or phosphorus acid esters] [N1201]
B01J31/02E4B2 . . . . . [N: Phosphoric acid mono-, di- or triesters ((RO)(R'O)2P=O) , i.e. R= C, R'= C, H] [N1201]
B01J31/02E4B4 . . . . . [N: 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] [N1201]
B01J31/02E4B6 . . . . . [N: 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] [N1201]
B01J31/02E4B8 . . . . . [N: comprising phosphinous acid (-ester) groups (R2P(OR')) or the isomeric phosphine oxide groups (R3P=O) , i.e. R= C, R'= C, H] [N1201]
B01J31/02E4D . . . . [N: Phosphorus acid amides] [N1201]
B01J31/02E4D2 . . . . . [N: Phosphazenes, oligomers thereof or the corresponding

phosphazenium salts (polyphosphazenes per se C07F9/06B2D)] [N1201]

B01J31/02E4F . . . . [N: 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] [N1201]

B01J31/02E4F2 . . . . . [N: 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] [N1201]

B01J31/02E4S . . . . [N: on mineral substrates] [N1201]

B01J31/02E6 . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02D] [N1201]

B01J31/02F . . [N: containing elements other than those covered by B01J31/02B to B01J31/02E4] [C0508]

B01J31/02F2 . . . [N: containing silicon (ligands in coordination complexes B01J31/16B)] [N1201]

B01J31/02F4 . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02E4S] [N1201]

B01J31/02G . . [N: 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] [N0508] [C1203]

B01J31/02G2 . . . [N: containing nitrogen as cationic centre] [N0508] [C1201]

B01J31/02G2B . . . . [N: the cationic portion being acyclic or nitrogen being a substituent on a ring] [N1201]

B01J31/02G2D . . . . [N: the nitrogen being a ring member] [N1201]

B01J31/02G2D2 . . . . . [N: of an aliphatic ring, e.g. morpholinium] [N1201]

B01J31/02G2D4 . . . . . [N: of an aromatic ring, e.g. pyridinium] [N1201]

B01J31/02G2F . . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02F2] [N1201] [C1203]

B01J31/02G3 . . . [N: containing atoms other than nitrogen as cationic centre] [N1201]

B01J31/02G3B . . . . [N: Phosphorus] [N1201]

B01J31/02G3D . . . . [N: Sulfur] [N1201]

B01J31/02G3F . . . . [N: also containing elements or functional groups covered by B01J31/02B to B01J31/02F2] [N1201]

B01J31/02G4 . . . [N: immobilised on a substrate] [N0508]

B01J31/02G4B . . . . [N: by polar or ionic interaction with the substrate, e.g. glass] [N0508]

B01J31/02G4D . . . . [N: by covalent attachment to the substrate, e.g. silica] [N0508]

B01J31/02G4D2 . . . . . [N: the substrate being a soluble polymer, dendrimer or oligomer of characteristic microstructure of groups B01J31/06B to B01J31/06F] [N1201]

B01J31/02G6 . . . [N: the ionic liquids being characterised by the counter-anions] [N1201]

B01J31/04 . . containing carboxylic acids or their salts [N: (B01J31/02G to B01J31/02G6 take precedence; multi-metal carboxylate complexes like Pd(II)acetate, i.e. Pd3(OAc)6 or Cr(II)acetate, i.e. Cr2(OAc)4 B01J31/22B2H)] [C1203]

B01J31/06 . . containing polymers [N: (organometallic polymers B01J31/12P; polymer-bound organometallic complexes B01J31/16D; coordination polymers B01J31/16F)] [C0508]

B01J31/06B . . . [N: Chiral polymers] [N0508]

B01J31/06B2 . . . . [N: Polymeric amino acids] [N0508]

B01J31/06D . . . [N: Polymers comprising a characteristic microstructure] [N0508]

B01J31/06D2 . . . . [N: Dendrimers] [N0508]

B01J31/06D4 . . . . [N: Cyclodextrins] [N0508]

B01J31/06D6 . . . . [N: Calixarenes and hetero-analogues, e.g. thiacalixarenes] [N0508]

B01J31/06D8 . . . . [N: Molecularly imprinted polymers (catalytic antibodies C12N9/00B)] [N0508]

B01J31/06F . . . [N: Polyalkylene glycols] [N1201]

B01J31/06H . . . [N: Hybrid organic-inorganic polymers, e.g. silica derivatized with organic groups (nitrogen containing groups on mineral substrates B01J31/02E2S; organometallic polymers B01J31/12P; coordination complexes immobilised on an inorganic support B01J31/16C; coordination polymers, e.g. metal-organic frameworks B01J31/16F)] [N1201]

B01J31/08 . . . Ion-exchange resins

B01J31/10 . . . . sulfonated

B01J31/12 . . containing organo-metallic compounds or metal hydrides

B01J31/12B . . . [N: Metal hydrides]

B01J31/12F . . . [N: Metal aryl or alkyl compounds]

B01J31/12P . . . [N: Organometallic polymers, e.g. comprising C-Si bonds in the main chain or in subunits grafted to the main chain (B01J31/06D2, B01J31/06D6, B01J31/06D8, B01J31/08 and B01J31/10 take precedence; polymer-bound organometallic complexes B01J31/16D; coordination polymers B01J31/16F; catalysts for the preparation of polysiloxanes, e.g. Karstedt catalysts C08G77/08)] [N0508]

B01J31/12P2 . . . . [N: Silicones or siloxanes or comprising such units] [N0508]

B01J31/12P2B . . . . . [N: Cyclic siloxanes] [N0508]

B01J31/12P2D . . . . . [N: the siloxanes or siloxane units, cyclic or not, comprising an additional Si-H bond, e.g. polyhydromethylsiloxane (PHMS)] [N0508]

B01J31/12P2F . . . . . [N: the siloxane units, e.g. silsesquioxane units, being grafted onto other polymers or inorganic supports, e.g. via an organic linker] [N0508]

B01J31/12Z . . . [N: Mixtures of organometallic compounds] [N9411] [C0809]

B01J31/14 . . . of aluminium or boron

B01J31/14B . . . . [N: of aluminium] [N0508]

B01J31/14D . . . . [N: of boron] [N0508]

B01J31/16 . containing coordination complexes

B01J31/16B . . [N: the ligands containing silicon] [N9411] [C0508]

B01J31/16C . . [N: Coordination complexes, e.g. organometallic complexes, immobilised on an inorganic support, e.g. ship-in-a-bottle type catalysts (catalysts comprising molecular sieves B01J29/00)] [N0508]

B01J31/16C2 . . . [N: immobilised by covalent linkages, i.e. pendant complexes with optional linking groups] [N0508]

B01J31/16C2B . . . . [N: covalent linkages via silicon containing groups] [N0508]

B01J31/16C2B2 . . . . . [N: established via a metathesis reaction using a silicon-containing olefin] [N0508]

B01J31/16D . . [N: Polymer immobilised coordination complexes, e.g.organometallic complexes] [N9411]

B01J31/16D2 . . . [N: immobilised by covalent linkages, i.e. pendant complexes with optional linking groups, e.g. on Wang or Merrifield resins] [N0508]

B01J31/16D2B . . . . [N: the linkage established via an olefin metathesis reaction] [N0508]

B01J31/16D2D . . . . [N: the linkage being to an organometallic polymer covered by groups B01J31/12P to B01J31/12P2F, e.g. polyhydrosiloxanes] [N0508]

B01J31/16D2F . . . . [N: the linkage being to a soluble polymer, e.g. PEG or dendrimer, i.e. molecular weight enlarged complexes] [N0508]

B01J31/16F . . [N: Coordination polymers, e.g. metal-organic frameworks (MOF) (preparation of metal complexes containing carboxylic acid moieties C07C51/41F; MOF's per se C07F)] [N0508] [C0809]

B01J31/18 . . containing nitrogen, phosphorus, arsenic or antimony [N: 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 B01J27/26; N-heterocyclic carbenes B01J31/22C)] [C0508]

B01J31/18B . . . [N: the ligands containing nitrogen] [C0508]

B01J31/18B2 . . . . [N: Cyclic ligands, including non-condensed polycyclic ligands, comprising at least one complexing nitrogen atom as ring member, e.g. pyridine] [N0508] [C0905]

B01J31/18B2B . . . . . [N: with more than one complexing nitrogen atom, e.g. bipyridyl, 2-aminopyridine][N0508]

B01J31/18B2B2 . . . . . [N: comprising aliphatic or saturated rings] [N0508]

B01J31/18B2D . . . . . [N: Ligands comprising condensed ring systems, e.g. acridine, carbazole] [N0508]

B01J31/18B2D2 . . . . . [N: with more than one complexing nitrogen atom, e.g. phenanthroline] [N0508]

B01J31/18B2D2B . . . . . {7 dots} [N: comprising aliphatic or saturated rings] [N0508]

B01J31/18B2F . . . . . [N: mixed aromatic/aliphatic ring systems, e.g. indoline] [N0508]

B01J31/18C . . . [N: the ligands containing phosphorus (phosphines B01J31/24)] [C0508]

B01J31/18C2 . . . . [N: Phosphites ((RO)3P), their isomeric phosphonates (R(RO)2P=O) and RO-substitution derivatives thereof] [N0508]

B01J31/18C2B . . . . . [N: Triamide derivatives thereof] [N0508]

B01J31/18C2D . . . . . [N: Mono- or diamide derivatives thereof] [N0508]

B01J31/18C4 . . . . [N: Phosphonites (RP(OR)2), their isomeric phosphinates (R2(RO)P=O) and RO-substitution derivatives thereof] [N0508]

B01J31/18C4B . . . . . [N: Amide derivatives thereof] [N0508]

B01J31/18C6 . . . . [N: Phosphinites (R2P(OR), their isomeric phosphine oxides (R3P=O) and RO-substitution derivatives thereof)][N0508]

B01J31/18C6B . . . . . [N: Amide derivatives thereof] [N0508]

B01J31/18C8 . . . . [N: Ligands comprising two different formal oxidation states of phosphorus in one at least bidentate ligand, e.g.phosphite/phosphinite] [N0508]

B01J31/18E . . . [N: containing both nitrogen and phosphorus as complexing atoms, including phosphino moieties, in one at least bidentate ligand] [N0508] [C0905]

B01J31/18G . . . [N: the ligands containing arsenic or antimony] [N0508]

B01J31/20 . . Carbonyls

B01J31/22 . . Organic complexes

B01J31/22B . . . [N: the ligands containing oxygen or sulfur as complexing atoms] [N9411] [C0508]

B01J31/22B2 . . . . [N: Oxygen, e.g. acetylacetonates] [N9411]

B01J31/22B2B . . . . . [N: At least two complexing oxygen atoms present in an at least bidentate or bridging ligand] [N0905]

B01J31/22B2D . . . . . [N: At least one oxygen and one nitrogen atom present as complexing

atoms in an at least bidentate or bridging ligand] [N0905]

B01J31/22B2F . . . . . [N: At least one oxygen and one phosphorous atom present as complexing atoms in an at least bidentate or bridging ligand] [N0905]

B01J31/22B2H . . . . . [N: Anionic ligands, i.e. the overall ligand carries at least one formal negative charge] [N0905]

B01J31/22B2H2 . . . . . [N: At least two oxygen atoms present in one at least bidentate or bridging ligand] [N0905]

B01J31/22B2H2B . . . . . {7 dots} [N: Beta-dicarbonyl ligands, e.g. acetylacetonates] [N0905]

B01J31/22B2H2D . . . . . {7 dots} [N: Bridging ligands, e.g. OAc in Cr2(OAc)4, Pt4(OAc)8 or dicarboxylate ligands] [N0905]

B01J31/22B2H4 . . . . . [N: At least one oxygen and one nitrogen atom present as complexing atoms in an at least bidentate or bridging ligand] [N0905]

B01J31/22B2H6 . . . . . [N: At least one oxygen and one phosphorous atom present as complexing atoms in an at least bidentate or bridging ligand] [N0905]

B01J31/22B2H8 . . . . . [N: Sulfonate ligands] [N1203]

B01J31/22B2H8B . . . . . {7 dots} [N: being perfluorinated, i.e. comprising at least one perfluorinated moiety as substructure in case of polyfunctional ligands] [N1203] [C1203]

B01J31/22B4 . . . . [N: Sulfur, e.g. thiocarbamates] [N9411]

B01J31/22C . . . [N: Carbenes or carbynes, i.e. (image)] [N9411] [C0508]

B01J31/22C2 . . . . [N: Heterocyclic carbenes] [N1201]

B01J31/22C2B . . . . . [N: with only nitrogen as heteroatomic ring members, e.g. 1,3-diarylimidazoline-2-ylidenes] [N1201]

B01J31/22C4 . . . . [N: Complexes comprising two carbene ligands differing from each other, e.g. Grubbs second generation catalysts] [N1201]

B01J31/22D . . . [N: Unsaturated compounds used as ligands] [N9411]

B01J31/22D2 . . . . [N: Alkynes, e.g. acetylides] [N9411]

B01J31/22D4 . . . . [N: Olefins] [N9411]

B01J31/22D6 . . . . [N: Cyclic compounds, e.g. cyclopentadienyls] [N9411]

B01J31/24 . . Phosphines [N: 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 PH3 B01J31/18C)] [C1203]

B01J31/24B . . . [N: Cyclic ligands, including non-condensed polycyclic ligands, the phosphine-P atom being a ring member or a substituent on the ring] [N0508]

B01J31/24B2 . . . . [N: with more than one complexing phosphine-P atom] [N0508]

B01J31/24B2B . . . . . [N: comprising aliphatic or saturated rings] [N0508]

B01J31/24B4 . . . . [N: comprising P as ring member] [N0508]

B01J31/24B4A . . . . . N: comprising aliphatic or saturated rings] [N0809]

B01J31/24B4D . . . . . [N: with more than one complexing phosphine-P atom] [N0809]

B01J31/24B4D2 . . . . . [N: comprising aliphatic or saturated rings] [N0809]

B01J31/24B4F . . . . . [N: and further hetero atoms as ring members, excluding the positions adjacent to P] [N0809]

B01J31/24B6 . . . . [N: comprising condensed ring systems] [N0508]

B01J31/24B6B . . . . . [N: and phosphine-P atoms as substituents on a ring of the condensed system or on a further attached ring] [N0508]

B01J31/24B6B2 . . . . . [N: with more than one complexing phosphine-P atom] [N0508]

B01J31/24B6B2B . . . . . {7 dots} [N: comprising aliphatic or saturated rings, e.g. Xantphos] [N0508]

B01J31/24B6D . . . . . [N: and phosphine-P atoms as ring members in the condensed ring system or in a further ring] [N0508] [C0809]

B01J31/24B6D2 . . . . . [N: comprising aliphatic or saturated rings] [N0508]

B01J31/24B6D4 . . . . . [N: with more than one complexing phosphine-P atom] [N0508]

B01J31/24B6D4B . . . . . {7 dots} [N: comprising aliphatic or saturated rings] [N0809]

B01J31/24B6D6 . . . . . [N: Bridged ring systems, e.g. 9-phosphabicyclononane] [N0508]

B01J31/24B6D6B . . . . . {7 dots} [N: Tricyclic systems, e.g. phosphaadamantanes and hetero analogues] [N0508]

B01J31/24B6F . . . . . [N: Spiro-condensed ring systems] [N1201]

B01J31/24D . . . [N: Ligands comprising a phosphine-P atom and one or more further complexing phosphorus atoms covered by groups B01J31/18C to B01J31/18C8, e.g. phosphine/phosphinate or phospholyl/phosphonate ligands] [N0508]

B01J31/26 . containing in addition, inorganic metal compounds not provided for in groups B01J31/02 to B01J31/24

B01J31/28 . . of the platinum group metals, iron group metals or copper

B01J31/30 . . . Halides

B01J31/32 . . of manganese, technetium or rhenium

B01J31/34 . . of chromium, molybdenum or tungsten

B01J31/36 . . of vanadium, niobium or tantalum

B01J31/38 . . of titanium, zirconium or hafnium

B01J31/40 . Regeneration or reactivation

B01J31/40B . . [N: of catalysts containing polymers]

B01J31/40C . . [N: of catalysts containing metals]

B01J31/40C2 . . . [N: containing iron group metals, noble metals or copper]

B01J31/40C2B . . . . [N: containing iron group metals or copper]

B01J31/40C2C . . . . [N: containing noble metals]

B01J31/40C2C2 . . . . . [N: containing rhodium] [N0905]

B01J31/40C4 . . . [N: with recovery of phosphorous catalyst system constituents] [N0905]

B01J31/40C6 . . . [N: involving membrane separation] [N0905]

B01J31/40C8 . . . [N: involving extraction with coordinating ionic liquids or supercritical fluids, e.g. CO2] [N0905]

B01J31/40C10 . . . [N: involving electrochemical processes] [N0905]

B01J31/40C12 . . . [N: involving electromagnetic wave energy, e.g. UV or visible light] [N1201]

B01J31/40C14 . . . [N: involving a stripping step, with stripping gas or solvent] [N1201]

B01J32/00 **Catalyst carriers in general**

B01J33/00 **Protection of catalysts, e.g. by coating**

B01J35/00 **Catalysts, in general, characterised by their form or physical properties**

B01J35/00B . [N: Catalysts containing parts with different compositions]

B01J35/00C . [N: Colloids]

B01J35/00D . [N: Catalysts characterised by their physical properties]
B01J35/00D2 . . [N: Density]
B01J35/00D4 . . [N: Electric or magnetic properties]
B01J35/00D6 . . [N: Photocatalysts] [N0305]

[N: **WARNING** [N0811]
Groups B01J35/00D8 to B01J35/00D10F are not complete, see also B01J35/00D
]
B01J35/00D8 . . [N: Physical properties of the active metal ingredient] [N0811]
B01J35/00D8B . . . [N: metal surface area] [N0811]
B01J35/00D8D . . . [N: metal crystallite size] [N0811]
B01J35/00D8F . . . [N: metal dispersion value, e.g. percentage or fraction] [N0811]
B01J35/00D10 . . [N: Distribution of the active metal ingredient] [N0811]
B01J35/00D10B . . . [N: egg-shell like] [N0811]
B01J35/00D10D . . . [N: egg-yolk like] [N0811]
B01J35/00D10F . . . [N: homogeneous throughout the support particle] [N0811]

B01J35/02 . Solids
B01J35/02B . . [N: Catalysts characterised by dimensions, e.g. grain size]
B01J35/02P . . [N: Form of the solid particles (B01J35/08 takes precedence)]
B01J35/04 . . Foraminous structures, sieves, grids, honeycombs
B01J35/06 . . Fabrics or filaments
B01J35/06B . . . [N: Membranes]
B01J35/08 . . Spheres
B01J35/10 . . characterised by their surface properties or porosity

[N: **WARNING** [N1110]
Groups B01J35/10A to B01J35/10D6 are not complete, see also B01J35/10
]
B01J35/10A . . . [N: Surface area] [N0811]
B01J35/10A2 . . . . [N: less than 10 m2/g] [N0811]
B01J35/10A4 . . . . [N: 10-100 m2/g] [N0811]
B01J35/10A6 . . . . [N: 100-500 m2/g] [N0811]
B01J35/10A8 . . . . [N: 500-1000 m2/g] [N0811]
B01J35/10A10 . . . . [N: more than 1000 m2/g] [N0811]
B01J35/10B . . . [N: Pore volume] [N0811]
B01J35/10B2 . . . . [N: less than 0.5 ml/g] [N0811]
B01J35/10B4 . . . . [N: 0.5-1.0 ml/g] [N0811]
B01J35/10B6 . . . . [N: more than 1.0 ml/g] [N0811]
B01J35/10C . . . [N: Pore diameter] [N0811]
B01J35/10C2 . . . . [N: less than 2 nm] [N0811]

B01J35/10C4 . . . . [N: 2-50 nm] [N0811]
B01J35/10C6 . . . . [N: 50-500 nm] [N0811]
B01J35/10C8 . . . . [N: 500-1000 nm] [N0811]
B01J35/10C10 . . . . [N: larger than 1000 nm] [N0811]
B01J35/10D . . . [N: Pore distribution] [N0811]
B01J35/10D2 . . . . [N: monomodal] [N0811]
B01J35/10D4 . . . . [N: bimodal] [N0811]
B01J35/10D6 . . . . [N: polymodal] [N0811]

B01J35/12 . Liquids or melts

B01J37/00 **Processes, in general, for preparing catalysts; Processes, in general, for activation of catalysts**

B01J37/00B . [N: Use of binding agents; Moulding; Pressing; Powdering; Granulating; Addition of materials ameliorating the mechanical properties of the product catalyst] [C1204]
B01J37/00B2 . . [N: 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)] [C1204]
B01J37/00B4 . . [N: Powdering]
B01J37/00B4B . . . [N: Grinding]
B01J37/00B4C . . . [N: Drying a slurry, e.g. spray drying]
B01J37/00B4D . . . [N: Drying of aerosols]
B01J37/00B6 . . [N: Granulating]

B01J37/00C . [N: Preparation of particles, e.g. dispersion of droplets in an oil bath]

B01J37/00D . [N: Preparation by melting]

B01J37/00E . [N: Preparation by separation, e.g. by filtration, decantation, screening]

B01J37/02 . Impregnation, coating or precipitation ([N: B01J37/00B and B01J37/00B2 take precedence]; protection by coating B01J33/00) [C0006]
B01J37/02B . . [N: Impregnation]
B01J37/02B2 . . . [N: the impregnation liquid containing organic compounds]
B01J37/02B4 . . . [N: in several steps]
B01J37/02B6 . . . [N: Pretreatment of the support]
B01J37/02B8 . . . [N: involving a reaction between the support and a fluid]
B01J37/02B10 . . . [N: using a colloidal suspension]
B01J37/02B12 . . . [N: Preparation of the impregnating solution]
B01J37/02C . . [N: Coating]
B01J37/02C2 . . . [N: Pretreatment of the substrate before coating]
B01J37/02C4 . . . [N: the coating containing organic compounds]
B01J37/02C6 . . . [N: of particles]
B01J37/02C6B . . . . [N: by rotation]
B01J37/02C8 . . . [N: of metal substrates]

B01J37/02C8B . . . . [N: Oxidation of the substrate, e.g. anodisation]
B01J37/02C10 . . . [N: in several steps]
B01J37/02C12 . . . [N: using molten compounds]
B01J37/02C14 . . . [N: by pulverisation]
B01J37/02D . . [N: Impregnation and coating simultaneously]
B01J37/02E . . [N: Drying, e.g. preparing a suspension, adding a soluble salt and drying]
B01J37/02G . . [N: via the gaseous phase-sublimation]
B01J37/02M . . [N: Multiple impregnation or coating]
B01J37/02M2 . . . [N: Coating followed by impregnation]
B01J37/02M4 . . . [N: Coatings comprising several layers]
B01J37/02M6 . . . [N: Coatings comprising a zeolite]
B01J37/02M8 . . . [N: Coatings comprising impregnated particles]
B01J37/03 . . Precipitation; Co-precipitation
B01J37/03B . . . [N: Precipitation]
B01J37/03B2 . . . . [N: Using Hydrolysis]
B01J37/03B4 . . . . [N: Precipitation on carriers] [N1105]
B01J37/03C . . . [N: to form a gel or a cogel]
B01J37/03D . . . [N: to form slurries or suspensions, e.g. a washcoat]

B01J37/04 . Mixing [N: (B01J37/00B, B01J37/00B2 take precedence)] [C0006]

B01J37/06 . Washing [N: (B01J37/00B, B01J37/00B2 take precedence)] [C0006]

B01J37/08 . Heat treatment [N: (B01J37/00B, B01J37/00B2 take precedence)] [C0006]
B01J37/08B . . [N: Decomposition and pyrolysis]
B01J37/08B2 . . . [N: Decomposition of carbon-containing compounds into carbon]
B01J37/08B4 . . . [N: Decomposition of an organometallic compound, a metal complex or a metal salt of a carboxylic acid]
B01J37/08B6 . . . [N: Decomposition of a metal salt]
B01J37/10 . . in the presence of water, e.g. steam
B01J37/10B . . . [N: Hydropyrolysis]

B01J37/12 . Oxidising
B01J37/14 . . with gases containing free oxygen

B01J37/16 . Reducing
B01J37/18 . . with gases containing free hydrogen

B01J37/20 . Sulfiding

B01J37/22 . Halogenating
B01J37/24 . . Chlorinating
B01J37/26 . . Fluorinating

B01J37/28 . Phosphorising

B01J37/30 . Ion-exchange

B01J37/32 . Freeze drying, i.e. lyophilisation

B01J37/34 . Irradiation by, or application of, electric, magnetic or wave energy, e.g. ultrasonic waves; [N: Ionic sputtering; Flame or plasma spraying; Particle radiation] [C9409]

B01J37/34B . . [N: making use of electric or magnetic fields, wave energy or particle radiation (use of flames, plasma or lasers B01J37/34D)] [N9409]

B01J37/34B2 . . . [N: of electric, magnetic or electromagnetic fields, e.g. for magnetic separation] [N9409]

B01J37/34B4 . . . [N: of ultrasonic wave energy] [N9409]

B01J37/34B6 . . . [N: of electromagnetic wave energy] [N9409]

B01J37/34B6B . . . . [N: of ultraviolet wave energy] [N9409]

B01J37/34B6D . . . . [N: of microwave energy] [N9409]

B01J37/34B8 . . . [N: Ionic or cathodic spraying; Electric discharge] [N9409]

B01J37/34C . . [N: Electrochemical processes, e.g. electrochemical deposition or anodisation] [N9409]

B01J37/34D . . [N: making use of flames, plasmas or lasers] [N9409]

B01J37/36 . Biochemical methods

B01J38/00 Regeneration or reactivation of catalysts, in general

B01J38/02 . Heat treatment

B01J38/04 . Gas or vapour treating; Treating by using liquids vaporisable upon contacting spent catalyst

B01J38/06 . . using steam

B01J38/08 . . using ammonia or derivatives thereof

B01J38/10 . . using elemental hydrogen

B01J38/12 . . Treating with free oxygen-containing gas

B01J38/14 . . . with control of oxygen content in oxidation gas

B01J38/16 . . . Oxidation gas comprising essentially steam and oxygen

B01J38/18 . . . with subsequent reactive gas treating

B01J38/20 . . . Plural distinct oxidation stages

B01J38/22 . . . Moving bed, e.g. vertically or horizontally moving bulk

B01J38/24 . . . . having mainly transverse, i.e. lateral, flow of oxygen-containing gas and material

B01J38/26 . . . . having mainly counter-current flow of oxygen-containing gas and material

B01J38/28 . . . . having mainly concurrent flow of oxygen-containing gas and material

B01J38/30 . . . in gaseous suspension, e.g. fluidised bed

B01J38/32 . . . . Indirectly heating or cooling material within regeneration zone or prior to entry into regeneration zone

B01J38/34 . . . . with plural distinct serial combustion stages

B01J38/36 . . . . and with substantially complete oxidation of carbon monoxide to carbon dioxide within regeneration zone

B01J38/38 . . . and adding heat by solid heat carrier

B01J38/40 . . . and forming useful by-products

B01J38/42 . . using halogen-containing material

B01J38/44 . . . and adding simultaneously or subsequently free oxygen; using oxyhalogen compound

B01J38/46 . . . fluorine-containing

B01J38/48 . Liquid treating or treating in liquid phase, e.g. dissolved or suspended [N0308]

B01J38/48B . . [N: Impregnating or reimpregnating with, or deposition of metal compounds or catalytically active elements] [N1105]

B01J38/50 . . using organic liquids [N0308]

B01J38/52 . . . oxygen-containing [N0308]

B01J38/54 . . . halogen-containing [N0308]

B01J38/56 . . . Hydrocarbons [N0308]

B01J38/58 . . . and gas addition thereto [N0308]

B01J38/60 . . using acids [N0308]

B01J38/62 . . . organic [N0308]

B01J38/64 . . using alkaline material; using salts [N0308]

B01J38/66 . . . using ammonia or derivatives thereof [N0308]

B01J38/68 . . including substantial dissolution or chemical precipitation of a catalyst component in the ultimate reconstitution of the catalyst [N0308]

B01J38/70 . . Wet oxidation of material submerged in liquid[N0308]

B01J38/72 . including segregation of divers particles [N0308]

B01J38/74 . utilising ion-exchange [N0308]

Guide heading: **Ion-exchange** (treatment of milk A23C9/14; separation by liquid ion-exchangers B01D, e.g. B01D11/00; separation of isotopes B01D59/00; compounds er se, see the relevant classes, e.g. C01, C07, C08; treatment of water C02F1/42; refining of hydrocarbon oils, in the absence of hydrogen, with solid sorbents C10G25/00; purification of sugar juices C13D3/14; extraction of sugar from molasses C13J1/06; extraction of metal compounds from ores or concentrates by wet processes C22B3/00; using ion-exchange for investigating or analysing materials G01N30/96; treating radioactively contaminated material G21F9/12)

Notes

1. In groups B01J39/00 to B01J49/00:

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- 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
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2. In groups B01J39/00 to B01J49/00, in the absence of an indication to the contrary, classification is made in the last appropriate place

[N: **Note**
After the notation of B01J39/00 to B01J49/00, and separated there from by a + sign, notations concerning other constituents may be added. These notations are selected from groups B01J39/00 and B01J41/00
]

B01J39/00 **Cation exchange; Use of material as cation exchangers; Treatment of material for improving the cation exchange properties** (cation exchange chromatography processes B01D15/36B2) [C0410]

B01J39/02 . Processes using inorganic exchangers

B01J39/04 . Processes using organic exchangers
B01J39/04B . . [N: in the strongly acidic form]
B01J39/04D . . [N: in the weakly acidic form]

B01J39/08 . Use of material as cation exchangers; Treatment of material for improving the cation exchange properties
B01J39/08B . . [N: Inorganic material]
B01J39/10 . . Oxides or hydroxides
B01J39/12 . . Compounds containing phosphorus
B01J39/14 . . Base exchange silicates, e.g. zeolites
B01J39/16 . . Organic material
B01J39/16B . . . [N: containing also inorganic materials, e.g. inert material coated with an ion-exchange resin]
B01J39/18 . . . Macromolecular compounds [N: (B01J39/16B takes precedence)]
B01J39/18B . . . . [N: obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds]
B01J39/20 . . . . Macromolecular compounds obtained by reactions only involving unsaturated carbon-to-carbon bonds
B01J39/22 . . . . Cellulose or wood; Derivatives thereof
B01J39/24 . . Carbon, coal or tar

B01J39/26 . Cation exchangers for chromatographic processes [N0410]

B01J41/00 **Anion exchange; Use of material as anion exchangers; Treatment of material for improving the anion exchange properties** (anion exchange chromatography processes B01D15/36B4) [C0410]

B01J41/02 . Processes using inorganic exchangers

B01J41/04 . Processes using organic exchangers
B01J41/04B . . [N: in the strongly basic form]
B01J41/04D . . [N: in the weakly basic form]

B01J41/08 . Use of material as anion exchangers; Treatment of material for improving the anion exchange properties

B01J41/08B . . [N: Organic material (macromolecular compounds B01J41/12)]
B01J41/10 . . Inorganic material (carbon, coal or tar B01J41/18)
B01J41/12 . . Macromolecular compounds
B01J41/12B . . . [N: obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds]
B01J41/14 . . . Macromolecular compounds obtained by reactions only involving unsaturated carbon-to-carbon bonds
B01J41/16 . . . Cellulose or wood; Derivatives thereof
B01J41/18 . . Carbon, coal or tar

B01J41/20 . Anion exchangers for chromatographic processes [N0410]

B01J43/00 **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 B01D15/36) [C0410]

B01J45/00 **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 B01D15/36) [C0410]

B01J47/00 **Ion-exchange processes in general; Apparatus therefor** (ion-exchange chromatography processes or apparatus B01D15/08) [C0410]

B01J47/00B . [N: using batch processes]

B01J47/00D . [N: using portable ion-exchanging apparatus]

B01J47/00F . [N: in which the adsorbent properties of the ion-exchanger are involved, e.g. recovery of high molecular compounds (proteins)]

B01J47/00H . [N: electron-exchangers]

B01J47/00K . [N: Modification or after-treatment of ion-exchangers]

B01J47/00M . [N: Granulation, incorporation of ion-exchangers in a matrix, mixing with inert materials]
B01J47/00M2 . . [N: mixture in form of tablets]

B01J47/02 . Column or bed processes
B01J47/02B . . [N: characterised by the construction of the column or container]
B01J47/02B2 . . . [N: where the ion-exchangers are in a removable cartridge]
B01J47/02D . . [N: using more than one column or more than one bed in series]
B01J47/02D2 . . . [N: with alternately cationic and anionic exchangers]
B01J47/04 . . Mixed-bed processes
B01J47/06 . . during which the ion-exchange material is subjected to a physical treatment, e.g. heat, electric current, irradiation, vibration (electrodialysis, electro-osmosis

D61/42)

B01J47/08 . . . subjected to a direct electric current

B01J47/10 . with moving ion-exchange material; with ion-exchange material in suspension or in fluidised-bed form

B01J47/10B . . [N: in rotating beds]

B01J47/12 . characterised by the use of ion-exchange material in the form of sheets, ribbons or filaments, e.g. membranes (electrodialysis, electro-osmosis B01D61/42)

B01J47/12B . . [N: Use of materials in the form of filaments or fibres]

B01J47/12D . . [N: Precoat filters]

B01J47/14 . Controlling or regulating (controlling or regulating in general G05)

B01J47/14B . . [N: for obtaining a solution having a fixed pH]

B01J49/00 **Regeneration or reactivation of ion-exchangers; Apparatus therefor** (ion-exchange chromatography processes or apparatus B01D15/08) [C0410]

B01J49/00B . [N: of fixed beds]

B01J49/00B2 . . [N: containing cationic exchangers]

B01J49/00B4 . . [N: containing anionic exchangers]

B01J49/00B6 . . [N: containing cationic and anionic exchangers in separated beds]

B01J49/00B8 . . [N: of mixed beds]

B01J49/00D . [N: of moving beds]

B01J49/00D2 . . [N: containing cationic exchangers]

B01J49/00D4 . . [N: containing anionic exchangers]

B01J49/00D6 . . [N: containing cationic and anionic exchangers in separated beds]

B01J49/00D8 . . [N: of mixed beds]

B01J49/00F . [N: of membranes]

B01J49/00H . [N: electrical regeneration]

B01J49/00K . [N: thermal regeneration]

B01J49/00K2 . . [N: of amphoteric ion-exchangers ("Sirotherm process")]

B01J49/00M . [N: characterised by the regeneration reagents]

B01J49/00M2 . . [N: for cationic exchangers]

B01J49/00M4 . . [N: for anionic exchangers]

B01J49/00P . [N: Cleaning or rinsing ion-exchange beds]

B01J49/00R . [N: Process involving a plant]

B01J49/00R2 . . [N: of water softeners]

B01J49/00S . [N: Automatic regeneration]

B01J49/00S2 . . [N: Controlling or regulating devices therefor]

B01J49/02 . having devices which prevent back-flow of the ion-exchange mass during regenerating