COOPERATIVE PATENT CLASSIFICATION

PERFORMING OPERATIONS; TRANSPORTING

NOTES omitted

SEPARATING; MIXING

PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL

SEPARATION (separating solids from solids by wet methods B03B, B03D; by pneumatic jigs or tables B03B; by other dry methods B07; magnetic or electrostatic separation of solid materials from solid materials or fluids, separation by high-voltage electric fields B03C; centrifuges, vortex apparatus B04; presses per se for squeezing-out liquid from liquid-containing material B30B 9/02; treatment of water C02F, e.g. softening by ion-exchange C02F 1/42; {arrangements of air intake cleaners in gas turbine plants F02C 7/05}; arrangements or mounting of filters in air-conditioning, air-humidification or ventilation F24F 13/28)

NOTES

1. This subclass covers:
   • evaporation, distillation, crystallisation, filtration, dust precipitation, gas cleaning, absorption, adsorption;
   • similar processes which are not concerned with, or limited to, separation, except in the case of absorption or adsorption.
2. In this subclass the terms or expressions are used with the meaning indicated:
   • "filtration" and analogous terms include straining solids from fluids. Filtration is a process that normally uses a filter medium;
   • "filter medium" is a porous material or porous arrangement of material used to filter solids from fluids;
   • "filtering element" is a section of filter medium in addition to parts to which the medium is demountably or permanently fixed, including other sections of medium, end caps, peripheral frames or edge strips, but excluding housings;
   • "filter housing" is the fluid-constraining impervious vessel, whether open or closed, which contains, or is adapted to contain, one or more filtering elements or filter media;
   • "filter chamber" is the space within a housing, where filtering elements or filter media are located. Partitions may divide a single housing into a plurality of chambers;
   • "filtering apparatus" consists of filtering elements combined with housings, cleaning arrangements, motor or the like parts, which are characteristic of the particular type of apparatus. Ancillary devices such as pumps or valves are considered part of a filtering apparatus when inside the apparatus. Ancillary devices performing similar or different unit operation such as comminutors, mixers or non-filtering separators, whether or not inside the apparatus, are not considered part of a filtering apparatus. The term does not extend to apparatus, e.g. washing machines, of which the filter forms only a part.
3. For apparatus used in drying or evaporation, class F26 takes precedence over this subclass.
4. Group B01D 59/00 takes precedence over the other groups of this subclass and over other subclasses in class B01.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   B01D 15/04 covered by B01J 39/00 - B01J 49/90
   B01D 17/022 covered by B01D 17/0202
   B01D 17/025 covered by B01D 17/0208
   B01D 17/028 covered by B01D 17/0211
   B01D 17/032 covered by B01D 17/0214
   B01D 17/035 covered by B01D 17/0205
   B01D 17/038 covered by B01D 17/0217
   B01D 17/05 covered by B01D 17/047
   B01D 17/09 covered by B01D 17/005
   B01D 25/133 covered by B01D 25/285
   B01D 25/168 covered by B01D 25/285
   B01D 29/075 covered by B01D 29/01, B01D 29/64
   B01D 29/37 covered by B01D 29/336, B01D 29/356
   B01D 33/052 covered by B01D 33/042, B01D 33/048
   B01D 35/01 covered by B01D 36/001
   B01D 61/26 covered by A61M 1/1656
   B01D 61/34 covered by A61M 1/16
2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 **Evaporating** (evaporation in general, e.g. of liquids for gas phase reactions B01B 1/005; removal of incrustation B08B; preparation of starch C08B 3/000; sugar industry C113; prevention of incrustation C23F; drying solid materials or objects by evaporating liquids therefrom F26)

1/0005 . Evaporating devices suitable for floating on water
1/0011 . [Heating features]
1/0017 . Use of electrical or wave energy (B01D 1/0029 takes precedence)
1/0023 . Induction heating
1/0029 . Use of radiation
1/0035 . Solar energy (for treatment of water C02F 1/14)
1/0041 . Use of fluids
1/0047 . [in a closed circuit (B01D 3/007 takes precedence)]
1/0052 . Use of a liquid transfer medium or intermediate fluid, e.g. bain-marie
1/0058 . Use of waste energy from other processes or sources, e.g. combustion gas (for water treatment C02F 1/16)
1/0064 . Feeding of liquid into an evaporator
1/007 . [the liquid feed being split up in at least two streams before entering the evaporator]
1/0076 . Maintaining the liquid in the evaporator at a constant level
1/0082 . Regulation; Control
1/0088 . Cascade evaporators
1/0094 . [with forced circulation]
1/02 . Evaporators with heating coils
1/04 . Evaporators with horizontal tubes
1/06 . Evaporators with vertical tubes
1/065 . by film evaporating
1/08 . with short tubes (B01D 1/12 B01D 1/065 take precedence)
1/10 . with long tubes, e.g. Kestner evaporators (B01D 1/12 B01D 1/065 take precedence)
1/12 . and forced circulation
1/14 . with heated gases or vapours (or liquids) in contact with the liquid
1/16 . by spraying (B01D 1/22 takes precedence)
1/18 . to obtain dry solids (B01D 1/24 takes precedence)
1/20 . Sprayers (in general B05B)
1/22 . by bringing a thin layer of the liquid into contact with a heated surface (B01D 1/065 takes precedence)
1/221 . Composite plate evaporators
1/222 . In rotating vessels; vessels with movable parts
1/223 . containing a rotor
1/225 . with blades or scrapers
1/226 . in the form of a screw or with helical blade members
1/227 . with brushes
1/228 . horizontally placed cylindrical container or drum (B01D 1/223 takes precedence)
1/24 . to obtain dry solids
1/26 . Multiple-effect evaporating
1/28 . with vapour compression
1/2803 . Special features relating to the vapour to be compressed
1/2806 . The vapour is divided in at least two streams and only a part of the vapour is compressed
1/2809 . At least two streams are compressed
1/2812 . The vapour is coming from different sources
1/2815 . At least one source is a compressor
1/2818 . Cleaning of the vapour before compression, e.g. demisters, washing of the vapour
1/284 . Special features relating to the compressed vapour
1/2843 . The compressed vapour is divided in at least two streams
1/2846 . The compressed vapour is not directed to the same apparatus from which the vapour was taken off
1/285 . In combination with vapour from an other source
1/2853 . At least one of the other sources is a compressor, ejector
1/2856 . The compressed vapour is used for heating a reboiler or a heat exchanger outside an evaporator
1/2881 . Compression specifications (e.g. pressure, temperature, processes)
1/2884 . Multiple effect compression (B01D 1/2815 takes precedence)
1/2887 . The compressor is integrated in the evaporation apparatus
1/289 . Compressor features (e.g. constructions, details, cooling, lubrication, driving systems)
1/293 . Driving systems
1/2986 . Control, regulation
1/30 . Accessories for evaporators (Constructional details thereof)
1/305 . Demister (vapour-liquid separation)

3/00 **Distillation or related exchange processes in which liquids are contacted with gaseous media, e.g. stripping** (evaporation in general, e.g. of liquids for gas phase reactions B01B 1/005; gas chromatography B01D 15/08; destructive distillation C10B; preparation of alcoholic beverages by distillation C12H 6/02)

3/001 . Processes specially adapted for distillation or rectification of fermented solutions
3/002 . by continuous methods
3/003 . Rectification of spirit
3/004 . by continuous methods
3/005 . Combined distillation and rectification
3/006 . by vibration
3/007 . Energy recuperation; Heat pumps
3/008 . Liquid distribution
3/009 . in combination with chemical reactions
3/02 . in boilers or stills
3/04 . pipe stills
3/06 . Flash distillation
3/065 . Multiple-effect flash distillation (more than two traps)
Regulation; Control with one or more auxiliary substances
Vacuum distillation (B01D 3/12
{ B01D 1/22 ) , B01D 3/10 take precedence)
Steam distillation { the substance being a gas }
rectification step } { by two or more of a fractionation, separation or rectification step }
Fractionating columns in which vapour bubbles through liquid (packing elements B01J 19/30, B01J 19/32)
Fractionating columns in which vapour bubbles through liquid (packing elements B01J 19/30, B01J 19/32)
Fractionating columns with surface contact and vertical guides, e.g. film action
Fractionating columns in which vapour bubbles through liquid (packing elements B01J 19/30, B01J 19/32)
Fractionating columns with surface contact and vertical guides, e.g. film action
Fractionating columns with movable parts or in which centrifugal movement is caused
Other features of fractionating columns (; Constructional details of fractionating columns not provided for in groups B01D 3/16 - B01D 3/30)
Reboiler specifications
Tray constructions
Tray supports
[Tray supports]
Tray supports
[Tray supports]
Sealing between the column and the trays
[Sealing between the column and the trays]
with one or more auxiliary substances
[Tray supports]
with one or more auxiliary substances
[Sealing between the column and the trays]
Azeotropic distillation
Steam distillation
Extractive distillation
Regulation; Control
Reflex ratio control splitter
Solvent extraction

2011/002 . . . [Counter-current extraction]
2011/005 . . . [Co-current extraction]
2011/007 . . . [Extraction using a solvent in the gas phase]
11/043 . . . [with stationary contacting elements, sieve plates or loose contacting elements]
11/0434 . . . [comprising rotating mechanisms, e.g. mixers, rotational oscillating motion, mixing pumps]
11/0438 . . . [comprising vibrating mechanisms, electromagnetic radiations]
11/0442 . . . [Mixers with gas-agitation]
11/0446 . . . [Juxtaposition of mixers-settlers]
11/0449 . . . [with stationary contacting elements]
11/0453 . . . [with narrow passages limited by plates, walls, e.g. helically coiled tubes (B01D 11/0461 takes precedence)]
11/0457 . . . [comprising rotating mechanisms, e.g. mixers, mixing pumps]
11/0461 . . . [mixing by counter-current streams provoked by centrifugal force]
11/0465 . . . [comprising vibrating mechanisms, radiations]
11/0469 . . . [with gas agitation]
11/0473 . . . [Jet mixers, venturi mixers]
11/0476 . . . [Moving receptacles, e.g. rotating receptacles]
11/048 . . . [Mixing by counter-current streams provoked by centrifugal force, in rotating coils or in other rotating spaces]
11/0484 . . . [Controlling means]
11/0488 . . . [Flow sheets]
11/0492 . . . [Applications, solvents used]
11/0496 . . . [by extraction in microfluidic devices]

12/00 Displacing liquid, e.g. from wet solids or from dispersions of liquids or from solids in liquids, by means of another liquid

15/00 Separating processes involving the treatment of liquids with solid sorbents (using liquid sorbents B01D 11/00; ion exchange processes or materials, sorbent materials in general B01J, e.g. sorbents for chromatography B01J 20/28; for investigating or analysing materials G01N 30/00; Apparatus therefor)

15/02 . . . with moving adsorbents
15/08 . . Selective adsorption, e.g. chromatography

**NOTE**

In order that group B01D 15/08 may provide a basis for a complete search with respect to chromatography in general, all subject matter of general interest is classified in this group even if it is classified primarily in the application-oriented groups, for example dairy products A23C 9/148, treatment of blood, e.g. A61M 1/36, or analytical Biochemistry C07K 1/16.

15/10 . . . characterised by constructional or operational features
15/12 . . . relating to the preparation of the feed
15/125 . . . . [Pre-filtration]
15/14 . . . relating to the introduction of the feed to the apparatus
15/16 . . . relating to the conditioning of the fluid carrier
15/161 . . . [Temperature conditioning]
15/163 . . . [Pressure or speed conditioning]
15/165 . . . . [Flash chromatography]
15/166 . . . [Fluid composition conditioning, e.g. gradient]

15/168 . . . . [pH gradient, chromatofocusing, i.e. separation according to the isoelectric point pI]
15/18 . . . relating to flow patterns
15/1807 . . . [using counter-currents, e.g. fluidised beds]
15/1814 . . . [recycling of the fraction to be distributed]
15/1821 . . . . [Simulated moving beds]
15/1828 . . . . [characterized by process features]
15/1835 . . . . . [Flushing]
15/1842 . . . . [characterized by apparatus features]
15/185 . . . . [characterized by the components to be separated]
15/1857 . . . . [Reactive simulated moving beds]
15/1864 . . . . [using two or more columns]
15/1871 . . . . [placed in series]
15/1878 . . . . . [for multi-dimensional chromatography]
15/1885 . . . . [placed in parallel]
15/1892 . . . . [the sorbent material moving as a whole, e.g. continuous annular chromatography, true moving beds]
15/20 . . . relating to the conditioning of the sorbent material
15/203 . . . . [Equilibration or regeneration]
15/206 . . . . [Packing or coating]
15/22 . . . relating to the construction of the column
15/24 . . . relating to the treatment of the fractions to be distributed
15/242 . . . . [Intermediate storage of effluents]
15/245 . . . . [Adding materials to the effluents]
15/247 . . . . [Fraction collectors]
15/26 . . . . [characterised by the separation mechanism]
15/265 . . . . [Adsorption chromatography]
15/30 . . . . . [Partition chromatography]
15/305 . . . . . [Hydrophilic interaction chromatography [HLIC]]
15/32 . . . . Bonded phase chromatography
15/322 . . . . [Normal bonded phase]
15/325 . . . . [Reversed phase]
15/327 . . . . . [with hydrophobic interaction]
15/34 . . . Size selective separation, e.g. size exclusion chromatography, gel filtration, permeation
15/345 . . . . . [Perfusive chromatography]
15/36 . . . involving ionic interaction
15/361 . . . . [Ion-exchange]
15/362 . . . . . [Cation-exchange]
15/363 . . . . [Anion-exchange]
15/364 . . . . . [Amphoteric or zwitterionic ion-exchanger]
15/365 . . . . [Ion-exclusion]
15/366 . . . . [Ion-pair, e.g. ion-pair reversed phase]
15/367 . . . . [Ion-suppression]
15/368 . . . . [Cation- pi interaction]
15/38 . . . involving specific interaction not covered by one or more of groups B01D 15/265 - B01D 15/36
15/3804 . . . . [Affinity chromatography]
15/3809 . . . . [of the antigen-antibody type, e.g. protein A, G, L chromatography]
15/3814 . . . . [of the substrate or co-factor - enzyme type]
15/3819 . . . . . [of the nucleic acid-nucleic acid binding protein type]
15/3828 . . . . [(Ligand exchange chromatography, e.g. complexation, chelation or metal interaction chromatography)]

15/3833 . . . . [Chiral chromatography]

2015/3838 . . . . [(Ligand exchange chromatography, e.g. complexation chromatography, chelation chromatography, metal interaction chromatography)]

15/3842 . . . . [Micellar chromatography]

15/3847 . . . . [Multimodal interactions]

15/3850 . . . . [using imprinted phases or molecular recognition; using imprinted phases]

15/3857 . . . . [Reaction chromatography]

15/3861 . . . . [using an external stimulus]

15/3864 . . . . [using ultra-sound]

15/3871 . . . . [using light]

15/3876 . . . . [modifying the temperature]

15/388 . . . . [modifying the PH]

15/3885 . . . . [Using electrical or magnetic means]

2015/389 . . . . [using ultra-sound]

15/3895 . . . . [using light]

15/40 . . . . using supercritical fluid as mobile phase or eluent

15/42 . . . . characterised by the development mode, e.g. by displacement or by elution

15/422 . . . . [Displacement mode]

15/424 . . . . [Elution mode]

15/426 . . . . [Specific type of solvent]

15/428 . . . . [Frontal mode]

17/00 Separation of liquids, not provided for elsewhere, e.g. by thermal diffusion (devices for separating or removing fatty or oily substances or similar floating material from water, waste water, or sewage C02F 1/40), cleaning or keeping clear the surface of open water from oil or like materials E02B 15/04; arrangements for separating lubricants from refrigerants F25B 43/02)

NOTE
in this group, documents are classified and arranged according to a combination system limited to the symbols of the group and subgroups of B01D 17/00. In this system each combination is indicated, also of subgroups depending from the same group, e.g. B01D 17/041 + B01D 17/042

17/005 . . . . [by thermal diffusion]

17/006 . . . . Separation of liquids from each other by electricity

17/007 . . . . [Thickening liquid suspensions by filtration]

17/008 . . . . [with membranes]

17/010 . . . . [for use with liquid-separating apparatus, e.g. control circuits]

17/015 . . . . [in contact columns containing plates, grids or other filling elements]

17/021 . . . . [by bringing the liquid in a thin layer]

17/026 . . . . [in rotating vessels or in vessels containing movable parts]

17/031 . . . . [by filtration]

17/036 . . . . [Flash degasification (the other groups take precedence)]

17/042 . . . . [modifying the liquid flow (B01D 19/0021 takes precedence)]

17/047 . . . . [Atomizing, spraying, trickling]

17/052 . . . . [in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused (B01D 19/0026 takes precedence)]

17/057 . . . . [the centrifugal movement being caused by a vortex, e.g. using a cyclone, or by a tangential inlet]

17/063 . . . . [Regulation, control including valves and floats (for construction and details of valves F16K)]

17/068 . . . . [General arrangements, e.g. flowsheets (B01D 19/0063 takes precedence)]

17/073 . . . . [by a method not covered by groups B01D 19/0005 - B01D 19/0042]

17/078 . . . . [by vibration]

17/084 . . . . [using an electric current]

17/089 . . . . [using a magnetic field (magnetic separation in general B03C 1/00)]

17/094 . . . . [by using a vortex, cavitation]

17/096 . . . . [Foam dispersion or prevention (during boiling B01B 1.02; during fermentation C12)]

17/099 . . . . [by addition of chemical substances]

NOTES
1. Antifoam compositions containing a specific compound as the main substance are only classified in the, for this specific compound, corresponding B01D 19/0404 subgroup (e.g. polysiloxanes receive the classification B01D 19/0409); when the specific compound(s) is (are) not the main substance, then the attributed classification for this compound(s) is a combination of B01D 19/0404 + the corresponding B01D 19/0404 subgroup(s), (e.g. hydrocarbons containing silica are classified in B01D 19/0404 + B01D 19/0409). If the main substance is a mixture containing more than one specific compound, then the attributed classification is a combination of the corresponding B01D 19/0404 subgroup of the specific compounds, (e.g. benzene sulfonate
2. In groups B01D 19/0404 - B01D 19/0495, in the absence of an indication to the contrary, an invention is classified in the last appropriate place.

19/0404 . . . [characterised by the nature of the chemical substance]
19/0409 . . . . . . [compounds containing Si-atoms]
19/0413 . . . . . . [compounds containing N-atoms]
19/0418 . . . . . . [compounds containing P-atoms]
19/0422 . . . . . . [compounds containing S-atoms]
19/0427 . . . . . . . [compounds containing halogen-atoms]
19/0431 . . . . . . . (containing aromatic rings)
19/0436 . . . . . . . [with substituted groups]
19/044 . . . . . . . . [which contain Si-atoms]
19/0445 . . . . . . . . [which contain N-atoms]
19/045 . . . . . . . . [which contain P-atoms]
19/0454 . . . . . . . . [which contain S-atoms]
19/0459 . . . . . . . . [which contain halogen-atoms]
19/0463 . . . . . . . . . [containing rings other than aromatic rings]
19/0468 . . . . . . . . . [with substituted groups]
19/0472 . . . . . . . . . [which contain Si-atoms]
19/0477 . . . . . . . . . [which contain N-atoms]
19/0481 . . . . . . . . . [which contain P-atoms]
19/0486 . . . . . . . . . . [which contain S-atoms]
19/049 . . . . . . . . . . . [which contain halogen-atoms]
19/0495 . . . . . . . . . . . . [containing hetero rings]
19/0495 (continued)

21/00 Separation of suspended solid particles from liquids by sedimentation ([separation of ores or the like by sedimentation B03B 9/48 - B03B 9/60]; differential sedimentation B03D 3/00; purification of water, waste water, sewage or sludge C02F; e.g.) devices for separating or removing fatty or oily substances or similar floating material from water, waste water or sewage C02F 1/40)

NOTE:
{ Attention is made to the following places of filters:
liquid-liquid separation, e.g. for filtering elements made hydrophilic or hydrophobic, B01D 12/00; B01D 17/00; B01D 43/00; filtering material and its regeneration, as well as filtering aids, B01D 39/00; gas or air filters in general B01D 46/00;
aquarium filters A01K 63/04; filters for cigars and cigarettes A24D 3/00; filters for coffee or tea-making machines A47J 31/06; filters for filtering spinning solution or melt D01D 1/10; filters for washing machines D06F 39/10; filters or strainers for papermaking D21D; filters in water collecting systems E03B 3/18; E03B 7/07; subsoil filters for boreholes F21B 3/02; air filters for internal-combustion engines F02M 35/02; filters for pumps F04B 39/16, F04D 29/70; filters in pipe systems F16L 55/24; filtration of lubricants F16N 39/06; filters for volume measuring apparatus G01F 15/12)

21/003 . . . [Making of sedimentation devices, structural details thereof, e.g. prefabricated parts]
21/006 . . . [Settling tanks provided with means for cleaning and maintenance]
21/009 . . . [Settling tanks making use of electricity or magnetism (electric ultra filters B01D 61/425; filters making use of electricity or magnetism B01D 35/06; magnetic or electrostatic separation B03C)]
21/012 . . . [Settling tanks making use of filters, e.g. by floating layers of particulate material]
21/015 . . . [Controlling the inclination of settling devices]
21/018 . . . [provided with a pump mounted in or on a settling tank]
21/021 . . . [provided with a jet pump]
21/024 . . . [Inlets or outlets provided with regulating devices, e.g. valves, flaps (B01D 21/24 takes precedence)]
21/027 . . . [Floating sedimentation devices]
21/03 . . . [Sedimentation tanks provided with a plurality of compartments separated by a partition wall (B01D 21/0039 takes precedence)]
21/033 . . . [Vertical, perforated partition walls (B01D 21/2422 takes precedence)]
21/036 . . . [Horizontal partition walls]
21/039 . . . [Settling tanks provided with contact surfaces, e.g. baffles, particles]
21/042 . . . [Baffles or guide plates]
21/045 . . . [Plurality of essentially parallel plates]
21/048 . . . [Plurality of plates inclined in alternating directions]
21/051 . . . [Plurality of tube like channels]
21/054 . . . [Plates in form of a coil]
21/057 . . . [with counter-current flow direction of liquid and solid particles]
21/06 . . . [with co-current flow direction of liquid and solid particles]
21/063 . . . [with cross-flow flow direction of liquid and solid particles]
21/066 . . . [with a meandering flow pattern of liquid or solid particles]
21/069 . . . [Making of contact surfaces, structural details, materials therefor]
21/072 . . . [Means for adjusting, moving or controlling the position or inclination of the contact surfaces, e.g. for optimising the particle-liquid separation, for removing the settled particles, for preventing fouling]
21/075 . . . [Contact surfaces having surface features]
21/0084  . . [Enhancing liquid-particle separation using the flotation principle (floation in general B03D 1/00)]
21/0087  . . (Settling tanks provided with means for ensuring a special flow pattern, e.g. even inflow or outflow (B01D 21/2411 takes precedence))
21/009  . . [Heating or cooling mechanisms specially adapted for settling tanks]
21/0093  . . (Mechanisms for taking out of action one or more units of a multi-unit settling mechanism)
21/0096  . . (Safety mechanisms specially adapted for settling tanks (B01D 21/22 takes precedence))
21/01  . . using flocculating agents (for purifying water C02F 1/52; for liquid radioactive waste G21F 9/10)
21/02  . . Settling tanks { with single outlets for the separated liquid}
21/04  . . . with moving scrapers
21/06  . . . with rotating scrapers
21/08  . . . provided with flocculating compartments
21/10  . . (Settling tanks with multiple outlets for the separated liquids)
21/12  . . . [with moving scrapers]
21/14  . . . [with rotating scrapers]
21/16  . . . [provided with flocculating compartments]
21/18  . . Construction of the scrapers or the driving mechanisms for settling tanks
21/183  . . . [with multiple scraping mechanisms]
21/186  . . . [with two or more scrapers fixed at different heights on a central rotating shaft]
21/20  . . . Driving mechanisms
21/22  . . . Safety mechanisms
21/24  . . Feed or discharge mechanisms for settling tanks
21/2405  . . . [Feed mechanisms for settling tanks]
21/2411  . . . [having a tangential inlet]
21/2416  . . . [Liquid distributors with a plurality of feed points]
21/2422  . . . [Vertically arranged feed points]
21/2427  . . . (The feed or discharge opening located at a distant position from the side walls)
21/2433  . . . (Discharge mechanisms for floating particles)
21/2438  . . . [provided with scrapers on the liquid surface for removing floating particles]
21/2444  . . . (Discharge mechanisms for the classified liquid)
21/245  . . . (Discharge mechanisms for the sediments)
21/2455  . . . [Conveyor belts]
21/2461  . . . [Positive-displacement pumps; Screw feeders; Trough conveyors]
21/2466  . . . [Mammoth pumps, e.g. air lift pumps]
21/2472  . . . [Means for fluidising the sediments, e.g. by jets or mechanical agitators]
21/2477  . . . [Centrifugal pumps]
21/2483  . . . [Means or provisions for manually removing the sediments]
21/2488  . . . [bringing about a partial recirculation of the liquid, e.g. for introducing chemical aids]
21/2494  . . . [provided with means for the removal of gas, e.g. noxious gas, air]
21/26  . . Separation of sediment aided by centrifugal force [or centripetal force] (centrifuges B04B; cyclones B04C)
21/262  . . . [by using a centrifuge]
21/265  . . . [by using a vortex inducer or vortex guide, e.g. coil (B01D 21/2054 takes precedence)]
21/267  . . . [by using a cyclone]
21/28  . . . Mechanical auxiliary equipment for acceleration of sedimentation, e.g. by vibrators or the like
21/283  . . . (Settling tanks provided with vibrators)
21/286  . . . [Means for gentle agitation for enhancing flocculation]
21/30  . . . Control equipment
21/302  . . . (Active control mechanisms with external energy, e.g. with solenoid valve)
21/305  . . . (Control of chemical properties of a component, e.g. control of pH)
21/307  . . . (Passive control mechanisms without external energy, e.g. using a float)
21/32  . . . Density control of clear liquid or sediment, e.g. optical control [; Control of physical properties]
21/34  . . . Controlling the feed or discharge; Controlling the liquid level [; Control of process parameters]

**Filtration:** Filtering material, regeneration thereof

23/00  [Gravity filters (with moving filtering elements B01D 33/0035)]
23/005  . . [making filtering elements, not provided for elsewhere (see also B01D 25/001, B01D 27/005, B01D 29/0093)]
23/02  . . [with fixed filter bodies]
23/04  . . . [with filter bags filtering from the inside]
23/06  . . . [with rigid tubular bodies]
23/08  . . . [with saucer-shaped filtering elements]
23/10  . . . [with loose filter material]
23/12  . . . [with filtering material supported on louvred sides]
23/14  . . . [carbon filters]
23/16  . . . [Sand or gravel filters (filterbed-basin filters, small bed filters, e.g. in closed housing B01D 23/10)]
23/18  . . . [Bottoms of filter beds]
23/20  . . . [Feed or discharge devices (nozzles B05B)]
23/205  . . . [Special adaptation of spray heads therefor]
23/24  . . . [Regeneration of the filter material in the filter]
23/26  . . . [integrally combined with devices for controlling the filtration (shutting-off elements, changing over from one element to another B01D 35/12, B01D 35/14; control of filtration processes B01D 37/04)]
23/28  . . . [Filter funnels; Holders therefor (funnels in general B67C; funnels for laboratory use B01L; coffee or tea strainers or apparatus A47J 31/00 - A47J 31/06)]

24/00  Filters comprising loose filtering material, i.e. filtering material without any binder between the individual particles or fibres thereof (B01D 27/02 takes precedence)
24/001  . . (Making filter elements (not provided for elsewhere); see also B01D 25/001, B01D 27/005, B01D 29/012, B01D 29/111, B01D 33/0093)]
24/002  . . [with multiple filtering elements in parallel connection]
24/004  . . . [arranged concentrically or coaxially]
24/005  . . . [Filters being divided into a plurality of cells or compartments (B01D 24/04 takes precedence)]
24/007  . . [with multiple filtering elements in series connection]
24/008  . . . [arranged concentrically or coaxially]
24/02  . . . [with the filter bed stationary during the filtration]
Filtration; Filtering material, regeneration thereof

24/04 . . . the filtering material being clamped between pervious fixed walls (B01D 24/10, B01D 24/20 takes precedence)
24/042 . . . [the filtering material being held in a flexible porous bag]
24/045 . . . [with at least one flat vertical wall]
24/047 . . . [with vertical tubes distributing the liquid to be filtered or for collecting filtrate]
24/06 . . . the pervious walls comprising a series of louvres or slots
24/08 . . . the filtering material being supported by at least two pervious coaxial walls
24/10 . . . the filtering material being held in a closed container
24/105 . . . [downward filtration without specifications about the filter material supporting means]
24/12 . . . Downward filtration, the filtering material being supported by pervious surfaces (B01D 24/18 takes precedence)
2024/125 . . . [spray heads specially adapted therefor]
24/14 . . . Downward filtration, the container having distribution or collection headers or pervious conduits (B01D 24/18 takes precedence)
2024/145 . . . [spray heads specially adapted therefor]
24/16 . . . [Upward filtration (B01D 24/18 takes precedence]
2024/162 . . . [spray heads specially adapted therefor]
24/165 . . . [the filtering material being supported by pervious surfaces]
24/167 . . . [the container having distribution or collection headers or pervious conduits]
24/18 . . . Combined upward and downward filtration
24/183 . . . [the filtering material being supported by pervious surfaces]
24/186 . . . [the container having distribution or collection headers or pervious conduits]
24/20 . . . the filtering material being provided in an open container
24/205 . . . [Downward filtration without specifications about the filter material supporting means]
24/22 . . . Downward filtration, the filter material being supported by pervious surfaces
24/24 . . . Downward filtration, the container having distribution or collection headers or pervious conduits
24/26 . . . Upward filtration
24/263 . . . [the filtering material being supported by pervious surfaces]
24/266 . . . [the container having distribution or collection headers or pervious conduits]
24/28 . . . with the filter bed moving during the filtration (with the filter bed fluidised B01D 24/36)
24/30 . . . Translation
24/305 . . . [Vibrations]
24/32 . . . Rotation
24/34 . . . with the filtering material and its pervious support moving (tipping buckets, trays or like sections B01D 33/327)
24/36 . . . with the filter bed fluidised during the filtration (with the filter bed being stationary B01D 24/02)
24/38 . . . Feed or discharge devices
24/383 . . . [using multiple way valves]
24/386 . . . [internal recirculation]
24/40 . . . for feeding
24/402 . . . [containing fixed liquid displacement elements or cores]
24/405 . . . [Special treatment of the feed stream before contacting the filtering material, e.g. cutting (B01D 35/24, B01D 37/02, B01D 37/03 take precedence)]
24/407 . . . [provoking a tangential stream]
24/42 . . . for discharging filtrate
24/425 . . . [containing fixed liquid displacement elements or cores]
24/44 . . . for discharging filter cake, e.g. chutes
24/46 . . . Regenerating the filtering material in the filter (B01D 24/44 takes precedence)
24/4605 . . . [by scrapers, brushes, nozzles or the like placed on the cake-side of the stationary filtering material and only contacting the external layer (B01D 24/4631 takes precedence)]
24/461 . . . [by scrapers]
24/4615 . . . [by brushes]
24/4621 . . . [by nozzles acting on the cake side of the filter material, or by fluids acting in co-current direction with the feed stream]
24/4626 . . . [Construction of spray heads specially adapted for regeneration of the filter material or for filtrate discharging]
24/4631 . . . [Counter-current flushing, e.g. by air]
24/4636 . . . [with backwash shoes; with nozzles]
24/4642 . . . [with valves, e.g. rotating valves]
24/4647 . . . [with a rectilinear movement of the closing means]
24/4652 . . . [by using gasbumps]
24/4657 . . . [by using membranes]
24/4663 . . . [by using pistons]
24/4668 . . . [by moving the filtering element (B01D 24/4605 and B01D 24/4631 take precedence)]
24/4673 . . . [using rotary devices or vibration mechanisms, e.g. stirrers]
24/4678 . . . [using free vortex flow]
24/4684 . . . [using spray devices]
24/4689 . . . [Displacement of the filtering material to a compartment of the filtering device for regeneration]
24/4694 . . . [containing filter material retaining means (e.g. screens, balls) placed on the surface of the filter material]
24/48 . . . integrally combined with devices for controlling the filtration
24/4807 . . . [Handling the filter cake for purposes other than regenerating]
24/4815 . . . [for washing]
24/4823 . . . [for drying]
24/483 . . . [by compression]
24/4838 . . . [by gases or by heating]
24/4846 . . . [Retarding cake deposition on the filter during the filtration period, e.g. using stirrers (B01D 24/407 takes precedence)]
24/4853 . . . [by clearness or turbidity measuring]
24/4861 . . . [by flow measuring]
24/4869 . . . [by level measuring]
24/4876 . . . [in which the filtering elements are moved between filtering operations; particular measures for removing or replacing the filtering elements (B01D 24/46, B01D 24/4807 take precedence)]
24/4884 . . . [by pressure measuring]
25/00 Filters formed by clamping together several filtering elements or parts of such elements (disc filters B01D 29/39)

25/001 . . . [Making filtering elements (not provided for elsewhere; see also B01D 24/001, B01D 27/005, B01D 29/012, B01D 29/111, B01D 33/0093)]

25/002 . . . [Clamping devices (B01D 25/12 and subgroups take precedence)]

25/003 . . . [integradly combined with devices for controlling the filtration]

25/004 . . . [by clearness or turbidity measuring]

25/005 . . . [by flow measuring]

25/006 . . . [by level measuring]

25/007 . . . [by pressure measuring]

25/008 . . . [by temperature measuring]

25/02 . . . in which the elements are pre-formed independent filtering units, e.g. modular systems

25/04 . . . [with screens or sheets, e.g. cloths, paper (B01D 25/12 takes precedence)]

25/06 . . . [with loose, granular of fibrous filtering material]

25/08 . . . [with rigid self-supporting filtering elements]

25/10 . . . [in which the suspended particles form the filtering medium]

25/12 . . . Filter presses, i.e. of the plate and frame type {filter presses in which the liquid is removed by pressing-out solid matter B30B}

25/121 . . . [with bandshaped filtering elements intermittently entrained between the press plates, the lateral sides of the elements being clamped between two successive plates or between a plate and a successive frame during the filtration period, e.g. zigzag endless filter belts]

25/122 . . . [Construction of the plates]

25/124 . . . [Pressing-out operation after filtration, e.g. of the cake (presses in general B30)]

25/125 . . . [Opening and/or closing and/or pressure applying devices or means]

25/127 . . . with one or more movable filter bands arranged to be clamped between the press plates or between a plate and a frame during filtration, e.g. zigzag endless filter bands (B01D 25/172, B01D 25/176, B01D 25/19 take precedence)

25/1275 . . . [the plates or the frames being placed in a non-vertical position]

25/14 . . . [Clamping means clamping of filter cloth or similar securing means]

25/16 . . . (Edge filtering elements, i.e. using contiguous impervious surfaces)

25/164 . . . Chamber-plate presses, i.e. the sides of the filtering elements being clamped between two successive filtering plates (B01D 25/127, B01D 25/172, B01D 25/176, B01D 25/19 take precedence)

25/1645 . . . [the plates being placed in a non-vertical position]

25/172 . . . Plate spreading means (removal of filter cakes B01D 25/32)

25/176 . . . attaching the filter element to the filter press plates, e.g. around the central feed hole in the plates

25/18 . . . [of flat, stacked bodies]

25/19 . . . Clamping means for closing the filter press, e.g. hydraulic jacks

25/20 . . . [of spirally or helically wound bodies]

25/21 . . . Plate and frame presses (B01D 25/172, B01D 25/176, B01D 25/19 take precedence)

25/215 . . . [Construction of the filter plates, frames]

25/22 . . . Cell-type filters

25/24 . . . Cell-type roll filters

25/26 . . . Cell-type stack filters

25/28 . . . Leaching or washing filter cakes in the filter [handling the filter cake for purposes other than regenerating]

25/281 . . . [specially for chamber filter presses]

25/282 . . . [for drying]

25/284 . . . [by gases or by heating]

25/285 . . . [by compression using inflatable membranes]

25/287 . . . [by compression using pistons]

25/288 . . . [Retarding cake deposition on the filter during the filtration period, e.g. using stirrers]

25/30 . . . Feeding devices {; Discharge devices}

25/302 . . . [specially adapted for chamber filter presses]

25/305 . . . [for discharging filtrate]

25/307 . . . [with internal recirculation through the filtering element (B01D 37/02 takes precedence)]

25/32 . . . Removal of the filter cakes

25/322 . . . [specially for chamber filter presses]

25/325 . . . [counter-current flushing, e.g. by air bumps]

25/327 . . . [with backwash shoes, with nozzles]

25/34 . . . by moving, e.g. rotating, the filter elements (B01D 25/172, B01D 25/19 take precedence)

25/343 . . . [Particular measures for replacing or isolating one or more filtering elements; Transport systems for the filtering apparatus (B01D 25/28, B01D 25/32, B01D 25/346, B01D 25/36 take precedence)]

25/346 . . . [by vibration]

25/36 . . . by centrifugal force

25/38 . . . by moving parts, e.g. scrapers, contacting stationary filter elements {sprayers}

25/383 . . . [Brushes]

25/386 . . . [Nozzles]

27/00 Cartridge filters of the throw-away type

27/005 . . . [Making filter elements (not provided for elsewhere; see also B01D 24/001, B01D 25/001, B01D 29/012, B01D 29/111, B01D 33/0093)]

27/002 . . . with cartridges made from a mass of loose {granular or fibrous} material

27/004 . . . with cartridges made of a piece of unitary material, e.g. filter paper

27/006 . . . with corrugated, folded or wound material

27/007 . . . having a coaxial stream through the filtering element

27/008 . . . Construction of the casing

27/10 . . . Safety devices, e.g. by-passes

27/101 . . . [Filter condition indicators]

27/103 . . . [Bypass or safety valves]

27/105 . . . [Bidirectional working filters]

27/106 . . . [Anti-leakage or anti-return valves]

27/108 . . . [Flow control valves; Damping or calibrated passages]

27/14 . . . having more than one filtering element

27/142 . . . [connected in parallel]

27/144 . . . [arranged concentrically or coaxially]

27/146 . . . [connected in series]
Filtration; Filtering material, regeneration thereof

27/148 . . . [arranged concentrically or coaxially]
29/00 Other filters with filtering elements stationary
durint filtration, e.g. pressure or suction filters,
or filtering elements therefor \((B01D 24/00, B01D 25/00\) and \(B01D 27/00\) take precedence)\)
29/0002 . . . \{Aspects of other filters with filtering elements
stationary during filtration, or of filtering elements
thereof\}
29/0004 . . . \{Filters with flat filtering elements\}
29/0006 . . . \{Making filtering elements\}
29/0009 . . . \{with curved filtering elements\}
29/0011 . . . \{ring shaped\}
29/0013 . . . \{Filters in which the filtering elements are moved
between filtering operations; Means specially
adapted for removing the filtering elements,
or introducing new ones; Transport systems
specially adapted for the filtering elements\}
29/0015 . . . \{Filtering bands\}
29/0018 . . . \{Filters with screens or sheets, e.g. cloth, paper\}
29/002 . . . \{with rigid, self-supporting filtering elements,
e.g. of ceramic material\}
29/0022 . . . \{Filters with corrugated, folded, or wound
sheets\}
29/0025 . . . \{allowing a coaxial stream through the
filtering element (for cartridge filters
\(B01D 27/07)\})\}
29/0027 . . . \{Filters with loose, granular, or fibrous filtering
material\}
29/0029 . . . \{Bag, cage, hose, tube, sleeve, or like filters\}
29/0031 . . . \{Pressing-out operation after filtration, e.g.
by means of membranes (filter presses per se
\(B01D 25/12)\})\}
29/0034 . . . \{Filters having flexible filtering material\}
29/0036 . . . \{which is supported\}
29/0038 . . . . . . \{on solid frames with surface grooves and
the like\}
29/004 . . . . . . \{to take up a concertina shape during
filtration\}
29/0043 . . . \{having rigid self-supporting filtering material
\((B01D 29/0068\) takes precedence)\}
29/0045 . . . \{Edge filtering elements\}
29/0047 . . . \{with multiple filtering units\}
29/005 . . . \{connected in parallel (\(B01D 29/0056\) takes
precedence)\}
29/0052 . . . \{connected in series (\(B01D 29/0059\) takes
precedence)\}
29/0054 . . . \{arranged concentrically or coaxially\}
29/0056 . . . \{connected in parallel\}
29/0059 . . . \{connected in series\}
29/0061 . . . \{which are vibrated\}
29/0063 . . . \{which are open-ended\}
29/0065 . . . \{Filter candles\}
29/0068 . . . \{Filters with hollow discs side-by-side on or
around one or more tubes (with elements moving
during filtration \(B01D 33/0048, B01D 33/0051\))\}
29/007 . . . \{having filtrate discharge tubes fixed
non-perpendicularly to the filtering surfaces\}
29/0072 . . . \{Filters integrally combined with devices for
controlling the filtration (for shutting-off elements
or changing over from one element to another
\(B01D 35/12, B01D 35/14; controlling filtration
processes \(B01D 37/04)\})\}
29/0075 . . . \{Regeneration of the filtering material in the
filter (for two separate filter elements placed in
different units \(B01D 35/12)\}\}
29/0077 . . . . . . \{by scrapers, brushes, nozzles or the
like placed on the cake-side of the filters
\((B01D 29/0084\) takes precedence)\}
29/0079 . . . . . . \{Counter-current flushing, e.g. by air bumps\}
29/0081 . . . . . . \{with backwash shoes; with nozzles\}
29/0084 . . . . . . \{by moving the filter element \((B01D 29/0088\)
takes precedence)\}
29/0086 . . . . . . \{by vibration\}
29/0088 . . . . . . \{by centrifugal force\}
29/009 . . . . . . \{Filters having feed or discharge devices\}
29/0093 . . . \{Making filtering elements (not provided for
elsewhere) (see also \(B01D 23/005, B01D 25/001,
B01D 27/005)\}\}
29/0095 . . . \{Flat filtering elements \((B01D 25/12, B01D 25/26,
B01D 29/0015, B01D 29/0068\) take precedence)\}
29/0097 . . . \{Curved filtering elements, e.g. concave filtering
elements\}
29/01 . . . \{with flat filtering elements \((B01D 29/39\) takes
precedence)\}

\textbf{NOTE}\n
\{If the construction of the filtering element
itself is of minor importance the document
is classified in the subgroups \(B01D 29/01\) and
\(B01D 29/014 - B01D 29/018\), otherwise in the
subgroups \(B01D 29/03 - B01D 29/073\)\}
29/012 . . . \{Making filtering elements (making bag, cage,
hose, tube, sleeve or like filtering elements
\(B01D 29/11)\}\}
29/014 . . . \{with curved filtering elements (construction
\(B01D 29/035, B01D 29/071)\}\}
29/016 . . . \{with corrugated, folded or wound filtering
elements\}
29/018 . . . \{ring shaped\}
29/03 . . . \{self-supporting\}
29/031 . . . \{with corrugated, folded filtering elements\}
2029/033 . . . \{bar screens\}
29/035 . . . \{with curved filtering elements\}
29/036 . . . \{ring shaped\}
29/038 . . . \{with corrugated, folded filtering elements\}
29/05 . . . \{supported\}
29/055 . . . \{ring shaped\}
29/07 . . . \{with corrugated, folded or wound filtering
sheets\}
29/071 . . . \{with curved filtering elements
\((B01D 29/072, B01D 29/073\) take
precedence)\}
29/072 . . . \{ring shaped\}
29/073 . . . \{with wound filtering sheets\}
2029/075 . . \{Located in a closed housing and comprising
scrapers or agitators on the cake side of the
filtering elements, e.g. Nutsche- or Rosenmund-type filters
for performing multiple steps operations\}
29/085 . \{Funnel filters; Holders therefor\}
29/09 . \{with filtering bands, e.g. movable between filtering
operations \((B01D 25/121\) takes precedence)\}
29/093 . \{combined with means to fasten the opposite
edges of the filtering band together, e.g. Zipper\}
29/096 . . . (Construction of filtering bands or supporting belts, e.g. devices for centering, mounting, or securing the filtering bands or the supporting belts)

29/11 . . . with bag, cage, hose, tube, sleeve or like filtering elements

**NOTE**

If the construction of the filtering element itself is of minor importance the document is classified in the subgroups B01D 29/11, B01D 29/14 and B01D 29/17, otherwise in the subgroups B01D 29/13 - B01D 29/356

29/111 . . . (Making filtering elements)

29/112 . . . (Ring shaped filters wherein both opposite axial sides are opened and the axial length is shorter than the diameter, e.g. as used in hydraulic transmission systems)

29/114 . . . (arranged for inward flow filtration (B01D 29/15, B01D 29/33 take precedence))

29/115 . . . [open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element]

29/117 . . . (arranged for outward flow filtration (B01D 29/23, B01D 29/35 take precedence))

29/118 . . . [open-ended]

29/13 . . . Supported filter elements

29/15 . . . arranged for inward flow filtration

29/17 . . . open-ended [the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element]

29/19 . . . on solid frames with surface grooves or the like

29/21 . . . with corrugated, folded or wound sheets

29/213 . . . [having a concertina shape]

29/216 . . . [with wound sheets]

29/23 . . . arranged for outward flow filtration

29/232 . . . [with corrugated, folded or wound sheets]

29/235 . . . [having a concertina shape]

29/237 . . . [with wound sheets]

29/25 . . . open-ended [the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element]

29/27 . . . Filter bags

29/31 . . . Self-supporting filtering elements

29/33 . . . arranged for inward flow filtration

29/333 . . . [with corrugated, folded filtering elements]

29/336 . . . [open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element]

29/35 . . . arranged for outward flow filtration

29/353 . . . [with corrugated, folded filtering elements]

29/356 . . . [open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element]

29/39 . . . with hollow discs side by side on, or around, one or more tubes, e.g. of the leaf type

29/395 . . . [mounted axially on the tube]

29/41 . . . mounted transversely on the tube

29/413 . . . [divided in sectors]

29/416 . . . [Filtering tables]

29/43 . . . mounted otherwise than transversely on the tube [mounted otherwise than axially on the tube]

29/44 . . . Edge filtering elements, i.e. using contiguous impervious surfaces

29/445 . . . [Bar screens]

29/46 . . . of flat, stacked bodies

29/48 . . . of spirally or helically wound bodies

29/50 . . . with multiple filtering elements, characterised by their mutual disposition (B01D 29/39 takes precedence)

29/52 . . . in parallel connection

29/54 . . . arranged concentrically or coaxially

29/56 . . . in series connection

29/58 . . . arranged concentrically or coaxially

29/60 . . . integrally combined with devices for controlling the filtration

29/601 . . . [by clearance or turbidity measuring]

29/603 . . . [by flow measuring]

29/605 . . . [by level measuring]

29/606 . . . [by pressure measuring]

29/608 . . . [by temperature measuring]

29/62 . . . Regenerating the filter material in the filter (devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration, B01D 35/12)

29/64 . . . by scrapers, brushes, [nozzles], or the like, acting on the cake side of the filtering element

29/6407 . . . [brushes]

29/6415 . . . [with a rotary movement with respect to the filtering element]

29/6423 . . . [with a translational movement with respect to the filtering element]

29/643 . . . [with a combination of movements with respect to the filtering element]

29/6438 . . . [nozzles]

29/6446 . . . [with a rotary movement with respect to the filtering element]

29/6453 . . . [with a translational movement with respect to the filtering element]

29/6461 . . . [with a combination of movements with respect to the filtering element]

29/6469 . . . [scrapers]

29/6476 . . . [with a rotary movement with respect to the filtering element]

29/6484 . . . [with a translatory movement with respect to the filtering element]

29/6492 . . . [with a combination of movements with respect to the filtering element]

29/66 . . . by flushing, e.g. counter-current air-bumps

29/661 . . . [by using gas-bumps]

29/663 . . . [by using membranes]

29/665 . . . [by using pistons]

29/666 . . . [by a stirrer placed on the filtrate side of the filtering element]

29/668 . . . [with valves, e.g. rotating valves for coaxially placed filtering elements]

**NOTE**

the subgroup covers only counter-current flushing

29/68 . . . with backwash arms, shoes or nozzles
Filters with filtering elements which move during the filtering operation (filters comprising loose filtering material moving or fluidised during filtration B01D 24/28 - B01D 24/36; centrifuges B01B)

33/003 . . . . . [Aspects of filters with filtering elements which move during the filtering operation]

33/006 . . . . . [with rotating filtering surfaces (rotating brush filters B01D 35/10)]

33/009 . . . . . [with cylindrical filtering surfaces, e.g. hollow drums, rotating drum filters for paper making D21B]

33/012 . . . . . [Drums provided with cells each independently connected with pressure distributor]

33/016 . . . . . [Drums with a single compartment]

33/019 . . . . . [arranged for outward flow filtration]

33/022 . . . . . [combined with filtering bands or the like]

33/025 . . . . . [with endless filtering bands]

33/029 . . . . . [with multiple filtering bands with or without one or more non filtering bands]

33/032 . . . . . [with loose, granular, or fibrous filtering material]

33/035 . . . . . [Gravity filters]

33/038 . . . . . [with external feed]

33/041 . . . . . [with plane surfaces]

33/045 . . . . . [with rotary tables]

33/048 . . . . . [with hollow discs transversely mounted on a hollow shaft]

33/051 . . . . . [with hollow frames axially mounted on a hollow shaft]

33/054 . . . . . [with loose, granular, or fibrous filtering material]

33/058 . . . . . [with filtering surfaces travelling along conveyors (tipping bucket type B01D 35/08; brush filters B01D 35/10)]

33/061 . . . . . [Accessories and components]

33/064 . . . . . [Devices for handling the filter cake, e.g. washing, discharging]

33/067 . . . . . [with scrapers, brushes, nozzles or the like placed on the cake-side of the filter (B01D 33/0074 takes precedence)]

33/07 . . . . . [counter-current flushing]

33/074 . . . . . [with backwash shoes, with nozzles]

33/077 . . . . . [by moving the filtering element]

33/08 . . . . . [by vibration]

33/083 . . . . . [by centrifugal force]

33/087 . . . . . [Feed or discharge devices for liquids]

33/09 . . . . . [Pressure distribution systems (pressure distribution systems for filters with tipping buckets or trays B01D 35/08)]

33/093 . . . . . [Making filter elements (not provided for elsewhere) see also B01D 24/001, B01D 25/001, B01D 27/005, B01D 29/012, B01D 29/111]

33/096 . . . . . [moving rectilinearly (filters B01D 35/10)]

33/01 . . . . . [with translationally moving filtering elements, e.g. pistons (B01D 33/04 - B01D 33/327 take precedence)]

33/018 . . . . . [with bag, cage, hose, tube, sleeve or the like filtering elements]

33/0116 . . . . . [arranged for inward flow filtration]

33/0125 . . . . . [open ended]

33/0133 . . . . . [arranged for outward flow filtration]
Filtration; Filtering material, regeneration thereof

33/0141 . . . [open ended]
33/015 . . . [with flat filtering elements]
33/0158 . . . [self-supporting]
33/0166 . . . [bar screens]
33/0175 . . . [with curved filtering elements]
33/0183 . . . [supported]
33/0191 . . . [with corrugated, folded or wound filtering sheets]
33/03 . . . with vibrating filter elements
33/0307 . . . [with bag, cage, hose, tube, sleeve or the like filtering elements]
33/0315 . . . [arranged for inward flow filtration]
33/0323 . . . [open ended]
33/033 . . . [arranged for outward flow filtration]
33/0338 . . . [open ended]
33/0346 . . . [with flat filtering elements]
33/0353 . . . [self-supporting]
33/0361 . . . [bar screens]
33/0369 . . . [with curved filtering elements]
33/0376 . . . [supported]
33/0384 . . . [with corrugated, folded or wound filtering sheets]
33/0392 . . . [with curved filtering elements]
33/04 . . . with filtering bands or the like supported on cylinders which are impervious for filtering
33/042 . . . [whereby the filtration and squeezing-out take place between at least two filtering bands]
33/044 . . . with filtering bands or the like supported on cylinders which are pervious for filtering
33/048 . . . with endless filtering bands
33/052 . . . [combined with a compression device]
33/056 . . . Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts
33/0565 . . . [combined with means to fasten the opposite edges of the filtering band together, e.g. zipper]
33/06 . . . with rotary cylindrical filtering surfaces, e.g. hollow drums (B01D 33/044 takes precedence; ; rotating drums for paper-making D21B)
33/067 . . . Construction of the filtering drums, e.g. mounting or sealing arrangements
33/073 . . . [arranged for inward flow filtration]
33/09 . . . with surface cells independently connected to pressure distributors
33/11 . . . [arranged for outward flow filtration]
33/13 . . . [arranged for outward flow filtration]
33/15 . . . with rotary plane filtering surfaces
33/155 . . . [the filtering surface being parallel to the rotation axis]
33/17 . . . with rotary filtering tables (tables divided into separately tiltable buckets, trays or like sections B01D 33/322)
33/19 . . . [the table surface being divided in successively tilted sectors or cells, e.g. for discharging the filter cake]
33/21 . . . with hollow filtering discs transversely mounted on a hollow rotary shaft
33/215 . . . [the filtering discs being fixed inwardly on a rotating construction]
33/23 . . . Construction of discs or component sectors thereof

33/25 . . . with hollow frames axially mounted on a hollow rotary shaft
33/27 . . . with rotary filtering surfaces, which are neither cylindrical nor planar, e.g. helical surfaces
33/275 . . . [using contiguous impervious surfaces]
33/29 . . . the movement of the filter elements being a combination of movements (B01D 33/19 takes precedence)
33/31 . . . Planetary movement
33/327 . . . Tipping buckets, trays or like sections
33/333 . . . with individual filtering elements moving along a closed path (tipping buckets, trays or like sections B01D 33/327)
33/35 . . . with multiple filtering elements characterised by their mutual disposition (B01D 33/042; B01D 33/21 take precedence)
33/37 . . . in parallel connection
33/39 . . . concentrically or coaxially
33/41 . . . in series connection
33/42 . . . concentrically or coaxially
33/44 . . . Regenerating the filter material in the filter (devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration, B01D 35/12)
33/46 . . . by scrapers, brushes (nozzles) or the like acting on the cake-side of the filtering element (B01D 33/503 takes precedence)
33/461 . . . [brushes]
33/463 . . . [nozzles]
33/465 . . . [take-off rollers]
33/466 . . . [scrapers]
33/468 . . . [wires, strands, strings or the like]
33/48 . . . by flushing, e.g. counter-current air-bumps

NOTE

the subgroup covers only counter-current flushing

33/50 . . . with backwash arms, shoes or nozzles
33/503 . . . [the backwash arms, shoes acting on the cake side]
33/506 . . . [with a stirrer placed on the filtrate side]
33/52 . . . [by forces created by movement of the filter element]
33/54 . . . involving vibrations
33/56 . . . involving centrifugal force
33/58 . . . Handling the filter cake in the filter for purposes other than for regenerating (B01D 33/76 takes precedence) [the filter cake remaining on the filtering element]
33/60 . . . for washing
33/62 . . . for drying
33/64 . . . by compression
33/642 . . . [by pressure belts]
33/644 . . . [by pressure plates, membranes]
33/646 . . . [by pressure rollers]
33/648 . . . [by screws]
33/66 . . . by gases or by heating
33/663 . . . [by direct contact with a fluid]
33/666 . . . [by indirect heat-exchange]
33/68 . . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers
33/70 . . . having feed or discharge devices (B01D 33/82 takes precedence)
33/705 . . . [with internal recirculation through the filter]
Filtration; Filtering material, regeneration thereof

35/02 . . . Filters adapted for location in special places, e.g. pipe-lines, pumps, stop-cocks. (B01D 35/05 takes precedence; [water pipe system filters E03B 3/18, E03B 7/07; dirt catchers in sewers E03F; filters or strainers for pipe-lines in general B08B, E03F: object or dirt catching devices in sinks or the like E03C 1/26; suction strainers or filters for pumps F04B 53/005, F04D 29/70(1)])

35/023 . . . [Filter pipe filters]
35/027 . . . rigidly mounted in or on tanks or reservoirs (B01D 35/04 takes precedence)
35/0273 . . . [Filtering elements with a horizontal or inclined rotation or symmetry axis submerged in tanks or reservoirs]
35/0276 . . . [Filtering elements with a vertical rotation or symmetry axis mounted on tanks or reservoirs]
35/04 . . . Plug, tap, or cock filters [filtering elements mounted in or on a faucet]
35/043 . . . [Reversible faucet filters]
35/046 . . . [the filtering element being mounted in the faucet plug]
35/05 . . . Floating filters
35/06 . . . Filters making use of electricity or magnetism (ultrafiltration, microfiltration B01D 61/14; electrodialysis, electro-osmosis B01D 61/42; devices comprising filters and magnetic separators B03C 1/30)
35/08 . . . [Filters with tipping buckets or trays]
35/10 . . . Brush filters [Rotary brush filters]
35/12 . . . Devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration
35/14 . . . Safety devices specially adapted for filtration (preventing or minimising fires or explosions A62C); Devices for indicating clogging (incorporated in a throw-away filter B01D 27/10)
35/143 . . . Filter condition indicators
35/1435 . . . [with alarm means]
35/147 . . . Bypass or safety valves
35/1475 . . . [Pressure relief valves or pressure control valves]
35/15 . . . Bidirectional working filters
35/153 . . . Anti-leakage or anti-return valves
35/157 . . . Flow control valves: Damping or calibrated passages
35/1573 . . . [Flow control valves]
35/1576 . . . [Calibrated passages]
35/16 . . . Cleaning-out devices, e.g. for removing the cake from the filter casing or for evacuating the last remnants of liquid
35/18 . . . Heating or cooling the filters
35/185 . . . [comprising a vaporizing unit]
35/20 . . . Vibrating the filters (regenerating filter material by vibrations in filters with stationary filtering elements B01D 29/72; discharging the filter cake by vibrations in filters with moving filtering elements B01D 33/54, B01D 33/76)
35/22 . . . Directing the mixture to be filtered on to the filters in a manner to clean the filters [(B01D 29/904 takes precedence)]
35/24 . . . Providing loose granular material to scratch the filters clean
35/26 . . . Filters with built-in pumps [filters provided with a pump mounted in or on the casing (aquarium pumps or filters A01K 63/04)]
35/28 . . . Strainers not provided for elsewhere
35/30 . . . Filter housing constructions
35/301 . . . [Constructions of two or more housings (B01D 35/12 takes precedence)]
35/303 . . . [the housings being modular, e.g. standardised]
35/305 . . . [with features related to crash tests or crash safety measures]
35/306 . . . [Filter mounting adapter]
35/308 . . . [Made of at least two different materials, e.g. metal and plastic]
35/31 . . . including arrangements for environmental protection, e.g. pressure resisting features
35/32 . . . against radiation
35/34 . . . open-topped (B01D 35/31 takes precedence)
36/00 . . . Filter circuits or combinations of filters with other separating devices
Filtration; Filtering material, regeneration thereof

39/1684 . . . . [Wound filtering material]
39/1692 . . . . [Other shaped material, e.g. perforated or porous sheets]
39/18 . . . . the material being cellulose or derivatives thereof ((cork or peat B01D 39/1646) ; making filter paper D21F 11/14)
39/20 . . . . of inorganic material, e.g. asbestos paper, metallic filtering material of non-woven wires (porous ceramic material {C04B 38/00} ; sintering metals C22C 1/04 ; [making porous sintered metal bodies B22F 3/10, honeycomb filters B01D 46/2418, materials used for filtering exhaust gases of an internal combustion engine F01N 3/02] , ceramic honeycomb structures C04B 38/00006])
39/2003 . . . . [Glass or glassy material]
39/2006 . . . . [the material being particulate]
39/201 . . . . [sintered or bonded by inorganic agents]
39/2013 . . . . [otherwise bonded, e.g. by resins]
39/2017 . . . . [the material being filamentary or fibrous]
39/202 . . . . [sintered or bonded by inorganic agents]
39/2024 . . . . [otherwise bonded, e.g. by resins]
39/2027 . . . . [Metallic material]
39/2031 . . . . [the material being particulate]
39/2034 . . . . [sintered or bonded by inorganic agents]
39/2037 . . . . [otherwise bonded]
39/2041 . . . . [the material being filamentary or fibrous]
39/2044 . . . . [sintered or bonded by inorganic agents]
39/2048 . . . . [otherwise bonded]
39/2051 . . . . [Metallic foam]
39/2055 . . . . [Carbonaceous material (solid sorbent compositions comprising free carbon B01J 20/20)]
39/2058 . . . . [the material being particulate]
39/2062 . . . . [Bonded, e.g. activated carbon blocks]
39/2065 . . . . [the material being fibrous]
39/2068 . . . . [Other inorganic materials, e.g. ceramics]
39/2072 . . . . [the material being particulate or granular]
39/2075 . . . . [sintered or bonded by inorganic agents]
39/2079 . . . . [otherwise bonded, e.g. by resins]
39/2082 . . . . [the material being filamentary or fibrous]
39/2086 . . . . [sintered or bonded by inorganic agents]
39/2089 . . . . [otherwise bonded, e.g. by resins]
39/2093 . . . . [Ceramic foam]
39/2096 . . . . [Wound materials]

41/00 Regeneration of the filtering material or filter elements outside the filter for liquid or gaseous fluids
41/02 . of loose filtering material
41/04 . of rigid self-supporting filtering material

43/00 Separating particles from liquids, or liquids from solids, otherwise than by sedimentation or filtration (flotation processes B03D 1/00; drying solid materials or objects F26B)
### Separating dispersed particles from gases or vapours

**A62B 23/00; filtering air for vehicles B60H 3/06; separating pneumatically-conveyed materials from propelling gas B65G 53/60; exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust F01N 3/02; air cleaners for the intakes of gas-turbine or jet-propulsion plants F02C 7/05; of combustion engines F02M 35/024; for compressors F04B 39/16; filtering in air-conditioning F24F 3/16**

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<td>[Involving sonic or ultrasonic waves]</td>
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<td>[By electrical means, e.g. for the generation of electrostatic forces in order to reject particles]</td>
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<td>46/046</td>
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</table>
Separating dispersed particles from gases or vapours

Particle separators, e.g. dust precipitators, using filtering belts or supporting elements.

- Means acting upon failure of the filtering system, e.g. in case of damage of the filter elements; Failsafes.
- Construction of filtering belts or supporting elements.
-ሉетод€
- Methods for maintaining a space between filters, e.g. avoiding contact between adjacent filters.
- Cleaning filters.
- Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious edge filters.
- Particle separators, e.g. dust precipitators, using loose filtering material.
- Particle separators, e.g. dust precipitators, using filter brushes.
- Particle separators, e.g. dust precipitators, using filter plates, sheets, or pads having plane surfaces, i.e. axial filtering.
- V-type arrangements.
- Curved filtering elements.
- Ring-shaped filtering elements.
- in multiple arrangements.
- [V-type arrangements]
- arranged in a star shape.
- arranged on non-filtering conveyors (or supports).
- Particle separators, e.g. dust precipitators, using filtering belts.
- Construction of filtering belts or supporting belts including devices for centering, mounting or sealing thereof.
- the belts combined with drums.
- the belts travelling during filtering.
- Particle separators, e.g. dust precipitators, using rigid hollow filter bodies.
- characterised by the physical shape or structure of the filtering element.
- Filter candles.
- Filter cartridges.
- End caps including additional functions or special forms.
- Honeycomb filters (used for filtering exhaust gases of an internal combustion engine F01N 3/022; ceramic honeycomb structures per se C04B 38/0006).
- Mounting of the body within a housing.
- characterized by parameters related to the physical properties of the honeycomb structure material, e.g. modulus of rupture, porosity.
- (of the honeycomb walls or cells)
- [Porosity]
- [Pore diameter]
- (of the plugs)
- (of the outer peripheral sealing)
- (of the adhesive layers, i.e. joints between segments)

-characterised by the geometrical structure, shape, pattern or configuration or parameters related to the geometry of the structure, e.g. thickness, cell density.
- (of the whole honeycomb or segments, e.g. elliptic body, octagonal segment, centre of gravity).
- (of the plugs, e.g. projections, gaps, length).
- (the outer peripheral sealing, e.g. undulations, thickness).
- (of the adhesive layers, i.e. joints between segments, e.g. undulations, thickness).
- (of the cells, e.g. diamonds, hexagonal configuration, cell density).
- (of the walls along the length of the honeycomb, e.g. inclination from inlet to outlet, length, thickness).
- (Triangular shapes or configurations).
- (Quadrangular shapes or configurations, e.g. square, diamond).
- (Octagonal shapes or configurations).
- (Circular shapes or configurations).
- Other shapes or configurations not covered by groups B01D 46/2474 - B01D 2046/2488.
- The honeycomb filter being defined by mathematical equations.
- rotatable.
- Particle separators, e.g. dust precipitators, using filter brushes.
- Particle separators, e.g. dust precipitators, using loose filtering material.
- the material moving during filtering.
- not horizontally, e.g. using shoots.
- as a substantially horizontal layer, e.g. on rotary tables, drums, conveyor belts.
- as fluidised bed.
- Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious surfaces.
- (of helically or spirally wound bodies).
- (of stacked bodies).
- Auxiliary equipment or operation thereof.
- (Prevention of static charge, e.g. by grounding).
- [Influencing the heat transfer which act passively, e.g. isolations, heat sinks, cooling ribs).
- (Manipulating filters or filter elements, e.g. handles or extracting tools).
- (Reducing noise or vibration emissions).
- (Means for power supply or devices using electrical power in filters or filter elements).
- (Allowing or improving visual supervision, e.g. lamps, transparent parts, windows).
- (Means for active heating or cooling).
- (Special valve constructions adapted to filters or filter elements).
- (Venturi’s or systems showing a venturi effect).
- (Means for wireless communication).
- controlling filtration.
- (by measuring the concentration of particles).
- (by flow measuring).
- (by pressure measuring).
Separating dispersed particles from gases or vapours

46/48 . . . [by temperature measuring]
46/46 . . . automatic
46/48 . . . Removing dust other than cleaning filters, e.g.
by using collecting trays
46/50 . . . Means for discharging electrostatic potential
46/52 . . . Particle separators, e.g. dust precipitators, using
filters embodying folded [corrugated or wound
sheet] material
46/521 . . . [using folded, pleated material]
46/522 . . . . [with specific folds, e.g. having different
lengths]
46/523 . . . . [with means for maintaining spacing between
the pleats or folds]
46/525 . . . . [which comprises flutes]
46/526 . . . . . [in stacked arrangement]
46/527 . . . . . . [in wound arrangement]
46/528 . . . . . [using wound sheets (B01D 46/527 takes
precedence)]
46/54 . . . Particle separators, e.g. dust precipitators, using
ultra-fine filter sheets or diaphragms
46/543 . . . . [using membranes]
46/546 . . . . [using nano- or microfibres]

47/00 Separating dispersed particles from gases, air
or vapours by liquid as separating agent (B01D 45/10
takes precedence; fractionating columns or parts
thereof B01D 3/16)
47/02 . . . by passing the gas or air or vapour over or through a
liquid bath
47/021 . . . . [by bubbling the gas through a liquid bath]
47/022 . . . . [by using a liquid curtain (B01D 47/06 takes
precedence)]
47/024 . . . . [by impinging the gas to be cleaned essentially in
a perpendicular direction onto the liquid surface]
47/025 . . . . [by contacting gas and liquid with a static flow
mixer (B01D 47/14 takes precedence)]
47/027 . . . . . [by directing the gas to be cleaned essentially
tangential to the liquid surface]
47/028 . . . . . [by directing the gas through a wetted wire
mesh or a perforated plate (B01D 47/14 takes
precedence)]
47/04 . . . by passing the gas or air or vapour through foam
47/05 . . . by condensation of the separating agent
47/06 . . Spray cleaning
47/063 . . . . [with two or more jets impinging against each
other]
47/066 . . . . [with nozzles using mechanical vibrations]
47/08 . . . with rotary nozzles
47/085 . . . . [with nozzles which are partly immersed in the
washing fluid]
47/10 . . . Venturi scrubbers
47/12 . . . Washers with plural different washing sections
(B01D 47/14 takes precedence)
47/14 . . . Packed scrubbers (packing elements B01J 19/30,
B01J 19/32)
47/16 . . . Apparatus having rotary means, other than rotatable
nozzles, for atomising the cleaning liquid
47/18 . . . . with horizontally-arranged shafts

49/00 Separating dispersed particles from gases, air
or vapours by other methods
49/003 . . . [by sedimentation]
49/006 . . . [by sonic or ultrasonic techniques]
49/02 . . . by thermal repulsion

50/00 Combinations of devices for separating particles
from gases or vapours
50/002 . . . [Combinations of devices relating to groups
B01D 45/00 and B01D 46/00]
50/004 . . . [Combinations of devices relating to groups
B01D 45/00 and B01D 47/00]
50/006 . . . [Combinations of devices relating to groups
B01D 46/00 and B01D 47/00]
50/008 . . . [Combinations of devices relating to groups
B01D 45/00 and B01D 46/00 and B01D 47/00]

51/00 Auxiliary pretreatment of gases or vapours to be
cleaned (preventing dust fires A62C; pretreatment
specially adapted for magnetic or electrostatic
separation B03C)
51/02 . . . Amassing the particles, e.g. by flocculation
(amassing by electric fields B03C 3/0175)
51/04 . . . by seeding, e.g. by adding particles
51/06 . . . by varying the pressure of the gas or vapour
51/08 . . . . by sound or ultrasonics
51/10 . . . Conditioning the gas to be cleaned

53/00 Separation of gases or vapours; Recovering
vapours of volatile solvents from gases; Chemical
or biological purification of waste gases, e.g. engine
exhaust gases, smoke, fumes, flue gases, aerosols,
(recovery of volatile solvents by condensation
B01D 5/00; sublimation B01D 7/00; cold traps, cold
baffles B01D 8/00; working-up undefined gaseous
mixtures obtained by cracking hydrocarbon oils
C10G 7/00; cleaning coal gas C10K; working-up
of natural gas, or synthetic natural gas, C10L 3/10;
separation of difficult-to-condense gases or air
by liquefaction F25J; for investigating materials
G01N 30/00)

NOTE
Group B01D 53/34 takes precedence over groups
B01D 53/02 - B01D 53/32

53/002 . . . [by condensation]
53/005 . . . [by heat treatment]
53/007 . . . [by irradiation]
53/002 . . . by adsorption, e.g. preparative gas chromatography
[(solid sorbent compositions B01J 20/00; preparation
of inorganic compounds or elements
C01)]

NOTE
In group B01D 53/02 and subgroups it is
desirable to add indexing codes relating to
adsorbents, components to be removed, main
components in the product gas stream or type
of gas or vapour treatment chosen from groups
B01D 2253/00, B01D 2256/00, B01D 2257/00 or
B01D 2259/00

53/025 . . . . [with wetted adsorbents; Chromatography
(analytical chromatography
G01N 30/00; G01N 30/96; for liquids
B01D 15/08)]
53/04 . . . . with stationary adsorbents [(B01D 53/025 takes
precedence)]
53/0407 . . . . . [Constructional details of adsorbing systems]
53/0415 . . . . . . [Beds in cartridges]
53/0423 . . . . . . [Beds in columns]
Separating dispersed particles from gases or vapours

NOTE

In groups B01D 53/0462 and B01D 53/047 - B01D 53/0476 it is desirable to add indexing codes chosen from B01D 2259/40007, B01D 2259/40001 relating to controlling and processing aspects of pressure or temperature swing adsorption according to the "moving bed" method.

53/0462 . . . . [Temperature swing adsorption]
53/047 . . . . Pressure swing adsorption
53/0473 . . . . [Rapid pressure swing adsorption]
53/0476 . . . . [Vacuum pressure swing adsorption]
53/053 . . with storage or buffer vessel
53/06 . . with moving adsorbents, e.g. rotating beds (B01D 53/025 takes precedence)
53/08 . . according to the "moving bed" method
53/10 . . with dispersed adsorbents
53/12 . . according to the "fluidised technique"
53/14 . . by absorption
53/1406 . . . . [Multiple stage absorption]
53/1412 . . . . [Controlling the absorption process]
53/1418 . . . . [Recovery of products]
53/1425 . . . . [Regeneration of liquid absorbents]
53/1431 . . . . [Pretreatment by other processes]
53/1437 . . . . [Pretreatment by adsorption]
53/1443 . . . . [Pretreatment by diffusion]
53/1445 . . . . [Pretreatment by separation of solid or liquid material]
53/1456 . . . . [Removing acid components]
53/1462 . . . . [Removing mixtures of hydrogen sulfide and carbon dioxide]
53/1468 . . . . [Removing hydrogen sulfide]
53/1475 . . . . [Removing carbon dioxide]
53/1481 . . . . [Removing sulfur dioxide or sulfur trioxide]
53/1487 . . . . [Removing organic compounds]
53/1493 . . . . [Selection of liquid materials for use as absorbents]

NOTE

In B01D 53/1493 it is desirable to add indexing codes for compositional aspects of absorbents. The codes are chosen from B01D 2252/00 - B01D 2252/61.

53/18 . . . . Absorbing units; Liquid distributors therefor (B01D 3/16, B01D 3/26, B01D 3/30 take precedence; packing elements B01J 19/30, B01J 19/32)
53/185 . . . . [Liquid distributors]
53/22 . . by diffusion (manufacturing semi-permeable membranes B01D 67/00; form, structure or properties of semi-permeable membranes B01D 69/00; material for semi-permeable membranes B01D 71/00)
2053/221 . . . . [Devices]
2053/222 . . . . [with plates]

2053/223 . . . . [with hollow tubes]
2053/224 . . . . [with hollow fibres]
53/225 . . . . [Multiple stage diffusion]
53/226 . . . . [in serial connexion]
53/227 . . . . [in parallel connexion]
53/228 . . . . [characterised by specific membranes]
53/229 . . . . [Integrated processes (Diffusion and at least one other process, e.g. adsorption, absorption)]
53/24 . . by centrifugal force (centrifuges B04B: cyclones B04C)
53/26 . . Drying gases or vapours
53/261 . . . . [by adsorption]
53/263 . . . . [by absorption]
53/265 . . . . [by refrigeration (condensation)]
53/266 . . . . [by filtration]
53/268 . . . . [by diffusion]
53/28 . . Selection of materials for use as drying agents
53/30 . . Controlling by gas-analysis apparatus (regulating non electrical variables in general G05D)
53/32 . . by electrical effects other than those provided for in group B01D 61/00
53/323 . . . . [by electrostatic effects or by high-voltage electric fields]
53/326 . . . . [in electrochemical cells]
53/34 . . Chemical or biological purification of waste gases
53/343 . . . . [Heat recovery]
53/346 . . . . [Controlling the process]
53/38 . . Removing components of undefined structure
53/40 . . . . Acidic components (B01D 53/44 takes precedence)
53/42 . . . . Basic components (B01D 53/44 takes precedence)
53/44 . . . . Organic components
53/46 . . . . Removing components of defined structure
53/48 . . . . Sulfur compounds
53/485 . . . . {containing only one sulfur compound other than sulfur oxides or hydrogen sulfide}
53/50 . . . . Sulfur oxides (B01D 53/60 takes precedence)
53/501 . . . . {by treating the gases with a solution or a suspension of an alkali or earth-alkali or ammonium compound}
53/502 . . . . . . {characterised by a specific solution or suspension}
53/504 . . . . . . {characterised by a specific device}
53/505 . . . . . . {in a spray drying process}
53/507 . . . . . . {by treating the gases with other liquids}
53/508 . . . . . . {by treating the gases with solids}
53/52 . . . . Hydrogen sulfide
53/523 . . . . . . {Mixtures of hydrogen sulfide and sulfur oxides}
53/526 . . . . . . {Mixtures of hydrogen sulfide and carbon dioxide}
53/54 . . . . Nitrogen compounds
53/56 . . . . Nitrogen oxides (B01D 53/60 takes precedence)
53/565 . . . . . . {by treating the gases with solids}
53/58 . . . . Ammonia
53/60 . . . . Simultaneously removing sulfur oxides and nitrogen oxides
53/62 . . . . Carbon oxides
53/64 . . . . Heavy metals or compounds thereof, e.g. mercury
53/66 . . . . Ozone
Separating dispersed particles from gases or vapours

53/68 . . . . Halogens or halogen compounds
53/685 . . . . [by treating the gases with solids]
53/70 . . . . Organic halogen compounds
53/72 . . . . Organic compounds not provided for in groups B01D 53/48 - B01D 53/70, e.g. hydrocarbons
53/73 . . . . After-treatment of removed components
53/74 . . . . General processes for purification of waste gases; Apparatus or devices specially adapted therefor (B01D 53/92 takes precedence)
53/75 . . . . Multi-step processes
53/76 . . . . Gas phase processes, e.g. by using aerosols
53/77 . . . . Liquid phase processes
53/78 . . . . with gas-liquid contact
53/79 . . . . Injecting reactants
53/80 . . . . Semi-solid phase processes, i.e. by using slurries
53/81 . . . . Solid phase processes
53/82 . . . . with stationary reactants
53/83 . . . . with moving reactants
53/84 . . . . Biological processes
53/85 . . . . with gas-solid contact
53/86 . . . . Catalytic processes
53/8603 . . . . [Removing sulfur compounds]
53/8606 . . . . [only one sulfur compound other than sulfur oxides or hydrogen sulfide]
53/8609 . . . . [Sulfur oxides]
53/8612 . . . . [Hydrogen sulfide]
53/8615 . . . . [Mixtures of hydrogen sulfide and sulfur oxides]
53/8618 . . . . [Mixtures of hydrogen sulfide and carbon dioxides]
53/8621 . . . . [Removing nitrogen compounds]
53/8625 . . . . [Nitrogen oxides]
53/8628 . . . . [Processes characterised by a specific catalyst]
53/8631 . . . . [Processes characterised by a specific device]
53/8634 . . . . [Ammonia]
53/8637 . . . . [Simultaneously removing sulfur oxides and nitrogen oxides]
53/864 . . . . [Removing carbon monoxide or hydrocarbons]
53/8643 . . . . [Removing mixtures of carbon monoxide or hydrocarbons and nitrogen oxides]
53/8646 . . . . [Simultaneous elimination of the components (B01D 53/8656 takes precedence)]
53/865 . . . . [characterised by a specific catalyst]
53/8653 . . . . [characterised by a specific device]
53/8656 . . . . [Successive elimination of the components]
53/8659 . . . . [Removing halogens or halogen compounds]
53/8662 . . . . [Organic halogen compounds]
53/8665 . . . . [Removing heavy metals or compounds thereof, e.g. mercury]
53/8668 . . . . [Removing organic compounds not provided for in B01D 53/8603 - B01D 53/8665]
53/8671 . . . . [Removing components of defined structure not provided for in B01D 53/8603 - B01D 53/8668]
53/8675 . . . . [Ozone]
53/8678 . . . . [Removing components of undefined structure]
53/8681 . . . . [Acidic components (B01D 53/8687 takes precedence)]
53/8684 . . . . [Basic components (B01D 53/8687 takes precedence)]
53/8687 . . . . [Organic components]
53/8689 . . . . [Multiple step processes]
53/8693 . . . . [After-treatment of removed components]
53/8696 . . . . [Controlling the catalytic process]
53/88 . . . . Handling or mounting catalysts
53/885 . . . . [Devices in general for catalytic purification of waste gases]
53/90 . . . . Injecting reactants
53/92 . . . . of engine exhaust gases (exhaust [or silencing] apparatus [for internal combustion engines, machines or engines in general], having means for purifying, [rendering innocuous] or otherwise treating exhaust gases F01N 3/00]
53/922 . . . . [Mixtures of carbon monoxide or hydrocarbons and nitrogen oxides]
53/925 . . . . [Simultaneous elimination of carbon monoxide or hydrocarbons and nitrogen oxides]
53/927 . . . . [Successive elimination of carbon monoxide or hydrocarbons and nitrogen oxides]
53/94 . . . . by catalytic processes
53/9404 . . . . [Removing only nitrogen compounds]
53/9409 . . . . [Nitrogen oxides]
53/9413 . . . . [Processes characterised by a specific catalyst]
53/9418 . . . . [for removing nitrogen oxides by selective catalytic reduction [SCR] using a reducing agent in a lean exhaust gas]
53/9422 . . . . [for removing nitrogen oxides by NOx storage or reduction by cyclic switching between lean and rich exhaust gases (LNT, NSC, NSR)]
53/9427 . . . . [for removing nitrous oxide]
53/9431 . . . . [Processes characterised by a specific device]
53/9436 . . . . [Ammonia]
53/944 . . . . [Simultaneously removing carbon monoxide, hydrocarbons or carbon making use of oxidation catalysts (three-way-catalysts [TWC] B01D 53/9445)]
53/9445 . . . . [Simultaneously removing carbon monoxide, hydrocarbons or nitrogen oxides making use of three-way-catalysts [TWC] or four-way-catalysts [FWC]]
53/945 . . . . [characterised by a specific catalyst]
53/9454 . . . . [characterised by a specific device]
53/9459 . . . . [Removing one or more of nitrogen oxides, carbon monoxide, or hydrocarbons by multiple successive catalytic functions; systems with more than one different function, e.g. zone coated catalysts (layered catalysts with only one function B01D 53/9413, B01D 53/944 or B01D 53/945)]
53/9463 . . . . [with catalysts positioned on one brick]
53/9468 . . . . [in different layers]
53/9472 . . . . [in different zones]
Separating dispersed particles from gases or vapours

Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, or ultrafiltration; Apparatus specially adapted therefor: Semi-permeable membranes or their production

NOTE

In groups B01D 61/00 - B01D 71/00, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place ([with respect to B01D 71/00, see also Note (1) following that group]).

61/00 Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor

NOTE

In groups B01D 61/00 - B01D 61/58 it is desirable to add the indexing codes relating to process operations and control chosen from groups B01D 2311/00 - B01D 2311/2696. to details relating to membrane modules and apparatus indexing codes chosen from B01D 2313/00 - B01D 2313/90, to details relating to the membrane module operation indexing codes chosen from B01D 2315/00 - B01D 2315/16, to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from B01D 2317/00 - B01D 2317/08 and to details relating to the membrane assembly within one housing indexing codes chosen from B01D 2319/00 - B01D 2319/06

53/9477  . . . .  (with catalysts positioned on separate bricks, e.g. exhaust systems)
53/9481  . . . .  (Catalyst preceded by an adsorption device without catalytic function for temporary storage of contaminants, e.g. during cold start)
53/9486  . . . .  (for storing hydrocarbons)
53/949 . . . .  (for storing sulfur oxides)
53/9495  . . . .  (Controlling the catalytic process)
53/96 . . Regeneration, reactivation or recycling of reactants
53/965  . . . .  (including an electrochemical process step)
57/00 Separation, other than separation of solids, not fully covered by a single other group or subclass, e.g. B03C
57/02  . . by electrophoresis (treatment of water, waste water, sewage or sludge by electrophoresis C02F 1/469: electrophoretic production of compounds or non-metals C25B 7/00; investigating or analysing materials by using electrophoresis G01N 27/26)
59/00 Separation of different isotopes of the same chemical element (preventing occurrence of critical conditions when producing fissile material G21; shielding from radioactivity G21F)
59/02  . . Separation by phase transition
59/04  . . by distillation
59/06  . . by fractional melting; by zone melting
59/08  . . by fractional crystallisation, by precipitation, by zone freezing
59/10  . . Separation by diffusion
59/12  . . by diffusion through barriers
59/14  . . Construction of the barrier
59/16  . . by thermal diffusion
59/18  . . by separation jets
59/20  . . Separation by centrifuging
59/22  . . Separation by extracting
59/24  . . by solvent extraction
59/26  . . by sorption, i.e. absorption, adsorption, persorption
59/28  . . Separation by chemical exchange
59/30  . . by ion exchange
59/32  . . by exchange between fluids
59/33  . . involving dual temperature exchange
59/34  . . Separation by photochemical methods
59/36  . . Separation by biological methods
59/38  . . Separation by electrochemical methods (in general B01J)
59/40  . . by electrolysis
59/42  . . by electromigration; by electrophoresis
59/44  . . Separation by mass spectrography (particle spectrometers or separator tubes H01J 49/00)
59/46  . . using only electrostatic fields
59/48  . . using electrostatic and magnetic fields
59/50  . . Separation involving two or more processes covered by different groups selected from groups B01D 59/02, B01D 59/10, B01D 59/20, B01D 59/22, B01D 59/28, B01D 59/34, B01D 59/36, B01D 59/38, B01D 59/44

Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, or ultrafiltration; Apparatus specially adapted therefor: Semi-permeable membranes or their production

NOTE

In groups B01D 61/00 - B01D 71/00, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place ([with respect to B01D 71/00, see also Note (1) following that group]).

61/00 Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor

NOTE

In groups B01D 61/00 - B01D 61/58 it is desirable to add the indexing codes relating to process operations and control chosen from groups B01D 2311/00 - B01D 2311/2696. to details relating to membrane modules and apparatus indexing codes chosen from B01D 2313/00 - B01D 2313/90, to details relating to the membrane module operation indexing codes chosen from B01D 2315/00 - B01D 2315/16, to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from B01D 2317/00 - B01D 2317/08 and to details relating to the membrane assembly within one housing indexing codes chosen from B01D 2319/00 - B01D 2319/06

61/002  . . [Forward osmosis, direct osmosis (actuators for pressure retarded osmosis F03G 7/0005)]
61/005  . . [Osmotic agents, draw solutions]
61/007  . . [Separation by stereoseparation, steric separation]
61/012  . . Reverse osmosis; Hyperfiltration [: Nanofiltration]
61/022  . . [comprising multiple reverse osmosis, hyperfiltration or nanofiltration steps]
61/025  . . [Reverse osmosis; Hyperfiltration (B01D 61/222 takes precedence)]
61/027  . . [Nanofiltration (B01D 61/222 takes precedence)]
61/04  . . Feed pretreatment
61/06  . . Energy recovery
61/08  . . Apparatus therefor
61/10  . . Accessories; Auxiliary operations
61/12  . . Controlling or regulating
61/14  . . Ultrafiltration; Microfiltration
61/142  . . [comprising multiple ultrafiltration or microfiltration steps]
61/145  . . [Ultrafiltration (B01D 61/142 takes precedence)]
61/147  . . [Microfiltration (B01D 61/142 takes precedence)]
61/16  . . Feed pretreatment
61/18  . . Apparatus therefor
61/20  . . Accessories; Auxiliary operations
61/22  . . Controlling or regulating
61/24  . . Dialysis [: Membrane extraction (dialysate solution flow A61M 1/1656)]
61/243  . . [Dialysis]
61/246  . . [Membrane extraction]
61/28  . . Apparatus therefor
Apparatus... Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, or ultrafiltration; B01D

63/30 . . . Accessories; Auxiliary operations
61/32 . . . Controlling or regulating (measuring ultrafiltrate during dialysis A61M 1/16)
61/36 . . . Pervaporation; Membrane distillation; Liquid permeation
61/362 . . . [Pervaporation]
61/364 . . . [Membrane distillation]
61/366 . . . [Apparatus therefor]
61/368 . . . [Accessories; Auxiliary operations]
61/38 . . . Liquid-membrane separation
61/40 . . . using emulsion-type membranes
61/42 . . . Electrolysis; Electro-osmosis [Electro-ultrafiltration]
61/422 . . . [Electrolysis]
61/425 . . . [Electro-ultrafiltration]
61/427 . . . [Electro-osmosis]
61/44 . . . Ion-selective electrodialysis
61/445 . . . [with bipolar membranes; Water splitting]
61/46 . . . Apparatus therefor
61/48 . . . having one or more compartments filled with ion-exchange material [. e.g. electrodeionisation]
61/485 . . . . . . [Specific features relating to the ion-exchange material]
61/50 . . . Stacks of the plate-and-frame type
61/52 . . . Accessories; Auxiliary operations
61/54 . . . Controlling or regulating
61/56 . . . Electro-osmotic dewatering
61/58 . . . Multistep processes (comprising reverse osmosis or hyperfiltration steps B01D 61/022; comprising ultrafiltration or microfiltration steps B01D 61/142)

NOTE

In group B01D 61/58 specific process steps within the multistep process are indexed by codes chosen from B01D 61/02 - B01D 61/56

63/00 Apparatus in general for separation processes using semi-permeable membranes

NOTE

In groups B01D 63/00 - B01D 63/16 it is desirable to add the indexing codes relating to membrane modules and apparatus chosen from groups B01D 2313/00 - B01D 2313/90, to details relating to the membrane module operation indexing codes chosen from B01D 2315/00 - B01D 2315/16, to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from B01D 2317/00 - B01D 2317/08 and to details relating to the membrane assembly within one housing indexing codes are chosen from B01D 2319/00 - B01D 2319/06

63/005 . . . [Microfluidic devices comprising semi-permeable hollow fibre membranes]
63/02 . . . Hollow fibre modules
63/021 . . . [Manufacturing thereof]
63/022 . . . [Encapsulating hollow fibres]
63/023 . . . [Materials therefor]
63/024 . . . [with a single potted end or U-shaped]
63/025 . . . [Bobbin units]
63/026 . . . [Wafer type modules or flat-surface type modules]
63/027 . . . [Twinned or braided type modules]
63/028 . . . [Microfluidic devices comprising semi-permeable hollow fibre membranes]
63/029 . . . [Microfluidic devices comprising semi-permeable hollow fibre membranes]
63/04 . . . comprising multiple hollow fibre assemblies
63/043 . . . [with separate tube sheets]
63/046 . . . [in separate housings]
63/06 . . . Tubular membrane modules
63/061 . . . [Manufacturing thereof]
63/062 . . . [with membranes on a surface of a support tube]
63/063 . . . [on the inner surface thereof]
63/065 . . . [on the outer surface thereof]
63/066 . . . [with a porous block having membrane coated passages]
63/067 . . . [with pleated membranes]
63/068 . . . [with flexible membrane tubes]
63/08 . . . Flat membrane modules
63/081 . . . [Manufacturing thereof]
63/082 . . . [comprising a stack of flat membranes, e.g. plate-and-frame devices]
63/084 . . . [at least one flow duct intersecting the membranes]
63/085 . . . [specially adapted for two fluids in mass exchange flow]
63/087 . . . [Single membrane modules]
63/088 . . . [Microfluidic devices comprising semi-permeable flat membranes]
63/10 . . . Spiral-wound membrane modules
63/103 . . . [Details relating to membrane envelopes]
63/106 . . . [Anti-Telescopic-Devices [ATD]]
63/12 . . . comprising multiple spiral-wound assemblies
63/14 . . . Pleat-type membrane modules
63/16 . . . Rotary, reciprocated or vibrated modules

65/00 Accessories or auxiliary operations, in general, for separation processes or apparatus using semi-permeable membranes

65/003 . . . [Membrane bonding or sealing]
65/006 . . . [Membrane storage]
65/02 . . . Membrane cleaning or sterilisation [: Membrane regeneration]

NOTE

In group B01D 65/02 it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups B01D 2321/00 - B01D 2321/28

65/022 . . . [Membrane sterilisation]
65/025 . . . [Removal of membrane elements before washing]
65/027 . . . [Cleaning of other parts of the apparatus than the membrane]
Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, or ultrafiltration;

Apparatus...

65/04 . . . with movable bodies, e.g. foam balls

**WARNING**

Group **B01D 65/04** is no longer used for classification of new documents as from November 1st, 2007. Documents presently classified in this group are in the process of reclassification.

65/06 . . . with special washing compositions

**WARNING**

Group **B01D 65/06** is no longer used for classification of new document as from November 1st, 2007. Documents presently classified in this group are in the process of reclassification.

65/08 . . . Prevention of membrane fouling or of concentration polarisation

**NOTE**

In group **B01D 65/08** it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups **B01D 2321/00 - B01D 2321/28**.

65/10 . . . Testing of membranes or membrane apparatus; Detecting or repairing leaks

**NOTE**

The documents classified in the groups **B01D 67/00 - B01D 71/00** are also searchable in a keyword-based electronic off-line database called "MEMBRANE".

65/102 . . . [Detection of leaks in membranes]
65/104 . . . [Detection of leaks in membrane apparatus or modules]
65/106 . . . [Repairing membrane apparatus or modules]
65/108 . . . [Repairing membranes]

67/00 Processes specially adapted for manufacturing semi-permeable membranes for separation processes or apparatus

**NOTE**

In group **B01D 67/00** it is desirable to add the indexing codes relating to membrane preparation chosen from groups **B01D 2323/00 - B01D 2323/42**.

67/0002 . . . [Organic membrane formation]
67/0004 . . . [by agglomeration of particles, e.g. sintering]
67/0006 . . . [by chemical reactions (in-situ polymerisation, polycondensation, cross-linking or reaction for manufacturing composite membranes **B01D 69/125**)]
67/0009 . . . [by phase separation, sol-gel transition, evaporation or solvent quenching]
67/0011 . . . [Casting solutions therefor]
67/0013 . . . [Casting processes (hollow fibre membrane manufacturing methods **B01D 69/08**)]
67/0016 . . . [Coagulation]
67/0018 . . . [Thermally induced processes]
67/002 . . . [from melts]
Semi-permeable membranes for separation processes or apparatus characterised by their form, structure or properties; Manufacturing processes specially adapted therefor

NOTES

1. In this group, the following term is used with the meaning indicated:
   "properties" covers those of a mechanical, physical or chemical nature

2. Manufacturing processes, if considered of interest, are also classified in group B01D 67/00

characterised by their properties

NOTE

In group B01D 69/02 it is desirable to add the indexing codes relating to properties of membranes chosen from groups B01D 2325/00, B01D 2325/38

69/04 Tubular membranes
69/043 (characterised by the tube diameter)
69/046 (characterised by the cross-sectional shape of the tube)
69/06 Flat membranes
69/08 Hollow fibre membranes (manufacture of hollow fibres D01D 5/24, D01F 1/08)
69/081 (characterised by the fibre diameter)
69/082 (characterised by the cross-sectional shape of the fibre)
69/084 Undulated fibres
69/085 (Details relating to the spinnneret)
69/087 (Details relating to the spinning process)
69/088 (Co-extrusion; Co-spinning)
69/10 Supported membranes; Membrane supports
69/105 (Support pretreatment)
69/12 Composite membranes; Ultra-thin membranes
69/122 (Separate manufacturing of ultra-thin membranes)
69/125 (In-situ manufacturing by polymerisation, copolycondensation, cross-linking, and/or reaction)
69/127 (using electrical discharge or plasma-polymerisation)
69/14 Dynamic membranes
69/141 (Heterogeneous membranes, e.g. containing dispersed material; Mixed matrix membranes)
69/142 (with "carriers")
69/144 (containing embedded or bound biomolecules)
69/145 (containing embedded catalysts)
69/147 (containing embedded adsorbents)
69/148 (Organic/inorganic mixed matrix membranes)

Semi-permeable membranes for separation processes or apparatus characterised by the material; Manufacturing processes specially adapted therefor

NOTES

1. In this group, if the material is a composition it is classified according to the constituent present in highest proportion. This constituent is classified according to the last place rule, see Note before group B01D 61/00. If there is more than one constituent present in equal highest proportions, then each of these constituents is classified according to the last place rule.

2. Manufacturing processes, if considered of interest, are also classified in group B01D 67/00.

71/02 Inorganic material
71/021 (Carbon)
71/022 (Metals)
71/024 (Oxides)
71/025 (Aluminium oxide)
71/027 (Silicium oxide)
71/028 (Molecular sieves, e.g. zeolites, silicalite (B01D 71/021 takes precedence))
71/04 Glass
71/06 Organic material
71/08 Polysaccharides
71/10 Cellulose; Modified cellulose
71/12 Cellulose derivatives
71/14 Esters of organic acids
71/16 Cellulose acetate
71/18 Mixed esters, e.g. cellulose acetate-butyrate
71/20 Esters of inorganic acids, e.g. cellulose nitrate
71/22 Cellulose ethers
71/24 Rubbers

NOTE

In this group the following term is used with the meaning indicated:
- "rubber" covers:
  a. natural or conjugated diene rubber;
  b. rubber in general (for specific rubber, see the group provided for such macromolecular compound)

71/26 Polyalkenes
71/28 Polymers of vinyl aromatic compounds
71/30 Polyanenyl halides
71/32 containing fluorine atoms
71/34 Polyvinylidene fluoride
71/36 Polytetrafluoroethylene
71/38 Polyalkenylalcohols; Polyalkenylesters; Polyanenylaldehydes; Polyanenylketones; Polyalkenylesters; Polyalkenylketals
71/40 Polymers of unsaturated acids or derivatives thereof, e.g. salts, amides, amidines, nitriles, anhydrides, esters
71/42 Polymers of nitriles, e.g. polycrylonitrile
71/44 Polymers obtained by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of groups B01D 71/26, B01D 71/42
71/46 Epoxy resins
71/48 Polyesters
71/50 Polycarbonates
71/52 Polyethers
71/54 Polyureas; Polyurethanes
71/56 Polyamides, e.g. polyester-amides
71/58 Other polymers having nitrogen in the main chain, with or without oxygen or carbon only
71/60 Polyamines
Apparatus...

Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, or ultrafiltration; B01D

Details relating to filtering apparatus

2201/00 Types of filters having loose filtering material
2201/005 . with a binder between the individual particles or fibres
2201/02 . Carbon filters
2201/04 . Sand or gravel filters

2201/00 Details relating to filtering apparatus
2201/02 . Filtering elements having a conical form
2201/04 . Supports for the filtering elements
2201/0407 . Perforated supports on both sides of the filtering element
2201/0415 . Details of supporting structures
2201/0423 . not in the inner side of the cylindrical filtering elements
2201/043 . Filter tubes connected to plates
2201/0438 . mounted substantially vertically on plates at the lower side of the filter elements
2201/0446 . suspended from plates at the upper side of the filter elements
2201/0453 . positioned between at least two plates
2201/0461 . Springs
2201/0469 . Filter tubes connected to collector tubes
2201/0476 . mounted substantially vertically on collector tubes at the lower side of the filter elements
2201/0484 . suspended from collector tubes at the upper side of the filter elements
2201/0492 . positioned between at least two collector tubes
2201/06 . Resilient foam as filtering element
2201/08 . Regeneration of the filter
2201/081 . using nozzles or suction devices
2201/082 . Suction devices placed on the cake side of the filtering element
2201/083 . Suction devices placed on the filtrate side of the filtering element, e.g. with variable edge filters

2201/064 . Nozzles placed on the filtrate side of the filtering element
2201/085 . using another chemical than the liquid to be filtered
2201/086 . using fluid streams co-current to the filtration direction
2201/087 . using gas bubbles, e.g. air
2201/088 . Arrangements for killing microorganisms
2201/089 . using rollers having projections to clear the filter apertures
2201/10 . Filtration under gravity in large open drainage basins
2201/12 . Pleated filters
2201/122 . with pleats of different length
2201/125 . with non-parallel pleats
2201/127 . with means for keeping the spacing between the pleats
2201/14 . Particulate filter materials with a lower density than the liquid mixture to be filtered
2201/16 . Valves
2201/162 . with snap, latch or clip connecting means
2201/165 . Multi-way valves
2201/167 . Single-way valves
2201/18 . Filters characterised by the openings or pores
2201/182 . for depth filtration
2201/184 . Special form, dimension of the openings, pores of the filtering elements
2201/186 . Pore openings which can be modified
2201/188 . Multiple filtering elements having filtering areas of different size
2201/20 . Pressure-related systems for filters
2201/202 . Systems for applying pressure to filters
2201/204 . Systems for applying vacuum to filters
2201/206 . by the weight of the liquid in a tube, e.g. siphon, barometric leg
2201/208 . by venturi systems
2201/22 . Filtering bands with supporting discs
2201/24 . Tools used for the removal of filters
2201/26 . Transport systems for filtering devices
2201/265 . mounted on vehicles
2201/28 . Position of the filtering element
2201/282 . Filtering elements with a horizontal rotation or symmetry axis
2201/285 . Filtering elements with a symmetry axis not parallel to the rotation axis
2201/287 . Filtering elements with a vertical or inclined rotation or symmetry axis
2201/29 . Filter cartridge constructions
2201/291 . End caps
2201/293 . Making of end caps
2201/295 . with projections extending in a radial outward direction, e.g. for use as a guide, spacing means
2201/296 . Other than having a circular shape
2201/298 . End caps common to at least two filtering elements
2201/30 . Filter housing constructions
2201/301 . Details of removable closures, lids, caps, filter heads
2201/302 . having inlet or outlet ports
2201/303 . not arranged concentrically
2201/304 . Seals or gaskets
2201/305 . Snap, latch or clip connecting means
Honeycomb-like

Shape of non-cylindrical filtering elements

Power supply means for regenerating the filter

Wireless systems for monitoring the filter

Filter identification means

Means for dissipating electrostatic charges

Overflow systems

Means for dissipating electrostatic charges

Filter identification means

Computerised or programmable systems

Wireless systems for monitoring the filter

Power supply means for regenerating the filter

using the kinetic energy of the fluid circulating in the filtering device

using regenerative sources, e.g. wind, sun

Shape of non-cylindrical filtering elements

Oval

Square or rectangular

Triangular

Honeycomb-like
Details relating to the separation of dispersed particles from gases, air or vapours by liquid as separating agent

- Enhancing the particle separation by electrostatic or magnetic effects (B01D 2247/102 takes precedence; electrostatic or magnetic separation B03C)
- Regenerating the washing fluid (recovering paint spray booth B05B 14/462)
- Means for controlling the separation process
- Means for removing the washing fluid dispersed in the gas or vapours (separating dispersed particles from gases by gravity, inertia or centrifugal forces B01D 45/00)
- Using a cyclone
- Using electrostatic or magnetic effects
- Using fluids, e.g. as a fluid curtain or as large liquid droplets
- Using an impeller
- By gas flow reversal
- Using a structured demister, e.g. tortuous channels
- Using an unstructured demister, e.g. a wire mesh demister
- Using vortex inducers
- Fan arrangements for providing forced draft
- Fan arrangements for providing induced draft

Reactants

- Oxidants
- Oxygen
- Ozone
- Peroxides
- Organic peroxides
- Halogens or halogen compounds (hydrogen halides B01D 2251/50)
- Air
- Reductants
- Hydrogen
- Carbon monoxide
- Ammonium compounds
- Ammonia
- Ammonium hydroxide
- Urea
- Hydrocarbons
- Organic compounds not provided for in groups B01D 2251/206 or B01D 2251/208
- Alkali metal compounds
2252/00 Absorbsents, i.e. solvents and liquid materials for gas absorption

2252/10 Inorganic absorbents (chemical reactants

2252/102 Ammonia

2252/103 Water

2252/1035 Sea water

2252/20 Organic absorbents

2252/202 Alcohols or their derivatives

2252/2021 Methanol

2252/2023 Glycols, diols or their derivatives

2252/2025 Ethers or esters of alkylene glycols, e.g. ethylene or propylene carbonate

2252/2026 Polylethylene glycol, ethers or esters thereof, e.g. Selexol

2252/2028 Polypropylene glycol, ethers or esters thereof

2252/204 Amines

2252/20405 Monoamines

2252/2041 Diamines

2252/20415 Tri- or polyamines

2252/20421 Primary amines

2252/20426 Secondary amines

2252/20431 Tertiary amines

2252/20436 Cyclic amines

2252/20442 containing a piperidine-ring

2252/20447 containing a piperazine-ring

2252/20452 containing a morpholine-ring

2252/20457 containing a pyridine-ring

2252/20463 containing a pyrimidine-ring

2252/20468 containing a pyrroldione-ring

2252/20473 containing an imidazole-ring

2252/20478 Alkanolamines

2252/20484 with one hydroxyl group

2252/20489 with two or more hydroxyl groups

2252/20494 Amino acids, their salts or derivatives

2252/205 Other organic compounds not covered by

B01D 2252/00 - B01D 2252/20494

2252/2053 Other nitrogen compounds

2252/2056 Sulfur compounds, e.g. Sulfolane, thiols

2252/30 Ionic liquids and zwitter-ions

2252/40 Absorbents explicitly excluding the presence of water

2252/50 Combinations of absorbents

2252/502 having two or more functionalities in the same molecule other than alkanolamine

2252/504 Mixtures of two or more absorbents

2252/60 Additives

2252/602 Activators, promoting agents, catalytic agents or enzymes

2252/604 Stabilisers or agents inhibiting degradation

2252/606 Anticorrosion agents

2252/608 Antifoaming agents

2252/61 Antifouling agents

2253/00 Adsorbents used in separation treatment of gases and vapours

2253/10 Inorganic absorbents

2253/102 Carbon

2253/104 Alumina

2253/106 Silica or silicates

2253/108 Zeolites

2253/1085 characterized by a silicon-aluminium ratio

2253/11 Clays

2253/112 Metals or metal compounds not provided for in

B01D 2253/104 or B01D 2253/106

2253/1122 Metals

2253/1124 Metal oxides

2253/1126 Metal hydrides

2253/1128 Metal sulfides

2253/116 Molecular sieves other than zeolites

2253/20 Organic absorbents

2253/202 Polymeric absorbents

2253/204 Metal organic frameworks (MOF's)

2253/206 Ion exchange resins

2253/25 Coated, impregnated or composite absorbents

2253/30 Physical properties of absorbents

2253/302 Dimensions

2253/304 Linear dimensions, e.g. particle shape, diameter

2253/306 Surface area, e.g. BET-specific surface

2253/308 Pore size

2253/31 Pore size distribution

2253/311 Porosity, e.g. pore volume

2253/34 Specific shapes

2253/342 Monoliths

2253/3425 Honeycomb shape

2255/00 Catalysts

2255/10 Noble metals or compounds thereof

2255/102 Platinum group metals

2255/1021 Platinum

2255/1023 Palladium

2255/1025 Rhodium

2255/1026 Ruthenium

2255/1028 Iridium

2255/104 Silver

2255/106 Gold

2255/20 Metals or compounds thereof (noble metals

B01D 2255/10)
Type of catalytic reaction

- Non-metallic catalysts, additives or dopants
- Mixed oxides
- Transition metals
- Rare earth metals
- Catalysts not containing noble metals
- Alkaline earth metals
- Barium
- Rare earth metals
- Yttrium
- Lanthanum
- Cerium
- Praseodymium
- Neodymium
- Titanium
- Vanadium
- Manganese
- Iron
- Cobalt
- Nickel
- Copper
- Molybdenum
- Tungsten
- Chromium
- Zinc
- Other metals
- Aluminium
- Tin
- Bismuth
- Antimony
- Silica
- Mixed oxides
- Perovskites
- Spinel
- Zr-Ce mixed oxides
- Zeolites
- Beta zeolites
- ZSM 5 zeolites
- Catalysts not containing noble metals
- Non-metallic catalysts, additives or dopants
- Carbon
- Ligands for metal-organic catalysts
- Additives or dopants
- Type of catalytic reaction
- Multilayered catalyst
- Two layers
- Three layers
- More than three layers
- Multi-zoned catalysts
- Two zones
- Three zones
- More than three zones
- Multiple catalysts
- in parallel

Components to be removed

- Carbon oxides
- Sulfur compounds
- Halogen compounds
- Organic sulfur compounds, e.g. mercaptans
- Carbon oxides
- Oxygen
- Methane
- Hydrogen
- Nitrogen
- Hydrogen sulfide
- Single element halogens
- Chlorine
- Bromine
- Fluorine
- Hydrobromic acid
- Hydrofluoric acid
- Hydrochloric acid
- Hydrofluoric acid
- Inorganic halogen compounds
- Organic halogen compounds
- Bromine compounds
- Chlorine
- Fluorine
- Iodine
- Sulfur compounds
- Hydrogen sulfide
- Organic sulfur compounds, e.g. mercaptans
- Carbonoxysulfide COS
- Nitrogen compounds
- Dinitrogen oxide
- Nitrogen oxides other than dinitrogen oxide
- Ammonia
- Cyanides, e.g. hydrogen cyanide (HCH)
- Carbon oxides

Main component in the product gas stream after treatment

- Catalysts having a gradually changing coating
- Catalyst dispersed in the gas
- O₂-storage component incorporated in the catalyst
- H₂-storage component incorporated in the catalyst
- NOₓ-storage component incorporated in the catalyst
- NH₃-storage component incorporated in the catalyst
- Catalyst supported on particulate filters
- Wall flow filters
- Dimensions
- Linear dimensions
- Porosity
- Specific surface

- Nitrogen
- Oxygen
- Ozone
- Hydrogen
- Noble gases
- Carbon monoxide
- Carbon dioxide
- Hydrocarbons
- Methane
- Halogens or halogen compounds

- Single element gases other than halogens
- Nitrogen
- Oxygen
- Ozone
- Hydrogen
- Noble gases
- Halogens or halogen compounds
- Single element halogens
- Bromine
- Chlorine
- Fluorine
- Inorganic halogen compounds
- Hydrobromic acid
- Hydrochloric acid
- Hydrofluoric acid
- Organic halogen compounds
- Bromine compounds
- Chlorine
- Fluorine
- Iodine
- Sulfur compounds
- Hydrogen sulfide
- Organic sulfur compounds, e.g. mercaptans
- Carbonoxysulfide COS
- Nitrogen compounds
- Dinitrogen oxide
- Nitrogen oxides other than dinitrogen oxide
- Ammonia
- Cyanides, e.g. hydrogen cyanide (HCH)
- Carbon oxides
2257/502 . . . Carbon monoxide
2257/504 . . . Carbon dioxide
2257/55 . . . Compounds of silicon, phosphorus, germanium or arsenic
2257/553 . . . Compounds comprising hydrogen, e.g. silanes
2257/556 . . . Organic compounds
2257/60 . . Heavy metals or heavy metal compounds
2257/602 . . . Mercury or mercury compounds
2257/70 . . Organic compounds not provided for in groups
2258/0291 . . . Hydrocarbons
2258/0283 . . . Aromatic hydrocarbons
2258/0275 . . . Solvents not covered by groups
2258/0266 . . . Volatile organic compounds V.O.C.’s
2258/026 . . Water
2258/026 . . . Odorous compounds not provided for in groups
2258/025 . . . Methane
2258/027 . . . Natural gas engines
2258/0208 . . . Other waste gases
2258/0225 . . . from chemical or biological warfare
2258/0223 . . . from cement factories
2258/0241 . . . from glass manufacture plants
2258/0225 . . . from metallurgy plants
2258/0258 . . . from painting equipments or paint drying installations
2258/0225 . . . from food processing plants or kitchens
2258/0283 . . . Flue gases
2258/0291 . . . from waste incineration plants
2258/0285 . . . Biogas
2258/0208 . . Polluted air

2259/00 Sources of waste gases
2259/01 . . Engine exhaust gases
2259/012 . . Diesel engines and lean burn gasoline engines
2259/014 . . Stoichiometric gasoline engines
2259/016 . . Methanol engines
2259/018 . . Natural gas engines
2259/02 . . Other waste gases
2259/0208 . . from fuel cells
2259/0216 . . from CVD treatment or semi-conductor manufacturing
2259/0225 . . from chemical or biological warfare
2259/0233 . . from cement factories
2259/0241 . . from glass manufacture plants
2259/0225 . . from metallurgy plants
2259/0258 . . from painting equipments or paint drying installations
2259/0266 . . from animal farms
2259/0275 . . from food processing plants or kitchens
2259/0283 . . Flue gases
2259/0291 . . from waste incineration plants
2259/05 . . Biogas
2259/06 . . Polluted air

2259/00 Type of treatment
2259/10 . . Gas phase, e.g. by using aerosols
2259/12 . . Methods and means for introducing reactants (for catalytic processes B01D 53/90)
2259/122 . . Gaseous reactants
2259/124 . . Liquid reactants
2259/126 . . Semi-solid reactants, e.g. slurries
2259/128 . . Solid reactants
2259/40 . . Further details for adsorption processes and devices
2259/40001 . . Methods relating to additional, e.g. intermediate, treatment of process gas
2259/40003 . . Methods relating to valve switching
2259/40005 . . using rotary valves
2259/40007 . . Controlling pressure or temperature swing adsorption
2259/40009 . . using sensors or gas analysers
2259/40011 . . Methods relating to the process cycle in pressure or temperature swing adsorption
2259/40013 . . Pressurization
2259/40015 . . with two sub-steps
2259/40016 . . with three sub-steps
2259/40018 . . with more than three sub-steps
2259/4002 . . Production
2259/40022 . . with two sub-steps
2259/40024 . . with three sub-steps
2259/40026 . . with more than three sub-steps
2259/40028 . . Depressurization
2259/4003 . . with two sub-steps
2259/40032 . . with three sub-steps
2259/40033 . . with more than three sub-steps
2259/40035 . . Equalization
2259/40037 . . with two sub-steps
2259/40039 . . with three sub-steps
2259/40041 . . with more than three sub-steps
2259/40043 . . Purgung
2259/40045 . . with two sub-steps
2259/40047 . . with three sub-steps
2259/40049 . . with more than three sub-steps
2259/4005 . . Nature of purge gas
2259/40052 . . Recycled product or process gas
2259/40054 . . treated before its reuse
2259/40056 . . Gases other than recycled product or process gas
2259/40058 . . Number of sequence steps, including sub-steps, per cycle
2259/4006 . . Less than four
2259/40062 . . Four
2259/40064 . . Five
2259/40066 . . Six
2259/40067 . . Seven
2259/40069 . . Eight
2259/40071 . . Nine
2259/40073 . . Ten
2259/40075 . . More than ten
2259/40077 . . Direction of flow
2259/40079 . . Co-current
2259/40081 . . Counter-current
2259/40083 . . Regeneration of adsorbents in processes other than pressure or temperature swing adsorption
2259/40084 . . by exchanging used adsorbents with fresh adsorbents
2259/40086 . . by using a purge gas (B01D 2259/4009 takes precedence)
2259/40088 . . by heating
2259/4009 . . using hot gas
2259/40092 . . using hot liquid
2259/40094 . . by applying microwaves
2259/40096 . . by using electrical resistance heating
2259/40098 . . with other heating means
2259/401 . . using a single bed
2259/402 . . using two beds
2259/403 . . using three beds
2259/404 . . using four beds
2259/406 . . using more than four beds
2259/4061 . . using five beds
2259/4062 . . using six beds
2259/4063 . . using seven beds
2265/028 . Special snap, latch or clip connecting means
2265/029 . Special screwing connections, threaded sections
2265/04 . Permanent measures for connecting different parts of the filter, e.g. welding, gluing or moulding
2265/05 . Special adapters for the connection of filters or parts of filters
2265/06 . Details of supporting structures for filtering material, e.g. cores

2267/00 Multiple filter elements specially adapted for separating dispersed particles from gases or vapours
2267/30 . Same type of filters
2267/40 . Different types of filters
2267/60 . Vertical arrangement
2267/70 . Horizontal arrangement

2271/00 Sealings for filters specially adapted for separating dispersed particles from gases or vapours
2271/02 . Gaskets, sealings
2271/022 . Axial sealings
2271/025 . Making of sealings
2271/027 . Radial sealings

2273/00 Operation of filters specially adapted for separating dispersed particles from gases or vapours
2273/10 . Allowing a continuous bypass of at least part of the flow, e.g. of secondary air, vents
2273/12 . Influencing the filter cake during filtration using filter aids
2273/14 . Filters which are moved between two or more positions, e.g. by turning, pushing
2273/16 . Means for selecting a filter element of a group of filters for a special purpose other than cleaning a filter
2273/18 . Testing of filters, filter elements, sealings
2273/20 . High temperature filtration
2273/22 . Making use of microwaves, e.g. for measurements
2273/24 . Making use of acoustic waves, e.g. for measurements
2273/26 . Making use of optical waves, e.g. for measurements
2273/28 . Making use of vacuum or underpressure
2273/30 . Means for generating a circulation of a fluid in a filtration system, e.g. using a pump or a fan

2275/00 Filter media structures for filters specially adapted for separating dispersed particles from gases or vapours
2275/10 . Multiple layers
2275/105 . Wound layers
2275/20 . Shape of filtering material
2275/201 . Conical shape
2275/202 . Disc-shaped filter elements
2275/203 . Shapes flexible in their geometry, e.g. bendable, adjustable to a certain size
2275/204 . Special shapes of loose filter materials
2275/205 . Rectangular shape
2275/206 . Special forms, e.g. adapted to a certain housing
2275/207 . Triangular shape
2275/208 . Oval shape
2275/30 . Porosity of filtering material
2275/302 . Means for changing the porosity of a filter element, e.g. adjustment of a slit width, compression of a foam material
B01D

2279/00 Filters adapted for separating dispersed particles from gases or vapours, specially modified for specific uses
- for air bags, e.g. inflators therefor
- for collecting heterogeneous particles separately
- for treatment of exhaust gases from IC Engines
- for venting arrangements
- for cleaning of environmental air, e.g. by filters installed on vehicles or streets
- for electronic devices, e.g. computers, hard-discs, mobile phones
- for air conditioning (air-conditioning systems comprising filters F24F 3/1603)
- in clean rooms, e.g. production facilities for electronic devices, laboratories
- for cleaning appliances, e.g. suction cleaners (suction cleaners comprising filters A47L 9/10)
- for the intake of internal combustion engines or turbines (intake systems for vehicles comprising filters F02M 35/024)
- for the sterilisation of air (disinfection, sterilisation or deodorization of air A61L 9/10)

2311/00 Details relating to membrane separation process operations and control

**NOTE**
In groups B01D 2311/02 - B01D 2311/08, the nature of specific operations carried out can be indexed by a combination of symbols chosen from B01D 2311/10 - B01D 2311/2696.

2311/02 Specific process operations before starting the membrane separation process
2311/04 Specific process operations in the feed stream; Feed pretreatment
2311/06 Specific process operations in the permeate stream
2311/08 Specific process operations in the concentrate stream
2311/10 Temperature control
2311/103 Heating
2311/106 Cooling
2311/12 Addition of chemical agents
2311/13 Use of sweep gas
2311/14 Pressure control
2311/16 Flux control
2311/165 Cross-flow velocity control
2311/18 pH control
2311/20 Power consumption
2311/22 characterised by a specific duration or time
2311/24 Quality control
2311/243 Electrical conductivity control
2311/246 Concentration control
2311/25 Recirculation, recycling, e.g. recirculation of concentrate into the feed
2311/26 Further operations combined with membrane separation processes
2311/2603 Application of an electric field, different from the potential difference across the membrane
2311/2607 Application of a magnetic field
2311/2611 Irradiation
2311/2615 Application of high-frequency electromagnetic fields or microwave irradiation
2311/2619 UV-irradiation
2311/2623 Ion-Exchange
2311/2626 Absorption or adsorption
2311/263 Chemical reaction
2311/2634 Oxidation
2311/2638 Reduction
2311/2642 Aggregation, sedimentation, flocculation, precipitation or coagulation
2311/2646 Decantation
2311/2649 Filtration
2311/2653 Degassing
2311/2657 Deseration
2311/2661 Addition of gas
2311/2665 Aeration other than for cleaning purposes
2311/2669 Distillation
2311/2673 Evaporation
2311/2676 Centrifugal separation
2311/268 Water softening
2311/2684 Electrochemical processes
2311/2688 Biological processes
2311/2692 Sterilization
2311/2696 Catalytic reactions

2313/00 Details relating to membrane modules or apparatus
2313/02 Specific tightening or locking mechanisms
2313/025 Specific membrane holders
2313/04 Specific sealing means
2313/06 External membrane module supporting or fixing means
2313/08 Flow guidance means within the module or the apparatus
2313/083 Bypass routes
2313/086 Meandering flow path over the membrane
2313/10 Specific supply elements
2313/105 Supply manifolds
2313/12 Specific discharge elements
2313/125 Discharge manifolds
2313/13 Specific connectors
2313/14 Specific spacers
2313/143 on the feed side
2313/146 on the permeate side
2313/16 Specific vents
2313/18 Specific valves
2313/19 Specific flow restrictors
2313/20 Specific housing
2313/21 Specific headers, end caps
Details relating to the membrane module operation

- Rotation or turning
- Reciprocation, oscillation or vibration
- Moving the membrane in one direction, e.g., displacement, translational movement
- Submerged-type; Immersion type
- Fully permeating type; Dead-end filtration
- Cross-flow filtration
- Feed-and-bleed systems
- Batch-systems
- Diafiltration
- Time sequence of one or more process steps carried out periodically within one apparatus
- Operation control schemes defined by a periodically repeated sequence comprising filtration cycles combined with cleaning or gas supply, e.g., aeration

Membrane module arrangements within a plant or an apparatus (membrane assemblies within one housing B01D 2319/00)

- Elements in series
- Reject series
- Permeate series
- Christmas tree arrangements
- Elements in parallel
- Use of membranes of different materials or properties within one module

Details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling

- Forward flushing
- Backflushing
- Use of osmotic pressure, e.g., direct osmosis
- Use of hot water or water vapor
- Use of feed
- Use of permeate
- Use of concentrate
- Use of chemical agents
- Use of acids
- Use of bases
- Use of enzymatic agents
- Use of other chemical agents
- Use of gases
- Aeriation
- By influencing the flow
- statically
- Static mixers; Turbulence generators
- Tangential inlet
- dynamically
- Mixers; Agitators
- Integrated pumps
- by vibration of the membrane, e.g., with an actuator
- Pulsated flow
- Ultrasonic treatment
- By reversing the flow
- using movable bodies, e.g., foam balls
- Electrical effects
- Polarity reversal
- Interruption of electric currents
- Magnetic effects
- By suction
- By soaking or impregnating
- Mechanical cleaning, e.g., with brushes or scrapers
- By heating or pyrolysis
- by radiation
- By UV radiation
- By gamma radiation
- Automatic control of cleaning processes

Membrane assemblies within one housing (module or elements arrangements within a plant or an apparatus B01D 2317/00)

- Elements in series
- Reject series
- Permeate series
- Christmas tree arrangements
- Hydrophilization
- Hydrophobization
- Specific viscosities of materials involved
- Specific temperatures applied
- Specific pressure applied
- Specific ratios of components used
- Aging features
- Use of swelling agents
- Use of pore-control agents
- Use of plasticizers
- Use of fillers
- Use of non-solvents
- Use of supercritical fluids
- Use of template or surface directing agents [SDA]
Spraying processes
Pore treatments
Reducing the pores
Closing of pores, e.g. for membrane sealing
Cross-linking
Use of chain transfer agents or inhibitors
Use of radiation
UV-treatment
Use of magnetic or electrical fields
Introduction of specific chemical groups
Graft polymerization
involving radiation
Electrospinning
in-situ membrane formation
Details of membrane preparation apparatus
Relaxation steps
Impregnation
Influencing the pH
Control of the membrane preparation process

Details relating to properties of membranes
Details relating to pores or pososity of the membranes

Characteristic pore shapes
Asymmetric membranes
Dense layer within the membrane
Finger pores
Sponge structure
Nonporous membranes
Microfluidic pore structures
Characteristic thickness
Surface irregularities
Patterned membranes
Catalysts being present on the surface of the membrane or in the pores
Adsorbents being present on the surface of the membranes or in the pores
Membrane materials having negatively charged functional groups
Membrane materials having positively charged functional groups
Membrane materials having mixed charged functional groups
Specific permeability or cut-off range
Thermal or heat-resistance properties
Mechanical properties, e.g. strength
Electrical properties
Degradation or stability over time
Chemical resistance
Melting point or glass-transition temperatures
Molecular weight or degree of polymerization
Hydrophilic membranes
Hydrophobic membranes
Fibre reinforced membranes
Ion-exchange membranes
Transmission of light
Magnetic properties
Antimicrobial properties