

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SEPARATING; MIXING

B01 PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL

B01D **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

B01D

B01D

(continued)

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 30/00](#); sugar industry [C13](#); 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)}
 - 1/2893 . . . {Driving systems}
 - 1/2896 . . {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)}

- 3/08 . in rotating vessels; Atomisation on rotating discs
([B01D 1/222](#) , [B01D 3/10](#) take precedence)
- 3/085 . . {using a rotary evaporator}
- 3/10 . Vacuum distillation ([B01D 3/12](#) takes precedence)
- 3/101 . . {Recirculation of the fluid used as fluid working medium in a vacuum creating device}
- 3/103 . . {by using a barometric column}
- 3/105 . . {with the use of an ejector for creating the vacuum, the ejector being placed between evaporator or distillation devices}
- 3/106 . . {with the use of a pump for creating vacuum and for removing the distillate}
- 3/108 . . {using a vacuum lock for removing the concentrate during distillation}
- 3/12 . Molecular distillation
- 3/14 . Fractional distillation {or use of a fractionation or rectification column}
- 3/141 . . {where at least one distillation column contains at least one dividing wall}
- 3/143 . . {by two or more of a fractionation, separation or rectification step}
- 3/145 . . . {One step being separation by permeation}
- 3/146 . . . {Multiple effect distillation}
- 3/148 . . . {in combination with at least one evaporator}
- 3/16 . . Fractionating columns in which vapour bubbles through liquid ([packing elements B01J 19/30](#), [B01J 19/32](#))
- 3/163 . . . {Plates with valves}
- 3/166 . . . {Heating and/or cooling of plates}
- 3/18 . . . with horizontal bubble plates
- 3/20 Bubble caps; Risers for vapour; Discharge pipes for liquid
- 3/205 {Bubble caps}
- 3/22 . . . with horizontal sieve plates or grids; Construction of sieve plates or grids
- 3/225 {Dual-flow sieve trays}
- 3/24 . . . with sloping plates or elements mounted stepwise
- 3/26 . . Fractionating columns in which vapour and liquid flow past each other, or in which the fluid is sprayed into the vapour, or in which a two-phase mixture is passed in one direction
- 3/28 . . . Fractionating columns with surface contact and vertical guides, e.g. film action
- 3/30 . . Fractionating columns with movable parts or in which centrifugal movement is caused
- 3/32 . . Other features of fractionating columns {; Constructional details of fractionating columns not provided for in groups [B01D 3/16](#) - [B01D 3/30](#)}
- 3/322 . . . {Reboiler specifications}
- 3/324 . . . {Tray constructions}
- 3/326 {Tray supports}
- 3/328 {Sealing between the column and the trays}
- 3/34 . with one or more auxiliary substances
- 3/343 . . {the substance being a gas}
- 3/346 . . . {the gas being used for removing vapours, e.g. transport gas}
- 3/36 . . Azeotropic distillation
- 3/38 . . Steam distillation
- 3/40 . . Extractive distillation
- 3/42 . Regulation; Control
- 3/4205 . . {Reflux ratio control splitter}
- 3/4211 . . . {of columns}
- 3/4216 {Head stream}
- 3/4222 {Head- and side stream}
- 3/4227 {Head- and bottom stream}
- 3/4233 {Head- and feed stream}
- 3/4238 {Head-, side- and bottom stream}
- 3/4244 {Head-, side- and feed stream}
- 3/425 {Head-, bottom- and feed stream}
- 3/4255 {Head-, side-, bottom- and feed stream}
- 3/4261 {Side stream}
- 3/4266 {Side- and bottom stream}
- 3/4272 {Side- and feed stream}
- 3/4277 {Side-, bottom- and feed stream}
- 3/4283 {Bottom stream}
- 3/4288 {Bottom- and feed stream}
- 3/4294 {Feed stream}
- 5/00** **Condensation of vapours; Recovering volatile solvents by condensation** ([B01D 8/00](#) takes precedence; [condensers F28B](#))
- 5/0003 . {by using heat-exchange surfaces for indirect contact between gases or vapours and the cooling medium}
- 5/0006 . . {Coils or serpentes}
- 5/0009 . . {Horizontal tubes}
- 5/0012 . . {Vertical tubes}
- 5/0015 . . {Plates}
- 5/0018 . . {Dome shaped ([B01D 5/0066](#) takes precedence)}
- 5/0021 . . {Vortex}
- 5/0024 . . {Rotating vessels or vessels containing movable parts}
- 5/0027 . {by direct contact between vapours or gases and the cooling medium}
- 5/003 . . {within column(s)}
- 5/0033 . {Other features}
- 5/0036 . . {Multiple-effect condensation; Fractional condensation}
- 5/0039 . . {Recuperation of heat, e.g. use of heat pump(s), compression}
- 5/0042 . . {Thermo-electric condensing; using Peltier-effect}
- 5/0045 . . {Vacuum condensation}
- 5/0048 . . {Barometric condensation}
- 5/0051 . . {Regulation processes; Control systems, e.g. valves}
- 5/0054 . . {General arrangements, e.g. flow sheets}
- 5/0057 . {in combination with other processes}
- 5/006 . . {with evaporation or distillation}
- 5/0063 . . . {Reflux condensation}
- 5/0066 . . . {Dome shaped condensation}
- 5/0069 . . {with degasification or deaeration}
- 5/0072 . . {with filtration}
- 5/0075 . . {with heat exchanging ([B01D 5/0039](#) takes precedence)}
- 5/0078 . {characterised by auxiliary systems or arrangements}
- 5/0081 . . {Feeding the steam or the vapours}
- 5/0084 . . {Feeding or collecting the cooling medium ([B01D 5/0087](#) takes precedence)}
- 5/0087 . . {Recirculating of the cooling medium}
- 5/009 . . {Collecting, removing and/or treatment of the condensate}

5/0093	. . {Removing and treatment of non condensable gases}	11/02	. of solids
5/0096	. . {Cleaning (cleaning in general B08B)}		NOTE
7/00	Sublimation (B01D 8/00 takes precedence; freeze-drying F26)		Combinations of characteristics of individual groups, e.g. B01D 11/0226 and B01D 11/028 are expressed as B01D 11/0226 + B01D 11/028
7/02	. Crystallisation directly from the vapour phase (into single crystals C30B 23/00)	11/0203	. . {with a supercritical fluid}
8/00	Cold traps; Cold baffles (pumps for evacuating by condensing or freezing F04B 37/08)	11/0207	. . {Control systems}
9/00	Crystallisation (crystallisation directly from the vapour phase B01D 7/02 ; making single crystals C30B ; crystallisation as part of the Bayer process also classified in C01F 7/14)	11/0211	. . {in combination with an electric or magnetic field}
9/0004	. {cooling by heat exchange (by evaporation of components of the mixture to be separated B01D 9/0013 ; refrigeration machines F25B)}	11/0215	. . {Solid material in other stationary receptacles}
9/0009	. . {by direct heat exchange with added cooling fluid}	11/0219	. . . {Fixed bed of solid material}
9/0013	. . {by indirect heat exchange}	11/0223	. . . {Moving bed of solid material (see also B01D 11/0261)}
9/0018	. {Evaporation of components of the mixture to be separated}	11/0226	. . . . {with the general transport direction of the solids parallel to the rotation axis of the conveyor, e.g. worm}
9/0022	. . {by reducing pressure}	11/023	. . . . {using moving bands, trays fixed on moving transport chains}
9/0027	. . {by means of conveying fluid, e.g. spray-crystallisation (spray-drying F26B)}	11/0234	. . . . {using other slow rotating arms or elements, whereby the general transport direction of the solids is not parallel to the rotation axis, e.g. perpendicular (B01D 11/0238 takes precedence)}
9/0031	. . {by heating (B01D 9/0022 , B01D 9/0027 take precedence)}	11/0238	. . . . {on fixed or rotating flat surfaces, e.g. tables combined with rotating elements or on rotating flat surfaces}
9/0036	. {Crystallisation on to a bed of product crystals; Seeding}	11/0242	. . . . {in towers, e.g. comprising contacting elements}
9/004	. {Fractional crystallisation; Fractionating or rectifying columns}	11/0246	. . . . . {comprising rotating means}
9/0045	. . {Washing of crystals, e.g. in wash columns}	11/0249	. . . . . {comprising jet means}
9/005	. {Selection of auxiliary, e.g. for control of crystallisation nuclei, of crystal growth, of adherence to walls; Arrangements for introduction thereof}	11/0253	. . . . {Fluidised bed of solid materials}
9/0054	. . {Use of anti-solvent}	11/0257	. . . . {using mixing mechanisms, e.g. stirrers, jets (B01D 11/0242 takes precedence)}
9/0059	. {General arrangements of crystallisation plant, e.g. flow sheets}	11/0261	. . {comprising vibrating mechanisms, e.g. mechanical, acoustical}
9/0063	. {Control or regulation (control per se G05)}	11/0265	. . . {Applying ultrasound}
9/0068	. {Prevention of crystallisation}	11/0269	. . {Solid material in other moving receptacles (B01D 11/0238 takes precedence)}
9/0072	. {Crystallisation in microfluidic devices}	11/0273	. . . {in rotating drums}
9/0077	. {Screening for crystallisation conditions or for crystal forms}	11/0276	. . . . {with the general transport direction of the solids parallel to the rotation axis of the conveyor, e.g. spirals}
9/0081	. {Use of vibrations, e.g. ultrasound}	11/028	. . {Flow sheets}
2009/0086	. {Processes or apparatus therefor}	11/0284	. . . {Multistage extraction}
2009/009	. . {Separation of organic compounds by selective or extractive crystallisation with the aid of auxiliary substances forming complex or molecular compounds, e.g. with ureum, thiouream or metal salts}	11/0288	. . {Applications, solvents}
2009/0095	. . . {with the aid of other complex forming substances than ureum, thiouream or metal salts}	11/0292	. . {Treatment of the solvent}
9/02	. from solutions {not used}	11/0296	. . . {Condensation of solvent vapours (condensation in general B01D 5/00)}
9/04	. . concentrating solutions by removing frozen solvent therefrom	11/04	. of solutions which are liquid
11/00	Solvent extraction	11/0403	. . {with a supercritical fluid}
2011/002	. {Counter-current extraction}	11/0407	. . . {the supercritical fluid acting as solvent for the solute}
2011/005	. {Co-current extraction}	11/0411	. . . {the supercritical fluid acting as solvent for the solvent and as anti-solvent for the solute, e.g. formation of particles from solutions}
2011/007	. {Extraction using a solvent in the gas phase}	11/0415	. . {in combination with membranes}
		11/0419	. . {in combination with an electric or magnetic field or with vibrations}
		11/0423	. . . {Applying ultrasound}
		11/0426	. . {Counter-current multistage extraction towers in a vertical or sloping position}

- 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 20/281](#); 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](#), optically active organic compounds [C07B 57/00](#) or peptides [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 [HILIC]}
- 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}

15/3823	. . . . . {of other types, e.g. avidin, streptavidin, biotin}	17/06	. Separation of liquids from each other by electricity
15/3828	. . . . . {Ligand exchange chromatography, e.g. complexation, chelation or metal interaction chromatography}	17/08	. {Thickening liquid suspensions by filtration}
15/3833	. . . . . {Chiral chromatography}	17/085	. . {with membranes}
2015/3838	. . . . . {Ligand exchange chromatography, e.g. complexation chromatography, chelation chromatography, metal interaction chromatography}	17/10	. . {with stationary filtering elements}
15/3842	. . . . . {Micellar chromatography}	17/12	. Auxiliary equipment particularly adapted for use with liquid-separating apparatus, e.g. control circuits
15/3847	. . . . . {Multimodal interactions}		
15/3852	. . . . . {using imprinted phases or molecular recognition; using imprinted phases}	19/00	Degasification of liquids
15/3857	. . . . . {Reaction chromatography}	19/0005	. {with one or more auxiliary substances}
15/3861	. . . . . {using an external stimulus}	19/001	. . {by bubbling steam through the liquid (B01D 19/0042 , B01D 19/0047 and B01D 19/0052 take precedence)}
15/3866	. . . . . {using ultra-sound}	19/0015	. . . {in contact columns containing plates, grids or other filling elements}
15/3871	. . . . . {using light}	19/0021	. {by bringing the liquid in a thin layer}
15/3876	. . . . . {modifying the temperature}	19/0026	. . {in rotating vessels or in vessels containing movable parts}
15/388	. . . . . {modifying the pH}	19/0031	. {by filtration}
15/3885	. . . . . {Using electrical or magnetic means}	19/0036	. {Flash degasification (the other groups take precedence)}
2015/389	. . . . . {using ultra-sound}	19/0042	. {modifying the liquid flow (B01D 19/0021 takes precedence)}
2015/3895	. . . . . {using light}	19/0047	. . {Atomizing, spraying, trickling}
15/40	. . . using supercritical fluid as mobile phase or eluent	19/0052	. . {in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused (B01D 19/0026 takes precedence)}
15/42	. . characterised by the development mode, e.g. by displacement or by elution	19/0057	. . . {the centrifugal movement being caused by a vortex, e.g. using a cyclone, or by a tangential inlet}
15/422	. . . {Displacement mode}	19/0063	. {Regulation, control including valves and floats (for construction and details of valves F16K)}
15/424	. . . {Elution mode}	19/0068	. {General arrangements, e.g. flowsheets (B01D 19/0063 takes precedence)}
15/426	. . . . {Specific type of solvent}	19/0073	. {by a method not covered by groups B01D 19/0005 - B01D 19/0042 }
15/428	. . . {Frontal mode}	19/0078	. . {by vibration}
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)	19/0084	. . {using an electric current}
	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	19/0089	. . {using a magnetic field (magnetic separation in general B03C 1/00)}
17/005	. {by thermal diffusion}	19/0094	. . {by using a vortex, cavitation}
17/02	. Separation of non-miscible liquids	19/02	. Foam dispersion or prevention (during boiling B01B 1/02 ; during fermentation C12)
17/0202	. . {by ab- or adsorption}	19/04	. . by addition of chemical substances
17/0205	. . {by gas bubbles or moving solids}		NOTES
17/0208	. . {by sedimentation}		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).
17/0211	. . . {with baffles}		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
17/0214	. . . {with removal of one of the phases}		
17/0217	. . {by centrifugal force}		
17/04	. . Breaking emulsions		
17/041	. . . {with moving devices}		
17/042	. . . {by changing the temperature}		
17/044	. . . {by changing the pressure}		
17/045	. . . {with coalescers}		
17/047	. . . {with separation aids}		
17/048	. . . {by changing the state of aggregation}		

B01D

B01D 19/04
(continued)

and an amide are classified in [B01D 19/0413](#) + [B01D 9/02](#)).

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}

21/00 **Separation of suspended solid particles from liquids by sedimentation** ({separation of ores or the like by sedimentation [B03B 5/48](#) - [B03B 5/60](#) } ; 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 frying fat [A47J 37/12](#); filters for suction cleaners [A47L 9/10](#); blood or infusion liquid filters [A61M 5/165](#); filtration devices for laboratory use [B01L](#); "dewatering" ore or coal slurry [B03B 5/48](#); magnetic filters [B03C 1/00](#); screens or sieves per se [B07B 1/00](#);

filters for lubricating and cooling systems in turning, boring or milling machines [B23Q 11/10](#);

filters for cooling systems in grinding machines [B24B 55/00](#); extrusion filters [B29C 48/69](#);

filter presses [B30B 9/02](#); purification of process water, drinking water and waste water [C02F](#);

filters for alcoholic beverages [C12H 1/00](#);

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 [E21B 43/02](#);

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](#)}

- 21/0003 . {Making of sedimentation devices, structural details thereof, e.g. prefabricated parts}
- 21/0006 . {Settling tanks provided with means for cleaning and maintenance}
- 21/0009 . {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](#))}
- 21/0012 . {Settling tanks making use of filters, e.g. by floating layers of particulate material}
- 21/0015 . {Controlling the inclination of settling devices}
- 21/0018 . {provided with a pump mounted in or on a settling tank}
- 21/0021 . . {provided with a jet pump}
- 21/0024 . {Inlets or outlets provided with regulating devices, e.g. valves, flaps ([B01D 21/24](#) takes precedence)}
- 21/0027 . {Floating sedimentation devices}
- 21/003 . {Sedimentation tanks provided with a plurality of compartments separated by a partition wall ([B01D 21/0039](#) takes precedence)}
- 21/0033 . . {Vertical, perforated partition walls ([B01D 21/2422](#) takes precedence)}
- 21/0036 . . {Horizontal partition walls}
- 21/0039 . {Settling tanks provided with contact surfaces, e.g. baffles, particles}
- 21/0042 . . {Baffles or guide plates}
- 21/0045 . . {Plurality of essentially parallel plates}
- 21/0048 . . {Plurality of plates inclined in alternating directions}
- 21/0051 . . {Plurality of tube like channels}
- 21/0054 . . {Plates in form of a coil}
- 21/0057 . . {with counter-current flow direction of liquid and solid particles}
- 21/006 . . {with co-current flow direction of liquid and solid particles}
- 21/0063 . . {with cross-flow flow direction of liquid and solid particles}
- 21/0066 . . {with a meandering flow pattern of liquid or solid particles}
- 21/0069 . . {Making of contact surfaces, structural details, materials therefor}
- 21/0072 . . . {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}
- 21/0075 . . . {Contact surfaces having surface features}

- 21/0084 . {Enhancing liquid-particle separation using the flotation principle ([flotation 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 21/0054 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 distribution; 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 24/004 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

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

- 24/4892 . . {by temperature 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 . {integrally 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 or 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)}
- 27/02 . with cartridges made from a mass of loose {granular or fibrous} material
- 27/04 . with cartridges made of a piece of unitary material, e.g. filter paper
- 27/06 . . with corrugated, folded or wound material
- 27/07 . . . having a coaxial stream through the filtering element
- 27/08 . 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}

- 27/148 . . . {arranged concentrically or coaxially}
- 29/00** **Other filters with filtering elements stationary during 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)
- NOTE**
- {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 29/111)}
- 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}
- 29/033 . . . {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}
- 29/075 . {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 step 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 sealing 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 29/114](#) and [B01D 29/117](#), 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 clearness 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 elements}
- 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 elements}
- 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 elements}
- 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

- 29/682 {with a rotary movement with respect to the filtering element}
- 29/684 {with a translatory movement with respect to the filtering element}
- 29/686 {with a combination of movements with respect to the filtering elements}
- 29/688 {with backwash arms or shoes acting on the cake side}
- 29/70 . . by forces created by movement of the filter element
- 29/705 . . . {by compression of compressible filter medium, e.g. foam}
- 29/72 . . . involving vibrations
- 29/74 . . . involving centrifugal force
- 29/76 . Handling the filter cake in the filter for purposes other than for regenerating (B01D 29/94 takes precedence)
- 29/78 . . for washing
- 29/80 . . for drying
- 29/82 . . . by compression
- 29/822 {using membranes}
- 29/824 {using pistons}
- 29/826 {using rollers}
- 29/828 {using screws (B01D 29/6476 takes precedence)}
- 29/84 . . . by gases or by heating
- 29/843 {by direct contact with a fluid}
- 29/846 {by indirect heat-exchange}
- 29/86 . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers {(B01D 29/908 takes precedence)}
- 29/865 . . . {by vibration of the liquid}
- 29/88 . having feed or discharge devices
- 29/885 . . {with internal recirculation through the filtering element (B01D 37/02 takes precedence)}
- 29/90 . . for feeding
- 29/902 . . . {containing fixed liquid displacement elements or cores}
- 29/904 . . . {directing the mixture to be filtered on the filtering element in a manner to clean the filter continuously (B01D 29/115, B01D 29/118, B01D 29/17, B01D 29/25, B01D 29/336, B01D 29/356, B01D 29/902, B01D 29/908 take precedence)}
- 29/906 . . . {Special treatment of the feed stream before contacting the filtering element, e.g. cutting (B01D 35/24, B01D 37/02, B01D 37/03 take precedence)}
- 29/908 . . . {provoking a tangential stream}
- 29/92 . . for discharging filtrate
- 29/925 . . . {containing liquid displacement elements or cores}
- 29/94 . . for discharging the filter cake, e.g. chutes
- 29/945 . . . {for continuously discharging concentrated liquid}
- 29/96 . in which the filtering elements are moved between filtering operations; Particular measures for removing or replacing the filtering elements; Transport systems for filters (B01D 29/09, B01D 29/70 take precedence)
- 29/965 . . {Device for changing the inclination of the filtering element}
- 33/00 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 B04B)**
- 33/0003 . {Aspects of filters with filtering elements which move during the filtering operation}
- 33/0006 . . {with rotating filtering surfaces (rotating brush filters B01D 35/10)}
- 33/0009 . . . {with cylindrical filtering surfaces, e.g. hollow drums, rotating drum filters for paper making D21B}
- 33/0012 {Drums provided with cells each independently connected with pressure distributor}
- 33/0016 {Drums with a single compartment}
- 33/0019 {arranged for outward flow filtration}
- 33/0022 {combined with filtering bands or the like}
- 33/0025 {with endless filtering bands}
- 33/0029 {with multiple filtering bands with or without one or more non filtering bands}
- 33/0032 {with loose, granular, or fibrous filtering material}
- 33/0035 {Gravity filters}
- 33/0038 {with external feed}
- 33/0041 . . . {with plane surfaces}
- 33/0045 {with rotary tables}
- 33/0048 {with hollow discs transversely mounted on a hollow shaft}
- 33/0051 {with hollow frames axially mounted on a hollow shaft}
- 33/0054 {with loose, granular, or fibrous filtering material}
- 33/0058 . . . {with filtering surfaces travelling along conveyors (tipping bucket type B01D 35/08; brush filters B01D 35/10)}
- 33/0061 . . {Accessories and components}
- 33/0064 . . . {Devices for handling the filter cake, e.g. washing, discharging}
- 33/0067 {with scrapers, brushes, nozzles or the like placed on the cake-side of the filter (B01D 33/0074 takes precedence)}
- 33/007 {counter-current flushing}
- 33/0074 {with backwash shoes, with nozzles}
- 33/0077 {by moving the filter element}
- 33/008 {by vibration}
- 33/0083 {by centrifugal force}
- 33/0087 . . . {Feed or discharge devices for liquids}
- 33/009 . . . {Pressure distribution systems (pressure distribution systems for filters with tipping buckets or trays B01D 35/08)}
- 33/0093 . {Making filter elements (not provided for elsewhere)(see also B01D 24/001, B01D 25/001, B01D 27/005, B01D 29/012, B01D 29/111)}
- 33/0096 . . {moving rectilinearly (filters B01D 35/10)}
- 33/01 . with translationally moving filtering elements, e.g. pistons (B01D 33/04 - B01D 33/327 take precedence)
- 33/0108 . . {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}

33/0141	. . . . {open ended}	33/25	. . with hollow frames axially mounted on a hollow rotary shaft
33/015	. . {with flat filtering elements}	33/27	. with rotary filtering surfaces, which are neither cylindrical nor planar, e.g. helical surfaces
33/0158	. . . {self-supporting}	33/275	. . {using contiguous impervious surfaces}
33/0166	. . . . {Bar screens}	33/29	. the movement of the filter elements being a combination of movements (B01D 33/19 takes precedence)
33/0175	. . . . {with curved filtering elements}	33/31	. . Planetary movement
33/0183	. . . {supported}	33/327	. . Tipping buckets, trays or like sections
33/0191	. . . . {with corrugated, folded or wound filtering sheets}	33/333	. with individual filtering elements moving along a closed path (tipping buckets, trays or like sections B01D 33/327)
33/03	. . with vibrating filter elements	33/35	. with multiple filtering elements characterised by their mutual disposition (B01D 33/042), B01D 33/21 take precedence)
33/0307	. . . {with bag, cage, hose, tube, sleeve or the like filtering elements}	33/37	. . in parallel connection
33/0315	. . . . {arranged for inward flow filtration}	33/39	. . . concentrically or coaxially
33/0323	. . . . . {open ended}	33/41	. . in series connection
33/033	. . . . {arranged for outward flow filtration}	33/42	. . . concentrically or coaxially
33/0338	. . . . . {open ended}	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)
33/0346	. . . {with flat filtering elements}	33/46	. . by scrapers, brushes {nozzles} or the like acting on the cake-side of the filtering element (B01D 33/503 takes precedence)
33/0353	. . . . {self-supporting}	33/461	. . . {brushes}
33/0361	. . . . . {Bar screens}	33/463	. . . {nozzles}
33/0369	. . . . . {with curved filtering elements}	33/465	. . . {take-off rollers}
33/0376	. . . . {supported}	33/466	. . . {scrapers}
33/0384	. . . . . {with corrugated, folded or wound filtering sheets}	33/468	. . . {wires, strands, strings or the like}
33/0392	. . . . . {with curved filtering elements}	33/48	. . by flushing, e.g. counter-current air-bumps
33/04	. with filtering bands or the like supported on cylinders which are impervious for filtering		NOTE the subgroup covers only counter-current flushing
33/042	. . {whereby the filtration and squeezing-out take place between at least two filtering bands}	33/50	. . . with backwash arms, shoes or nozzles
33/044	. with filtering bands or the like supported on cylinders which are pervious for filtering	33/503	. . . . {the backwash arms, shoes acting on the cake side}
33/048	. . with endless filtering bands	33/506	. . . . {with a stirrer placed on the filtrate side}
2033/052	. . . {combined with a compression device}	33/52	. . by forces created by movement of the filter element
33/056	. Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts	33/54	. . . involving vibrations
33/0565	. . {combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper}	33/56	. . . involving centrifugal force
33/06	. with rotary cylindrical filtering surfaces, e.g. hollow drums (B01D 33/044 takes precedence ; rotating drums for paper-making D21B)	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}
33/067	. . Construction of the filtering drums, e.g. mounting or sealing arrangements	33/60	. . for washing
2033/07	. . {arranged for inward flow filtration}	33/62	. . for drying
33/073	. . arranged for inward flow filtration	33/64	. . . by compression
33/09	. . . with surface cells independently connected to pressure distributors	33/642	. . . . {by pressure belts}
33/11	. . arranged for outward flow filtration	33/644	. . . . {by pressure plates, membranes}
33/13	. . . with surface cells independently connected to pressure distributors	33/646	. . . . {by pressure rollers}
33/15	. with rotary plane filtering surfaces	33/648	. . . . {by screws}
33/155	. . {the filtering surface being parallel to the rotation axis}	33/66	. . . by gases or by heating
33/17	. . with rotary filtering tables (tables divided into separately tiltable buckets, trays or like sections B01D 33/327)	33/663	. . . . {by direct contact with a fluid}
33/19	. . . the table surface being divided in successively tilted sectors or cells, e.g. for discharging the filter cake	33/666	. . . . {by indirect heat-exchange}
33/21	. . with hollow filtering discs transversely mounted on a hollow rotary shaft	33/68	. . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers
33/215	. . . {the filtering discs being fixed inwardly on a rotating construction}	33/70	. having feed or discharge devices (B01D 33/82 takes precedence)
33/23	. . . Construction of discs or component sectors thereof	33/705	. . {with internal recirculation through the filter}

- 33/72 . . for feeding
- 33/722 . . . {containing fixed liquid displacement elements or cores}
- 33/725 . . . {Special treatment of the feed stream before contacting the filtering element, e.g. cutting ([B01D 35/24](#), [B01D 37/02](#), [B01D 37/03](#) take precedence)}
- 33/727 . . . {provoking a tangential stream}
- 33/74 . . for discharging filtrate
- 33/742 . . . {containing fixed liquid displacement elements or cores}
- 33/745 . . . {Construction of suction casings, pans, or the like}
- 33/747 {moving during the filtration period}
- 33/76 . . for discharging the filter cake, e.g. chutes
- 33/763 . . . {for continuously discharging concentrated liquid}
- 33/766 . . . {Devices for breaking the filter cake, e.g. cutting}
- 33/80 . Accessories
- 33/801 . . {Driving means, shaft packing systems or the like}
- 33/802 . . {Device for changing the inclination of the filtering element}
- 33/803 . . {in which the filtering elements are moved between filtering operations ([B01D 33/52](#) takes precedence); Particular measures for removing or replacing the filtering elements; Transport systems for filters}
- 33/804 . . {integrally combined with devices for controlling the filtration}
- 33/805 . . . {by clearness or turbidity measuring}
- 33/806 . . . {by flow measuring}
- 33/807 . . . {by level measuring}
- 33/808 . . . {by pressure measuring}
- 33/809 . . . {by temperature measuring}
- 33/82 . . Means for pressure distribution
- 35/00 Other filtering devices; Auxiliary devices for filtration; Filter housing constructions**
- 35/005 . {Filters specially adapted for use in internal-combustion engine lubrication or fuel systems, not of special interest for [B01D 23/00](#) - [B01D 33/00](#) (internal-combustion engine lubricating systems [F02M](#); lubrication in general [F16N](#))}
- 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](#))}
- 35/023 . . {Filler 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**

- 36/001 . {Filters in combination with devices for the removal of gas, air purge systems}
- 36/003 . {Filters in combination with devices for the removal of liquids ([B01D 35/185](#) takes precedence)}
- 36/005 . . {Liquid level sensing means, e.g. for water in gasoil-filters}
- 36/006 . . {Purge means}
- 36/008 . . {Means to filter or treat the separated liquid}
- 36/02 . Combinations of filters of different kinds ([B01D 29/50](#), [B01D 33/35](#) take precedence)
- 36/04 . Combinations of filters with settling tanks
- 36/045 . . {Combination of filters with centrifugal separation devices}
- 37/00 Processes of filtration** (processes specially adapted for filtering gases [B01D 46/00](#))
- 37/02 . Precoating the filter medium; Addition of filter aids to the liquid being filtered {(devices for feeding reagents [C02F 1/685](#) and sub-groups; filter aids)}
- 37/025 . . {additives incorporated in the filter}
- 37/03 . using flocculating agents
- 37/04 . Controlling the filtration
- NOTES**
 1. If the construction of the filtering element is of minor importance, the documents are classified in this group only
 2. Filters integrally combined with devices for controlling the filtration are also classified in the relevant groups for these aspects, e.g. [B01D 24/48](#), [B01D 29/60](#), [B01D 33/804](#)
- 37/041 . . {by clearness or turbidity measuring}
- 37/043 . . {by flow measuring}
- 37/045 . . {by level measuring}
- 37/046 . . {by pressure measuring}
- 37/048 . . {by temperature measuring}
- 39/00 Filtering material for liquid or gaseous fluids**
- 39/02 . Loose filtering material, e.g. loose fibres
- 39/04 . . Organic material, e.g. cellulose, cotton
- 39/06 . . Inorganic material, e.g. asbestos fibres, glass beads or fibres
- 39/08 . Filter cloth, i.e. woven, knitted or interlaced material ([metallic B01D 39/10](#))
- 39/083 . . {of organic material}
- 39/086 . . {of inorganic material}
- 39/10 . Filter screens essentially made of metal
- 39/12 . . of wire gauze; of knitted wire; of expanded metal
- 39/14 . Other self-supporting filtering material {; Other filtering material (non-woven fabrics in general [D04H 3/00](#))}
- 39/16 . . of organic material, e.g. synthetic fibres
- 39/1607 . . . {the material being fibrous ([B01D 39/18](#) takes precedence)}
- 39/1615 {of natural origin}
- 39/1623 {of synthetic origin}
- 39/163 {sintered or bonded}
- 39/1638 . . . {the material being particulate}
- 39/1646 {of natural origin, e.g. cork or peat}
- 39/1653 {of synthetic origin}
- 39/1661 {sintered or bonded}
- 39/1669 . . . {Cellular material}
- 39/1676 {of synthetic origin}
- 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 3/022](#), ceramic honeycomb structures [C04B 38/0006](#))}
- 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 (suction cleaner filters [A47L 9/10](#); filters for breathing-protection purposes [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](#), of compressors [F04B 39/16](#); filtering in air-conditioning [F24F 3/16](#), [F24F 8/10](#))

45/00 Separating dispersed particles from gases or vapours by gravity, inertia, or centrifugal forces

- 45/02 . by utilising gravity
- 45/04 . by utilising inertia ([B01D 45/12](#) takes precedence)
- 45/06 . . by reversal of direction of flow
- 45/08 . . by impingement against baffle separators
- 45/10 . . . which are wetted
- 45/12 . by centrifugal forces (centrifuges [B04B](#); cyclones [B04C](#))
- 45/14 . . generated by rotating vanes, discs, drums or brushes
- 45/16 . . generated by the winding course of the gas stream {, the centrifugal forces being generated solely or partly by mechanical means, e.g. fixed swirl vanes}
- 45/18 . Cleaning-out devices

46/00 Filters {, i.e. particle separators} or filtering processes specially modified for separating dispersed particles from gases or vapours (filtering elements [B01D 23/00](#) - [B01D 35/00](#); filtering material [B01D 39/00](#); their regeneration outside the filters [B01D 41/00](#))

- 46/0001 . {Making filtering elements}
- 46/0002 . {Casings; Housings; Frame constructions}
- 46/0004 . . {Details of removable closures, lids, caps or filter heads}
- 46/0005 . . {Mounting of filtering elements within casings, housings or frames ([B01D 46/2422](#) takes precedence)}
- 46/0006 . . . {Filter elements or cartridges installed in a drawer-like manner}
- 46/0008 . . . {Two or more filter elements not fluidly connected positioned in the same housing}
- 46/0009 . . . {Tray-like arrangements of filters in a vessel}
- 46/001 . . {Means for connecting filter housings to supports}
- 46/0012 . . {In-line filters}
- 46/0013 . . {Modules}
- 46/0015 . . {Throw-away type filters}
- 46/0016 . . {Folded frame or housing constructions}
- 46/0017 . . {Filter elements installed in a branch of a pipe, e.g. with an y-shaped tubular housing}
- 46/0019 . {with multiple filtering elements, characterised by their mutual disposition}
- 46/002 . . {connected in parallel}
- 46/0021 . . . {arranged concentrically or coaxially}
- 46/0023 . . {connected in series}
- 46/0024 . . . {arranged concentrically or coaxially}
- 46/0026 . . . {Protecting screens at filter inlet or outlet}
- 46/0027 . {with additional separating or treating functions}
- 46/0028 . . {provided with antibacterial or antifungal means}
- 46/003 . . {including coalescing means for the separation of liquid}

- 46/0031 . . . {with collecting, draining means}
- 46/0032 . . {using electrostatic forces to remove particles, e.g. electret filters}
- 46/0034 . . {using magnetic forces to remove particles}
- 46/0035 . . {by wetting, e.g. using surfaces covered with oil}
- 46/0036 . . {by adsorption or absorption}
- 46/0038 . . {with means for influencing the odor, e.g. deodorizing substances}
- 46/0039 . {with flow guiding by feed or discharge devices}
- 46/0041 . . {for feeding}
- 46/0042 . . . {Use of the inlet flow in order to clean the filter surface}
- 46/0043 . . . {containing fixed gas displacement elements or cores}
- 46/0045 . . . {by using vanes}
- 46/0046 . . . {provoking a tangential stream ([B01D 46/0045](#) takes precedence)}
- 46/0047 . . {for discharging the filtered gas}
- 46/0049 . . . {containing fixed gas displacement elements or cores}
- 46/005 . . {Crossflow filtration, i.e. having an inlet and two outlets}
- 46/0052 . {with filtering elements moving during filtering operation ([B01D 46/22](#), [B01D 46/32](#) take precedence)}
- 46/0053 . . {with vibrating filtering elements}
- 46/0054 . . {with translational movement}
- 46/0056 . . {with rotational movement}
- 46/0057 . {Regenerating the filter material in the filter ([B01D 46/04](#), [B01D 46/48](#) take precedence)}
- 46/0058 . . {Devices for taking out of action one or more units of multi-unit filters}
- 46/006 . . {Chemical processes for the removal of the retained particles, e.g. by burning of processes}
- 46/0061 . . . {making use of catalysts}
- 46/0063 . . . {by heating only}
- 46/0064 . . {by means of acting on the cake side and moving with respect to the filtering elements}
- 46/0065 . . . {by scrapers, brushes, nozzles or the like}
- 46/0067 . . {by acting counter-currently on the filtering surface (e.g. flushing)}
- 46/0068 . . . {with pressurised gas, e.g. pulsed air}
- 46/0069 {Using pressurized gas at supersonic velocities}
- 46/0071 . . . {with backwash arms, shoes or nozzles}
- 46/0072 . . {by forces created by movement of the filter element}
- 46/0073 . . . {involving centrifugal forces}
- 46/0075 . . . {involving vibrations or shaking}
- 46/0076 {involving sonic or ultrasonic waves}
- 46/0078 . . {by electrical means, e.g. for the generation of electrostatic forces in order to reject particles}
- 46/0079 . . {by other means not moving with respect to the filtering elements, e.g. fixed nozzles on the cake side}
- 46/008 . . {Replacing filter elements}
- 46/0082 . . {Washing the filter inside the filter housing}
- 46/0083 . . {Cleaning the filter surface by interrupting suction so that the filter cake falls by gravity}
- 46/0084 . {provided with safety means}
- 46/0086 . . {Filter condition indicators}
- 46/0087 . . {Bypass or safety valves}
- 46/0089 . . {Anti-return means}

46/009	. . {Identification of filter type or position thereof, e.g. by transponders or bar codes}	46/2451	. . . . {characterized by the geometrical structure, shape, pattern or configuration or parameters related to the geometry of the structure, e.g. thickness, cell density}
46/0091	. . {Including arrangements for environmental or personal protection}	46/2455	. . . . {of the whole honeycomb or segments, e.g. elliptic body, octagonal segment, centre of gravity}
46/0093	. . . {against fire or explosion}	46/2459	. . . . {of the plugs, e.g. projections, gaps, length}
46/0094	. . . {against radiation}	46/2462	. . . . {the outer peripheral sealing, e.g. undulations, thickness}
46/0095	. . {Means acting upon failure of the filtering system, e.g. in case of damage of the filter elements; Failsafes}	46/2466	. . . . {of the adhesive layers, i.e. joints between segments, e.g. undulations, thickness}
46/0097	. . {Special means for preventing bypass around the filter, i.e. in addition to usual seals}	46/247	. . . . {of the cells, e.g. diamonds, hexagonal configuration, cell density}
46/0098	. . {Protecting coverages on the filter which is removed before the filter is used, protection of filter, packaging}	46/2474	. . . . {of the walls along the length of the honeycomb, e.g. inclination from inlet to outlet, length, thickness}
46/02	. Particle separators, e.g. dust precipitators, having hollow filters made of flexible material	2046/2477	. . . . {Triangular shapes or configurations}
46/023	. . {Pockets filters, i.e. multiple bag filters mounted on a common frame}	2046/2481	. . . . {Quadrangular shapes or configurations, e.g. square, diamond}
46/026	. . {Means for maintaining a space between filters, e.g. avoiding contact between adjacent filters}	2046/2485	. . . . {Octagonal shapes or configurations}
46/04	. . Cleaning filters	2046/2488	. . . . {Circular shapes or configurations}
46/06	. . with means keeping the working surfaces flat	2046/2492	. . . . {Other shapes or configurations not covered by groups B01D 46/2474 - B01D 2046/2488 }
46/08	. . . the working surfaces forming a star shape	2046/2496	. . . . {The honeycomb filter being defined by mathematical equations}
46/10	. Particle separators, e.g. dust precipitators, using filter plates, sheets, or pads having plane surfaces {, i.e. axial filtering}	46/26	. . rotatable
46/103	. . {Curved filtering elements}	46/28	. Particle separators, e.g. dust precipitators, using filter brushes
46/106	. . {Ring-shaped filtering elements}	46/30	. Particle separators, e.g. dust precipitators, using loose filtering material
46/12	. . in multiple arrangements	46/32	. . the material moving during filtering
46/125	. . . {V-type arrangements}	46/34	. . . not horizontally, e.g. using shoots
46/14	. . arranged in a star shape	46/36	. . . as a substantially horizontal layer, e.g. on rotary tables, drums, conveyor belts
46/16	. . arranged on non-filtering conveyors {or supports}	46/38	. . . as fluidised bed
46/18	. Particle separators, e.g. dust precipitators, using filtering belts	46/40	. Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious surfaces
46/185	. . {Construction of filtering belts or supporting belts including devices for centering, mounting or sealing thereof}	46/403	. . {of helically or spirally wound bodies}
46/20	. . the belts combined with drums	46/406	. . {of stacked bodies}
46/22	. . the belts travelling during filtering	46/42	. Auxiliary equipment or operation thereof
46/24	. Particle separators, e.g. dust precipitators, using rigid hollow filter bodies	46/4209	. . {Prevention of static charge, e.g. by grounding}
46/2403	. . {characterised by the physical shape or structure of the filtering element}	46/4218	. . {Influencing the heat transfer which act passively, e.g. isolations, heat sinks, cooling ribs}
46/2407	. . . {Filter candles}	46/4227	. . {Manipulating filters or filter elements, e.g. handles or extracting tools}
46/2411	. . . {Filter cartridges}	46/4236	. . {Reducing noise or vibration emissions}
46/2414	. . . . {End caps including additional functions or special forms}	46/4245	. . {Means for power supply or devices using electrical power in filters or filter elements}
46/2418	. . . {Honeycomb filters (used for filtering exhaust gases of an internal combustion engine F01N 3/022 ; ceramic honeycomb structures per se C04B 38/0006)}	46/4254	. . {Allowing or improving visual supervision, e.g. lamps, transparent parts, windows}
46/2422	. . . . {Mounting of the body within a housing}	46/4263	. . {Means for active heating or cooling}
46/2425	. . . . {characterized by parameters related to the physical properties of the honeycomb structure material, e.g. modulus of rupture, porosity}	46/4272	. . {Special valve constructions adapted to filters or filter elements}
46/2429	. . . . . {of the honeycomb walls or cells}	46/4281	. . {Venturi's or systems showing a venturi effect}
2046/2433	. . . . . {Porosity}	46/429	. . {Means for wireless communication}
2046/2437	. . . . . {Pore diameter}	46/44	. . controlling filtration
46/244	. . . . . {of the plugs}	46/442	. . . {by measuring the concentration of particles}
46/2444	. . . . . {of the outer peripheral sealing}	46/444	. . . {by flow measuring}
46/2448	. . . . . {of the adhesive layers, i.e. joints between segments}	46/446	. . . {by pressure measuring}

- 46/448 . . . {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 70/00](#); 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}
- 53/02 . 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)}

NOTE

{In groups [B01D 53/0462](#) and [B01D 53/047](#) - [B01D 53/0476](#) it is desirable

B01D 53/04

(continued)

to add indexing codes chosen from
[B01D 2259/40007](#) - [B01D 2259/40081](#)
 relating to controlling and processing aspects
 of pressure or temperature swing adsorption}

- 53/0407 . . . {Constructional details of adsorbing systems}
- 53/0415 {Beds in cartridges}
- 53/0423 {Beds in columns}
- 53/0431 {Beds with radial gas flow}
- 53/0438 {Cooling or heating systems}
- 53/0446 {Means for feeding or distributing gases}
- 53/0454 . . . {Controlling adsorption ([controlling temperature swing adsorption B01D 53/0462](#),
[controlling pressure swing adsorption B01D 53/047](#))}
- 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}
- 53/145 . . . {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
- 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}
- 53/869 {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}
- 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 7/005](#))}
- 61/005 . . {Osmotic agents, draw solutions}
- 61/007 . {Separation by stereostructure, steric separation}
- 61/02 . Reverse osmosis; Hyperfiltration {; Nanofiltration}
- 61/022 . . {comprising multiple reverse osmosis, hyperfiltration or nanofiltration steps}
- 61/025 . . {Reverse osmosis; Hyperfiltration ([B01D 61/022](#) takes precedence)}
- 61/027 . . {Nanofiltration ([B01D 61/022](#) 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

- 61/30 . . 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 . Electrodialysis; Electro-osmosis {Electro-ultrafiltration}
 - 61/422 . . {Electrodialysis}
 - 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}

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

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}

67/0023 . . {by inducing porosity into non porous precursor membranes}

67/0025 . . . {by mechanical treatment, e.g. pore-stretching}

67/0027 {by stretching}

67/003 . . . {by selective elimination of components, e.g. by leaching}

67/0032 . . . {by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods}

67/0034 {by micromachining techniques, e.g. using masking and etching steps, photolithography}

67/0037 . . {by deposition from the gaseous phase, e.g. CVD, PVD}

67/0039 . {Inorganic membrane formation}

67/0041 . . {by agglomeration of particles in the dry state, e.g. sintering}

67/0044 . . {by chemical reaction}

67/0046 . . {by slurry techniques, e.g. die or slip-casting}

67/0048 . . {by sol-gel transition}

67/0051 . . {by controlled crystallisation, e.g. hydrothermal growth}

67/0053 . . {by inducing porosity into non porous precursor membranes}

67/0055 . . . {by mechanical treatment}

67/0058 . . . {by selective elimination of components, e.g. by leaching}

67/006 . . . {by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods}

67/0062 {by micromachining techniques, e.g. using masking and etching steps, photolithography}

67/0065 {by anodic oxidation}

67/0067 . . {by carbonisation or pyrolysis}

67/0069 . . {by deposition from the liquid phase, e.g. electrochemical deposition ([B01D 67/0046](#) takes precedence)}

67/0072 . . {by deposition from the gaseous phase, e.g. sputtering, CVD, PVD}

67/0074 . . {from melts}

67/0076 . . {Pretreatment of inorganic membrane material prior to membrane formation, e.g. coating of metal powder}

67/0079 . {Formation of membranes comprising organic and inorganic components}

67/0081 . {After-treatment of organic or inorganic membranes}

67/0083 . . {Thermal after-treatment}

67/0086 . . {Mechanical after-treatment}

67/0088 . . {Physical treatment with compounds, e.g. swelling, coating or impregnation (involving chemical reactions [B01D 67/0093](#))}

67/009 . . {with wave-energy, particle-radiation or plasma}

67/0093 . . {Chemical modification}

67/0095 . . {Drying}

67/0097 . . {Storing or preservation}

69/00 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](#)

- 69/02 . 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 spinneret}
- 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, polycondensation, 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}
- 71/00 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 . . Polyalkenyl halides
- 71/32 . . . containing fluorine atoms
- 71/34 Polyvinylidene fluoride
- 71/36 Polytetrafluoroethene
- 71/38 . . Polyalkenylalcohols; Polyalkenylesters; Polyalkenylethers; Polyalkenylaldehydes; Polyalkenylketones; Polyalkenylacetals; Polyalkenylketals
- 71/40 . . Polymers of unsaturated acids or derivatives thereof, e.g. salts, amides, imides, nitriles, anhydrides, esters
- 71/42 . . . Polymers of nitriles, e.g. polyacrylonitrile
- 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
- 71/62 . . . Polycondensates having nitrogen-containing heterocyclic rings in the main chain
- 71/64 Polyimides; Polyamide-imides; Polyester-imides; Polyamide acids or similar polyimide precursors
- 71/66 . . Polymers having sulfur in the main chain, with or without nitrogen, oxygen or carbon only
- 71/68 . . . Polysulfones; Polyethersulfones
- 71/70 . . Polymers having silicon in the main chain, with or without sulfur, nitrogen, oxygen or carbon only

71/72	. . Macromolecular compounds obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of the groups B01D 71/46 - B01D 71/70	2201/10	. Filtration under gravity in large open drainage basins
71/74	. . Natural macromolecular material or derivatives thereof (B01D 71/08 , B01D 71/24 take precedence)	2201/12	. Pleated filters
71/76	. . Macromolecular material not specifically provided for in a single one of groups B01D 71/08 - B01D 71/74 (rubbers in general B01D 71/24)	2201/122	. . with pleats of different length
71/78	. . . Graft polymers	2201/125	. . with non-parallel pleats
71/80	. . . Block polymers	2201/127	. . with means for keeping the spacing between the pleats
71/82	. . . characterised by the presence of specified groups, e.g. introduced by chemical after-treatment	2201/14	. Particulate filter materials with a lower density than the liquid mixture to be filtered
<hr/>		2201/16	. Valves
2101/00	Types of filters having loose filtering material	2201/162	. . with snap, latch or clip connecting means
2101/005	. with a binder between the individual particles or fibres	2201/165	. . Multi-way valves
2101/02	. Carbon filters	2201/167	. . Single-way valves
2101/04	. Sand or gravel filters	2201/18	. Filters characterised by the openings or pores
2201/00	Details relating to filtering apparatus	2201/182	. . for depth filtration
2201/02	. Filtering elements having a conical form	2201/184	. . Special form, dimension of the openings, pores of the filtering elements
2201/04	. Supports for the filtering elements	2201/186	. . . Pore openings which can be modified
2201/0407	. . Perforated supports on both sides of the filtering element	2201/188	. . Multiple filtering elements having filtering areas of different size
2201/0415	. . Details of supporting structures	2201/20	. Pressure-related systems for filters
2201/0423	. . . not in the inner side of the cylindrical filtering elements	2201/202	. . Systems for applying pressure to filters
2201/043	. . Filter tubes connected to plates	2201/204	. . Systems for applying vacuum to filters
2201/0438	. . . mounted substantially vertically on plates at the lower side of the filter elements	2201/206	. . . by the weight of the liquid in a tube, e.g. siphon, barometric leg
2201/0446	. . . suspended from plates at the upper side of the filter elements	2201/208	. . . by venturi systems
2201/0453	. . . positioned between at least two plates	2201/22	. Filtering bands with supporting discs
2201/0461	. . Springs	2201/24	. Tools used for the removal of filters
2201/0469	. . Filter tubes connected to collector tubes	2201/26	. Transport systems for filtering devices
2201/0476	. . . mounted substantially vertically on collector tubes at the lower side of the filter elements	2201/265	. . mounted on vehicles
2201/0484	. . . suspended from collector tubes at the upper side of the filter elements	2201/28	. Position of the filtering element
2201/0492	. . . positioned between at least two collector tubes	2201/282	. . Filtering elements with a horizontal rotation or symmetry axis
2201/06	. Resilient foam as filtering element	2201/285	. . Filtering elements with a symmetry axis not parallel to the rotation axis
2201/08	. Regeneration of the filter	2201/287	. . Filtering elements with a vertical or inclined rotation or symmetry axis
2201/081	. . using nozzles or suction devices	2201/29	. Filter cartridge constructions
2201/082	. . . Suction devices placed on the cake side of the filtering element	2201/291	. . End caps
2201/083	. . . Suction devices placed on the filtrate side of the filtering element, e.g. with variable edge filters	2201/293	. . . Making of end caps
2201/084	. . . Nozzles placed on the filtrate side of the filtering element	2201/295	. . . with projections extending in a radial outward direction, e.g. for use as a guide, spacing means
2201/085	. . using another chemical than the liquid to be filtered	2201/296	. . . Other than having a circular shape
2201/086	. . using fluid streams co-current to the filtration direction	2201/298	. . . End caps common to at least two filtering elements
2201/087	. . using gas bubbles, e.g. air	2201/30	. Filter housing constructions
2201/088	. . Arrangements for killing microorganisms	2201/301	. . Details of removable closures, lids, caps, filter heads
2201/089	. . using rollers having projections to clear the filter apertures	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
		2201/306	. . . Closures, lids, caps or filter heads forming one element with the filtering element
		2201/307	. . Filtering elements contained in an insert body mounted in a filter housing (double casing), e.g. to avoid contamination when removing or replacing the filter element
		2201/308	. . Use of foils, membranes or other means to protect the filter before its use or for protecting the environment, e.g. during removal of the filter
		2201/309	. . Housings with transparent parts
		2201/31	. Other construction details

- 2201/313 . . Means for protecting the filter from the incoming fluid, e.g. shields
- 2201/316 . . Standpipes
- 2201/32 . . Flow characteristics of the filter
- 2201/325 . . Outward flow filtration
- 2201/34 . . Seals or gaskets for filtering elements ([for removable closures, lids, caps or filter heads B01D 2201/304](#))
- 2201/342 . . Axial sealings
- 2201/345 . . Pressurized seals or gaskets
- 2201/347 . . Radial sealings
- 2201/36 . . Filtering elements containing a rotating housing construction
- 2201/38 . . Preventing rewetting of the filter cake on the filter media
- 2201/40 . . Special measures for connecting different parts of the filter
- 2201/4007 . . Use of cam or ramp systems
- 2201/4015 . . Bayonet connecting means
- 2201/4023 . . Means for connecting filter housings to supports
- 2201/403 . . allowing dilatation, e.g. by heat
- 2201/4038 . . for connecting at least two filtering elements together
- 2201/4046 . . Means for avoiding false mounting of different parts
- 2201/4053 . . . using keys
- 2201/4061 . . . between a cartridge and a filter head or manifold
- 2201/4069 . . Magnetic means
- 2201/4076 . . Anti-rotational means
- 2201/4084 . . Snap or Seeger ring connecting means
- 2201/4092 . . Threaded sections, e.g. screw
- 2201/44 . . Special measures allowing the even or uniform distribution of fluid along the length of a conduit
- 2201/46 . . Several filtrate discharge conduits each connected to one filter element or group of filter elements
- 2201/48 . . Overflow systems
- 2201/50 . . Means for dissipating electrostatic charges
- 2201/52 . . Filter identification means
- 2201/54 . . Computerised or programmable systems
- 2201/56 . . Wireless systems for monitoring the filter
- 2201/58 . . Power supply means for regenerating the filter
- 2201/583 . . using the kinetic energy of the fluid circulating in the filtering device
- 2201/586 . . using regenerative sources, e.g. wind, sun
- 2201/60 . . Shape of non-cylindrical filtering elements
- 2201/602 . . Oval
- 2201/605 . . Square or rectangular
- 2201/607 . . Triangular
- 2201/62 . . Honeycomb-like
- 2201/64 . . Filters having floating elements ([floating filters B01D 35/05](#))
- 2202/00 Details concerning evaporation, distillation or condensation**
- 2202/10 . . Use of a microdevice for separation ([microreactors B01J 19/00](#))
- 2202/20 . . Use of an ionic liquid in the separation process
- 2215/00 Separating processes involving the treatment of liquids with adsorbents**
- 2215/02 . . with moving adsorbents
- 2215/021 . . Physically moving or fluidising the adsorbent beads or particles or slurry, excluding the movement of the entire columns
- 2215/022 . . Physically moving the adsorbent as a whole, e.g. belts, discs or sheets
- 2215/023 . . Simulated moving beds
- 2215/024 . . . Provisions to deal with recirculated volumes, e.g. in order to regulate flow
- 2215/025 . . . Reekon with dead volumes between sections
- 2215/026 . . . Flushing the injection conduits
- 2215/027 . . . Used at supercritical conditions of temperature or pressure
- 2215/028 . . . Co-current flow
- 2215/029 . . Centrifuge-like arrangements
- 2221/00 Applications of separation devices**
- 2221/02 . . Small separation devices for domestic application, e.g. for canteens, industrial kitchen, washing machines
- 2221/04 . . Separation devices for treating liquids from earth drilling, mining ([separation of well effluents E21B 43/34, flotation in general B03D 1/00](#))
- 2221/06 . . Separation devices for industrial food processing or agriculture
- 2221/08 . . Mobile separation devices
- 2221/10 . . Separation devices for use in medical, pharmaceutical or laboratory applications, e.g. separating amalgam from dental treatment residues ([apparatus for dental treatment A61C 17/065](#))
- 2221/12 . . Separation devices for treating rain or storm water ([storm water treatment E03F](#))
- 2221/14 . . Separation devices for workshops, car or semiconductor industry, e.g. for separating chips and other machining residues
- 2221/16 . . Separation devices for cleaning ambient air, e.g. air along roads or air in cities
- 2239/00 Aspects relating to filtering material for liquid or gaseous fluids**
- 2239/02 . . Types of fibres, filaments or particles, self-supporting or supported materials
- 2239/0208 . . Single-component fibres
- 2239/0216 . . Bicomponent or multicomponent fibres
- 2239/0225 . . . Side-by-side
- 2239/0233 . . . Island-in-sea
- 2239/0241 . . comprising electrically conductive fibres or particles
- 2239/025 . . comprising nanofibres ([apparatus incorporating such gas filtering material see B01D 46/546](#))
- 2239/0258 . . comprising nanoparticles
- 2239/0266 . . comprising biodegradable or bio-soluble polymers
- 2239/0275 . . comprising biologically produced plastics, e.g. bioplastics
- 2239/0283 . . comprising filter materials made from waste or recycled materials
- 2239/0291 . . comprising swelling polymers
- 2239/04 . . Additives and treatments of the filtering material
- 2239/0407 . . comprising particulate additives, e.g. adsorbents ([apparatus incorporating gas filtering material B01D 46/0036](#))
- 2239/0414 . . Surface modifiers, e.g. comprising ion exchange groups
- 2239/0421 . . . Rendering the filter material hydrophilic
- 2239/0428 . . . Rendering the filter material hydrophobic

2239/0435	. . Electret (apparatus incorporating such gas filtering material B01D 46/0032)	2247/00	Details relating to the separation of dispersed particles from gases, air or vapours by liquid as separating agent
2239/0442	. . Antimicrobial, antibacterial, antifungal additives (apparatus incorporating such gas filtering material B01D 46/0028)	2247/02	. Enhancing the particle separation by electrostatic or magnetic effects (B01D 2247/102 takes precedence; electrostatic or magnetic separation B03C)
2239/045	. . Deodorising additives	2247/04	. Regenerating the washing fluid (recovering paint spray booth B05B 14/462)
2239/0457	. . Specific fire retardant or heat resistant properties (apparatus incorporating such gas filtering material B01D 46/0093)	2247/06	. Separation units provided with means for cleaning and maintenance
2239/0464	. . Impregnants	2247/08	. Means for controlling the separation process
2239/0471	. . Surface coating material	2247/10	. 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)
2239/0478	. . . on a layer of the filter	2247/101	. . using a cyclone
2239/0485	. . . on particles	2247/102	. . using electrostatic or magnetic effects
2239/0492	. . . on fibres	2247/103	. . using fluids, e.g. as a fluid curtain or as large liquid droplets
2239/06	. Filter cloth, e.g. knitted, woven non-woven; self-supported material	2247/104	. . using an impeller
2239/0604	. . Arrangement of the fibres in the filtering material	2247/105	. . by gas flow reversal
2239/0609	. . . Knitted	2247/106	. . using a structured demister, e.g. tortuous channels
2239/0613	. . . Woven	2247/107	. . using an unstructured demister, e.g. a wire mesh demister
2239/0618	. . . Non-woven	2247/108	. . using vortex inducers
2239/0622	. . . Melt-blown	2247/12	. Fan arrangements for providing forced draft
2239/0627	. . . Spun-bonded	2247/14	. Fan arrangements for providing induced draft
2239/0631	. . . Electro-spun	2251/00	Reactants
2239/0636	. . . Two or more types of fibres present in the filter material	2251/10	. Oxidants
2239/064	. . . The fibres being mixed	2251/102	. . Oxygen
2239/0645	. . Arrangement of the particles in the filtering material	2251/104	. . Ozone
2239/065	. . More than one layer present in the filtering material (apparatus incorporating such gas filtering material B01D 2275/10)	2251/106	. . Peroxides
2239/0654	. . . Support layers	2251/1065	. . . Organic peroxides
2239/0659	. . . The layers being joined by needling	2251/108	. . Halogens or halogen compounds (hydrogen halides B01D 2251/50)
2239/0663	. . . The layers being joined by hydro-entangling	2251/11	. . Air
2239/0668	. . . The layers being joined by heat or melt-bonding	2251/20	. Reductants
2239/0672	. . . The layers being joined by welding	2251/202	. . Hydrogen
2239/0677	. . . by spot-welding	2251/204	. . Carbon monoxide
2239/0681	. . . The layers being joined by gluing	2251/206	. . Ammonium compounds
2239/0686	. . . by spot-gluing	2251/2062	. . . Ammonia
2239/069	. . Special geometry of layers	2251/2065	. . . Ammonium hydroxide
2239/0695	. . . Wound layers (apparatus incorporating such gas filtering material B01D 2275/105)	2251/2067	. . . Urea
2239/08	. Special characteristics of binders	2251/208	. . Hydrocarbons
2239/083	. . Binders between layers of the filter	2251/21	. . Organic compounds not provided for in groups B01D 2251/206 or B01D 2251/208
2239/086	. . Binders between particles or fibres	2251/30	. Alkali metal compounds
2239/10	. Filtering material manufacturing	2251/302	. . of lithium
2239/12	. Special parameters characterising the filtering material	2251/304	. . of sodium
2239/1208	. . Porosity (apparatus incorporating such gas filtering material B01D 2275/30 - B01D 2275/307)	2251/306	. . of potassium
2239/1216	. . Pore size	2251/40	. Alkaline earth metal or magnesium compounds
2239/1225	. . Fibre length	2251/402	. . of magnesium
2239/1233	. . Fibre diameter	2251/404	. . of calcium
2239/1241	. . Particle diameter	2251/406	. . of strontium
2239/125	. . Size distribution	2251/408	. . of barium
2239/1258	. . Permeability	2251/50	. Inorganic acids
2239/1266	. . Solidity	2251/502	. . Hydrochloric acid
2239/1275	. . Stiffness	2251/504	. . Nitric acid
2239/1283	. . Stability index	2251/506	. . Sulfuric acid
2239/1291	. . Other parameters	2251/508	. . Sulfur dioxide
		2251/51	. . Hydrogen sulfide
		2251/512	. . Phosphoric acid

2251/60	. Inorganic bases or salts	2252/604	. . Stabilisers or agents inhibiting degradation
2251/602	. . Oxides	2252/606	. . Anticorrosion agents
2251/604	. . Hydroxides	2252/608	. . Antifoaming agents
2251/606	. . Carbonates	2252/61	. . Antifouling agents
2251/608	. . Sulfates	2253/00	Adsorbents used in separation treatment of gases and vapours
2251/61	. . Phosphates	2253/10	. Inorganic adsorbents
2251/70	. Organic acids	2253/102	. . Carbon
2251/80	. Organic bases or salts	2253/104	. . Alumina
2251/90	. Chelants	2253/106	. . Silica or silicates
2251/902	. . EDTA	2253/108	. . . Zeolites
2251/904	. . NTA	2253/1085	. . . . characterized by a silicon-aluminium ratio
2251/95	. Specific microorganisms	2253/11	. . . Clays
2252/00	Absorbents, i.e. solvents and liquid materials for gas absorption	2253/112	. . Metals or metal compounds not provided for in B01D 2253/104 or B01D 2253/106
2252/10	. Inorganic absorbents (chemical reactants B01D 2251/00)	2253/1122	. . . Metals
2252/102	. . Ammonia	2253/1124	. . . Metal oxides
2252/103	. . Water	2253/1126	. . . Metal hydrides
2252/1035	. . . Sea water	2253/1128	. . . Metal sulfides
2252/20	. Organic absorbents	2253/116	. . Molecular sieves other than zeolites
2252/202	. . Alcohols or their derivatives	2253/20	. Organic adsorbents
2252/2021	. . . Methanol	2253/202	. . Polymeric adsorbents
2252/2023	. . . Glycols, diols or their derivatives	2253/204	. . Metal organic frameworks (MOF's)
2252/2025	. . . . Ethers or esters of alkylene glycols, e.g. ethylene or propylene carbonate	2253/206	. . Ion exchange resins
2252/2026	. . . . Polyethylene glycol, ethers or esters thereof, e.g. Selexol	2253/25	. Coated, impregnated or composite adsorbents
2252/2028	. . . . Polypropylene glycol, ethers or esters thereof	2253/30	. Physical properties of adsorbents
2252/204	. . Amines	2253/302	. . Dimensions
2252/20405	. . . Monoamines	2253/304	. . . Linear dimensions, e.g. particle shape, diameter
2252/2041	. . . Diamines	2253/306	. . . Surface area, e.g. BET-specific surface
2252/20415	. . . Tri- or polyamines	2253/308	. . . Pore size
2252/20421	. . . Primary amines	2253/31	. . . Pore size distribution
2252/20426	. . . Secondary amines	2253/311	. . . Porosity, e.g. pore volume
2252/20431	. . . Tertiary amines	2253/34	. . Specific shapes
2252/20436	. . . Cyclic amines	2253/342	. . . Monoliths
2252/20442	. . . . containing a piperidine-ring	2253/3425	. . . . Honeycomb shape
2252/20447	. . . . containing a piperazine-ring	2255/00	Catalysts
2252/20452	. . . . containing a morpholine-ring	2255/10	. Noble metals or compounds thereof
2252/20457	. . . . containing a pyridine-ring	2255/102	. . Platinum group metals
2252/20463	. . . . containing a pyrimidine-ring	2255/1021	. . . Platinum
2252/20468	. . . . containing a pyrrolidone-ring	2255/1023	. . . Palladium
2252/20473	. . . . containing an imidazole-ring	2255/1025	. . . Rhodium
2252/20478	. . . Alkanolamines	2255/1026	. . . Ruthenium
2252/20484	. . . . with one hydroxyl group	2255/1028	. . . Iridium
2252/20489	. . . . with two or more hydroxyl groups	2255/104	. . Silver
2252/20494	. . . Amino acids, their salts or derivatives	2255/106	. . Gold
2252/205	. . Other organic compounds not covered by B01D 2252/00 - B01D 2252/20494	2255/20	. Metals or compounds thereof (noble metals B01D 2255/10)
2252/2053	. . . Other nitrogen compounds	2255/202	. . Alkali metals
2252/2056	. . . Sulfur compounds, e.g. Sulfolane, thiols	2255/2022	. . . Potassium
2252/30	. Ionic liquids and zwitter-ions	2255/2025	. . . Lithium
2252/40	. Absorbents explicitly excluding the presence of water	2255/2027	. . . Sodium
2252/50	. Combinations of absorbents	2255/204	. . Alkaline earth metals
2252/502	. . having two or more functionalities in the same molecule other than alkanolamine	2255/2042	. . . Barium
2252/504	. . Mixtures of two or more absorbents	2255/2045	. . . Calcium
2252/60	. Additives	2255/2047	. . . Magnesium
2252/602	. . Activators, promoting agents, catalytic agents or enzymes	2255/206	. . Rare earth metals
		2255/2061	. . . Yttrium
		2255/2063	. . . Lanthanum
		2255/2065	. . . Cerium
		2255/2066	. . . Praseodymium

2255/2068	. . . Neodymium	2255/9202	. . . Linear dimensions
2255/207	. . Transition metals	2255/9205	. . . Porosity
2255/20707	. . . Titanium	2255/9207	. . . Specific surface
2255/20715	. . . Zirconium	2256/00	Main component in the product gas stream after treatment
2255/20723	. . . Vanadium	2256/10	. Nitrogen
2255/2073	. . . Manganese	2256/12	. Oxygen
2255/20738	. . . Iron	2256/14	. Ozone
2255/20746	. . . Cobalt	2256/16	. Hydrogen
2255/20753	. . . Nickel	2256/18	. Noble gases
2255/20761	. . . Copper	2256/20	. Carbon monoxide
2255/20769	. . . Molybdenum	2256/22	. Carbon dioxide
2255/20776	. . . Tungsten	2256/24	. Hydrocarbons
2255/20784	. . . Chromium	2256/245	. . Methane
2255/20792	. . . Zinc	2256/26	. Halogens or halogen compounds
2255/209	. . Other metals	2257/00	Components to be removed
2255/2092	. . . Aluminium	2257/10	. Single element gases other than halogens
2255/2094	. . . Tin	2257/102	. . Nitrogen
2255/2096	. . . Bismuth	2257/104	. . Oxygen
2255/2098	. . . Antimony	2257/106	. . Ozone
2255/30	. Silica	2257/108	. . Hydrogen
2255/40	. Mixed oxides	2257/11	. . Noble gases
2255/402	. . Perovskites	2257/20	. Halogens or halogen compounds
2255/405	. . Spinel	2257/202	. . Single element halogens
2255/407	. . Zr-Ce mixed oxides	2257/2022	. . . Bromine
2255/50	. Zeolites	2257/2025	. . . Chlorine
2255/502	. . Beta zeolites	2257/2027	. . . Fluorine
2255/504	. . ZSM 5 zeolites	2257/204	. . Inorganic halogen compounds
2255/65	. Catalysts not containing noble metals	2257/2042	. . . Hydrobromic acid
2255/70	. Non-metallic catalysts, additives or dopants	2257/2045	. . . Hydrochloric acid
2255/702	. . Carbon	2257/2047	. . . Hydrofluoric acid
2255/705	. . Ligands for metal-organic catalysts	2257/206	. . Organic halogen compounds
2255/707	. . Additives or dopants	2257/2062	. . . Bromine compounds
2255/80	. Type of catalytic reaction	2257/2064	. . . Chlorine
2255/802	. . Photocatalytic	2257/2066	. . . Fluorine
2255/804	. . Enzymatic	2257/2068	. . . Iodine
2255/806	. . Electrocatalytic	2257/30	. Sulfur compounds
2255/808	. . Hydrolytic	2257/302	. . Sulfur oxides
2255/90	. Physical characteristics of catalysts	2257/304	. . Hydrogen sulfide
2255/902	. . Multilayered catalyst	2257/306	. . Organic sulfur compounds, e.g. mercaptans
2255/9022	. . . Two layers	2257/308	. . Carbonoxysulfide COS
2255/9025	. . . Three layers	2257/40	. Nitrogen compounds
2255/9027	. . . More than three layers	2257/402	. . Dinitrogen oxide
2255/903	. . Multi-zoned catalysts	2257/404	. . Nitrogen oxides other than dinitrogen oxide
2255/9032	. . . Two zones	2257/406	. . Ammonia
2255/9035	. . . Three zones	2257/408	. . Cyanides, e.g. hydrogen cyanide (HCH)
2255/9037	. . . More than three zones	2257/50	. Carbon oxides
2255/904	. . Multiple catalysts	2257/502	. . Carbon monoxide
2255/9045	. . . in parallel	2257/504	. . Carbon dioxide
2255/905	. . Catalysts having a gradually changing coating	2257/55	. Compounds of silicon, phosphorus, germanium or arsenic
2255/906	. . Catalyst dispersed in the gas	2257/553	. . Compounds comprising hydrogen, e.g. silanes
2255/908	. . O ₂ -storage component incorporated in the catalyst	2257/556	. . Organic compounds
2255/909	. . H ₂ -storage component incorporated in the catalyst	2257/60	. Heavy metals or heavy metal compounds
2255/91	. . NO _x -storage component incorporated in the catalyst	2257/602	. . Mercury or mercury compounds
2255/911	. . NH ₃ -storage component incorporated in the catalyst	2257/70	. Organic compounds not provided for in groups B01D 2257/00 - B01D 2257/602
2255/912	. . HC-storage component incorporated in the catalyst	2257/702	. . Hydrocarbons
2255/915	. . Catalyst supported on particulate filters	2257/7022	. . . Aliphatic hydrocarbons
2255/9155	. . . Wall flow filters	2257/7025	. . . . Methane
2255/92	. . Dimensions		

B01D

2257/7027	. . . Aromatic hydrocarbons	2259/40032	. . . . with three sub-steps
2257/704	. . Solvents not covered by groups B01D 2257/702 - B01D 2257/7027	2259/40033	. . . . with more than three sub-steps
2257/706	. . Organometallic compounds	2259/40035	. . . Equalization
2257/708	. . Volatile organic compounds V.O.C.'s	2259/40037	. . . . with two sub-steps
2257/80	. Water	2259/40039	. . . . with three sub-steps
2257/90	. Odorous compounds not provided for in groups B01D 2257/00 - B01D 2257/708	2259/40041	. . . . with more than three sub-steps
2257/91	. Bacteria; Microorganisms	2259/40043	. . . Purging
2257/93	. Toxic compounds not provided for in groups B01D 2257/00 - B01D 2257/708	2259/40045	. . . . with two sub-steps
2258/00	Sources of waste gases	2259/40047	. . . . with three sub-steps
2258/01	. Engine exhaust gases	2259/40049	. . . . with more than three sub-steps
2258/012	. . Diesel engines and lean burn gasoline engines	2259/4005	. . . . Nature of purge gas
2258/014	. . Stoichiometric gasoline engines	2259/40052	. . . . . Recycled product or process gas
2258/016	. . Methanol engines	2259/40054	. . . . . treated before its reuse
2258/018	. . Natural gas engines	2259/40056	. . . . . Gases other than recycled product or process gas
2258/02	. Other waste gases	2259/40058	. . . . Number of sequence steps, including sub-steps, per cycle
2258/0208	. . from fuel cells	2259/4006	. . . . . Less than four
2258/0216	. . from CVD treatment or semi-conductor manufacturing	2259/40062	. . . . . Four
2258/0225	. . from chemical or biological warfare	2259/40064	. . . . . Five
2258/0233	. . from cement factories	2259/40066	. . . . . Six
2258/0241	. . from glass manufacture plants	2259/40067	. . . . . Seven
2258/025	. . from metallurgy plants	2259/40069	. . . . . Eight
2258/0258	. . from painting equipments or paint drying installations	2259/40071	. . . . . Nine
2258/0266	. . from animal farms	2259/40073	. . . . . Ten
2258/0275	. . from food processing plants or kitchens	2259/40075	. . . . . More than ten
2258/0283	. . Flue gases	2259/40077	. . . Direction of flow
2258/0291	. . . from waste incineration plants	2259/40079	. . . . . Co-current
2258/05	. Biogas	2259/40081	. . . . . Counter-current
2258/06	. Polluted air	2259/40083	. . Regeneration of adsorbents in processes other than pressure or temperature swing adsorption
2259/00	Type of treatment	2259/40084	. . . by exchanging used adsorbents with fresh adsorbents
2259/10	. Gas phase, e.g. by using aerosols	2259/40086	. . . by using a purge gas (B01D 2259/4009 takes precedence)
2259/12	. Methods and means for introducing reactants (for catalytic processes B01D 53/90)	2259/40088	. . . by heating
2259/122	. . Gaseous reactants	2259/4009	. . . . using hot gas
2259/124	. . Liquid reactants	2259/40092	. . . . using hot liquid
2259/126	. . Semi-solid reactants, e.g. slurries	2259/40094	. . . . by applying microwaves
2259/128	. . Solid reactants	2259/40096	. . . . by using electrical resistance heating
2259/40	. Further details for adsorption processes and devices	2259/40098	. . . . with other heating means
2259/40001	. . Methods relating to additional, e.g. intermediate, treatment of process gas	2259/401	. . using a single bed
2259/40003	. . Methods relating to valve switching	2259/402	. . using two beds
2259/40005	. . . using rotary valves	2259/403	. . using three beds
2259/40007	. . Controlling pressure or temperature swing adsorption	2259/404	. . using four beds
2259/40009	. . . using sensors or gas analysers	2259/406	. . using more than four beds
2259/40011	. . Methods relating to the process cycle in pressure or temperature swing adsorption	2259/4061	. . . using five beds
2259/40013	. . . Pressurization	2259/4062	. . . using six beds
2259/40015	. . . . with two sub-steps	2259/4063	. . . using seven beds
2259/40016	. . . . with three sub-steps	2259/4065	. . . using eight beds
2259/40018	. . . . with more than three sub-steps	2259/4066	. . . using nine beds
2259/4002	. . . Production	2259/4067	. . . using ten beds
2259/40022	. . . . with two sub-steps	2259/4068	. . . using more than ten beds
2259/40024	. . . . with three sub-steps	2259/41	. . using plural beds of the same adsorbent in series
2259/40026	. . . . with more than three sub-steps	2259/414	. . using different types of adsorbents
2259/40028	. . . Depressurization	2259/4141	. . . within a single bed
2259/4003	. . . . with two sub-steps	2259/4143	. . . . arranged as a mixture
		2259/4145	. . . . arranged in series
		2259/4146	. . . . . Contiguous multilayered adsorbents
		2259/4148	. . . . . Multiple layers positioned apart from each other
		2259/416	. . involving cryogenic temperature treatment

2259/418	. . deleted	2267/60	. Vertical arrangement
2259/45	. Gas separation or purification devices adapted for specific applications	2267/70	. Horizontal arrangement
2259/4508	. . for cleaning air in buildings	2271/00	Sealings for filters specially adapted for separating dispersed particles from gases or vapours
2259/4516	. . for fuel vapour recovery systems	2271/02	. Gaskets, sealings
2259/4525	. . for storage and dispensing systems	2271/022	. . Axial sealings
2259/4533	. . for medical purposes	2271/025	. . Making of sealings
2259/4541	. . for portable use, e.g. gas masks	2271/027	. . Radial sealings
2259/455	. . for transportable use (portable devices B01D 2259/4541)	2273/00	Operation of filters specially adapted for separating dispersed particles from gases or vapours
2259/4558	. . . for being employed as mobile cleaners for ambient air, i.e. the earth's atmosphere	2273/10	. Allowing a continuous bypass of at least part of the flow, e.g. of secondary air, vents
2259/4566	. . for use in transportation means	2273/12	. Influencing the filter cake during filtration using filter aids
2259/4575	. . . in aeroplanes or space ships	2273/14	. Filters which are moved between two or more positions, e.g. by turning, pushing
2259/4583	. . for removing chemical, biological and nuclear warfare agents	2273/16	. Means for selecting a filter element of a group of filters for a special purpose other than cleaning a filter
2259/4591	. . Construction elements containing cleaning material, e.g. catalysts	2273/18	. Testing of filters, filter elements, sealings
2259/65	. Employing advanced heat integration, e.g. Pinch technology	2273/20	. High temperature filtration
2259/652	. . using side coolers	2273/22	. Making use of microwaves, e.g. for measurements
2259/655	. . using heat storage materials	2273/24	. Making use of acoustic waves, e.g. for measurements
2259/657	. . . using latent heat, e.g. with phase change materials	2273/26	. Making use of optical waves, e.g. for measurements
2259/80	. Employing electric, magnetic, electromagnetic or wave energy, or particle radiation	2273/28	. Making use of vacuum or underpressure
2259/802	. . Visible light	2273/30	. Means for generating a circulation of a fluid in a filtration system, e.g. using a pump or a fan
2259/804	. . UV light	2275/00	Filter media structures for filters specially adapted for separating dispersed particles from gases or vapours
2259/806	. . Microwaves	2275/10	. Multiple layers
2259/808	. . Laser	2275/105	. . Wound layers
2259/81	. . X-rays	2275/20	. Shape of filtering material
2259/812	. . Electrons	2275/201	. . Conical shape
2259/814	. . Magnetic fields	2275/202	. . Disc-shaped filter elements
2259/816	. . Sonic or ultrasonic vibration	2275/203	. . Shapes flexible in their geometry, e.g. bendable, adjustable to a certain size
2259/818	. . Employing electrical discharges or the generation of a plasma	2275/204	. . Special shapes of loose filter materials
2265/00	Casings, housings or mounting for filters specially adapted for separating dispersed particles from gases or vapours	2275/205	. . Rectangular shape
2265/02	. Non-permanent measures for connecting different parts of the filter	2275/206	. . Special forms, e.g. adapted to a certain housing
2265/021	. . Anti-rotational means	2275/207	. . Triangular shape
2265/022	. . Bayonet connecting means	2275/208	. . Oval shape
2265/023	. . making use of magnetic forces	2275/30	. Porosity of filtering material
2265/024	. . Mounting aids	2275/302	. . Means for changing the porosity of a filter element, e.g. adjustment of a slit width, compression of a foam material
2265/025	. . . making use of ramps or cams	2275/305	. . Porosity decreasing in flow direction
2265/026	. . . with means for avoiding false mounting	2275/307	. . Porosity increasing in flow direction
2265/027	. . Quick closing means for, e.g. filter heads, caps, maintenance openings	2275/40	. Porous blocks
2265/028	. . Snap, latch or clip connecting means	2275/403	. . Flexible blocks
2265/029	. . Special screwing connections, threaded sections	2275/406	. . Rigid blocks
2265/04	. Permanent measures for connecting different parts of the filter, e.g. welding, glueing or moulding	2275/50	. Stabilised filter material, stabilised by, e.g. structuring, calendering
2265/05	. . Special adapters for the connection of filters or parts of filters	2277/00	Filters specially adapted for separating dispersed particles from gases or vapours characterised by the position of the filter in relation to the gas stream
2265/06	. Details of supporting structures for filtering material, e.g. cores	2277/10	. Parallel
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		

2277/20	. Inclined, i.e. forming an angle of between 0° and 90°	2311/2615	. . . Application of high-frequency electromagnetic fields or microwave irradiation
2277/30	. Transverse, i.e. forming an angle of 90°	2311/2619	. . . UV-irradiation
2279/00	Filters adapted for separating dispersed particles from gases or vapours specially modified for specific uses	2311/2623	. . Ion-Exchange
2279/10	. for air bags, e.g. inflators therefor	2311/2626	. . Absorption or adsorption
2279/20	. for collecting heterogeneous particles separately	2311/263	. . Chemical reaction
2279/30	. for treatment of exhaust gases from IC Engines	2311/2634	. . . Oxidation
2279/35	. for venting arrangements	2311/2638	. . . Reduction
2279/40	. for cleaning of environmental air, e.g. by filters installed on vehicles or on streets	2311/2642	. . Aggregation, sedimentation, flocculation, precipitation or coagulation
2279/45	. for electronic devices, e.g. computers, hard-discs, mobile phones	2311/2646	. . Decantation
2279/50	. for air conditioning (air-conditioning systems comprising filters F24F 8/10)	2311/2649	. . Filtration
2279/51	. . in clean rooms, e.g. production facilities for electronic devices, laboratories	2311/2653	. . Degassing
2279/55	. for cleaning appliances, e.g. suction cleaners (suction cleaners comprising filters A47L 9/10)	2311/2657	. . . Deaeration
2279/60	. for the intake of internal combustion engines or turbines (intake systems for vehicles comprising filters F02M 35/024)	2311/2661	. . Addition of gas
2279/65	. for the sterilisation of air (disinfection, sterilisation or deodorization of air A61L 9/00)	2311/2665	. . . Aeration other than for cleaning purposes
2311/00	Details relating to membrane separation process operations and control	2311/2669	. . Distillation
	NOTE	2311/2673	. . Evaporation
	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	2311/2676	. . Centrifugal separation
2311/02	. Specific process operations before starting the membrane separation process	2311/268	. . Water softening
2311/04	. Specific process operations in the feed stream; Feed pretreatment	2311/2684	. . Electrochemical processes
2311/06	. Specific process operations in the permeate stream	2311/2688	. . Biological processes
2311/08	. Specific process operations in the concentrate stream	2311/2692	. . Sterilization
2311/10	. Temperature control	2311/2696	. . Catalytic reactions
2311/103	. . Heating	2313/00	Details relating to membrane modules or apparatus
2311/106	. . Cooling	2313/02	. Specific tightening or locking mechanisms
2311/12	. Addition of chemical agents	2313/025	. . Specific membrane holders
2311/13	. Use of sweep gas	2313/04	. Specific sealing means
2311/14	. Pressure control	2313/06	. External membrane module supporting or fixing means
2311/16	. Flux control	2313/08	. Flow guidance means within the module or the apparatus
2311/165	. . Cross-flow velocity control	2313/083	. . Bypass routes
2311/18	. pH control	2313/086	. . Meandering flow path over the membrane
2311/20	. Power consumption	2313/10	. Specific supply elements
2311/22	. characterised by a specific duration or time	2313/105	. . Supply manifolds
2311/24	. Quality control	2313/12	. Specific discharge elements
2311/243	. . Electrical conductivity control	2313/125	. . Discharge manifolds
2311/246	. . Concentration control	2313/13	. Specific connectors
2311/25	. Recirculation, recycling, e.g. recirculation of concentrate into the feed	2313/14	. Specific spacers
2311/26	. Further operations combined with membrane separation processes	2313/143	. . on the feed side
2311/2603	. . Application of an electric field, different from the potential difference across the membrane	2313/146	. . on the permeate side
2311/2607	. . Application of a magnetic field	2313/16	. Specific vents
2311/2611	. . Irradiation	2313/18	. Specific valves
		2313/19	. Specific flow restrictors
		2313/20	. Specific housing
		2313/21	. Specific headers, end caps
		2313/22	. Specific cooling or heating elements
		2313/23	. Specific membrane protectors, e.g. sleeves or screens
		2313/24	. Specific pressurizing or depressurizing means
		2313/243	. . Pumps
		2313/246	. . Energy recovery means
		2313/26	. Specific gas distributors or gas intakes
		2313/28	. Specific concentration chambers
		2313/30	. Specific dilution or de-ionizing chambers
		2313/32	. Intermediate chambers
		2313/34	. Energy carriers
		2313/345	. . Electrodes
		2313/36	. Energy sources

- 2313/365 . . Electrical sources
- 2313/38 . Heat exchangers
- 2313/40 . Adsorbents within the flow path
- 2313/42 . Catalysts within the flow path
- 2313/44 . Cartridge types
- 2313/46 . Supply, recovery or discharge mechanisms of washing members
- 2313/48 . Mechanisms for switching between regular separation operations and washing
- 2313/50 . Specific extra reservoirs
- 2313/54 . Modularity of membrane module elements
- 2313/56 . Specific mechanisms for loading the membrane in a module
- 2313/58 . Parts of membrane modules specifically adapted to single use
- 2313/90 . Other integrated auxiliary systems
- 2315/00 Details relating to the membrane module operation**
- 2315/02 . Rotation or turning
- 2315/04 . Reciprocation, oscillation or vibration
- 2315/05 . Moving the membrane in one direction, e.g. displacement, translational movement
- 2315/06 . Submerged-type; Immersion type
- 2315/08 . Fully permeating type; Dead-end filtration
- 2315/10 . Cross-flow filtration
- 2315/12 . Feed-and-bleed systems
- 2315/14 . Batch-systems
- 2315/16 . Diafiltration
- 2315/18 . Time sequence of one or more process steps carried out periodically within one apparatus
- 2315/20 . Operation control schemes defined by a periodically repeated sequence comprising filtration cycles combined with cleaning or gas supply, e.g. aeration
- 2317/00 Membrane module arrangements within a plant or an apparatus (membrane assemblies within one housing [B01D 2319/00](#))**
- 2317/02 . Elements in series
- 2317/022 . . Reject series
- 2317/025 . . Permeate series
- 2317/027 . . Christmas tree arrangements
- 2317/04 . Elements in parallel
- 2317/06 . Use of membrane modules of the same kind
- 2317/08 . Use of membrane modules of different kinds
- 2319/00 Membrane assemblies within one housing (module or elements arrangements within a plant or an apparatus [B01D 2317/00](#))**
- 2319/02 . Elements in series
- 2319/022 . . Reject series
- 2319/025 . . Permeate series
- 2319/027 . . Christmas tree arrangements
- 2319/04 . Elements in parallel
- 2319/06 . Use of membranes of different materials or properties within one module
- 2321/00 Details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling**
- 2321/02 . Forward flushing
- 2321/04 . Backflushing
- 2321/06 . Use of osmotic pressure, e.g. direct osmosis
- 2321/08 . Use of hot water or water vapor
- 2321/10 . Use of feed
- 2321/12 . Use of permeate
- 2321/14 . Use of concentrate
- 2321/16 . Use of chemical agents
- 2321/162 . . Use of acids
- 2321/164 . . Use of bases
- 2321/166 . . Use of enzymatic agents
- 2321/168 . . Use of other chemical agents
- 2321/18 . Use of gases
- 2321/185 . . Aeration
- 2321/20 . By influencing the flow
- 2321/2008 . . statically
- 2321/2016 . . . Static mixers; Turbulence generators
- 2321/2025 . . . Tangential inlet
- 2321/2033 . . dynamically
- 2321/2041 . . . Mixers; Agitators
- 2321/205 . . . Integrated pumps
- 2321/2058 . . . by vibration of the membrane, e.g. with an actuator
- 2321/2066 . . Pulsated flow
- 2321/2075 . . . Ultrasonic treatment
- 2321/2083 . . By reversing the flow
- 2321/2091 . . using movable bodies, e.g. foam balls
- 2321/22 . Electrical effects
- 2321/223 . . Polarity reversal
- 2321/226 . . Interruption of electric currents
- 2321/24 . Magnetic effects
- 2321/26 . By suction
- 2321/28 . By soaking or impregnating
- 2321/30 . Mechanical cleaning, e.g. with brushes or scrapers
- 2321/32 . By heating or pyrolysis
- 2321/34 . by radiation
- 2321/343 . . By UV radiation
- 2321/346 . . By gamma radiation
- 2321/40 . Automatic control of cleaning processes
- 2323/00 Details relating to membrane preparation**
- 2323/02 . Hydrophilization
- 2323/04 . Hydrophobization
- 2323/06 . Specific viscosities of materials involved
- 2323/08 . Specific temperatures applied
- 2323/10 . Specific pressure applied
- 2323/12 . Specific ratios of components used
- 2323/14 . Aging features
- 2323/16 . Use of swelling agents
- 2323/18 . Use of pore-control agents
- 2323/20 . Use of plasticizers
- 2323/21 . Use of fillers
- 2323/22 . Use of non-solvents
- 2323/225 . . Use of supercritical fluids
- 2323/24 . Use of template or surface directing agents [SDA]
- 2323/26 . Spraying processes
- 2323/28 . Pore treatments
- 2323/283 . . Reducing the pores
- 2323/286 . . Closing of pores, e.g. for membrane sealing
- 2323/30 . Cross-linking
- 2323/32 . Use of chain transfer agents or inhibitors
- 2323/34 . Use of radiation
- 2323/345 . . UV-treatment
- 2323/35 . Use of magnetic or electrical fields
- 2323/36 . Introduction of specific chemical groups
- 2323/38 . Graft polymerization
- 2323/385 . . involving radiation

- 2323/39 . Electrospinning
- 2323/40 . in-situ membrane formation
- 2323/42 . Details of membrane preparation apparatus
- 2323/44 . Relaxation steps
- 2323/46 . Impregnation
- 2323/48 . Influencing the pH
- 2323/50 . Control of the membrane preparation process

2325/00 Details relating to properties of membranes

- 2325/02 . Details relating to pores or porosity of the membranes
- 2325/021 . . Characteristic pore shapes
- 2325/022 . . Asymmetric membranes
- 2325/023 . . . Dense layer within the membrane
- 2325/025 . . Finger pores
- 2325/026 . . Sponge structure
- 2325/027 . . Nonporous membranes
- 2325/028 . . Microfluidic pore structures
- 2325/04 . Characteristic thickness
- 2325/06 . Surface irregularities
- 2325/08 . Patterned membranes
- 2325/10 . Catalysts being present on the surface of the membrane or in the pores
- 2325/12 . Adsorbents being present on the surface of the membranes or in the pores
- 2325/14 . Membrane materials having negatively charged functional groups
- 2325/16 . Membrane materials having positively charged functional groups
- 2325/18 . Membrane materials having mixed charged functional groups
- 2325/20 . Specific permeability or cut-off range
- 2325/22 . Thermal or heat-resistance properties
- 2325/24 . Mechanical properties, e.g. strength
- 2325/26 . Electrical properties
- 2325/28 . Degradation or stability over time
- 2325/30 . Chemical resistance
- 2325/32 . Melting point or glass-transition temperatures
- 2325/34 . Molecular weight or degree of polymerization
- 2325/36 . Hydrophilic membranes
- 2325/38 . Hydrophobic membranes
- 2325/40 . Fibre reinforced membranes
- 2325/42 . Ion-exchange membranes
- 2325/44 . Transmission of light
- 2325/46 . Magnetic properties
- 2325/48 . Antimicrobial properties