

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](#).
5. {In this subclass, combination sets [C-Sets] are used. The detailed information about the C-Sets construction and the associated syntax rules are found in the definitions of [B01D](#).}

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 29/37	covered by	B01D 29/336 , B01D 29/356
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 serpentines}
- 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, thiourem or metal salts}	11/0288	. . {Applications, solvents}
2009/0095	. . . {with the aid of other complex forming substances than ureum, thiourem or metal salts}	11/0292	. . {Treatment of the solvent}
9/02	. from solutions	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; Apparatus therefor

WARNING

Group [B01D 15/00](#) is impacted by reclassification into groups [B01D 15/122](#) and [B01D 15/267](#).

Groups [B01D 15/00](#), [B01D 15/122](#) and [B01D 15/267](#) should be considered in order to perform a complete search.

- 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](#)

WARNING

Group [B01D 15/08](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/122](#), [B01D 15/222](#) and [B01D 15/267](#).

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

- 15/10 . . characterised by constructional or operational features

WARNING

Group [B01D 15/10](#) is impacted by reclassification into group [B01D 15/102](#).

Groups [B01D 15/10](#) and [B01D 15/102](#) should be considered in order to perform a complete search.

- 15/102 . . . {Process control, e.g. determination or optimization of process parameters; Programmable logic control [PLC]}

WARNING

Group [B01D 15/102](#) is incomplete pending reclassification of documents from groups [B01D 15/08](#), [B01D 15/10](#), [B01D 15/18](#), [B01D 15/1807](#), [B01D 15/1814](#), [B01D 15/1821](#), [B01D 15/1828](#), [B01D 15/1835](#), [B01D 15/1842](#), [B01D 15/185](#), [B01D 15/1857](#), [B01D 15/1864](#), [B01D 15/1871](#), [B01D 15/1878](#), [B01D 15/1885](#) and [B01D 15/1892](#).

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

- 15/12 . . . relating to the preparation of the feed

WARNING

Group [B01D 15/12](#) is impacted by reclassification into group [B01D 15/122](#).

Groups [B01D 15/12](#) and [B01D 15/122](#) should be considered in order to perform a complete search.

- 15/122 {Solid phase extraction}

WARNING

Group [B01D 15/122](#) is incomplete pending reclassification of documents from groups [B01D 15/00](#), [B01D 15/08](#), [B01D 15/12](#), [B01D 15/125](#) and [B01D 15/22](#).

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

- 15/125 {Pre-filtration}

WARNING

Group [B01D 15/125](#) is impacted by reclassification into group [B01D 15/122](#).

Groups [B01D 15/125](#) and [B01D 15/122](#) should be considered in order to perform a complete search.

- 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 or chromatofocusing, i.e. separation according to the isoelectric point pI}

15/18 . . . relating to flow patterns

WARNING

Group [B01D 15/18](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1801 {Radial flow}

WARNING

Group [B01D 15/1801](#) is incomplete pending reclassification of documents from groups [B01D 15/18](#), [B01D 15/1807](#), [B01D 15/1814](#), [B01D 15/1821](#), [B01D 15/1828](#), [B01D 15/1835](#), [B01D 15/1842](#), [B01D 15/185](#), [B01D 15/1857](#), [B01D 15/1864](#), [B01D 15/1871](#), [B01D 15/1878](#), [B01D 15/1885](#), [B01D 15/1892](#) and [B01D 15/22](#).

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

15/1807 {using counter-currents, e.g. fluidised beds}

WARNING

Group [B01D 15/1807](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1814 {Recycling of the fraction to be distributed}

WARNING

Group [B01D 15/1814](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1821 {Simulated moving beds}

WARNING

Group [B01D 15/1821](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1828 {characterised by process features}

WARNING

Group [B01D 15/1828](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1835 {Flushing}

WARNING

Group [B01D 15/1835](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1842 {characterised by apparatus features}

WARNING

Group [B01D 15/1842](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/185 {characterised by the components to be separated}

WARNING

Group [B01D 15/185](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1857 {Reactive simulated moving beds}

WARNING

Group [B01D 15/1857](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1864 {using two or more columns}

WARNING

Group [B01D 15/1864](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1867](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1867 {with intermediate treatments or steps performed between columns}

WARNING

Group [B01D 15/1867](#) is incomplete pending reclassification of documents from groups [B01D 15/1864](#), [B01D 15/36](#), [B01D 15/361](#), [B01D 15/362](#), [B01D 15/363](#), [B01D 15/364](#), [B01D 15/365](#), [B01D 15/366](#), [B01D 15/367](#), [B01D 15/368](#), [B01D 15/38](#), [B01D 15/3804](#), [B01D 15/3809](#), [B01D 15/3814](#), [B01D 15/3819](#), [B01D 15/3823](#), [B01D 15/3828](#), [B01D 15/3833](#), [B01D 15/3842](#), [B01D 15/3847](#), [B01D 15/3852](#), [B01D 15/3857](#), [B01D 15/3861](#), [B01D 15/3866](#), [B01D 15/3871](#), [B01D 15/3876](#), [B01D 15/388](#) and [B01D 15/3885](#).

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

15/1871 {placed in series}

WARNING

Group [B01D 15/1871](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1878 {for multi-dimensional chromatography}

WARNING

Group [B01D 15/1878](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1885 {placed in parallel}

WARNING

Group [B01D 15/1885](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1892 {the sorbent material moving as a whole, e.g. continuous annular chromatography, true moving beds or centrifugal chromatography}

WARNING

Group [B01D 15/1892](#) is impacted by reclassification into groups [B01D 15/102](#), [B01D 15/1801](#), [B01D 15/1894](#) and [B01D 15/1896](#).

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

15/1894 {Liquid-liquid chromatography, e.g. centrifugal partition chromatography or extraction chromatography}

WARNING

Group [B01D 15/1894](#) is incomplete pending reclassification of documents from groups [B01D 15/18](#), [B01D 15/1807](#), [B01D 15/1814](#), [B01D 15/1821](#), [B01D 15/1828](#), [B01D 15/1835](#), [B01D 15/1842](#), [B01D 15/185](#), [B01D 15/1857](#), [B01D 15/1864](#), [B01D 15/1871](#), [B01D 15/1878](#), [B01D 15/1885](#), [B01D 15/1892](#), [B01D 15/22](#) and [B01D 15/30](#).

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

15/1896 {Membrane chromatography or membrane adsorbers}

WARNING

Group [B01D 15/1896](#) is incomplete pending reclassification of documents from groups [B01D 15/18](#), [B01D 15/1807](#), [B01D 15/1814](#), [B01D 15/1821](#), [B01D 15/1828](#), [B01D 15/1835](#), [B01D 15/1842](#), [B01D 15/185](#), [B01D 15/1857](#), [B01D 15/1864](#), [B01D 15/1871](#), [B01D 15/1878](#), [B01D 15/1885](#), [B01D 15/1892](#), [B01D 15/22](#), [B01D 15/36](#), [B01D 15/361](#), [B01D 15/362](#), [B01D 15/363](#), [B01D 15/364](#), [B01D 15/365](#), [B01D 15/366](#), [B01D 15/367](#), [B01D 15/368](#), [B01D 15/38](#), [B01D 15/3804](#), [B01D 15/3809](#), [B01D 15/3814](#), [B01D 15/3819](#), [B01D 15/3823](#), [B01D 15/3828](#), [B01D 15/3833](#), [B01D 15/3842](#), [B01D 15/3847](#), [B01D 15/3852](#), [B01D 15/3857](#), [B01D 15/3861](#), [B01D 15/3866](#), [B01D 15/3871](#), [B01D 15/3876](#), [B01D 15/388](#) and [B01D 15/3885](#).

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

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

WARNING

Group [B01D 15/22](#) is impacted by reclassification into groups [B01D 15/122](#), [B01D 15/1801](#), [B01D 15/1894](#), [B01D 15/1896](#) and [B01D 15/222](#).

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

- 15/222 {Arrangements of modules or cassettes}

WARNING

Group [B01D 15/222](#) is incomplete pending reclassification of documents from groups [B01D 15/08](#) and [B01D 15/22](#).

Groups [B01D 15/08](#), [B01D 15/22](#) and [B01D 15/222](#) should be considered in order to perform a complete search.

- 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

WARNING

Group [B01D 15/26](#) is impacted by reclassification into group [B01D 15/267](#).

Groups [B01D 15/26](#) and [B01D 15/267](#) should be considered in order to perform a complete search.

- 15/265 . . . {Adsorption chromatography}

WARNING

Group [B01D 15/265](#) is impacted by reclassification into group [B01D 15/267](#).

Groups [B01D 15/265](#) and [B01D 15/267](#) should be considered in order to perform a complete search.

- 15/267 {using neutral sorbents, e.g. activated carbon or diatomaceous earth}

WARNING

Group [B01D 15/267](#) is incomplete pending reclassification of documents from groups [B01D 15/00](#), [B01D 15/08](#), [B01D 15/26](#) and [B01D 15/265](#).

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

- 15/30 . . . Partition chromatography

WARNING

Group [B01D 15/30](#) is impacted by reclassification into group [B01D 15/1894](#).

Groups [B01D 15/30](#) and [B01D 15/1894](#) should be considered in order to perform a complete search.

- 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

- 15/36 . . . involving ionic interaction, e.g. ion-exchange, ion-pair, ion-suppression or ion-exclusion

WARNING

Group [B01D 15/36](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/36](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

- 15/361 {Ion-exchange}

WARNING

Group [B01D 15/361](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/361](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

- 15/362 {Cation-exchange}

WARNING

Group [B01D 15/362](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/362](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

- 15/363 {Anion-exchange}

WARNING

Group [B01D 15/363](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/363](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

- 15/364 {Amphoteric or zwitterionic ion-exchanger}

WARNING

Group [B01D 15/364](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/364](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/365 {Ion-exclusion}

WARNING

Group [B01D 15/365](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/365](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/366 {Ion-pair, e.g. ion-pair reversed phase}

WARNING

Group [B01D 15/366](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/366](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/367 {Ion-suppression}

WARNING

Group [B01D 15/367](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/367](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/368 {Cation-pi interaction}

WARNING

Group [B01D 15/368](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/368](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/38 . . . involving specific interaction not covered by one or more of groups {[B01D 15/265](#) and [B01D 15/30](#) - [B01D 15/36](#), e.g. affinity, ligand exchange or chiral chromatography}

WARNING

Group [B01D 15/38](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/38](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3804 {Affinity chromatography}

WARNING

Group [B01D 15/3804](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3804](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3809 {of the antigen-antibody type, e.g. protein A, G or L chromatography}

WARNING

Group [B01D 15/3809](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3809](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3814 {of the substrate or cofactor-enzyme type}

WARNING

Group [B01D 15/3814](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3814](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3819 {of the nucleic acid-nucleic acid binding protein type}

WARNING

Group [B01D 15/3819](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3819](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3823 {of other types, e.g. avidin, streptavidin or biotin}

WARNING

Group [B01D 15/3823](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3823](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3828 {Ligand exchange chromatography, e.g. complexation, chelation or metal interaction chromatography}

WARNING

Group [B01D 15/3828](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3828](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3833 {Chiral chromatography}

WARNING

Group [B01D 15/3833](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3833](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3842 {Micellar chromatography}

WARNING

Group [B01D 15/3842](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3842](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3847 {Multimodal interactions}

WARNING

Group [B01D 15/3847](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3847](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3852 {using imprinted phases or molecular recognition}

WARNING

Group [B01D 15/3852](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3852](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3857 {Reaction chromatography}

WARNING

Group [B01D 15/3857](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3857](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3861 {using an external stimulus}

WARNING

Group [B01D 15/3861](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3861](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3866 {using ultrasound}

WARNING

Group [B01D 15/3866](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3866](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3871 {using light}

WARNING

Group [B01D 15/3871](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3871](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3876 {modifying the temperature}

WARNING

Group [B01D 15/3876](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3876](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/388 {modifying the pH}

WARNING

Group [B01D 15/388](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/388](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

15/3885 {using electrical or magnetic means}

WARNING

Group [B01D 15/3885](#) is impacted by reclassification into groups [B01D 15/1867](#) and [B01D 15/1896](#).

Groups [B01D 15/3885](#), [B01D 15/1867](#) and [B01D 15/1896](#) should be considered in order to perform a complete search.

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

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

15/422 . . . {Displacement mode}

15/424 . . . {Elution mode}

15/426 {Specific type of solvent}

15/428 . . . {Frontal mode}

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

NOTE

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

- 17/005 . {by thermal diffusion}
- 17/02 . Separation of non-miscible liquids
- 17/0202 . . {by ab- or adsorption}
- 17/0205 . . {by gas bubbles or moving solids}
- 17/0208 . . {by sedimentation}
- 17/0211 . . . {with baffles}
- 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}
- 17/06 . Separation of liquids from each other by electricity
- 17/08 . {Thickening liquid suspensions by filtration}
- 17/085 . . {with membranes}
- 17/10 . . {with stationary filtering elements}
- 17/12 . Auxiliary equipment particularly adapted for use with liquid-separating apparatus, e.g. control circuits

19/00 Degasification of liquids

- 19/0005 . {with one or more auxiliary substances}
- 19/001 . . {by bubbling steam through the liquid ([B01D 19/0042](#), [B01D 19/0047](#) and [B01D 19/0052](#) take precedence)}
- 19/0015 . . . {in contact columns containing plates, grids or other filling elements}
- 19/0021 . {by bringing the liquid in a thin layer}
- 19/0026 . . {in rotating vessels or in vessels containing movable parts}
- 19/0031 . {by filtration}
- 19/0036 . {Flash degasification (the other groups take precedence)}
- 19/0042 . {modifying the liquid flow ([B01D 19/0021](#) takes precedence)}
- 19/0047 . . {Atomizing, spraying, trickling}
- 19/0052 . . {in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused ([B01D 19/0026](#) takes precedence)}
- 19/0057 . . . {the centrifugal movement being caused by a vortex, e.g. using a cyclone, or by a tangential inlet}
- 19/0063 . {Regulation, control including valves and floats (for construction and details of valves [F16K](#))}

- 19/0068 . {General arrangements, e.g. flowsheets ([B01D 19/0063](#) takes precedence)}
- 19/0073 . {by a method not covered by groups [B01D 19/0005](#) - [B01D 19/0042](#)}
- 19/0078 . . {by vibration}
- 19/0084 . . {using an electric current}
- 19/0089 . . {using a magnetic field (magnetic separation in general [B03C 1/00](#))}
- 19/0094 . . {by using a vortex, cavitation}
- 19/02 . Foam dispersion or prevention (during boiling [B01B 1/02](#); during fermentation [C12](#))
- 19/04 . . by addition of chemical substances

NOTES

1. Antifoam compositions containing a specific compound as the main substance are only classified in the, for this specific compound, corresponding [B01D 19/0404](#) subgroup (e.g. polysiloxanes receive the classification [B01D 19/0409](#)); when the specific compound(s) is (are) not the main substance, then the attributed classification for this compound(s) is a combination of [B01D 19/0404](#) + the corresponding [B01D 19/0404](#) subgroup(s), (e.g. hydrocarbons containing silica are classified in [B01D 19/0404](#) + [B01D 19/0409](#)). If the main substance is a mixture containing more than one specific compound, then the attributed classification is a combination of the corresponding [B01D 19/0404](#) subgroup of the specific compounds, (e.g. benzene sulfonate 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	24/008	. . {arranged concentrically or coaxially}
21/2405	. . {Feed mechanisms for settling tanks}	24/02	. with the filter bed stationary during the filtration
21/2411	. . . {having a tangential inlet}	24/04	. . the filtering material being clamped between pervious fixed walls (B01D 24/10 , B01D 24/20 take precedence)
21/2416	. . . {Liquid distributors with a plurality of feed points}	24/042	. . . {the filtering material being held in a flexible porous bag}
21/2422	. . . . {Vertically arranged feed points}	24/045	. . . {with at least one flat vertical wall}
21/2427	. . {The feed or discharge opening located at a distant position from the side walls}	24/047	. . . . {with vertical tubes distributing the liquid to be filtered or for collecting filtrate}
21/2433	. . {Discharge mechanisms for floating particles}	24/06	. . . the pervious walls comprising a series of louvres or slots
21/2438	. . . {provided with scrapers on the liquid surface for removing floating particles}	24/08	. . . the filtering material being supported by at least two pervious coaxial walls
21/2444	. . {Discharge mechanisms for the classified liquid}	24/10	. . the filtering material being held in a closed container
21/245	. . {Discharge mechanisms for the sediments}	24/105	. . . {downward filtration without specifications about the filter material supporting means}
21/2455	. . . {Conveyor belts}	24/12	. . . Downward filtration, the filtering material being supported by pervious surfaces (B01D 24/18 takes precedence)
21/2461	. . . {Positive-displacement pumps; Screw feeders; Trough conveyors}	2024/125	. . . . {spray heads specially adapted therefor}
21/2466	. . . {Mammoth pumps, e.g. air lift pumps}	24/14	. . . Downward filtration, the container having distribution or collection headers or pervious conduits (B01D 24/18 takes precedence)
21/2472	. . . {Means for fluidising the sediments, e.g. by jets or mechanical agitators}	2024/145	. . . . {spray heads specially adapted therefor}
21/2477	. . . {Centrifugal pumps}	24/16	. . . Upward filtration (B01D 24/18 takes precedence)
21/2483	. . . {Means or provisions for manually removing the sediments}	2024/162	. . . . {spray heads specially adapted therefor}
21/2488	. . {bringing about a partial recirculation of the liquid, e.g. for introducing chemical aids}	24/165	. . . . {the filtering material being supported by pervious surfaces}
21/2494	. . {provided with means for the removal of gas, e.g. noxious gas, air}	24/167	. . . . {the container having distribution or collection headers or pervious conduits}
21/26	. Separation of sediment aided by centrifugal force {or centripetal force} (centrifuges B04B ; cyclones B04C)	24/18	. . . Combined upward and downward filtration
21/262	. . {by using a centrifuge}	24/183	. . . . {the filtering material being supported by pervious surfaces}
21/265	. . {by using a vortex inducer or vortex guide, e.g. coil (B01D 21/0054 takes precedence)}	24/186	. . . . {the container having distribution or collection headers or pervious conduits}
21/267	. . {by using a cyclone}	24/20	. . the filtering material being provided in an open container
21/28	. Mechanical auxiliary equipment for acceleration of sedimentation, e.g. by vibrators or the like	24/205	. . . {Downward filtration without specifications about the filter material supporting means}
21/283	. . {Settling tanks provided with vibrators}	24/22	. . . Downward filtration, the filter material being supported by pervious surfaces
21/286	. . {Means for gentle agitation for enhancing flocculation}	24/24	. . . Downward filtration, the container having distribution or collection headers or pervious conduits
21/30	. Control equipment	24/26	. . . Upward filtration
21/302	. . {Active control mechanisms with external energy, e.g. with solenoid valve}	24/263	. . . . {the filtering material being supported by pervious surfaces}
21/305	. . {Control of chemical properties of a component, e.g. control of pH}	24/266	. . . . {the container having distribution or collection headers or pervious conduits}
21/307	. . {Passive control mechanisms without external energy, e.g. using a float}	24/28	. with the filter bed moving during the filtration (with the filter bed fluidised B01D 24/36)
21/32	. . Density control of clear liquid or sediment, e.g. optical control {; Control of physical properties}	24/30	. . Translation
21/34	. . Controlling the feed distribution; Controlling the liquid level {; Control of process parameters}	24/305	. . . {Vibrations}
		24/32	. . Rotation
		24/34	. with the filtering material and its pervious support moving (tipping buckets, trays or like sections B01D 33/327)
		24/36	. with the filter bed fluidised during the filtration (with the filter bed being stationary B01D 24/02)
		24/38	. Feed or discharge devices
		24/383	. . {using multiple way valves}

Filtration; Filtering material, regeneration thereof

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}
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}

- 24/386 . . {internal recirculation}
- 24/40 . . for feeding
- 24/402 . . . {containing fixed liquid displacement elements or cores}
- 24/405 . . . {Special treatment of the feed stream before contacting the filtering material, e.g. cutting ([B01D 35/24](#), [B01D 37/02](#), [B01D 37/03](#) take precedence)}
- 24/407 . . . {provoking a tangential stream}
- 24/42 . . for discharging filtrate
- 24/425 . . . {containing fixed liquid displacement elements or cores}
- 24/44 . . for discharging filter cake, e.g. chutes
- 24/46 . . Regenerating the filtering material in the filter ([B01D 24/44](#) takes precedence)
- 24/4605 . . {by scrapers, brushes, nozzles or the like placed on the cake-side of the stationary filtering material and only contacting the external layer ([B01D 24/4631](#) takes precedence)}
- 24/461 . . . {by scrapers}
- 24/4615 . . . {by brushes}
- 24/4621 . . . {by nozzles acting on the cake side of the filter material, or by fluids acting in co-current direction with the feed stream}
- 24/4626 . . {Construction of spray heads specially adapted for regeneration of the filter material or for filtrate discharging}
- 24/4631 . . {Counter-current flushing, e.g. by air}
- 24/4636 . . . {with backwash shoes; with nozzles}
- 24/4642 . . . {with valves, e.g. rotating valves}
- 24/4647 {with a rectilinear movement of the closing means}
- 24/4652 . . . {by using gasbumps}
- 24/4657 . . . {by using membranes}
- 24/4663 . . . {by using pistons}
- 24/4668 . . {by moving the filtering element ([B01D 24/4605](#) and [B01D 24/4631](#) take precedence)}
- 24/4673 . . . {using rotary devices or vibration mechanisms, e.g. stirrers}
- 24/4678 . . . {using free vortex flow}
- 24/4684 . . . {using spray devices}
- 24/4689 . . . {Displacement of the filtering material to a compartment of the filtering device for regeneration}
- 24/4694 . . {containing filter material retaining means (e.g. screens, balls) placed on the surface of the filter material}
- 24/48 . . integrally combined with devices for controlling the filtration
- 24/4807 . . {Handling the filter cake for purposes other than regenerating}
- 24/4815 . . . {for washing}
- 24/4823 . . . {for drying}
- 24/483 {by compression}
- 24/4838 {by gases or by heating}
- 24/4846 . . . {Retarding cake deposition on the filter during the filtration period, e.g. using stirrers ([B01D 24/407](#) takes precedence)}
- 24/4853 . . {by clearness or turbidity measuring}
- 24/4861 . . {by flow measuring}
- 24/4869 . . {by level measuring}
- 24/4876 . . {in which the filtering elements are moved between filtering operations; particular measures for removing or replacing the filtering elements ([B01D 24/46](#), [B01D 24/4807](#) take precedence)}
- 24/4884 . . {by pressure measuring}
- 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}
- 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
- 25/12 . Filter presses, i.e. of the plate or plate and frame type
- 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}
- 25/164 . . 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
- 25/19 . . Clamping means for closing the filter press, e.g. hydraulic jacks
- 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}
- 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 Filters with filtering elements stationary during filtration, e.g. pressure or suction filters, not covered by groups B01D 24/00 - B01D 27/00; Filtering elements therefor

- 29/0093 . {Making filtering elements not provided for elsewhere}
- 29/0095 . {Flat filtering elements (B01D 25/12, B01D 25/26 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}
- 2029/033 . . . {bar screens}
- 29/035 . . . {with curved filtering elements}
- 29/036 . . . {ring shaped}
- 29/038 {with corrugated, folded filtering elements}
- 29/05 . . supported
- 29/055 . . . {ring shaped}
- 29/07 . . . with corrugated, folded or wound filtering sheets
- 29/071 {with curved filtering elements (B01D 29/072, B01D 29/073 take precedence)}
- 29/072 {ring shaped}
- 29/073 {with wound filtering sheets}
- 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 such as chemical reactions, filtering and cake treatment

NOTE

If the subject matter classified in this group also contains relevant information covered by other subgroups of group B01D 29/00, it is also classified in the other appropriate subgroups of group B01D 29/00.

- 29/085 . Funnel filters; Holders therefor
- 29/09 . with filtering bands, e.g. movable between filtering operations
- 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](#))**
- 33/01 . . 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}
- 33/015 . . {with flat filtering elements}
- 33/0158 . . . {self-supporting}
- 33/0166 {Bar screens}
- 33/0175 {with curved filtering elements}
- 33/0183 . . . {supported}
- 33/0191 {with corrugated, folded or wound filtering sheets}
- 33/03 . . with vibrating filter elements
- 33/0307 . . . {with bag, cage, hose, tube, sleeve or the like filtering elements}
- 33/0315 {arranged for inward flow filtration}
- 33/0323 {open ended}
- 33/033 {arranged for outward flow filtration}
- 33/0338 {open ended}
- 33/0346 . . . {with flat filtering elements}
- 33/0353 {self-supporting}
- 33/0361 {Bar screens}
- 33/0369 {with curved filtering elements}
- 33/0376 {supported}
- 33/0384 {with corrugated, folded or wound filtering sheets}
- 33/0392 {with curved filtering elements}
- 33/04 . . with filtering bands or the like supported on cylinders which are impervious for filtering
- 33/042 . . {whereby the filtration and squeezing-out take place between at least two filtering bands}
- 33/044 . . with filtering bands or the like supported on cylinders which are pervious for filtering
- 33/048 . . with endless filtering bands
- 33/052 . . . combined with a compression device ([B01D 33/64](#) takes precedence)
- 33/056 . . Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts
- 33/0565 . . {combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper}
- 33/06 . . with rotary cylindrical filtering surfaces, e.g. hollow drums ([B01D 33/044](#) takes precedence {; rotating drums for paper-making [D21B](#)})
- 33/067 . . Construction of the filtering drums, e.g. mounting or sealing arrangements
- 33/073 . . arranged for inward flow filtration
- 33/09 . . . with surface cells independently connected to pressure distributors
- 33/11 . . arranged for outward flow filtration
- 33/13 . . . with surface cells independently connected to pressure distributors
- 33/15 . . with rotary plane filtering surfaces
- 33/155 . . {the filtering surface being parallel to the rotation axis}
- 33/17 . . with rotary filtering tables (tables divided into separately tiltable buckets, trays or like sections [B01D 33/327](#))
- 33/19 . . . the table surface being divided in successively tilted sectors or cells, e.g. for discharging the filter cake
- 33/21 . . with hollow filtering discs transversely mounted on a hollow rotary shaft
- 33/215 . . . {the filtering discs being fixed inwardly on a rotating construction}
- 33/23 . . . Construction of discs or component sectors thereof
- 33/25 . . with hollow frames axially mounted on a hollow rotary shaft
- 33/27 . . with rotary filtering surfaces, which are neither cylindrical nor planar, e.g. helical surfaces
- 33/275 . . {using contiguous impervious surfaces}
- 33/29 . . the movement of the filter elements being a combination of movements ([B01D 33/19](#) takes precedence)
- 33/31 . . Planetary movement

- 33/327 . . Tipping buckets, trays or like sections
- 33/333 . with individual filtering elements moving along a closed path ([tipping buckets, trays or like sections B01D 33/327](#))
- 33/35 . with multiple filtering elements characterised by their mutual disposition ([B01D 33/042](#) , [B01D 33/21](#) take precedence)
- 33/37 . . in parallel connection
- 33/39 . . . concentrically or coaxially
- 33/41 . . in series connection
- 33/42 . . . concentrically or coaxially
- 33/44 . Regenerating the filter material in the filter ([devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration, B01D 35/12](#))
- 33/46 . . by scrapers, brushes {nozzles} or the like acting on the cake-side of the filtering element ([B01D 33/503](#) takes precedence)
- 33/461 . . . {brushes}
- 33/463 . . . {nozzles}
- 33/465 . . . {take-off rollers}
- 33/466 . . . {scrapers}
- 33/468 . . . {wires, strands, strings or the like}
- 33/48 . . by flushing, e.g. counter-current air-bumps
- NOTE**
the subgroup covers only counter-current flushing
- 33/50 . . . with backwash arms, shoes or nozzles
- 33/503 {the backwash arms, shoes acting on the cake side}
- 33/506 {with a stirrer placed on the filtrate side}
- 33/52 . . by forces created by movement of the filter element
- 33/54 . . . involving vibrations
- 33/56 . . . involving centrifugal force
- 33/58 . Handling the filter cake in the filter for purposes other than for regenerating ([B01D 33/76](#) takes precedence){the filter cake remaining on the filtering element}
- 33/60 . . for washing
- 33/62 . . for drying
- 33/64 . . . by compression
- 33/642 {by pressure belts}
- 33/644 {by pressure plates, membranes}
- 33/646 {by pressure rollers}
- 33/648 {by screws}
- 33/66 . . . by gases or by heating
- 33/663 {by direct contact with a fluid}
- 33/666 {by indirect heat-exchange}
- 33/68 . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers
- 33/70 . having feed or discharge devices ([B01D 33/82](#) takes precedence)
- 33/705 . . {with internal recirculation through the filter}
- 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 Filtering devices having features not specifically covered by groups [B01D 24/00](#) - [B01D 33/00](#), or for applications not specifically covered by groups [B01D 24/00](#) - [B01D 33/00](#); Auxiliary devices for filtration; Filter housing constructions**
- 35/005 . {Filters specially adapted for use in internal-combustion engine lubrication or fuel systems}
- 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](#))
- 35/10 . 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}
- 39/1692 {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)}	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}
39/2003	. . . {Glass or glassy material}	45/18	. Cleaning-out devices
39/2006	. . . . {the material being particulate}	46/00	Filters or filtering processes specially modified for separating dispersed particles from gases or vapours (filtering elements B01D 24/00-B01D 35/00 ; filtering material B01D 39/00 ; their regeneration outside the filters B01D 41/00)
39/201	. . . . . {sintered or bonded by inorganic agents}	46/0001	. {Making filtering elements}
39/2013	. . . . . {otherwise bonded, e.g. by resins}	46/0002	. {Casings; Housings; Frame constructions}
39/2017	. . . . . {the material being filamentary or fibrous}	46/0004	. . {Details of removable closures, lids, caps or filter heads}
39/202	. . . . . {sintered or bonded by inorganic agents}	46/0005	. . {Mounting of filtering elements within casings, housings or frames (B01D 46/2422 takes precedence)}
39/2024	. . . . . {otherwise bonded, e.g. by resins}	46/0006	. . . {Filter elements or cartridges installed in a drawer-like manner}
39/2027	. . . {Metallic material}	46/0008	. . . {Two or more filter elements not fluidly connected positioned in the same housing}
39/2031	. . . . . {the material being particulate}	46/0009	. . . {Tray-like arrangements of filters in a vessel}
39/2034	. . . . . {sintered or bonded by inorganic agents}	46/001	. . {Means for connecting filter housings to supports}
39/2037	. . . . . {otherwise bonded}	46/0012	. . {In-line filters}
39/2041	. . . . . {the material being filamentary or fibrous}	46/0013	. . {Modules}
39/2044	. . . . . {sintered or bonded by inorganic agents}	46/0015	. . {Throw-away type filters}
39/2048	. . . . . {otherwise bonded}	46/0016	. . {Folded frame or housing constructions}
39/2051	. . . . . {Metallic foam}	46/0017	. . {Filter elements installed in a branch of a pipe, e.g. with an y-shaped tubular housing}
39/2055	. . . {Carbonaceous material (solid sorbent compositions comprising free carbon B01J 20/20)}	46/0027	. {with additional separating or treating functions}
39/2058	. . . . . {the material being particulate}	46/0028	. . {provided with antibacterial or antifungal means}
39/2062	. . . . . {Bonded, e.g. activated carbon blocks}	46/003	. . {including coalescing means for the separation of liquid}
39/2065	. . . . . {the material being fibrous}	46/0031	. . . {with collecting, draining means}
39/2068	. . . {Other inorganic materials, e.g. ceramics}	46/0032	. . {using electrostatic forces to remove particles, e.g. electret filters}
39/2072	. . . . . {the material being particulate or granular}	46/0034	. . {using magnetic forces to remove particles}
39/2075	. . . . . {sintered or bonded by inorganic agents}	46/0035	. . {by wetting, e.g. using surfaces covered with oil}
39/2079	. . . . . {otherwise bonded, e.g. by resins}	46/0036	. . {by adsorption or absorption}
39/2082	. . . . . {the material being filamentary or fibrous}	46/0038	. . {with means for influencing the odor, e.g. deodorizing substances}
39/2086	. . . . . {sintered or bonded by inorganic agents}	46/0039	. {with flow guiding by feed or discharge devices}
39/2089	. . . . . {otherwise bonded, e.g. by resins}	46/0041	. . {for feeding}
39/2093	. . . . . {Ceramic foam}	46/0042	. . . {Use of the inlet flow in order to clean the filter surface}
41/00	Regeneration of the filtering material or filter elements outside the filter for liquid or gaseous fluids	46/0043	. . . {containing fixed gas displacement elements or cores}
41/02	. of loose filtering material	46/0045	. . . {by using vanes}
41/04	. of rigid self-supporting filtering material	46/0046	. . . {provoking a tangential stream (B01D 46/0045 takes precedence)}
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)	46/0047	. . {for discharging the filtered gas}
Separating dispersed particles from gases or vapours		46/0049	. . . {containing fixed gas displacement elements or cores}
45/00	Separating dispersed particles from gases or vapours by gravity, inertia, or centrifugal forces	46/005	. . {Crossflow filtration, i.e. having an inlet and two outlets}
45/02	. by utilising gravity	46/0052	. {with filtering elements moving during filtering operation (B01D 46/22 , B01D 46/32 take precedence)}
45/04	. by utilising inertia (B01D 45/12 takes precedence)	46/0053	. . {with vibrating filtering elements}
45/06	. . by reversal of direction of flow	46/0054	. . {with translational movement}
45/08	. . by impingement against baffle separators	46/0056	. . {with rotational movement}
45/10	. . . which are wetted	46/0084	. {provided with safety means}
45/12	. by centrifugal forces (centrifuges B04B ; cyclones B04C)		
45/14	. . generated by rotating vanes, discs, drums or brushes		

46/0086	. . {Filter condition indicators}	46/24492	. . . . . {Pore diameter}
46/0087	. . {Bypass or safety valves}	46/24493	. . . . . {Modulus of rupture}
46/0089	. . {Anti-return means}	46/24494	. . . . . {Thermal expansion coefficient, heat capacity or thermal conductivity}
46/009	. . {Identification of filter type or position thereof, e.g. by transponders or bar codes}	46/24495	. . . . . {Young's modulus}
46/0091	. . {Including arrangements for environmental or personal protection}	46/2451	. . . . {characterized by the geometrical structure, shape, pattern or configuration or parameters related to the geometry of the structure}
46/0093	. . . {against fire or explosion}	46/2455	. . . . . {of the whole honeycomb or segments}
46/0094	. . . {against radiation}	46/2459	. . . . . {of the plugs}
46/0095	. . {Means acting upon failure of the filtering system, e.g. in case of damage of the filter elements; Failsafes}	46/2462	. . . . . {the outer peripheral sealing}
46/0097	. . {Special means for preventing bypass around the filter, i.e. in addition to usual seals}	46/2466	. . . . . {of the adhesive layers, i.e. joints between segments}
46/0098	. . {Protecting coverages on the filter which is removed before the filter is used, protection of filter, packaging}	46/247	. . . . . {of the cells}
46/02	. Particle separators, e.g. dust precipitators, having hollow filters made of flexible material	46/2474	. . . . . {of the walls along the length of the honeycomb}
46/023	. . {Pockets filters, i.e. multiple bag filters mounted on a common frame}	46/2476	. . . . . {Monolithic structures}
46/026	. . {Means for maintaining a space between filters, e.g. avoiding contact between adjacent filters}	46/2478	. . . . . {Structures comprising honeycomb segments}
46/04	. . Cleaning filters	46/248	. . . . . {Structures comprising laminated bodies or discs}
46/06	. . with means keeping the working surfaces flat	46/2482	. . . . . {Thickness, height, width, length or diameter}
46/08	. . . the working surfaces forming a star shape	46/2484	. . . . . {Cell density, area or aspect ratio}
46/10	. Particle separators, e.g. dust precipitators, using filter plates, sheets or pads having plane surfaces	46/2486	. . . . . {characterised by the shapes or configurations}
46/103	. . {Curved filtering elements}	46/2488	. . . . . {Triangular}
46/106	. . {Ring-shaped filtering elements}	46/249	. . . . . {Quadrangular e.g. square or diamond}
46/12	. . in multiple arrangements	46/2492	. . . . . {Hexagonal}
46/121	. . . V-type arrangements	46/2494	. . . . . {Octagonal}
46/14	. . arranged in a star shape	46/2496	. . . . . {Circular}
46/16	. . arranged on non-filtering conveyors {or supports}	46/2498	. . . . {The honeycomb filter being defined by mathematical relationships}
46/18	. Particle separators, e.g. dust precipitators, using filtering belts	46/26	. . rotatable
46/185	. . {Construction of filtering belts or supporting belts including devices for centering, mounting or sealing thereof}	46/28	. Particle separators, e.g. dust precipitators, using filter brushes
46/20	. . the belts combined with drums	46/30	. Particle separators, e.g. dust precipitators, using loose filtering material
46/22	. . the belts travelling during filtering	46/32	. . the material moving during filtering
46/24	. Particle separators, e.g. dust precipitators, using rigid hollow filter bodies	46/34	. . . not horizontally, e.g. using shoots
46/2403	. . {characterised by the physical shape or structure of the filtering element}	46/36	. . . as a substantially horizontal layer, e.g. on rotary tables, drums, conveyor belts
46/2407	. . . {Filter candles}	46/38	. . . as fluidised bed
46/2411	. . . {Filter cartridges}	46/40	. Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious surfaces
46/2414	. . . . {End caps including additional functions or special forms}	46/403	. . {of helically or spirally wound bodies}
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)}	46/406	. . {of stacked bodies}
46/2422	. . . . {Mounting of the body within a housing}	46/42	. Auxiliary equipment or operation thereof
46/2425	. . . . {characterized by parameters related to the physical properties of the honeycomb structure material}	46/4209	. . {Prevention of static charge, e.g. by grounding}
46/2429	. . . . . {of the honeycomb walls or cells}	46/4218	. . {Influencing the heat transfer which act passively, e.g. isolations, heat sinks, cooling ribs}
46/244	. . . . . {of the plugs}	46/4227	. . {Manipulating filters or filter elements, e.g. handles or extracting tools}
46/2444	. . . . . {of the outer peripheral sealing}	46/4236	. . {Reducing noise or vibration emissions}
46/2448	. . . . . {of the adhesive layers, i.e. joints between segments}	46/4245	. . {Means for power supply or devices using electrical power in filters or filter elements}
46/24491	. . . . . {Porosity}	46/4254	. . {Allowing or improving visual supervision, e.g. lamps, transparent parts, windows}
		46/4263	. . {Means for active heating or cooling}
		46/4272	. . {Special valve constructions adapted to filters or filter elements}
		46/4281	. . {Venturi's or systems showing a venturi effect}

- 46/429 . . {Means for wireless communication}
 - 46/44 . . controlling filtration
 - 46/442 . . . {by measuring the concentration of particles}
 - 46/444 . . . {by flow measuring}
 - 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}
 - 46/56 . . with multiple filtering elements, characterised by their mutual disposition (B01D 46/12 takes precedence)
 - 46/58 . . connected in parallel
 - 46/60 . . . arranged concentrically or coaxially
 - 46/62 . . connected in series
 - 46/64 . . . arranged concentrically or coaxially
 - 46/645 . . . {Protecting screens at filter inlet or outlet}
 - 46/66 . . Regeneration of the filtering material or filter elements inside the filter (B01D 46/04, B01D 46/48 take precedence)
 - 46/68 . . by means acting on the cake side involving movement with regard to the filter elements
- NOTE**
- Groups B01D 46/68 - B01D 46/78 are only for dry processes.
- 46/681 . . . by scrapers, brushes or the like
 - 46/682 . . . by nozzles
 - 46/69 . . by means acting on the cake side without movement with respect to the filter elements, e.g. fixed nozzles
 - 46/70 . . by acting counter-currently on the filtering surface, e.g. by flushing on the non-cake side of the filter
 - 46/71 . . . with pressurised gas, e.g. pulsed air
 - 46/715 {Using pressurized gas at supersonic velocities}
 - 46/72 . . . with backwash arms, shoes or nozzles
 - 46/74 . . by forces created by movement of the filter element
 - 46/76 . . . involving vibrations
 - 46/762 involving sonic or ultrasonic waves
 - 46/78 . . . involving centrifugal forces
 - 46/785 . . {by electrical means, e.g. for the generation of electrostatic forces in order to reject particles}

- 46/79 . . by liquid process
 - 46/80 . . Chemical processes for the removal of the retained particles, e.g. by burning
 - 46/82 . . . with catalysts
 - 46/84 . . . by heating only
 - 46/86 . . Cleaning the filter surface by interrupting suction so that the filter cake falls by gravity
 - 46/88 . . Replacing filter elements
 - 46/90 . . Devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration or maintenance
- 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 methods or devices for separating particles from gases or vapours

NOTE

Group B01D 50/10 takes precedence over groups B01D 50/20 - B01D 50/60.

- 50/10 . . Combinations of devices covered by groups B01D 45/00, B01D 46/00 and B01D 47/00
- 50/20 . . Combinations of devices covered by groups B01D 45/00 and B01D 46/00

- 50/40 . Combinations of devices covered by groups [B01D 45/00](#) and [B01D 47/00](#)
- 50/60 . Combinations of devices covered by groups [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 ultrasound
- 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 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 NO_x 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 IPC 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.

{The last place priority rule in groups [B01D 61/00](#) - [B01D 69/00](#) is not applied in the CPC.}

61/00 **Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis or ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor (separation of gases or vapours by diffusion [B01D 53/22](#))**

NOTES

1. {When classifying in this group, the indexing codes of the following groups must be added if applicable:
 - [B01D 2311/00](#) for details related to process operations and control;
 - [B01D 2313/00](#) for details related to membrane modules or apparatus;
 - [B01D 2315/00](#) for details related to the membrane module operation;
 - [B01D 2317/00](#) for details related to the module arrangement within a plant or an apparatus;
 - [B01D 2319/00](#) for details related to the membrane assembly within one housing.}
2. {Multistep processes comprising two or more membrane-separation steps of different kinds must be classified in [B01D 61/58](#) in combination with the subgroup for the specific steps. The symbols relating to the specific steps are added as "additional information."}
3. {Multistep processes comprising two or more membrane-separation steps of the same kind must be classified in the subgroup covering the specific multistep membrane separation, e.g. [B01D 61/029](#) for processes comprising two or more reverse osmosis steps, [B01D 61/3621](#) for processes comprising two or more pervaporation steps.}

- 61/002 . {Forward osmosis or direct osmosis}
- 61/0021 . . {comprising multiple forward osmosis steps}
- 61/0022 . . {Apparatus therefor}
- 61/0023 . . {Accessories; Auxiliary operations}
- 61/0024 . . {Controlling or regulating}
- 61/005 . . {Osmotic agents; Draw solutions}
- 61/007 . {Separation by stereostructure, steric separation}
- 61/02 . Reverse osmosis; Hyperfiltration {; Nanofiltration}
- 61/025 . . {Reverse osmosis; Hyperfiltration}
- 61/026 . . . {comprising multiple reverse osmosis steps}
- 61/027 . . {Nanofiltration}
- 61/0271 . . . {comprising multiple nanofiltration steps}
- 61/029 . . {Multistep processes comprising different kinds of membrane processes selected from reverse osmosis, hyperfiltration or nanofiltration}

- 61/04 . . Feed pretreatment

NOTE

{When classifying in this group, the type of pretreatment must be specified with the indexing codes of groups [B01D 2311/04](#) and [B01D 2311/10](#) - [B01D 2311/2696](#).}

- 61/06 . . Energy recovery
- 61/08 . . Apparatus therefor
- 61/081 . . . {used at home, e.g. kitchen}
- 61/10 . . Accessories; Auxiliary operations

- 61/12 . . Controlling or regulating
 - 61/14 . . Ultrafiltration; Microfiltration
 - 61/145 . . {Ultrafiltration}
 - 61/146 . . . {comprising multiple ultrafiltration steps}
 - 61/147 . . {Microfiltration}
 - 61/1471 . . . {comprising multiple microfiltration steps}
 - 61/149 . . {Multistep processes comprising different kinds of membrane processes selected from ultrafiltration or microfiltration}
 - 61/16 . . Feed pretreatment
- NOTE**
- {In group [B01D 61/16](#) the type of pretreatment must be specified with the indexing codes [B01D 2311/04](#) and [B01D 2311/10](#) - [B01D 2311/2696](#).}
- 61/18 . . Apparatus therefor
 - 61/20 . . Accessories; Auxiliary operations
 - 61/22 . . Controlling or regulating
 - 61/24 . . Dialysis {; Membrane extraction}
 - 61/243 . . {Dialysis}
 - 61/244 . . . {comprising multiple dialysis steps}
 - 61/246 . . {Membrane extraction}
 - 61/2461 . . . {comprising multiple membrane extraction steps}
 - 61/28 . . Apparatus therefor
 - 61/30 . . Accessories; Auxiliary operation
 - 61/32 . . Controlling or regulating
 - 61/36 . . Pervaporation; Membrane distillation; Liquid permeation
 - 61/362 . . {Pervaporation}
 - 61/3621 . . . {comprising multiple pervaporation steps}
 - 61/363 . . {Vapour permeation}
 - 61/3631 . . . {comprising multiple vapour permeation steps}
 - 61/364 . . {Membrane distillation}
 - 61/3641 . . . {comprising multiple membrane distillation steps}
 - 61/365 . . {Osmotic distillation or osmotic evaporation}
 - 61/3651 . . . {comprising multiple osmotic distillation or evaporation steps}
 - 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; Membrane capacitive deionization}
 - 61/422 . . {Electrodialysis}
 - 61/423 . . . {comprising multiple electrodialysis steps}
 - 61/425 . . {Electro-ultrafiltration}
 - 61/4251 . . . {comprising multiple electro-ultrafiltration steps}
 - 61/427 . . {Electro-osmosis}
 - 61/4271 . . . {comprising multiple electro-osmosis steps}
 - 61/428 . . {Membrane capacitive deionization}
 - 61/4281 . . . {comprising multiple membrane capacitive deionization steps}
 - 61/44 . . Ion-selective electrodialysis
 - 61/445 . . . {with bipolar membranes; Water splitting}
 - 61/46 . . . Apparatus therefor
 - 61/461 {comprising only a single cell, only one anion or cation exchange membrane or one pair of anion and cation membranes}

61/462	. . . . {comprising the membrane sequence AA, where A is an anion exchange membrane}	63/0231	. . . {using supporting structures, e.g. filaments for weaving mats}
61/463	. . . . {comprising the membrane sequence AC or CA, where C is a cation exchange membrane}	63/0232	. . . {using hollow fibers mats as precursor, e.g. wound or pleated mats}
61/464	. . . . {comprising the membrane sequence CC}	63/0233	. . . {forming the bundle}
61/465	. . . . {comprising the membrane sequence AB or BA, where B is a bipolar membrane}	63/024	. . {with a single potted end}
61/466	. . . . {comprising the membrane sequence BC or CB}	63/0241	. . . {being U-shaped}
61/467	. . . . {comprising the membrane sequence BB}	63/025	. . {Bobbin units}
61/468	. . . . {comprising more than two electrodes}	63/026	. . {Wafer type modules or flat-surface type modules}
61/48	. . . . having one or more compartments filled with ion-exchange material {, e.g. electrodeionisation}	63/027	. . {Twinned or braided type modules}
61/485	. . . . . {Specific features relating to the ion-exchange material}	63/028	. . {Microfluidic devices comprising semi-permeable hollow fibre membranes}
61/50	. . . . Stacks of the plate-and-frame type	63/031	. . {Two or more types of hollow fibres within one bundle or within one potting or tube-sheet}
61/52	. . . Accessories; Auxiliary operation	63/032	. . {More than two tube sheets for one bundle}
61/54	. . . Controlling or regulating	63/033	. . {Specific distribution of fibres within one potting or tube-sheet}
61/56	. . Electro-osmotic dewatering	63/034	. . {Lumen open in more than two directions}
61/58	. Multistep processes	63/04	. . comprising multiple hollow fibre assemblies
NOTE		63/043	. . . {with separate tube sheets}
{In group B01D 61/58 the symbols relating to the specific process steps in B01D 61/00 - B01D 61/56 are given as additional information.}		63/046	. . . {in separate housings}
63/00	Apparatus in general for separation processes using semi-permeable membranes	63/06	. Tubular membrane modules
NOTES		63/061	. . {Manufacturing thereof}
1. {When classifying in this group, the indexing codes of the following groups must be added if applicable:		63/062	. . {with membranes on a surface of a support tube}
• B01D 2313/00 for details related to membrane modules and apparatus;		63/063	. . . {on the inner surface thereof}
• B01D 2315/00 for details related to the membrane module operation;		63/065	. . . {on the outer surface thereof}
• B01D 2317/00 for details related to the module arrangement within a plant or an apparatus;		63/066	. . {with a porous block having membrane coated passages}
• B01D 2319/00 for details related to the membrane assembly within one housing.}		63/067	. . {with pleated membranes}
2. {Attention is drawn to the Note following B01D 59/50 , which indicates the last place rule is not applied in B01D 63/00 .}		63/068	. . {with flexible membrane tubes}
63/005	. {Microfluidic devices (Microfluidic devices comprising semi-permeable hollow fibre membranes B01D 63/028; Microfluidic devices comprising semi-permeable flat membranes B01D 63/088)}	63/069	. . {comprising a bundle of tubular membranes}
63/02	. Hollow fibre modules	63/08	. Flat membrane modules
63/021	. . {Manufacturing thereof}	63/081	. . {Manufacturing thereof}
63/022	. . . {Encapsulating hollow fibres}	63/082	. . {comprising a stack of flat membranes}
63/0221	. . . . {using a mould}	63/0821	. . . {Membrane plate arrangements for submerged operation}
63/0222	. . . . {using centrifugal forces}	63/0822	. . . {Plate-and-frame devices}
63/0223	. . . . {by fixing the hollow fibres prior to encapsulation}	63/084	. . . {at least one flow duct intersecting the membranes}
63/0224	. . . . {Opening the fibre ends after encapsulation}	63/085	. . . . {specially adapted for two fluids in mass exchange flow}
63/0225	. . . . {Multiple encapsulation layers}	63/087	. . {Single membrane modules}
63/023	. . . . {Encapsulating materials}	63/088	. . {Microfluidic devices comprising semi-permeable flat membranes}
		63/089	. . {Modules where the membrane is in the form of a bag, membrane cushion or pad}
		63/10	. Spiral-wound membrane modules
		63/101	. . {Spiral winding}
		63/103	. . {Details relating to membrane envelopes}
		63/1031	. . . {Glue line or sealing patterns}
		63/106	. . {Anti-Telescopic-Devices [ATD]}
		63/107	. . {Specific properties of the central tube or the permeate channel}
		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

NOTE

{Attention is drawn to the Note following [B01D 59/50](#), which indicates the last place rule is not applied in [B01D 65/00](#).}

- 65/003 . {Membrane bonding or sealing}
- 65/02 . Membrane cleaning or sterilisation {; Membrane regeneration}

NOTE

{When classifying in this group, the indexing codes of the following groups must be added if applicable:

[B01D 2321/00](#) for details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling.}

- 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
- 65/06 . . with special washing compositions
- 65/08 . Prevention of membrane fouling or of concentration polarisation

NOTE

{When classifying in this group, the indexing codes of the following groups must be added if applicable:

[B01D 2321/00](#) for details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling.}

- 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}
- 65/109 . . {Testing of membrane fouling or clogging, e.g. amount or affinity}

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

NOTES

1. {When classifying in this group, the indexing codes of the following groups must be added if applicable:
 - [B01D 2323/00](#) for details relating to membrane preparation.}
2. {Attention is drawn to the Note following [B01D 59/50](#), which indicates the last place rule is not applied in [B01D 67/00](#).}

- 67/0002 . {Organic membrane manufacture}
- 67/0004 . . {by agglomeration of particles}

- 67/00041 . . . {by sintering}
- 67/00042 . . . {by deposition of fibres, nanofibres or nanofibrils}
- 67/00043 . . . {by agglomeration of nanoparticles}
- 67/00044 . . . {by plasma spraying}
- 67/00045 . . . {by additive layer techniques, e.g. selective laser sintering [SLS], selective laser melting [SLM] or 3D printing}
- 67/00046 . . . {by deposition by filtration through a support or base layer}
- 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}
- 67/00091 . . . {by evaporation}
- 67/0011 . . . {Casting solutions therefor}
- 67/00111 {Polymer pretreatment in the casting solutions}
- 67/00113 {Pretreatment of the casting solutions, e.g. thermal treatment or ageing}
- 67/0013 . . . {Casting processes}
- 67/00135 {Air gap characteristics}
- 67/0016 . . . {Coagulation}
- 67/00165 {Composition of the coagulation baths}
- 67/0018 . . . {Thermally induced processes [TIPS]}
- 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}
- 67/0031 {by elimination of at least one of the blocks of a block copolymer}
- 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 manufacture}
- 67/0041 . . {by agglomeration of particles in the dry state}
- 67/00411 . . . {by sintering}
- 67/00412 . . . {by deposition of fibres, nanofibres or nanofibrils}
- 67/00413 . . . {by agglomeration of nanoparticles}
- 67/00414 . . . {by plasma spraying}
- 67/00415 . . . {by additive layer techniques, e.g. selective laser sintering [SLS], selective laser melting [SLM] or 3D printing}
- 67/00416 . . . {by deposition by filtration through a support or base layer}
- 67/0044 . . {by chemical reaction}
- 67/0046 . . {by slurry techniques, e.g. die or slip-casting}
- 67/0048 . . {by sol-gel transition}
- 67/0049 . . {by evaporation}
- 67/0051 . . {by controlled crystallisation, e.g. hydrothermal growth}

- 67/0053 . . {by inducing porosity into non porous precursor membranes} [B01D 2325/00](#) for details relating to properties of 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 . {Manufacture of membranes comprising organic and inorganic components}
- 67/00791 . . {Different components in separate layers}
- 67/00793 . . {Dispersing a component, e.g. as particles or powder, in another component}
- 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}
- 67/009 . . {with wave-energy, particle-radiation or plasma}
- 67/0093 . . {Chemical modification}
- 67/00931 . . . {by introduction of specific groups after membrane formation, e.g. by grafting}
- 67/00933 . . . {by addition of a layer chemically bonded to the membrane}
- 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**
- In this group, the following term is used with the meaning indicated:
 - "properties" covers those of a mechanical, physical or chemical nature.
 - { Manufacturing processes, if considered of interest, are also classified in group [B01D 67/00](#). }
 - { Attention is drawn to the Note following [B01D 59/50](#), which indicates the last place rule is not applied in [B01D 69/00](#). }
- 69/02 . characterised by their properties
- 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
- 69/061 . . {Membrane bags or membrane cushions}
- 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}
- 69/0871 . . . {Fibre guidance after spinning through the manufacturing apparatus}
- 69/088 . . . {Co-extrusion; Co-spinning}
- 69/10 . Supported membranes; Membrane supports
- 69/105 . . {Support pretreatment}
- 69/106 . . {Membranes in the pores of a support, e.g. polymerized in the pores or voids}
- 69/107 . . {Organic support material}
- 69/1071 . . . {Woven, non-woven or net mesh}
- 69/108 . . {Inorganic support material}
- 69/12 . Composite membranes; Ultra-thin membranes
- 69/1212 . . {Coextruded layers}
- 69/1213 . . {Laminated layers}
- 69/1214 . . {Chemically bonded layers, e.g. cross-linking}
- 69/1216 . . {Three or more layers}
- 69/1218 . . {Layers having the same chemical composition, but different properties, e.g. pore size, molecular weight or porosity}
- 69/122 . . {Separate manufacturing of ultra-thin membranes}
- 69/125 . . {*In situ* manufacturing by polymerisation, polycondensation, cross-linking or chemical reaction}
- 69/1251 . . . {by interfacial polymerisation}
- 69/127 . . . {using electrical discharge or plasma-polymerisation}
- 69/14 . Dynamic membranes
- 69/141 . . {Heterogeneous membranes, e.g. containing dispersed material; Mixed matrix membranes}
- 69/1411 . . . {containing dispersed material in a continuous matrix}
- 69/14111 {with nanoscale dispersed material, e.g. nanoparticles}
- 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}

NOTE

{When classifying in this group, the indexing codes of the following groups must be added if applicable:

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 the highest proportion; see Note before group [B01D 61/00](#). {This constituent is classified according to the last place rule.} 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}
- 71/0211 . . . {Graphene or derivatives thereof}
- 71/0212 . . . {Carbon nanotubes}
- 71/0213 . . {Silicon}
- 71/0215 . . {Silicon carbide; Silicon nitride; Silicon oxycarbide}
- 71/022 . . {Metals}
- 71/0221 . . . {Group 4 or 5 metals}
- 71/0223 . . . {Group 8, 9 or 10 metals}
- 71/02231 {Palladium}
- 71/02232 {Nickel}
- 71/0227 . . . {comprising an intermediate layer for avoiding intermetallic diffusion}
- 71/024 . . {Oxides}
- 71/025 . . . {Aluminium oxide}
- 71/027 . . . {Silicium oxide}
- 71/0271 . . . {Perovskites}
- 71/028 . . {Molecular sieves (carbon [B01D 71/021](#))}
- 71/0281 . . . {Zeolites}
- 71/04 . . Glass
- 71/05 . . {Cermets materials}
- 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
- 71/261 . . . {Polyethylene}
- 71/262 . . . {Polypropylene}

- 71/28 . . Polymers of vinyl aromatic compounds
- 71/281 . . . {Polystyrene}
- 71/282 . . . {Polyvinylphenol}
- 71/283 . . . {Polyvinylpyridine}
- 71/30 . . Polyalkenyl halides
- 71/301 . . . {Polyvinylchloride}
- 71/32 . . . containing fluorine atoms
- 71/34 Polyvinylidene fluoride
- 71/36 Polytetrafluoroethylene
- 71/38 . . Polyalkenylalcohols; Polyalkenylesters; Polyalkenylethers; Polyalkenylaldehydes; Polyalkenylketones; Polyalkenylacetals; Polyalkenylketals
- 71/381 . . . {Polyvinylalcohol}
- 71/382 . . . {Polyvinylethers}
- 71/383 . . . {Polyvinylacetates}
- 71/40 . . Polymers of unsaturated acids or derivatives thereof, e.g. salts, amides, imides, nitriles, anhydrides, esters
- 71/401 . . . {Polymers based on the polymerisation of acrylic acid, e.g. polyacrylate}
- 71/4011 {Polymethylmethacrylate}
- 71/402 . . . {Polymers based on the polymerisation of fumaric acid or derivatives thereof}
- 71/403 . . . {Polymers based on the polymerisation of maleic acid or derivatives thereof}
- 71/404 . . . {Polymers based on the polymerisation of crotonic acid}
- 71/42 . . . Polymers of nitriles, e.g. polyacrylonitrile
- 71/421 {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](#)
- 71/441 . . . {Polyvinylpyrrolidone}
- 71/46 . . Epoxy resins
- 71/48 . . Polyesters
- 71/481 . . . {Polyarylates}
- 71/50 . . Polycarbonates
- 71/52 . . Polyethers
- 71/521 . . . {Aliphatic polyethers}
- 71/5211 {Polyethylene glycol or polyethyleneoxide}
- 71/522 . . . {Aromatic polyethers}
- 71/5221 {Polyaryletherketone}
- 71/5222 {Polyetherketone, polyetheretherketone, or polyaryletherketone}
- 71/5223 {Polyphenylene oxide, phenyl ether polymers or polyphenylethers}
- 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
- 71/601 {Polyethylenimine}
- 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
- 71/641 {Polyamide-imides}
- 71/642 {Polyester-imides}
- 71/643 {Polyether-imides}

71/66	. . Polymers having sulfur in the main chain, with or without nitrogen, oxygen or carbon only	2201/084	. . . Nozzles placed on the filtrate side of the filtering element
71/68	. . . Polysulfones; Polyethersulfones	2201/085	. . using another chemical than the liquid to be filtered
71/69	. . . {Polysulfonamides}	2201/086	. . using fluid streams co-current to the filtration direction
71/70	. . Polymers having silicon in the main chain, with or without sulfur, nitrogen, oxygen or carbon only	2201/087	. . using gas bubbles, e.g. air
71/701	. . . {Polydimethylsiloxane}	2201/088	. . Arrangements for killing microorganisms
71/702	. . . {Polysilsesquioxanes or combination of silica with bridging organosilane groups}	2201/089	. . using rollers having projections to clear the filter apertures
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 {and B01D 71/701 - B01D 71/702 }	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
2101/00 Types of filters having loose filtering material		2201/16	. Valves
2101/005	. with a binder between the individual particles or fibres	2201/162	. . with snap, latch or clip connecting means
2101/02	. Carbon filters	2201/165	. . Multi-way valves
2101/04	. Sand or gravel filters	2201/167	. . Single-way valves
2201/00 Details relating to filtering apparatus		2201/18	. Filters characterised by the openings or pores
2201/02	. Filtering elements having a conical form	2201/182	. . for depth filtration
2201/04	. Supports for the filtering elements	2201/184	. . Special form, dimension of the openings, pores of the filtering elements
2201/0407	. . Perforated supports on both sides of the filtering element	2201/186	. . . Pore openings which can be modified
2201/0415	. . Details of supporting structures	2201/188	. . Multiple filtering elements having filtering areas of different size
2201/0423	. . . not in the inner side of the cylindrical filtering elements	2201/20	. Pressure-related systems for filters
2201/043	. . Filter tubes connected to plates	2201/202	. . Systems for applying pressure to filters
2201/0438	. . . mounted substantially vertically on plates at the lower side of the filter elements	2201/204	. . Systems for applying vacuum to filters
2201/0446	. . . suspended from plates at the upper side of the filter elements	2201/206	. . . by the weight of the liquid in a tube, e.g. siphon, barometric leg
2201/0453	. . . positioned between at least two plates	2201/208	. . . by venturi systems
2201/0461	. . Springs	2201/22	. Filtering bands with supporting discs
2201/0469	. . Filter tubes connected to collector tubes	2201/24	. Tools used for the removal of filters
2201/0476	. . . mounted substantially vertically on collector tubes at the lower side of the filter elements	2201/26	. Transport systems for filtering devices
2201/0484	. . . suspended from collector tubes at the upper side of the filter elements	2201/265	. . mounted on vehicles
2201/0492	. . . positioned between at least two collector tubes	2201/28	. Position of the filtering element
2201/06	. Resilient foam as filtering element	2201/282	. . Filtering elements with a horizontal rotation or symmetry axis
2201/08	. Regeneration of the filter	2201/285	. . Filtering elements with a symmetry axis not parallel to the rotation axis
2201/081	. . using nozzles or suction devices	2201/287	. . Filtering elements with a vertical or inclined rotation or symmetry axis
2201/082	. . . Suction devices placed on the cake side of the filtering element	2201/29	. Filter cartridge constructions
2201/083	. . . Suction devices placed on the filtrate side of the filtering element, e.g. with variable edge filters	2201/291	. . End caps
		2201/293	. . . Making of end caps
		2201/295	. . . with projections extending in a radial outward direction, e.g. for use as a guide, spacing means
		2201/296	. . . Other than having a circular shape
		2201/298	. . . End caps common to at least two filtering elements
		2201/30	. Filter housing constructions
		2201/301	. . Details of removable closures, lids, caps, filter heads
		2201/302	. . . having inlet or outlet ports
		2201/303	. . . . not arranged concentrically
		2201/304	. . . Seals or gaskets
		2201/305	. . . Snap, latch or clip connecting means

2201/306	. . . Closures, lids, caps or filter heads forming one element with the filtering element	2202/10	. Use of a microdevice for separation
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	2202/20	. Use of an ionic liquid in the separation process
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	2221/00	Applications of separation devices
2201/309	. . Housings with transparent parts	2221/02	. Small separation devices for domestic application, e.g. for canteens, industrial kitchen, washing machines
2201/31	. Other construction details	2221/04	. Separation devices for treating liquids from earth drilling, mining
2201/313	. . Means for protecting the filter from the incoming fluid, e.g. shields	2221/06	. Separation devices for industrial food processing or agriculture
2201/316	. . Standpipes	2221/08	. Mobile separation devices
2201/32	. Flow characteristics of the filter	2221/10	. Separation devices for use in medical, pharmaceutical or laboratory applications, e.g. separating amalgam from dental treatment residues
2201/325	. . Outward flow filtration	2221/12	. Separation devices for treating rain or storm water
2201/34	. Seals or gaskets for filtering elements	2221/14	. Separation devices for workshops, car or semiconductor industry, e.g. for separating chips and other machining residues
2201/342	. . Axial sealings	2221/16	. Separation devices for cleaning ambient air, e.g. air along roads or air in cities
2201/345	. . Pressurized seals or gaskets	2239/00	Aspects relating to filtering material for liquid or gaseous fluids
2201/347	. . Radial sealings	2239/02	. Types of fibres, filaments or particles, self-supporting or supported materials
2201/36	. Filtering elements containing a rotating housing construction	2239/0208	. . . Single-component fibres
2201/38	. Preventing rewetting of the filter cake on the filter media	2239/0216	. . . Bicomponent or multicomponent fibres
2201/40	. Special measures for connecting different parts of the filter	2239/0225	. . . Side-by-side
2201/4007	. . Use of cam or ramp systems	2239/0233	. . . Island-in-sea
2201/4015	. . Bayonet connecting means	2239/0241	. . comprising electrically conductive fibres or particles
2201/4023	. . Means for connecting filter housings to supports	2239/025	. . comprising nanofibres
2201/403	. . allowing dilatation, e.g. by heat	2239/0258	. . comprising nanoparticles
2201/4038	. . for connecting at least two filtering elements together	2239/0266	. . comprising biodegradable or bio-soluble polymers
2201/4046	. . Means for avoiding false mounting of different parts	2239/0275	. . comprising biologically produced plastics, e.g. bioplastics
2201/4053	. . . using keys	2239/0283	. . comprising filter materials made from waste or recycled materials
2201/4061	. . . between a cartridge and a filter head or manifold	2239/0291	. . comprising swelling polymers
2201/4069	. . Magnetic means	2239/04	. Additives and treatments of the filtering material
2201/4076	. . Anti-rotational means	2239/0407	. . comprising particulate additives, e.g. adsorbents
2201/4084	. . Snap or Seeger ring connecting means	2239/0414	. . Surface modifiers, e.g. comprising ion exchange groups
2201/4092	. . Threaded sections, e.g. screw	2239/0421	. . . Rendering the filter material hydrophilic
2201/44	. Special measures allowing the even or uniform distribution of fluid along the length of a conduit	2239/0428	. . . Rendering the filter material hydrophobic
2201/46	. Several filtrate discharge conduits each connected to one filter element or group of filter elements	2239/0435	. . Electret
2201/48	. Overflow systems	2239/0442	. . Antimicrobial, antibacterial, antifungal additives
2201/50	. Means for dissipating electrostatic charges	2239/045	. . Deodorising additives
2201/52	. Filter identification means	2239/0457	. . Specific fire retardant or heat resistant properties
2201/54	. Computerised or programmable systems	2239/0464	. . Impregnants
2201/56	. Wireless systems for monitoring the filter	2239/0471	. . Surface coating material
2201/58	. Power supply means for regenerating the filter	2239/0478	. . . on a layer of the filter
2201/583	. . using the kinetic energy of the fluid circulating in the filtering device	2239/0485	. . . on particles
2201/586	. . using regenerative sources, e.g. wind, sun	2239/0492	. . . on fibres
2201/60	. Shape of non-cylindrical filtering elements	2239/06	. Filter cloth, e.g. knitted, woven non-woven; self-supported material
2201/602	. . Oval	2239/0604	. . Arrangement of the fibres in the filtering material
2201/605	. . Square or rectangular	2239/0609	. . . Knitted
2201/607	. . Triangular	2239/0613	. . . Woven
2201/62	. Honeycomb-like	2239/0618	. . . Non-woven
2201/64	. Filters having floating elements	2239/0622	. . . Melt-blown
2202/00	Details concerning evaporation, distillation or condensation	2239/0627	. . . Spun-bonded

2239/0631	. . . Electro-spun	2251/10	. Oxidants
2239/0636	. . . Two or more types of fibres present in the filter material	2251/102	. . Oxygen
2239/064	. . . The fibres being mixed	2251/104	. . Ozone
2239/0645	. . Arrangement of the particles in the filtering material	2251/106	. . Peroxides
2239/065	. . More than one layer present in the filtering material	2251/1065	. . . Organic peroxides
2239/0654	. . . Support layers	2251/108	. . Halogens or halogen compounds
2239/0659	. . . The layers being joined by needling	2251/11	. . Air
2239/0663	. . . The layers being joined by hydro-entangling	2251/20	. Reductants
2239/0668	. . . The layers being joined by heat or melt-bonding	2251/202	. . Hydrogen
2239/0672	. . . The layers being joined by welding	2251/204	. . Carbon monoxide
2239/0677	. . . by spot-welding	2251/206	. . Ammonium compounds
2239/0681	. . . The layers being joined by gluing	2251/2062	. . . Ammonia
2239/0686	. . . by spot-gluing	2251/2065	. . . Ammonium hydroxide
2239/069	. . Special geometry of layers	2251/2067	. . . Urea
2239/0695	. . . Wound layers	2251/208	. . Hydrocarbons
2239/08	. Special characteristics of binders	2251/21	. . Organic compounds not provided for in groups B01D 2251/206 or B01D 2251/208
2239/083	. . Binders between layers of the filter	2251/30	. Alkali metal compounds
2239/086	. . Binders between particles or fibres	2251/302	. . of lithium
2239/10	. Filtering material manufacturing	2251/304	. . of sodium
2239/12	. Special parameters characterising the filtering material	2251/306	. . of potassium
2239/1208	. . Porosity	2251/40	. Alkaline earth metal or magnesium compounds
2239/1216	. . Pore size	2251/402	. . of magnesium
2239/1225	. . Fibre length	2251/404	. . of calcium
2239/1233	. . Fibre diameter	2251/406	. . of strontium
2239/1241	. . Particle diameter	2251/408	. . of barium
2239/125	. . Size distribution	2251/50	. Inorganic acids
2239/1258	. . Permeability	2251/502	. . Hydrochloric acid
2239/1266	. . Solidity	2251/504	. . Nitric acid
2239/1275	. . Stiffness	2251/506	. . Sulfuric acid
2239/1283	. . Stability index	2251/508	. . Sulfur dioxide
2239/1291	. . Other parameters	2251/51	. . Hydrogen sulfide
		2251/512	. . Phosphoric acid
		2251/60	. Inorganic bases or salts
		2251/602	. . Oxides
		2251/604	. . Hydroxides
		2251/606	. . Carbonates
		2251/608	. . Sulfates
		2251/61	. . Phosphates
		2251/70	. Organic acids
		2251/80	. Organic bases or salts
		2251/90	. Chelants
		2251/902	. . EDTA
		2251/904	. . NTA
		2251/95	. Specific microorganisms
2247/00	Details relating to the separation of dispersed particles from gases, air or vapours by liquid as separating agent	2252/00	Absorbents, i.e. solvents and liquid materials for gas absorption
2247/02	. Enhancing the particle separation by electrostatic or magnetic effects (B01D 2247/102 takes precedence; electrostatic or magnetic separation B03C)	2252/10	. Inorganic absorbents
2247/04	. Regenerating the washing fluid	2252/102	. . Ammonia
2247/06	. Separation units provided with means for cleaning and maintenance	2252/103	. . Water
2247/08	. Means for controlling the separation process	2252/1035	. . . Sea water
2247/10	. Means for removing the washing fluid dispersed in the gas or vapours	2252/20	. Organic absorbents
2247/101	. . using a cyclone	2252/202	. . Alcohols or their derivatives
2247/102	. . using electrostatic or magnetic effects	2252/2021	. . . Methanol
2247/103	. . using fluids, e.g. as a fluid curtain or as large liquid droplets	2252/2023	. . . Glycols, diols or their derivatives
2247/104	. . using an impeller	2252/2025	. . . . Ethers or esters of alkylene glycols, e.g. ethylene or propylene carbonate
2247/105	. . by gas flow reversal	2252/2026	. . . . Polyethylene glycol, ethers or esters thereof, e.g. Selexol
2247/106	. . using a structured demister, e.g. tortuous channels	2252/2028	. . . . Polypropylene glycol, ethers or esters thereof
2247/107	. . using an unstructured demister, e.g. a wire mesh demister	2252/204	. . Amines
2247/108	. . using vortex inducers		
2247/12	. Fan arrangements for providing forced draft		
2247/14	. Fan arrangements for providing induced draft		
2251/00	Reactants		

2252/20405	. . . Monoamines	2253/308	. . . Pore size
2252/2041	. . . Diamines	2253/31	. . . Pore size distribution
2252/20415	. . . Tri- or polyamines	2253/311	. . . Porosity, e.g. pore volume
2252/20421	. . . Primary amines	2253/34	. . Specific shapes
2252/20426	. . . Secondary amines	2253/342	. . . Monoliths
2252/20431	. . . Tertiary amines	2253/3425	. . . . Honeycomb shape
2252/20436	. . . Cyclic amines		
2252/20442	. . . . containing a piperidine-ring	2255/00	Catalysts
2252/20447	. . . . containing a piperazine-ring	2255/10	. Noble metals or compounds thereof
2252/20452	. . . . containing a morpholine-ring	2255/102	. . Platinum group metals
2252/20457	. . . . containing a pyridine-ring	2255/1021	. . . Platinum
2252/20463	. . . . containing a pyrimidine-ring	2255/1023	. . . Palladium
2252/20468	. . . . containing a pyrrolidone-ring	2255/1025	. . . Rhodium
2252/20473	. . . . containing an imidazole-ring	2255/1026	. . . Ruthenium
2252/20478	. . . Alkanolamines	2255/1028	. . . Iridium
2252/20484	. . . . with one hydroxyl group	2255/104	. . Silver
2252/20489	. . . . with two or more hydroxyl groups	2255/106	. . Gold
2252/20494	. . . Amino acids, their salts or derivatives	2255/20	. Metals or compounds thereof
2252/205	. . Other organic compounds not covered by B01D 2252/00 - B01D 2252/20494	2255/202	. . Alkali metals
2252/2053	. . . Other nitrogen compounds	2255/2022	. . . Potassium
2252/2056	. . . Sulfur compounds, e.g. Sulfolane, thiols	2255/2025	. . . Lithium
2252/30	. Ionic liquids and zwitter-ions	2255/2027	. . . Sodium
2252/40	. Absorbents explicitly excluding the presence of water	2255/204	. . Alkaline earth metals
2252/50	. Combinations of absorbents	2255/2042	. . . Barium
2252/502	. . having two or more functionalities in the same molecule other than alkanolamine	2255/2045	. . . Calcium
2252/504	. . Mixtures of two or more absorbents	2255/2047	. . . Magnesium
2252/60	. Additives	2255/206	. . Rare earth metals
2252/602	. . Activators, promoting agents, catalytic agents or enzymes	2255/2061	. . . Yttrium
2252/604	. . Stabilisers or agents inhibiting degradation	2255/2063	. . . Lanthanum
2252/606	. . Anticorrosion agents	2255/2065	. . . Cerium
2252/608	. . Antifoaming agents	2255/2066	. . . Praseodymium
2252/61	. . Antifouling agents	2255/2068	. . . Neodymium
		2255/207	. . Transition metals
2253/00	Adsorbents used in separation treatment of gases and vapours	2255/20707	. . . Titanium
2253/10	. Inorganic adsorbents	2255/20715	. . . Zirconium
2253/102	. . Carbon	2255/20723	. . . Vanadium
2253/104	. . Alumina	2255/2073	. . . Manganese
2253/106	. . Silica or silicates	2255/20738	. . . Iron
2253/108	. . . Zeolites	2255/20746	. . . Cobalt
2253/1085	. . . . characterized by a silicon-aluminium ratio	2255/20753	. . . Nickel
2253/11	. . . Clays	2255/20761	. . . Copper
2253/112	. . Metals or metal compounds not provided for in B01D 2253/104 or B01D 2253/106	2255/20769	. . . Molybdenum
2253/1122	. . . Metals	2255/20776	. . . Tungsten
2253/1124	. . . Metal oxides	2255/20784	. . . Chromium
2253/1126	. . . Metal hydrides	2255/20792	. . . Zinc
2253/1128	. . . Metal sulfides	2255/209	. . Other metals
2253/116	. . Molecular sieves other than zeolites	2255/2092	. . . Aluminium
2253/20	. Organic adsorbents	2255/2094	. . . Tin
2253/202	. . Polymeric adsorbents	2255/2096	. . . Bismuth
2253/204	. . Metal organic frameworks (MOF's)	2255/2098	. . . Antimony
2253/206	. . Ion exchange resins	2255/30	. Silica
2253/25	. Coated, impregnated or composite adsorbents	2255/40	. Mixed oxides
2253/30	. Physical properties of adsorbents	2255/402	. . Perovskites
2253/302	. . Dimensions	2255/405	. . Spinel
2253/304	. . . Linear dimensions, e.g. particle shape, diameter	2255/407	. . Zr-Ce mixed oxides
2253/306	. . . Surface area, e.g. BET-specific surface	2255/50	. Zeolites
		2255/502	. . Beta zeolites
		2255/504	. . ZSM 5 zeolites
		2255/65	. Catalysts not containing noble metals
		2255/70	. Non-metallic catalysts, additives or dopants
		2255/702	. . Carbon
		2255/705	. . Ligands for metal-organic catalysts

2255/707	. . Additives or dopants	2257/206	. . Organic halogen compounds
2255/80	. Type of catalytic reaction	2257/2062	. . . Bromine compounds
2255/802	. . Photocatalytic	2257/2064	. . . Chlorine
2255/804	. . Enzymatic	2257/2066	. . . Fluorine
2255/806	. . Electrocatalytic	2257/2068	. . . Iodine
2255/808	. . Hydrolytic	2257/30	. Sulfur compounds
2255/90	. Physical characteristics of catalysts	2257/302	. . Sulfur oxides
2255/902	. . Multilayered catalyst	2257/304	. . Hydrogen sulfide
2255/9022	. . . Two layers	2257/306	. . Organic sulfur compounds, e.g. mercaptans
2255/9025	. . . Three layers	2257/308	. . Carbonoxysulfide COS
2255/9027	. . . More than three layers	2257/40	. Nitrogen compounds
2255/903	. . Multi-zoned catalysts	2257/402	. . Dinitrogen oxide
2255/9032	. . . Two zones	2257/404	. . Nitrogen oxides other than dinitrogen oxide
2255/9035	. . . Three zones	2257/406	. . Ammonia
2255/9037	. . . More than three zones	2257/408	. . Cyanides, e.g. hydrogen cyanide (HCH)
2255/904	. . Multiple catalysts	2257/50	. Carbon oxides
2255/9045	. . . in parallel	2257/502	. . Carbon monoxide
2255/905	. . Catalysts having a gradually changing coating	2257/504	. . Carbon dioxide
2255/906	. . Catalyst dispersed in the gas	2257/55	. Compounds of silicon, phosphorus, germanium or arsenic
2255/908	. . O ₂ -storage component incorporated in the catalyst	2257/553	. . Compounds comprising hydrogen, e.g. silanes
2255/909	. . H ₂ -storage component incorporated in the catalyst	2257/556	. . Organic compounds
2255/91	. . NO _x -storage component incorporated in the catalyst	2257/60	. Heavy metals or heavy metal compounds
2255/911	. . NH ₃ -storage component incorporated in the catalyst	2257/602	. . Mercury or mercury compounds
2255/912	. . HC-storage component incorporated in the catalyst	2257/70	. Organic compounds not provided for in groups B01D 2257/00 - B01D 2257/602
2255/915	. . Catalyst supported on particulate filters	2257/702	. . Hydrocarbons
2255/9155	. . . Wall flow filters	2257/7022	. . . Aliphatic hydrocarbons
2255/92	. . Dimensions	2257/7025	. . . . Methane
2255/9202	. . . Linear dimensions	2257/7027	. . . Aromatic hydrocarbons
2255/9205	. . . Porosity	2257/704	. . Solvents not covered by groups B01D 2257/702 - B01D 2257/7027
2255/9207	. . . Specific surface	2257/706	. . Organometallic compounds
2256/00	Main component in the product gas stream after treatment	2257/708	. . Volatile organic compounds V.O.C.'s
2256/10	. Nitrogen	2257/80	. Water
2256/12	. Oxygen	2257/90	. Odorous compounds not provided for in groups B01D 2257/00 - B01D 2257/708
2256/14	. Ozone	2257/91	. Bacteria; Microorganisms
2256/16	. Hydrogen	2257/93	. Toxic compounds not provided for in groups B01D 2257/00 - B01D 2257/708
2256/18	. Noble gases	2258/00	Sources of waste gases
2256/20	. Carbon monoxide	2258/01	. Engine exhaust gases
2256/22	. Carbon dioxide	2258/012	. . Diesel engines and lean burn gasoline engines
2256/24	. Hydrocarbons	2258/014	. . Stoichiometric gasoline engines
2256/245	. . Methane	2258/016	. . Methanol engines
2256/26	. Halogens or halogen compounds	2258/018	. . Natural gas engines
2257/00	Components to be removed	2258/02	. Other waste gases
2257/10	. Single element gases other than halogens	2258/0208	. . from fuel cells
2257/102	. . Nitrogen	2258/0216	. . from CVD treatment or semi-conductor manufacturing
2257/104	. . Oxygen	2258/0225	. . from chemical or biological warfare
2257/106	. . Ozone	2258/0233	. . from cement factories
2257/108	. . Hydrogen	2258/0241	. . from glass manufacture plants
2257/11	. . Noble gases	2258/025	. . from metallurgy plants
2257/20	. Halogens or halogen compounds	2258/0258	. . from painting equipments or paint drying installations
2257/202	. . Single element halogens	2258/0266	. . from animal farms
2257/2022	. . . Bromine	2258/0275	. . from food processing plants or kitchens
2257/2025	. . . Chlorine	2258/0283	. . Flue gases
2257/2027	. . . Fluorine	2258/0291	. . . from waste incineration plants
2257/204	. . Inorganic halogen compounds	2258/05	. Biogas
2257/2042	. . . Hydrobromic acid		
2257/2045	. . . Hydrochloric acid		
2257/2047	. . . Hydrofluoric acid		

2258/06	. Polluted air	2259/40086	. . . by using a purge gas (B01D 2259/4009 takes precedence)
2259/00	Type of treatment	2259/40088	. . . by heating
2259/10	. Gas phase, e.g. by using aerosols	2259/4009	. . . . using hot gas
2259/12	. Methods and means for introducing reactants	2259/40092	. . . . using hot liquid
2259/122	. . Gaseous reactants	2259/40094	. . . . by applying microwaves
2259/124	. . Liquid reactants	2259/40096	. . . . by using electrical resistance heating
2259/126	. . Semi-solid reactants, e.g. slurries	2259/40098	. . . . with other heating means
2259/128	. . Solid reactants	2259/401	. . using a single bed
2259/40	. Further details for adsorption processes and devices	2259/402	. . using two beds
2259/40001	. . Methods relating to additional, e.g. intermediate, treatment of process gas	2259/403	. . using three beds
2259/40003	. . Methods relating to valve switching	2259/404	. . using four beds
2259/40005	. . . using rotary valves	2259/406	. . using more than four beds
2259/40007	. . Controlling pressure or temperature swing adsorption	2259/4061	. . . using five beds
2259/40009	. . . using sensors or gas analysers	2259/4062	. . . using six beds
2259/40011	. . Methods relating to the process cycle in pressure or temperature swing adsorption	2259/4063	. . . using seven beds
2259/40013	. . . Pressurization	2259/4065	. . . using eight beds
2259/40015	. . . . with two sub-steps	2259/4066	. . . using nine beds
2259/40016	. . . . with three sub-steps	2259/4067	. . . using ten beds
2259/40018	. . . . with more than three sub-steps	2259/4068	. . . using more than ten beds
2259/4002	. . . Production	2259/41	. . using plural beds of the same adsorbent in series
2259/40022	. . . . with two sub-steps	2259/414	. . using different types of adsorbents
2259/40024	. . . . with three sub-steps	2259/4141	. . . within a single bed
2259/40026	. . . . with more than three sub-steps	2259/4143	. . . . arranged as a mixture
2259/40028	. . . Depressurization	2259/4145	. . . . arranged in series
2259/4003	. . . . with two sub-steps	2259/4146	. . . . . Contiguous multilayered adsorbents
2259/40032	. . . . with three sub-steps	2259/4148	. . . . . Multiple layers positioned apart from each other
2259/40033	. . . . with more than three sub-steps	2259/416	. . involving cryogenic temperature treatment
2259/40035	. . . Equalization	2259/418	. . deleted
2259/40037	. . . . with two sub-steps	2259/45	. Gas separation or purification devices adapted for specific applications
2259/40039	. . . . with three sub-steps	2259/4508	. . for cleaning air in buildings
2259/40041	. . . . with more than three sub-steps	2259/4516	. . for fuel vapour recovery systems
2259/40043	. . . Purging	2259/4525	. . for storage and dispensing systems
2259/40045	. . . . with two sub-steps	2259/4533	. . for medical purposes
2259/40047	. . . . with three sub-steps	2259/4541	. . for portable use, e.g. gas masks
2259/40049	. . . . with more than three sub-steps	2259/455	. . for transportable use
2259/4005	. . . . Nature of purge gas	2259/4558	. . . for being employed as mobile cleaners for ambient air, i.e. the earth's atmosphere
2259/40052	. . . . . Recycled product or process gas	2259/4566	. . for use in transportation means
2259/40054	. . . . . treated before its reuse	2259/4575	. . . in aeroplanes or space ships
2259/40056	. . . . . Gases other than recycled product or process gas	2259/4583	. . for removing chemical, biological and nuclear warfare agents
2259/40058	. . . Number of sequence steps, including sub-steps, per cycle	2259/4591	. . Construction elements containing cleaning material, e.g. catalysts
2259/4006	. . . . Less than four	2259/65	. Employing advanced heat integration, e.g. Pinch technology
2259/40062	. . . . Four	2259/652	. . using side coolers
2259/40064	. . . . Five	2259/655	. . using heat storage materials
2259/40066	. . . . Six	2259/657	. . . using latent heat, e.g. with phase change materials
2259/40067	. . . . Seven	2259/80	. Employing electric, magnetic, electromagnetic or wave energy, or particle radiation
2259/40069	. . . . Eight	2259/802	. . Visible light
2259/40071	. . . . Nine	2259/804	. . UV light
2259/40073	. . . . Ten	2259/806	. . Microwaves
2259/40075	. . . . More than ten	2259/808	. . Laser
2259/40077	. . . Direction of flow	2259/81	. . X-rays
2259/40079	. . . . Co-current	2259/812	. . Electrons
2259/40081	. . . . Counter-current	2259/814	. . Magnetic fields
2259/40083	. . Regeneration of adsorbents in processes other than pressure or temperature swing adsorption	2259/816	. . Sonic or ultrasonic vibration
2259/40084	. . . by exchanging used adsorbents with fresh adsorbents		

2259/818	. . Employing electrical discharges or the generation of a plasma	2275/105	. . Wound layers
2265/00	Casings, housings or mounting for filters specially adapted for separating dispersed particles from gases or vapours	2275/20	. Shape of filtering material
2265/02	. Non-permanent measures for connecting different parts of the filter	2275/201	. . Conical shape
2265/021	. . Anti-rotational means	2275/202	. . Disc-shaped filter elements
2265/022	. . Bayonet connecting means	2275/203	. . Shapes flexible in their geometry, e.g. bendable, adjustable to a certain size
2265/023	. . making use of magnetic forces	2275/204	. . Special shapes of loose filter materials
2265/024	. . Mounting aids	2275/205	. . Rectangular shape
2265/025	. . . making use of ramps or cams	2275/206	. . Special forms, e.g. adapted to a certain housing
2265/026	. . . with means for avoiding false mounting	2275/207	. . Triangular shape
2265/027	. . Quick closing means for, e.g. filter heads, caps, maintenance openings	2275/208	. . Oval shape
2265/028	. . Snap, latch or clip connecting means	2275/30	. Porosity of filtering material
2265/029	. . Special screwing connections, threaded sections	2275/302	. . Means for changing the porosity of a filter element, e.g. adjustment of a slit width, compression of a foam material
2265/04	. Permanent measures for connecting different parts of the filter, e.g. welding, glueing or moulding	2275/305	. . Porosity decreasing in flow direction
2265/05	. . Special adapters for the connection of filters or parts of filters	2275/307	. . Porosity increasing in flow direction
2265/06	. Details of supporting structures for filtering material, e.g. cores	2275/40	. Porous blocks
2267/00	Multiple filter elements specially adapted for separating dispersed particles from gases or vapours	2275/403	. . Flexible blocks
2267/30	. Same type of filters	2275/406	. . Rigid blocks
2267/40	. Different types of filters	2275/50	. Stabilised filter material, stabilised by, e.g. structuring, calendering
2267/60	. Vertical arrangement	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
2267/70	. Horizontal arrangement	2277/10	. Parallel
2271/00	Sealings for filters specially adapted for separating dispersed particles from gases or vapours	2277/20	. Inclined, i.e. forming an angle of between 0° and 90°
2271/02	. Gaskets, sealings	2277/30	. Transverse, i.e. forming an angle of 90°
2271/022	. . Axial sealings	2279/00	Filters adapted for separating dispersed particles from gases or vapours specially modified for specific uses
2271/025	. . Making of sealings	2279/10	. for air bags, e.g. inflators therefor
2271/027	. . Radial sealings	2279/20	. for collecting heterogeneous particles separately
2273/00	Operation of filters specially adapted for separating dispersed particles from gases or vapours	2279/30	. for treatment of exhaust gases from IC Engines
2273/10	. Allowing a continuous bypass of at least part of the flow, e.g. of secondary air, vents	2279/35	. for venting arrangements
2273/12	. Influencing the filter cake during filtration using filter aids	2279/40	. for cleaning of environmental air, e.g. by filters installed on vehicles or on streets
2273/14	. Filters which are moved between two or more positions, e.g. by turning, pushing	2279/45	. for electronic devices, e.g. computers, hard-discs, mobile phones
2273/16	. Means for selecting a filter element of a group of filters for a special purpose other than cleaning a filter	2279/50	. for air conditioning
2273/18	. Testing of filters, filter elements, sealings	2279/51	. . in clean rooms, e.g. production facilities for electronic devices, laboratories
2273/20	. High temperature filtration	2279/55	. for cleaning appliances, e.g. suction cleaners
2273/22	. Making use of microwaves, e.g. for measurements	2279/60	. for the intake of internal combustion engines or turbines
2273/24	. Making use of acoustic waves, e.g. for measurements	2279/65	. for the sterilisation of air
2273/26	. Making use of optical waves, e.g. for measurements	2311/00	Details relating to membrane separation process operations and control
2273/28	. Making use of vacuum or underpressure	NOTE	
2273/30	. Means for generating a circulation of a fluid in a filtration system, e.g. using a pump or a fan	In this group, C-sets are used for classification. The detailed information about the C-Sets construction and the associated syntax rules are found in the definitions of B01D .	
2275/00	Filter media structures for filters specially adapted for separating dispersed particles from gases or vapours	2311/02	. Specific process operations before starting the membrane separation process
2275/10	. Multiple layers	2311/04	. Specific process operations in the feed stream; Feed pretreatment
		2311/06	. Specific process operations in the permeate stream

2311/08	. Specific process operations in the concentrate stream	2311/2692	. . Sterilization
2311/10	. Temperature control	2311/2696	. . Catalytic reactions
2311/103	. . Heating	2311/2697	. . Chromatography
2311/1031	. . . Heat integration, heat recovery or reuse within an apparatus	2311/2698	. . Compression
2311/1032	. . . Heating or reheating between serial separation steps	2311/2699	. . Drying
2311/106	. . Cooling	2313/00	Details relating to membrane modules or apparatus
2311/1061	. . . Cooling between serial separation steps	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	2313/041	. . Gaskets or O-rings
2311/16	. Flow or flux control	2313/042	. . Adhesives or glues
2311/165	. . Cross-flow velocity control	2313/06	. External membrane module supporting or fixing means
2311/18	. pH control	2313/08	. Flow guidance means within the module or the apparatus
2311/20	. Power consumption	2313/083	. . Bypass routes
2311/22	. characterised by a specific duration or time	2313/086	. . Meandering flow path over the membrane
2311/24	. Quality control	2313/10	. Specific supply elements
2311/243	. . Electrical conductivity control	2313/105	. . Supply manifolds
2311/246	. . Concentration control	2313/12	. Specific discharge elements
2311/25	. Recirculation, recycling or bypass, e.g. recirculation of concentrate into the feed	2313/125	. . Discharge manifolds
2311/251	. . Recirculation of permeate	2313/13	. Specific connectors
2311/2512	. . . to feed side	2313/131	. . Quick connectors or quick-fit
2311/2513	. . . to concentrate side	2313/14	. Specific spacers
2311/252	. . Recirculation of concentrate	2313/143	. . on the feed side
2311/2521	. . . to permeate side	2313/146	. . on the permeate side
2311/2523	. . . to feed side	2313/16	. Specific vents
2311/253	. . Bypassing of feed	2313/18	. Specific valves
2311/2531	. . . to permeate side	2313/19	. Specific flow restrictors
2311/2532	. . . to concentrate side	2313/20	. Specific housing
2311/26	. Further operations combined with membrane separation processes	2313/201	. . Closed housing, vessels or containers
2311/2603	. . Application of an electric field, different from the potential difference across the membrane	2313/2011	. . . Pressure vessels
2311/2607	. . Application of a magnetic field	2313/203	. . Open housings
2311/2611	. . Irradiation	2313/2031	. . . Frame or cage-like structures
2311/2615	. . . Application of high-frequency electromagnetic fields or microwave irradiation	2313/205	. . characterised by the shape
2311/2619	. . . UV-irradiation	2313/206	. . characterised by the material
2311/2623	. . Ion-Exchange	2313/2061	. . . Organic, e.g. polymeric material
2311/2626	. . Absorption or adsorption	2313/2062	. . . Inorganic material
2311/263	. . Chemical reaction	2313/208	. . Resilient or flexible housing walls, e.g. bags or foils
2311/2634	. . . Oxidation	2313/21	. Specific headers, end caps
2311/2638	. . . Reduction	2313/22	. Cooling or heating elements
2311/2642	. . Aggregation, sedimentation, flocculation, precipitation or coagulation	2313/221	. . Heat exchangers
2311/2643	. . Crystallisation	2313/23	. Specific membrane protectors, e.g. sleeves or screens
2311/2646	. . Decantation	2313/24	. Specific pressurizing or depressurizing means
2311/2649	. . Filtration	2313/243	. . Pumps
2311/2653	. . Degassing	2313/246	. . Energy recovery means
2311/2657	. . . Deaeration	2313/26	. Specific gas distributors or gas intakes
2311/2661	. . Addition of gas	2313/28	. Specific concentration chambers
2311/2665	. . . Aeration other than for cleaning purposes	2313/30	. Specific dilution or de-ionizing chambers
2311/2669	. . Distillation	2313/32	. Intermediate chambers
2311/2673	. . Evaporation	2313/34	. Energy carriers
2311/2674	. . Condensation	2313/345	. . Electrodes
2311/2676	. . Centrifugal separation	2313/36	. Energy sources
2311/268	. . Water softening	2313/365	. . Electrical sources
2311/2684	. . Electrochemical processes	2313/367	. . Renewable energy sources, e.g. wind or solar sources
2311/2688	. . Biological processes	2313/40	. Adsorbents within the flow path
		2313/42	. Catalysts within the flow path

2313/44	. Cartridge types	2319/025	. . Permeate series
2313/46	. Supply, recovery or discharge mechanisms of washing members	2319/027	. . Christmas tree arrangements
2313/48	. Mechanisms for switching between regular separation operations and washing	2319/04	. Elements in parallel
2313/50	. Specific extra tanks	2319/06	. Use of membranes of different materials or properties within one module
2313/501	. . Permeate storage tanks	2321/00	Details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling
2313/502	. . Concentrate storage tanks	2321/02	. Forward flushing
2313/54	. Modularity of membrane module elements	2321/04	. Backflushing
2313/56	. Specific mechanisms for loading the membrane in a module	2321/06	. Use of osmotic pressure, e.g. direct osmosis
2313/57	. Tools used for removal of membranes	2321/08	. Use of hot water or water vapor
2313/58	. Parts of membrane modules specifically adapted for single use	2321/10	. Use of feed
2313/60	. Specific sensors or sensor arrangements	2321/12	. Use of permeate
2313/62	. Displays	2321/14	. Use of concentrate
2313/64	. Bar codes; Data storage means; RFID	2321/16	. Use of chemical agents
2313/66	. Biodegradability of parts of the module	2321/162	. . Use of acids
2313/68	. Biocompatibility of parts of the module	2321/164	. . Use of bases
2313/70	. Control means using a programmable logic controller [PLC] or a computer	2321/166	. . Use of enzymatic agents
2313/701	. . comprising a software program or a logic diagram	2321/167	. . Use of scale inhibitors
2313/702	. . comprising telecommunication features, e.g. modems or antennas	2321/168	. . Use of other chemical agents
2313/90	. Additional auxiliary systems integrated with the module or apparatus	2321/18	. Use of gases
2313/901	. . Integrated prefilter	2321/185	. . Aeration
2313/902	. . Integrated cleaning device	2321/20	. By influencing the flow
2313/903	. . Integrated control or detection device	2321/2008	. . statically
2315/00	Details relating to the membrane module operation	2321/2016	. . . Static mixers; Turbulence generators
2315/02	. Rotation or turning	2321/2025	. . . Tangential inlet
2315/04	. Reciprocation, oscillation or vibration	2321/2033	. . dynamically
2315/05	. Moving the membrane in one direction, e.g. displacement, translational movement	2321/2041	. . . Mixers; Agitators
2315/06	. Submerged-type; Immersion type	2321/205	. . . Integrated pumps
2315/08	. Fully permeating type; Dead-end filtration	2321/2058	. . . by vibration of the membrane, e.g. with an actuator
2315/10	. Cross-flow filtration	2321/2066	. . Pulsated flow
2315/12	. Feed-and-bleed systems	2321/2075	. . . Ultrasonic treatment
2315/14	. Batch-systems	2321/2083	. . By reversing the flow
2315/16	. Diafiltration	2321/22	. Electrical effects
2315/17	. Depth filtration, asymmetric membranes arranged with wider pore size side towards feed	2321/223	. . Polarity reversal
2315/18	. Time sequence of one or more process steps carried out periodically within one apparatus	2321/226	. . Interruption of electric currents
2315/20	. Operation control schemes defined by a periodically repeated sequence comprising filtration cycles combined with cleaning or gas supply, e.g. aeration	2321/24	. Magnetic effects
2315/22	. Membrane contactor	2321/26	. By suction
2315/24	. Counter-current operation	2321/28	. by soaking or impregnating
2317/00	Membrane module arrangements within a plant or an apparatus	2321/281	. by applying a special coating to the membrane or to any module element
2317/02	. Elements in series	2321/282	. by spray flush or jet flush
2317/022	. . Reject series	2321/30	. Mechanical cleaning, e.g. with brushes or scrapers
2317/025	. . Permeate series	2321/32	. By heating or pyrolysis
2317/027	. . Christmas tree arrangements	2321/34	. by radiation
2317/04	. Elements in parallel	2321/343	. . By UV radiation
2317/06	. Use of membrane modules of the same kind	2321/346	. . by gamma radiation
2317/08	. Use of membrane modules of different kinds	2321/35	. with acoustic waves
2319/00	Membrane assemblies within one housing	2321/40	. Automatic control of cleaning processes
2319/02	. Elements in series	2321/42	. Chemical regeneration
2319/022	. . Reject series	2321/44	. Specific cleaning apparatus
		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
		2323/081	. . Heating
		2323/082	. . Cooling
		2323/10	. Specific pressure applied

2323/12	. Specific ratios of components used	2323/39	. Electrospinning
2323/14	. Ageing features	2323/40	. in-situ membrane formation
2323/15	. Use of additives	2323/42	. Details of membrane preparation apparatus
2323/16	. . Swelling agents	2323/44	. Relaxation steps
2323/18	. . Pore-control agents or pore formers	2323/46	. Impregnation
2323/20	. . Plasticizers	2323/48	. Influencing the pH
2323/21	. . Fillers	2323/50	. Control of the membrane preparation process
2323/216	. . Surfactants	2323/52	. Use of a mould
2323/217	. . Emulgator or emulsion/foam forming agents	2323/54	. Recycling of scrap material from production process or membrane fragments
2323/218	. . Additive materials	2323/56	. Use of ultrasound
2323/2181	. . . Inorganic additives	2323/58	. Fusion; Welding
2323/21811	. . . . Metals	2323/60	. Co-casting; Co-extrusion
2323/21813	. . . . Metal oxides	2323/62	. Cutting the membrane
2323/21815	. . . . Acids	2323/64	. Use of a temporary support
2323/21817	. . . . Salts	2323/66	. Avoiding penetration into pores of support of further porous layer with fluid or counter-pressure
2323/21819	. . . . Carbon, carbon nanotubes, graphene or derivatives thereof		
2323/2182	. . . Organic additives	2325/00	Details relating to properties of membranes
2323/21821	. . . . Alkanes	2325/02	. Details relating to pores or porosity of the membranes
2323/21822	. . . . Alkenes	2325/021	. . Pore shapes
2323/21823	. . . . Alcohols or hydroxydes, e.g. ethanol, glycerol or phenol	2325/0212	. . . Symmetric or isoporous membranes
2323/21824	. . . . Aldehydes	2325/0214	. . . Tapered pores
2323/21825	. . . . Ketones	2325/022	. . Asymmetric membranes
2323/21826	. . . . Acids, e.g. acetic acid	2325/023	. . . Dense layer within the membrane
2323/21827	. . . . Salts	2325/0231	. . . Dense layers being placed on the outer side of the cross-section
2323/21828	. . . . Ammonium Salts	2325/0232	. . . Dense layer on both outer sides of the membrane
2323/21829	. . . . Acrylates	2325/0233	. . . with clearly distinguishable layers
2323/2183	. . . . Ethers	2325/025	. . Finger pores
2323/21831	. . . . Cyclic ethers comprising heterocyclic O-Ring	2325/026	. . Sponge structure
2323/21832	. . . . Cyclic ethers comprising aromatic heterocyclic O-Ring	2325/027	. . Nonporous membranes
2323/21833	. . . . Esters	2325/028	. . Microfluidic pore structures
2323/21834	. . . . Amines	2325/0281	. . Fibril, or microfibril structures
2323/21835	. . . . Cyclic amines comprising heterocyclic N-Ring, e.g. pyridine	2325/0282	. . Dynamic pores-stimuli responsive membranes, e.g. thermoresponsive or pH-responsive
2323/21836	. . . . Cyclic amines comprising aromatic heterocyclic N-Ring	2325/0283	. . Pore size
2323/21837	. . . . Amides	2325/02831	. . . less than 1 nm
2323/21838	. . . . Imides	2325/02832	. . . 1-10 nm
2323/21839	. . . . Polymeric additives	2325/02833	. . . more than 10 and up to 100 nm
2323/2185	. . . . Polyethylene glycol	2325/02834	. . . more than 0.1 and up to 1 μ m
2323/2187	. . . . Polyvinylpyrrolidone	2325/04	. Characteristic thickness
2323/2189	. . . Metal-organic compounds or complexes	2325/06	. Surface irregularities
2323/219	. Specific solvent system	2325/08	. Patterned membranes
2323/22	. Specific non-solvents or non-solvent system	2325/10	. Catalysts being present on the surface of the membrane or in the pores
2323/225	. . Use of supercritical fluids	2325/12	. Adsorbents being present on the surface of the membranes or in the pores
2323/226	. . Use of ionic liquids	2325/14	. Membrane materials having negatively charged functional groups
2323/24	. Use of template or surface directing agents [SDA]	2325/16	. Membrane materials having positively charged functional groups
2323/26	. Spraying processes	2325/18	. Membrane materials having mixed charged functional groups
2323/28	. Pore treatments	2325/20	. Specific permeability or cut-off range
2323/283	. . Reducing the pores	2325/22	. Thermal or heat-resistance properties
2323/286	. . Closing of pores, e.g. for membrane sealing	2325/24	. Mechanical properties, e.g. strength
2323/30	. Cross-linking	2325/26	. Electrical properties
2323/32	. Use of chain transfer agents or inhibitors	2325/28	. Degradation or stability over time
2323/34	. Use of radiation	2325/30	. Chemical resistance
2323/345	. . UV-treatment	2325/32	. Melting point or glass-transition temperatures
2323/35	. Use of magnetic or electrical fields		
2323/36	. Introduction of specific chemical groups		
2323/38	. Graft polymerization		
2323/385	. . involving radiation		

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- 2325/34 . Molecular weight or degree of polymerisation
- 2325/341 . . At least two polymers of same structure but different molecular weight
- 2325/36 . Hydrophilic membranes
- 2325/38 . Hydrophobic membranes
- 2325/39 . Amphiphilic membranes
- 2325/40 . Fibre reinforced membranes
- 2325/42 . Ion-exchange membranes
- 2325/43 . Specific optical properties
- 2325/44 . . Specific light transmission
- 2325/46 . Magnetic properties
- 2325/48 . Antimicrobial properties
- 2325/50 . Membrane in gel form
- 2325/52 . Crystallinity
- 2325/54 . Interpenetration relationship between layers in supported or composite membranes
- 2325/56 . Biodegradability of membrane
- 2325/58 . Biocompatibility of membrane