C02F

TREATMENT OF WATER, WASTE WATER, SEWAGE, OR SLUDGE (separation in general B01D; special arrangements on waterborne vessels of installations for treating water, waste water or sewage, e.g. for producing fresh water, B63J; adding materials to water to prevent corrosion C23F; treating radioactively-contaminated liquids G21F 9/04; regeneration of reactants for recirculation into processes, see the relevant places for the processes)

Definition statement

This place covers:

The physical, chemical and biological treatment of water, waste water or sewage, e.g. by distillation or evaporation, by degassing, by centrifugal separation, by flocculation of suspended impurities or by using plants such as algae.

Selection or use of compositions for such treatments.

Compositions (per se) specially adapted for water treatment.

Softening water and preventing scale; Adding scale preventatives or scale removers to water, e.g. adding sequestering agents.

Aeration of stretches of water.

Multistage treatment of water, waste water or sewage.

Treatment of sludge and devices therefore, e.g. bioreactors. Sludge treatment covered in this subclass is usually restricted to the treatment of sludge obtained from a water treatment process.

Devices for the treatment of water, waste water or sewage, e.g. devices for separating or removing fatty or oily substances or similar floating material.

Relationships with other classification places

Separation in general is classified in B01D.

Making potable water by desalination or solar evaporation is classified in C02F and apparatus for separation in general are classified in B01D.

References

Limiting references

This place does not cover:

Processes for making harmful chemical substances harmless, or less harmful, by effecting a chemical change in the substances	A62D 3/00
Settling tanks and filter devices in general	B01D
Adding materials to water to prevent corrosion	C23F
Cleaning or keeping clear the surface of open water, e.g. the sea	E02B 15/00
Devices for cleaning or keeping clear the surface of open water	E02B 15/04
Methods for obtaining or collecting drinking water or tap water	E03B 3/00
Treating radioactively-contaminated liquids	G21F 9/04

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Special arrangements on waterborne vessels of installations for producing fresh water	B63J 1/00
Special arrangements on waterborne vessels of installations for treating waste water or sewage	B63J 4/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Medicinal water	A61K
Degasification of liquids in general	B01D 19/00
Ion-exchange in general	B01J
Packing elements in general	B01J 19/32
Devices in sewers for separating liquid or solid substances from sewage	E03F 5/14
Methods of steam generation	F22B
Preheating boiler feed-water or accumulating preheated boiler feed-water	F22D
Incinerators or other apparatus for burning waste liquors	F23G 7/04

Special rules of classification

When classifying in this subclass, classification is also made in group B01D 15/08 insofar as subject matter of general interest relating to chromatography is concerned.

It is desirable to add the indexing symbols of group C02F 2101/00 for the nature of the contaminant and of group C02F 2103/00 for the nature of the water, waste water, sewage or sludge to be treated which are considered to be of interest for search.

Devices are only classified in detail if there is no appropriate, more general place available and if they are clearly related to the water treatment aspect (i.e. if they are not universally applicable). The following symbols can be considered for classifying additional information:

Specifying the nature of the contaminant	C02F 2101/00 - C02F 2101/40
Specifying the nature of water, waste water or sludge to be treated	C02F 2103/00 - C02F 2103/42
Details of the apparatus used for treatment of water, wastewater or sludge	C02F 2201/00 - C02F 2201/784
Specifying details of the apparatus and plants for the biological treatment of water, wastewater or sewage	C02F 2203/00
Controlling or monitoring parameters in water treatment	C02F 2209/00 - C02F 2209/445
Specifying general aspects of water treatment	C02F 2301/00 - C02F 2301/08
Specific treatment goals	C02F 2303/00 - C02F 2303/20
The use of specific compounds in water treatment	C02F 2305/00 - C02F 2305/10
The location of water treatment or water treatment device	C02F 2307/00 - C02F 2307/08

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Sludge	Solids that remain after wastewater treatment. This material may be separated, treated and composted into fertiliser. Aqueous suspension of solids resulting from water treatment processes and having a solids concentration of typically more than 2 g/L.

C02F 1/00

Treatment of water, waste water, or sewage (C02F 3/00 - C02F 9/00 take precedence)

Definition statement

This place covers:

This group covers processes and apparatus relating to physical and chemical water treatment (ultrapure water, potable water, wastewater).

Treatment concerns only water, waste water or sewage and not any liquids

References

Limiting references

This place does not cover:

Biological water treatment	C02F 3/00
Softening water, preventing scale	C02F 5/00
Aeration of stretches of water	C02F 7/00
Multistage treatment of water	C02F 9/00

C02F 1/001

{Processes for the treatment of water whereby the filtration technique is of importance (C02F 1/44 takes precedence; construction of filters in general B01D 24/00 - B01D 41/00)}

Definition statement

This place covers:

Methods for separation of water and particles suspended in water.

References

Limiting references

This place does not cover:

Membrane treatment	C02F 1/44
Filter devices	B01D 24/00 - B01D 41/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Membrane filters	B01D 61/00 - B01D 71/00

Special rules of classification

The head group should only be used if none of the more specific groups is appropriate.

C02F 1/002

{using small portable filters for producing potable water, e.g. personal travel or emergency equipment, survival kits, combat gear (C02F 1/003 takes precedence)}

Definition statement

This place covers:

This class relates to small portable filters, which are mostly pocket-sized, e.g. filters integrated in drinking straws, canteens or bottles. Bottle-filters can be further characterised using the symbol C02F 2307/02.

References

Limiting references

This place does not cover:

Household type filters	C02F 1/003

Informative references

Attention is drawn to the following places, which may be of interest for search:

Indexing symbol for bottle-filters	C02F 2307/02

C02F 1/003

{using household-type filters for producing potable water, e.g. pitchers, bottles, faucet mounted devices (C02F 9/20 takes precedence)}

Definition statement

This place covers:

This class contains household filters, e.g. pitchers, larger bottles, cartridges, faucet mounted devices, filters useable either in commercial or residential establishments. Additional details can be classified using Indexing symbols C02F 2307/02 - C02F 2307/06 (see the informative references).

References

Limiting references

This place does not cover:

Small-scale multistage treatment apparatus	C02F 9/20

Informative references

Attention is drawn to the following places, which may be of interest for search:

Filter as part of a bottle	C02F 2307/02
Filter being part of a pitcher or jug	C02F 2307/04
Filter being mounted on a faucet or showerhead	C02F 2307/06
Apparatus for making beverages including water filters	A47J 31/605
Filter condition indicators	B01D 35/143
Liquid dispensers	B67D

C02F 1/004

{using large scale industrial sized filters}

Definition statement

This place covers:

To be used for large scale (industrial scale) mechanical filtration, e.g. use of a sand filter, rapid filtration. Typical applications are filters in drinking water purification plants, post filtration in wastewater treatment plants, water filtration for industrial water stream.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Biofilters	C02F 3/00
Filters in general	B01D

C02F 1/005

{Systems or processes based on supernatural or anthroposophic principles, cosmic or terrestrial radiation, geomancy or rhabdomancy}

Definition statement

This place covers:

Systems or processes based on supernatural or anthroposophic principles. This class is used for all esoteric applications which claim implausible effects (lack of scientific explanation, quackery).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Homeaopathy, esoteric applications	A61K 41/0004
Screening of terrestrial radiation	A61N 1/16
Radio-esthesis, dowsing	G01V 9/002

Special rules of classification

Clear treatment steps, e.g. magnetic treatment, irradiation can be classified by adding the corresponding additional information symbol (C02F 1/48, C02F 1/30; etc.).

C02F 1/006

{Water distributors either inside a treatment tank or directing the water to several treatment tanks; Water treatment plants incorporating these distributors, with or without chemical or biological tanks (for settling tanks B01D 21/24)}

Definition statement

This place covers:

This class is used for any devices directing the water to be treated into the treatment tank or installation, e.g. pipes, connecting vessels.

References

Limiting references

This place does not cover:

Water distributors for settling tanks	B01D 21/24

C02F 1/008

{Control or steering systems not provided for elsewhere in subclass C02F}

Definition statement

This place covers:

Control of parameters in the physical or chemical water treatment processes

References

Limiting references

This place does not cover:

Control of flocculation processes	C02F 1/5209
Control of biological water treatment processes	C02F 3/006

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control parameters and systems	C02F 2209/00 - C02F 2209/445
Control in general	G01N

C02F 1/02

by heating (methods of steam generation F22B; preheating boiler feed-water or accumulating preheated boiler feed-water F22D)

Definition statement

This place covers:

Treatment of water by heating

References

Limiting references

This place does not cover:

Methods of steam generation	F22B
Preheating boiler feed-water	F22D

Informative references

Attention is drawn to the following places, which may be of interest for search:

Heat sterilisation for pharmaceuticals	A61L 2/0023
General heat sterilisation	A61L 2/04

Special rules of classification

The groups C02F 1/02 - C02F 1/18 cover applications in which the water treatment process concerns mainly the heating of the water to be treated, e.g. disinfection, evaporation, distillation.

C02F 1/04

by distillation or evaporation

Definition statement

This place covers:

Treatment of water using distillation, apparatus details should always be classified in the corresponding classes in B01D.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

General distillation and evaporation, devices	B01D 1/00 - B01D 5/00

Special rules of classification

Seawater desalination can be indexed with the symbol C02F 2103/08.

C02F 1/041

{by means of vapour compression}

Definition statement

This place covers:

Treatment of water, waste water or sewage by vapour compression

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Evaporating with vapour compression	B01D 1/28

C02F 1/042

{Prevention of deposits}

Definition statement

This place covers:

Prevention of deposits in the context of distillation or evaporation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrochemical prevention or elimination of deposits	C02F 1/4604
Softening water, scale prevention	C02F 5/00
Elimination of deposits, scale removal or prevention being a secondary aspect	C02F 2303/22

C02F 1/045

{for obtaining ultra-pure water}

Definition statement

This place covers:

Distillation / evaporation process for obtaining ultrapure water.

Special rules of classification

Symbol C02F 2103/04 should be used for all other processes producing ultrapure water.

C02F 1/046

{under vacuum produced by a barometric column}

Definition statement

This place covers:

Treatment of water, waste water or sewage by distillation or evaporation under vacuum produced by a barometric column

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Vacuum distillation using a barometric column	B01D 3/103

C02F 1/048

{Purification of waste water by evaporation}

Definition statement

This place covers:

Treatment of wastewater by evaporation and distillation.

Special rules of classification

The specific type of wastewater can be further characterised using the symbols under C02F 2103/00 - C02F 2103/42.

C02F 1/06

Flash evaporation

Definition statement

This place covers:

Treatment of water, waste water or sewage by flash evaporation, i.e. evaporation under (non-barametric) vacuum or by sudden expansion

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Flash distillation	B01D 3/06

C02F 1/08

Thin film evaporation

Definition statement

This place covers:

Treatment of water, waste water or sewage by evaporating a thin film of liquid on heated surfaces, packing elements or by using a falling film evaporator

Relationships with other classification places

Apparatus for filtration like thin film evaporator concerning liquid purification is classified in B01D

When the liquid purification concerns water, then it's also classified in C02F 1/08

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Film evaporation	B01D 1/065
Thin layer evaporation	B01D 1/22

C02F 1/10

by direct contact with a particulate solid or with a fluid, as a heat transfer medium

Definition statement

This place covers:

Treatment of water, waste water or sewage by putting the water in direct contact with the heat carrier medium

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Evaporating with heated gases in contact with the liquid	B01D 1/14

C02F 1/12

Spray evaporation

Definition statement

This place covers:

Treatment of water, waste water or sewage by dispersing the water in form of droplets (spray) in a gas for evaporating

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Evaporating by spraying	B01D 1/16

C02F 1/14

using solar energy

Definition statement

This place covers:

Treatment of water, waste water or sewage by using solar heat directly or indirectly for evaporating water

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Evaporating in general using solar energy	B01D 1/0035

C02F 1/16

using waste heat from other processes

Definition statement

This place covers:

Treatment of water, waste water or sewage by using waste heat from other processes, e.g. from engine cooling circuits, power plants or industrial production processes

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Evaporating using waste energy	B01D 1/0058

C02F 1/18

Transportable devices to obtain potable water

Definition statement

This place covers:

Transportable device and process using such device for treating water by distillation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mobile apparatus and plants in general	C02F 2201/008
Mobile biological apparatus and plants in general	C02F 2203/008

C02F 1/20

by degassing, i.e. liberation of dissolved gases (degasification of liquids in general B01D 19/00; arrangement of degassing apparatus in boiler feed supply F22D)

Definition statement

This place covers:

Processes removing dissolved gases such as oxygen, carbon dioxide or halogens. This class is also used for processes directed at removing volatile organic or inorganic compounds, e.g. ammonia. This includes stripping and vacuum processes.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Apparatus for degasification of liquids in general	B01D 19/00
Arrangement of degassing apparatus in boiler feed supply	F22D

Special rules of classification

Indexing symbols for the compounds to be removed should be used if available (C02F 2101/00 - C02F 2101/40).

C02F 1/22

by freezing

Definition statement

This place covers:

Processes for cleaning water by freezing, separation of ice and slush from water and subsequent melting of ice and slush, e.g. freeze desalination.

Special rules of classification

Freeze-desalination using methane-hydrates (clathrates) is classified as a combination of C02F 1/22 and C02F 1/265.

C02F 1/24

by flotation (C02F 1/465 takes precedence)

Definition statement

This place covers:

Water treatment processes by flotation, e.g. for separating solids and liquids dispersed in water by using microbubbles, dissolved air flotation (DAF).

References

Limiting references

This place does not cover:

Electroflotation	C02F 1/465

Informative references

Attention is drawn to the following places, which may be of interest for search:

Flotation devices	B03D 1/14

C02F 1/26

by extraction

Definition statement

This place covers:

Treatment of water, waste water or sewage by extraction, e.g. removing pollutant from water by extraction, solvent extraction.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Solvent extraction	B01D 11/00

C02F 1/28

by sorption (using ion-exchange C02F 1/42; sorbent compositions B01J)

Definition statement

This place covers:

Treatment of water by sorption, removal of a compound by adsorption on a generally solid sorbent, regardless of the mechanism involved (chemisorption, complexation).

References

Limiting references

This place does not cover:

Treatment of water, waste water or sewage by ion exchange	C02F 1/42

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sorbents in general	B01J

Special rules of classification

If more than one sorbent is used the head group should be used in combination with the more specific symbols chosen from C02F 2001/422 - C02F 2001/427.

C02F 1/281

{using inorganic sorbents}

Definition statement

This place covers:

Water treatment using natural and synthetic inorganic sorbents. Examples for inorganic sorbents include zeolites, clays, silicagel, metal-hydroxides. Ion exchange occurring at the surface of inorganic sorbents is also classified here.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Inorganic sorbents	B01J 20/02

C02F 1/283

{using coal, charred products, or inorganic mixtures containing them}

Definition statement

This place covers:

Activated carbon and other coal or carbon based adsorbents, Powdered activated carbon (PAC), carbon black

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Carbon based sorbents	B01J 20/20

Special rules of classification

Only to be used if the carbonaceous compound is the active adsorbent (not for carriers).

C02F 1/285

{using synthetic organic sorbents}

Definition statement

This place covers:

Treatment of water, waste water or sewage by sorption using synthetic organic sorbents, e.g. organic adsorbents not occurring naturally, e.g. synthetic polymers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sorbents comprising synthetic macromolecular compounds	B01J 20/26

C02F 1/286

{using natural organic sorbents or derivatives thereof}

Definition statement

This place covers:

Sorption using natural organic sorbents such as algae, compost, humic acids, cellulose, etc.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sorbents comprising naturally occurring natural macromolecular compounds	B01J 20/24

C02F 1/288

{using composite sorbents, e.g. coated, impregnated, multi-layered}

Definition statement

This place covers:

Processes using coated, impregnated, hybrid and multi-layered sorbents.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Coated solid sorbents	B01J 20/32

Special rules of classification

Use of layered adsorbents should be classified as combination of class and additional symbol, e.g. C02F 1/288 and C02F 1/283.

C02F 1/30

by irradiation

Definition statement

This place covers:

Processes for treating water, waste water or sewage by using radiation sources, e.g. plasma, ionised gas. Irradiation with sunlight should be classified here only if the effect is not due to the UV radiation and if the effect is not achieved by heating.

C02F 1/302

{with microwaves}

Definition statement

This place covers:

Treatment of water with microwave radiation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Disinfecting and sterilising with microwaves	A61L 2/12

Special rules of classification

If microwaves are primarily used for heating C02F 1/02 is used.

C02F 1/32

with ultraviolet light

Definition statement

This place covers:

Processes using ultraviolet light (light having a wavelength of approximately 100-400 nm).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Disinfection and sterilisation using ultraviolet light	A61L 2/10

Special rules of classification

C02F 1/325 should always be used when apparatus details are mentioned. Photocatalysis is classified by combining C02F 1/32 or C02F 1/325 with C02F 1/74 and C02F 2305/10.

C02F 1/325

{Irradiation devices or lamp constructions}

Definition statement

This place covers:

Devices for UV treatment.

Special rules of classification

Details should be classified by using the symbols under C02F 2201/32.

C02F 1/34

with mechanical oscillations

Definition statement

This place covers:

Processes using cavitation for the destruction of particles and substances in the water to be treated. Mechanical creation by nozzles, valves, throttles or pumps.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

General mixing	B01F

Special rules of classification

Can be given as additional information for sludge treatment.

C02F 1/36

ultrasonic vibrations

Definition statement

This place covers:

Processes using ultrasonic transducer or similar devices to create ultrasound.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Disinfection and sterilisation using ultrasonic devices	A61L 2/025

Special rules of classification

If ultrasonic waves are created mechanically, e.g. with a nozzle, classify in C02F 1/34.

C02F 1/38

by centrifugal separation

Definition statement

This place covers:

Processes for treatment of water, waste water or sewage in which separation is achieved by using centrifugal forces, e.g. hydrocyclones, hydrodynamical separators.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Centrifugal separators in general	B04C

C02F 1/385

{by centrifuging suspensions (centrifuges B04B)}

Definition statement

This place covers:

Centrifugal separation for treating water.

References

Limiting references

This place does not cover:

Centrifugal separation of sludge	C02F 11/127
Centrifuges	B04B

C02F 1/40

Devices for separating or removing fatty or oily substances or similar floating material (cleaning or keeping clear the surface of open water from oil or like materials E02B 15/04; devices in sewers for separating liquid or solid substances from sewage E03F 5/14, e.g. for use in drains leading to the sewer E03F 5/16)

Definition statement

This place covers:

Devices for removing fatty or oily substances or similar floating material,, e.g. grease traps, oil water separators or oil skimmers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separation of liquids	B01D 17/00

Devices for removing oil from open water surfaces	E02B 15/04
Devices in sewers for removing fat and oil from sewage	E03F 5/14
Devices for use in drains leading to the sewer	E03F 5/16

C02F 1/42

by ion-exchange (ion-exchange in general B01J)

Definition statement

This place covers:

Use of resin type ion exchangers for treatment of water, waste water or sewage

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dishwashers comprising water softeners	A47L 15/4229
Ion-exchange in general	B01J 39/00 - B01J 49/00
Washing machines comprising water softeners	D06F 39/007

Special rules of classification

Ion exchange using zeolites and other inorganic ion exchangers should be classified in C02F 1/281 (sorption with inorganic sorbents).

C02F 1/44

by dialysis, osmosis or reverse osmosis {(general membrane separation processes B01D 61/00, membrane modules B01D 63/00, electrodialysis C02F 1/4693, combination of membrane modules and bioreactors C02F 3/1268)}

Definition statement

This place covers:

Water treatment processes using membrane separation.

References

Limiting references

This place does not cover:

Electrodialysis	C02F 1/4693
Membrane bioreactor systems	C02F 3/1268
Submerged membrane bioreactors	C02F 3/1273
Anaerobic membrane bioreactors	C02F 3/2853

Informative references

Attention is drawn to the following places, which may be of interest for search:

Membrane separation, devices	B01D 61/00 - B01D 71/82

C02F 1/441

{by reverse osmosis}

Definition statement

This place covers:

Treatment of water, waste water, sewage by reverse osmosis

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reverse osmosis processes in general	B01D 61/025

C02F 1/442

{by nanofiltration}

Definition statement

This place covers:

Treatment of water, waste water, sewage by nanofiltration

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Nanofiltration processes in general	B01D 61/027

C02F 1/444

{by ultrafiltration or microfiltration}

Definition statement

This place covers:

Treatment of water, waste water, sewage by ultrafiltration or microfiltration

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Ultrafiltration processes in general	B01D 61/145
Microfiltration processes in general	B01D 61/147

C02F 1/46

by electrochemical methods

Definition statement

This place covers:

Electrochemical methods for treating water, if no electrical current (static electrical field) is used C02F 1/48 applies.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrolytic processes for producing compounds	C25B
Electroplating	C25D

Special rules of classification

When classifying in C02F 1/46 the additional symbols under C02F 2201/46 should be used for additional information.

C02F 1/4604

{for desalination of seawater or brackish water}

Definition statement

This place covers:

All electrochemical seawater desalination processes not covered by C02F 1/469.

C02F 1/4606

{for producing oligodynamic substances to disinfect the water}

Definition statement

This place covers:

Production of disinfecting metallic ions, e.g. Ag, Cu, by electrolysis.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Non-electrolytic oligodynamic treatment	C02F 1/505

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Oligodynamic substances	active substances in very small quantities, used especially to describe the sterilizing effect of some heavy metals against bacteria

C02F 1/4608

{using electrical discharges}

Definition statement

This place covers:

Treatment of water by applying electrical discharges, generally by using high voltages.

C02F 1/46104

{Devices therefor; Their operating or servicing}

Definition statement

This place covers:

Electrolytic devices used for water treatment, for additional details not covered by classes in C02F the symbols C02F 2001/46119 - C02F 2001/46171 , and C02F 2001/46185 - C02F 2001/46195 can be used.

C02F 1/46109

{Electrodes}

Definition statement

This place covers:

Electrodes for water treatment purposes.

Special rules of classification

Additional information can be given by using the symbols C02F 2001/46119 - C02F 2001/46166.

C02F 1/46114

{Electrodes in particulate form or with conductive and/or non conductive particles between them}

Definition statement

This place covers:

Electrolytic cells where the space between anode and cathode is filled with a bed of particles (static or fluidised bed) and electrodes which are themselves comprised of particles.

C02F 2001/46152

{characterised by the shape or form}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Treatment of water by electrolysis with electrodes in particulate form or with conductive and/or non-conductive particles between them	C02F 1/46114

C02F 1/4618

{for producing "ionised" acidic or basic water}

Definition statement

This place covers:

Production of acidic, oxidising water at the anode and alkaline, reducing water at the cathode (separation of the streams).

Special rules of classification

If the water is primarily used for oxidation C02F 1/4672 applies. For electrochemical reduction use C02F 1/4676. Additional symbols C02F 2001/46185 - C02F 2001/46195 are available.

C02F 1/463

by electrocoagulation

Definition statement

This place covers:

Electrochemical production of coagulant, e.g. iron or aluminium ions, usually with dissolution of the electrode.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Chemical flocculation or precipitation	C02F 1/52 - C02F 1/56

C02F 1/465

by electroflotation

Definition statement

This place covers:

Electrochemical production of microbubbles for flotation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Water treatment by flotation	C02F 1/24

C02F 1/4672

{by electrooxydation}

Definition statement

This place covers:

Electrochemical production of oxidants (oxygen, ozone, hydroxyl radicals) at the anode for disinfection and oxidation of organic and inorganic substances.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Creating reactive oxygen species	C02F 2305/023

C02F 1/4676

{by electroreduction}

Definition statement

This place covers:

Electrochemical production of reducing agents (hydrogen), occurring at the cathode.

C02F 1/4678

{of metals}

Definition statement

This place covers:

Reduction of metals (electroplating) is included in this group.

C02F 1/469

by electrochemical separation, e.g. by electro-osmosis, electrodialysis, electrophoresis

Definition statement

This place covers:

All processes where an electrical field is the driving force for separating substances in water treatment.

C02F 1/4691

{Capacitive deionisation}

Definition statement

This place covers:

Removing ions from water by capacitive deionisation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Capacitors	H01G

C02F 1/4693

{electrodialysis}

Definition statement

This place covers:

Treatment of water, waste water, sewage by electrodialysis

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrodialysis processes in general	B01D 61/422

C02F 1/4695

{electrodeionisation}

Definition statement

This place covers:

Use of an electrodialysis cell wherein one or more of the compartments is filled with ion-exchange material.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrodeionisation processes in general	B01D 61/48

C02F 1/4698

{electro-osmosis}

Definition statement

This place covers:

Treatment of water, waste water, sewage by using the effect of electro-osmetic flow, i.e. the motion of liquid induced by an applied electrical potential across a porous material such as a capillary tube, membrane or microchannel.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electro-osmosis processes in general	B01D 61/427

C02F 1/48

with magnetic or electric fields (C02F 1/46 takes precedence)

Definition statement

This place covers:

Includes treatment with an electrical field (no electrical current in the water).

References

Limiting references

This place does not cover:

Water treatment by electrochemical methods	C02F 1/46

Informative references

Attention is drawn to the following places, which may be of interest for search:

Eliminating or preventing deposits, scale prevention	C02F 2303/22
Magnetic or electrostatic separation	B03C

C02F 1/481

{using permanent magnets}

Definition statement

This place covers:

Treatment with permanent magnets.

C02F 1/484

{using electromagnets}

Definition statement

This place covers:

Treatment using electromagnets.

C02F 1/487

{using high frequency electromagnetic fields, e.g. pulsed electromagnetic fields}

Definition statement

This place covers:

Treatment of water by using high frequency electromagnetic fields, e.g. for reducing scale in pipelines. Frequencies above 500 Hz are considered "high frequency" in the present context.

C02F 1/488

{for separation of magnetic materials, e.g. magnetic flocculation}

Definition statement

This place covers:

Water treatment processes where a magnetic field is used for separation (includes removing loaded sorbents from water).

C02F 1/50

by addition or application of a germicide or by oligodynamic treatment {(C02F 1/4606, C02F 1/467, C02F 1/76 take precedence)}

Definition statement

This place covers:

Treatment of water by addition of chemicals and compounds that adversely affect the ability of microorganisms, animals and plants to survive or reproduce.

References

Limiting references

This place does not cover:

Electrochemical methods for producing oligodynamic substances to disinfect the water	C02F 1/4606
Electrochemical disinfection	C02F 1/467
Oxidation with halogens or compounds of halogens	C02F 1/76

Informative references

Attention is drawn to the following places, which may be of interest for search:

Chemicals for disinfection in general	A01N
Methods or apparatus for disinfection in general	A61L

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- EN: disinfect, sterilize, sanitize
- DE: sterilisieren, desinfizieren,

- FR: stériliser, désinfecter, aseptiser

C02F 1/505

{by oligodynamic treatment}

Definition statement

This place covers:

Treatment of water by oligodynamic effect created by the addition of metallic ions of mercury, silver, copper, iron, lead, zinc, bismuth, gold, aluminium.

C02F 1/52

by flocculation or precipitation of suspended impurities {(C02F 1/463 takes precedence)}

Definition statement

This place covers:

Processes and related installations or apparatus for water treatment by causing coagulation or flocculation. Crystallisation processes are to be included when used for water treatment.

References

Limiting references

This place does not cover:

Electrocoagulation	C02F 1/463

Informative references

Attention is drawn to the following places, which may be of interest for search:

Flotation processes	C02F 1/24
Sedimentation	B0D21

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Coagulation	breaking of the electrostatic repulsion to allow growth of "nuclei".
Flocculation	growth of "flocs" mostly by addition of separated nuclei.

Synonyms and Keywords

In patent documents the following terms are often used:

EN	Coagulation, flocculation, precipitation, agglomeration, weighting, ballast
DE	Koagulation, Flockung, Fällung, Agglomeration, Beschwerung, ballast
FR	Coagulation, floculation, précipitation, agglomération, pondération, ballast, lesté.

C02F 1/5209

{Regulation methods for flocculation or precipitation}

Definition statement

This place covers:

Water treatment documents where the invention information relates to the regulation of coagulation and flocculation, or to the way the coagulated or precipitated matter is separated when no other subclass is provided.

References

Limiting references

This place does not cover:

Control for chemical and physical water treatment	C02F 1/008
Control for biological water treatment	C02F 3/006

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control parameters	C02F 2209/00 - C02F 2209/44
Control in general	G01N

Special rules of classification

Use the Indexing Codes under C02F 2209/00 - C02F 2209/445 if applicable.

C02F 1/5227

{Processes for facilitating the dissolution of solid flocculants in water}

Definition statement

This place covers:

This group concerns processes for improving the dissolution of additives before coagulation or flocculation is performed.

C02F 1/5236

{using inorganic agents}

Definition statement

This place covers:

Water treatment using inorganic coagulants or flocculants.

Special rules of classification

Inorganic polymers should not receive the C02F 1/56 class or Indexing symbol.

C02F 1/5245

{using basic salts, e.g. of aluminium and iron}

Definition statement

This place covers:

Treament of water by addition of inorganic salts with alkaline character.

C02F 1/5254

{using magnesium compounds and phosphoric acid for removing ammonia}

Definition statement

This place covers:

Treatment of water in the MAP process, i.e. magnesium ammonium phosphate precipitation process to remove ammonium nitrogen from waste water

C02F 1/5263

{using natural chemical compounds}

Definition statement

This place covers:

Treatment of water by flocculation or precipitation of suspended impurities with the use of natural compounds chemically unmodified and unformulated; e.g. chitosan, bacterial products.

Special rules of classification

Compounds unmodified and unformulated. Formulations comprising them should be classified in C02F 1/5272.

C02F 1/5272

{using specific organic precipitants}

Definition statement

This place covers:

Treatment of water by flocculation or precipitation of suspended impurities with the use of defined organic compounds and formulations for water treatment, e.g. formulations comprising lignin as coagulant.

C02F 1/5281

{Installations for water purification using chemical agents}

Definition statement

This place covers:

Apparatuses and installations comprising devices for water coagulation and precipitation.

C02F 1/529

{Processes or devices for preparing lime water}

Definition statement

This place covers:

Water treatment including the preparation of lime water.

C02F 1/54

using organic material

Definition statement

This place covers:

Water treatment by organic compounds including oligomers

Special rules of classification

Non macromolecular compounds. Classify polymers under C02F 1/56

C02F 1/542

{Phosphorus compounds}

Definition statement

This place covers:

Water treatment by organic compounds comprising phosphorus functional groups.

C02F 1/545

{Silicon compounds}

Definition statement

This place covers:

Water treatment by organic compounds comprising silicon functional groups.

C02F 1/547

{Tensides}

Definition statement

This place covers:

Water treatment by surface active organic compounds.

C02F 1/56

Macromolecular compounds

Definition statement

This place covers:

Water treatment with organic polymers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Inorganic polymeric compounds	C02F 1/5236, C02F 1/5245
Polymers in general	C08F

C02F 1/58

by removing specified dissolved compounds (using ion-exchange C02F 1/42; softening water C02F 5/00)

Definition statement

This place covers:

Documents related to removal of specific polluting or unwanted compounds from water.

References

Limiting references

This place does not cover:

Ion-exchange	C02F 1/42
Softening water	C02F 5/00

Special rules of classification

The classes C02F 1/58 - C02F 1/645 should only be used if no other class is applicable, for specifying the compound to be removed the Indexing symbols in the range C02F 2101/00 - C02F 2101/40 should be given. Classification of the method and the apparatus used in C02F is also mandatory.

C02F 1/66

by neutralisation; pH adjustment (for degassing C02F 1/20; using ion-exchange C02F 1/42; for flocculation or precipitation of suspended impurities C02F 1/52; for removing dissolved compounds C02F 1/58)

Definition statement

This place covers:

Processes directed to obtain or avoid a particular pH value or range in water treatment.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Degassing	C02F 1/20
Ion-exchange	C02F 1/42
Flocculation and precipitation	C02F 1/52
Removing dissolved compounds	C02F 1/58

Special rules of classification

Classify here when invention information concerns pH adjustment. In all other cases involving pH measurement or adjustment use symbols from C02F 1/66 or C02F 2209/06.

C02F 1/68

by addition of specified substances, e.g. trace elements, for ameliorating potable water (medicinal water A61K)

Definition statement

This place covers:

Adding specific substances, e.g. vitamins, trace elements or carbon dioxide to water.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Medicinal water	A61K

C02F 1/681

{by addition of solid materials for removing an oily layer on water}

Definition statement

This place covers:

Addition of adsorbents to the water for removing oil from water (remediating oil spills).

C02F 1/683

{by addition of complex-forming compounds}

Definition statement

This place covers:

Water treatment by addition of any molecules forming a complex with a target, regardless their other characteristics or use

Synonyms and Keywords

In patent documents the following terms are often used:

sequestering, complexing, scavenging, chelating

C02F 1/685

{Devices for dosing the additives}

Definition statement

This place covers:

Water treatment devices for adding chemicals to water in a controlled manner.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dosing of halogens in gaseous form	C02F 1/763

C02F 1/686

{Devices for dosing liquid additives}

Definition statement

This place covers:

Water treatment devices for adding chemicals in liquid form.

C02F 1/687

{Devices for dosing solid compounds}

Definition statement

This place covers:

Water treatment devices for adding chemicals in solid form to water in a controlled manner.

C02F 1/688

{Devices in which the water progressively dissolves a solid compound}

Definition statement

This place covers:

Water treatment devices for adding chemicals to water in a controlled manner exploiting the flow of water which gradually dissolves the product to be dosed. Includes the use of tablets or granular products enclosed in a device.

C02F 1/70

by reduction {(C02F 1/4676 takes precedence)}

Definition statement

This place covers:

Water treatment processes wherein pollutants are chemically reduced.

References

Limiting references

This place does not cover:

Electrochemical reduction processes	C02F 1/4676

C02F 1/705

{Reduction by metals}

Definition statement

This place covers:

Water treatment processes wherein pollutants are reduced by metallic compounds (in zero valence state).

C02F 1/72

by oxidation {(C02F 1/4672 takes precedence)}

Definition statement

This place covers:

Water treatment processes wherein pollutants are chemically oxidized.

References

Limiting references

This place does not cover:

Electrochemical oxidation processes	C02F 1/4672

C02F 1/722

{Oxidation by peroxides}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by peroxides.

C02F 1/725

{by catalytic oxidation}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by catalytic reactions. Includes the use of heterogeneous catalysts.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Fenton type oxidation	C02F 2305/026
Photocatalysts	C02F 2305/10

Special rules of classification

Photocatalysis is classified by combining C02F 1/32 or C02F 1/325 with C02F 1/725 and C02F 2305/10.

C02F 1/727

{using pure oxygen or oxygen rich gas}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by pure oxygen or oxygen enriched gas.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reactive oxygen species, singlet oxygen, OH radical	C02F 2305/023

C02F 1/74

with air (aeration of stretches of water C02F 7/00)

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by air.

References

Limiting references

This place does not cover:

Activated sludge processes using surface aeration	C02F 3/14
Activated sludge processes using diffusers	C02F 3/20
Aeration of stretches of water	C02F 7/00

C02F 1/76

with halogens or compounds of halogens {(C02F 1/4674 takes precedence)}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by halogens.

References

Limiting references

This place does not cover:

Electrochemical oxidation using halogens	C02F 1/4674

C02F 1/763

{Devices for the addition of such compounds in gaseous form}

Definition statement

This place covers:

Water treatment devices for adding halogens in gaseous form to water in a controlled manner.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dosing of substances in general	C02F 1/685

C02F 1/766

{by means of halogens other than chlorine or of halogenated compounds containing halogen other than chlorine}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by halogens explicitly different from chlorine, e.g. bromine.

C02F 1/78

with ozone {(C02F 1/4672 takes precedence)}

Definition statement

This place covers:

Water treatment processes wherein pollutants are oxidized by ozone.

References

Limiting references

This place does not cover:

Electrochemical oxidation using ozone	C02F 1/4672

C02F 3/00

Biological treatment of water, waste water, or sewage {(C02F 1/006 takes precedence)}

Definition statement

This place covers:

This group covers processes relating to biological water treatment. Devices are only classified in detail if there is no appropriate, more general place available and if they are clearly related to the water treatment aspect (not universally applicable).

References

Limiting references

This place does not cover:

Water distributors	C02F 1/006

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Aerobic	presence of dissolved oxygen
Anoxic	oxygen not present as dissolved oxygen but in the form of nitrate, sulfate, etc.
Anaerobic	absence of oxygen

C02F 3/005

{Combined electrochemical biological processes (aeration by electrolytically produced oxygen bubbles C02F 3/202)}

Definition statement

This place covers:

Processes in which electrochemical treatment and biological treatment are directly combined, e.g. the electrodes being covered by a biofilm or electrodes being directly immersed in an activated sludge tank.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrochemical water treatment in general	C02F 1/46 - C02F 1/4698
Electrochemical aeration	C02F 3/202

C02F 3/006

{Regulation methods for biological treatment}

Definition statement

This place covers:

To be used if the control of a biological water treatment process is the main invention.

References

Limiting references

This place does not cover:

Control of physical and chemical water treatment processes	C02F 1/008
Control of flocculation or precipitation processes	C02F 1/5209

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control parameters	C02F 2209/00 - C02F 2209/445
Control in general	G01N

Special rules of classification

Symbols for the specific controlled parameters should be used if possible (C02F 2209/00-C02F 2209/445).

C02F 3/02

Aerobic processes

Definition statement

This place covers:

All aerobic water treatment processes, which are not covered by the following more specific groups.

C02F 3/04

using trickle filters

Definition statement

This place covers:

Trickling filters, i.e. biofilm reactors where the filter medium is not submerged in the water to be treated.

C02F 3/043

{Devices for distributing water over trickle filters}

Definition statement

This place covers:

Devices for distributing the water over the filter such as rotating arms, sprinklers.

C02F 3/046

{Soil filtration}

Definition statement

This place covers:

Filters using the soil as filter medium, the filters can be arranged in a column above the ground.

C02F 3/06

using submerged filters

Definition statement

This place covers:

Biofilters where the filter medium is completely submerged in the water to be treated.

Special rules of classification

The filter medium (fillings, grids, packing elements) is classified in C02F 3/10 and subgroups.

C02F 3/08

using moving contact bodies

Definition statement

This place covers:

This class contains processes which use larger biofilm carriers which are in movement in the reactor. Rotating biological contactors are classified in C02F 3/082.

Special rules of classification

Not for smaller biofilm carriers such as used in fluidised bed reactors. These should be classified in C02F 3/085. The carrier could be classified in C02F 3/10 and subgroups.

C02F 3/10

Packings; Fillings; Grids (packing elements in general B01J 19/30, B01J 19/32)

Definition statement

This place covers:

Packings, fillings and grids used as biofilm carrier (shape, arrangement, material).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separating processes characterised by the packing of the sorbent material	B01D 15/206
Packed scrubbers	**B01D47/54**
Packing elements	B01J 19/30, B01J 19/32

C02F 3/101

{Arranged-type packing, e.g. stacks, arrays}

Definition statement

This place covers:

Biological treatment of water, waste water or sewage by aerobic processes using arrangement of a plurality of tanks, packings, grids, disks in stacks, arrays.

C02F 3/102

{Permeable membranes}

Definition statement

This place covers:

Membrane acting as support for the biofilm (not primarily for separation or aeration).

Special rules of classification

In case the membrane is used primarily for separating activated sludge or other substances from water C02F 3/1268, C02F 3/1273 and C02F 3/2853 should be used.

C02F 3/103

{Textile-type packing}

Definition statement

This place covers:

Textiles acting as biofilm support.

C02F 3/104

{Granular carriers}

Definition statement

This place covers:

Granular carrier used as a packing or filling.

C02F 3/105

{Characterized by the chemical composition}

Definition statement

This place covers:

Packing, filler or carrier defined by the chemical composition, e.g. carbon based, inorganic, gels, polymers, etc.

C02F 3/12

Activated sludge processes

Definition statement

This place covers:

This group comprises all aerobic processes in which the microorganisms are present in the form of an activated sludge, i.e. located on or in flocs which are suspended in the water to be treated.

C02F 3/121

{Multistep treatment}

Definition statement

This place covers:

The treatment steps are carried out in different treatment tanks.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sludge treatment	C02F 11/00

Special rules of classification

Treatment with several steps carried out in a single tank should be classified in C02F 3/1263 (SBR).

C02F 3/1215

{Combinations of activated sludge treatment with precipitation, flocculation, coagulation and separation of phosphates}

Definition statement

This place covers:

Phosphate removal by chemical precipitation in combination with activated sludge treatment, e.g. by dosing salts of iron or aluminium directly into the activated sludge tank.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Precipitation and flocculation	C02F 1/52 - C02F 1/56
Phosphorous compounds	C02F 2101/105

Special rules of classification

If precipitation and separation is performed as a separate treatment, e.g. after the clarifier, C02F 1/5245 should be used.

C02F 3/1221

{comprising treatment of the recirculated sludge}

Definition statement

This place covers:

Reduction of surplus sludge by heating, ultrasonic treatment, oxidation carried out in a side stream (e.g. return sludge stream).

C02F 3/1226

{comprising an absorbent material suspended in the mixed liquor}

Definition statement

This place covers:

Using adsorbents or inert solids in suspension in the activated sludge tank, e.g. activated carbon powder or zeolites. The aim of the use of the adsorbents is to adsorb harmful substances or to improve the settleablilty of the flocs rather than to act as a carrier material.

Special rules of classification

This class is not used for classifying fluidised bed reactors. These should be classified in C02F 3/085.

C02F 3/1242

{Small compact installations for use in homes, apartment blocks, hotels or the like}

Definition statement

This place covers:

Small wastewater treatment plants such as upgraded septic tanks and other compact devices for use in small communities, hotels or single houses.

C02F 3/1257

{Oxidation ditches}

Definition statement

This place covers:

Extended aeration with simultaneous sludge stabilisation.

C02F 3/1263

{Sequencing batch reactors [SBR]}

Definition statement

This place covers:

Sequencing batch reactors (SBR) for carrying out several treatment steps batchwise in a single tank.

C02F 3/1268

{Membrane bioreactor systems}

Definition statement

This place covers:

Membrane bioreactor systems for aerobic treatment of water.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Membrane processes	C02F 1/44
Electrodialysis	C02F 1/4693
Anaerobic membrane treatment	C02F 3/2853
General membrane treatment	B01D 61/00

Special rules of classification

If the membrane is used to further purify the wastewater after a clarifier or other liquid-solid separation C02F 1/44 should be used.

C02F 3/1273

{Submerged membrane bioreactors}

Definition statement

This place covers:

The membrane module is submerged in the activated sludge suspension (treatment tank).

C02F 3/1284

{Mixing devices}

Definition statement

This place covers:

Mixing devices for keeping the activated sludge suspended.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

General mixing	B01F

Special rules of classification

Mixing in the context of aeration: C02F 3/14, C02F 3/20 - C02F 3/26.

C02F 3/14

using surface aeration

Definition statement

This place covers:

Activated sludge treatment using mechanical surface aeration.

C02F 3/20

using diffusers

Definition statement

This place covers:

Aeration in activated sludge processes whereby diffusers are used for aeration.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dispersing gas in a liquid	B01F 23/23

C02F 3/22

using circulation pipes

Definition statement

This place covers:

Circulation of the activated sludge suspension is achieved by injecting air (mammoth-pump effect).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dispersing gas in a liquid	B01F 23/23

C02F 3/226

{"Deep shaft" processes}

Definition statement

This place covers:

Processes using very deep treatment tanks for improving oxygen transfer.

C02F 3/28

Anaerobic digestion processes

Definition statement

This place covers:

Anaerobic treatment of wastewater.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Anaerobic treatment of sludge	C02F 11/04

Special rules of classification

Combined aerobic and anaerobic processes (Bio-P removal, nitrogen removal) are classified in C02F 3/30 - C02F 3/308.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Aerobic	presence of dissolved oxygen
Anoxic	oxygen not present as dissolved oxygen but in the form of nitrate, sulfate, etc.
Anaerobic	absence of oxygen

C02F 3/2806

{Anaerobic processes using solid supports for microorganisms}

Definition statement

This place covers:

Anaerobic biofilm processes using reactors with fixed beds, fluidised beds or membranes as biomass carrier.

C02F 3/282

{using anaerobic sequencing batch reactors}

Definition statement

This place covers:

Biological treatment of water, waste water or sewage with several treatment sets batchwise in a single anaerobic tank

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Aerobic SBR processes	C02F 3/1263

C02F 3/2833

{using fluidized bed reactors}

Definition statement

This place covers:

Biological treatment of water, waste water or sewage by anaerobic digestion processes using a reactor with fluidized bed, the water passing through a granular solid material at high enough velocity to suspend the solid

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Aerobic fluidised bed processes	C02F 3/085
Chemical or physical processes and apparatus conducted in the presence of fluids and solid particles	B01J 8/00

C02F 3/2846

{using upflow anaerobic sludge blanket [UASB] reactors}

Definition statement

This place covers:

Reactors containing an anaerobic sludge bed, internal separators and gas collectors.

C02F 3/2853

{using anaerobic membrane bioreactors}

Definition statement

This place covers:

Membrane bioreactors for anaerobic processes.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Membrane processes	C02F 1/44
Electrodialysis	C02F 1/4693
Membrane bioreactor systems	C02F 3/1268
Submerged membrane bioreactors	C02F 3/1273
General membrane treatment	B01D 61/00

C02F 3/286

{including two or more steps}

Definition statement

This place covers:

Treatment with two or more anaerobic steps (no oxygen, nitrate, nitrite available).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Aerobic multi-step processes	C02F 3/121

C02F 3/2873

{with internal draft tube circulation}

Definition statement

This place covers:

Internal circulation is achieved by the gas bubbles created during the fermentation process (carbon dioxide, methane).

C02F 3/2886

{Two story combinations of the Imhoff tank type}

Definition statement

This place covers:

Biological treatment of water, waste water or sewage by anaerobic digestion processes with two story septic tank combination, i.e. Imhoff tank: simple reactors, precursors of the UASB reactors.

C02F 3/30

Aerobic and anaerobic processes

Definition statement

This place covers:

Processes which are characterised by a combination of anaerobic, anoxic and aerobic process steps, particularly for the biological removal of phosphorous and nitrogen.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Aerobic	presence of dissolved oxygen
Anoxic	oxygen not present as dissolved oxygen but in the form of nitrate, sulfate, etc.
Anaerobic	absence of oxygen

C02F 3/301

{Aerobic and anaerobic treatment in the same reactor}

Definition statement

This place covers:

No separate reactors used for the anaerobic, anoxic and aerobic treatment steps.

C02F 3/302

{Nitrification and denitrification treatment (C02F 3/308 takes precedence)}

Definition statement

This place covers:

Biological nitrogen removal by means of combined nitrification / denitrification treatment.

References

Limiting references

This place does not cover:

Biological phosphorous removal	C02F 3/308

C02F 3/303

{characterised by the nitrification}

Definition statement

This place covers:

Biological nitrification processes, i.e. biological processes for oxidising ammonia to nitrite and/or nitrate.

C02F 3/305

{characterised by the denitrification}

Definition statement

This place covers:

Biological denitrification processes, i.e. biological processes for reducing nitrite and nitrate to elementar nitrogen.

C02F 3/308

{Biological phosphorus removal}

Definition statement

This place covers:

Biological processes for reducing phosphorous.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Combination of chemical precipitation of phosphorous and activated sludge treatment	C02F 3/1215

C02F 3/327

{characterised by animals and plants}

Definition statement

This place covers:

Biological treatment of water, waste water or sewage by using any plants or any animals, e.g. constructed wetlands, worms, algae, protozoa

C02F 3/34

characterised by the microorganisms used

Definition statement

This place covers:

Biological treatment processes using special types of microorganisms (specific species or consortia which are identified and not commonly used).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Biotechnology, microorganisms in general	C12N

C02F 3/341

{Consortia of bacteria}

Definition statement

This place covers:

Groups of bacteria which are specified and achieve a synergistic effect.

C02F 3/342

{characterised by the enzymes used}

Definition statement

This place covers:

Specific enzymes produced by microorganisms. Also for the use of the pure enzymes.

C02F 3/348

{characterised by the way or the form in which the microorganisms are added or dosed}

Definition statement

This place covers:

Dosing of the bacteria in a specific form, e.g. lyophilised, as a powder, together with nutrients) or dosing at a specific location (e.g. in a sidestream).

C02F 5/00

Softening water; Preventing scale; Adding scale preventatives or scale removers to water, e.g. adding sequestering agents (softening using ion-exchange C02F 1/42)

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Softening using ion-exchange	C02F 1/42
Detergents	C11D

C02F 5/02

Softening water by precipitation of the hardness

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein hardness is eliminated by precipitation before it may result in adverse effects.

C02F 5/04

using phosphates (C02F 5/06 takes precedence)

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein hardness is eliminated by precipitation using phosphates before it may result in adverse effects.

References

Limiting references

This place does not cover:

Softening using calcium compounds	C02F 5/06

C02F 5/06

using calcium compounds

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein hardness is eliminated by precipitation using calcium compounds before it may result in adverse effects.

C02F 5/08

Treatment of water with complexing chemicals or other solubilising agents for softening, scale prevention or scale removal, e.g. adding sequestering agents

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Use of complexing agents	C02F 1/683

C02F 5/083

{Mineral agents}

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein mineral agents are used.

C02F 5/086

{Condensed phosphates}

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein condensed phosphates are used.

C02F 5/10

using organic substances

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances not provided for in the following groups are used.

C02F 5/105

{combined with inorganic substances}

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances not provided for in the following groups are used in combination with inorganic substances.

C02F 5/12

containing nitrogen (C02F 5/14 takes precedence)

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances comprising nitrogen are used.

References

Limiting references

This place does not cover:

Softening using organic substances containing phosphorous	C02F 5/14

C02F 5/125

{combined with inorganic substances}

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances comprising nitrogen are used in combination with inorganic substances.

C02F 5/14

containing phosphorus

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances comprising phosphorus are used.

C02F 5/145

{combined with inorganic substances}

Definition statement

This place covers:

This group covers processes and apparatus relating to chemical water treatment to prevent clogging or the presence of hard deposits on apparatus in contact with water, wherein the adverse effects of hardness are avoided by preventing it to form scale or by removing existing scale wherein organic substances comprising phosphorus are used in combination with inorganic substances.

C02F 7/00

Aeration of stretches of water

Definition statement

This place covers:

Aeration of stretches of natural waters, like rivers, lakes or ponds. Devices for such use such as boats or fixed installations.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dispersing gas in a liquid	B01F 23/23

Special rules of classification

Treatment other than aeration should be classified using the relevant classes in combination with C02F 2103/007.

C02F 9/00

Multistage treatment of water, waste water or sewage

Definition statement

This place covers:

Treatment operations, carried out in a defined order in three or more different treatment stages, each stage occurring in a separate location, e.g. apparatus, reactor or compartment.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Activated sludge multistep treatment	C02F 3/121
Anaerobic multistep treatment	C02F 3/286
Multistage treatment	C02F 2301/08

Special rules of classification

Group C02F 9/00 does not cover treatments, where the essential characteristic resides in an individual step of the treatment, which treatments are covered by groups C02F 1/00 - C02F 7/00. Any individual step of a multistep treatment which is considered to represent information of interest for search, may also be classified in one or more of groups C02F 1/00 - C02F 1/56 or C02F 1/66 - C02F 7/00 as "additional information".

C02F 9/20

Portable or detachable small-scale multistage treatment devices, e.g. point of use or laboratory water purification systems

Definition statement

This place covers:

Processes incorporating several treatment steps in a compact, transportable device in the size of a small cupboard, e.g. filter units on wheels, laboratory devices for ultrapure water production or dispensers comprising advanced water treatment.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Small transportable filters	C02F 1/002
Household type filters	C02F 1/003

C02F 11/00

Treatment of sludge; Devices therefor

Definition statement

This place covers:

In the present context sludge is defined as an aqueous suspension of solids resulting from water treatment processes and having a solids content of more than 0.2% (2 g/L).

C02F 11/002

{Sludge treatment using liquids immiscible with water}

Definition statement

This place covers:

Extraction of contaminants from sludge.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Extraction for soil reclamation	B09C 1/02

C02F 11/004

{Sludge detoxification}

Definition statement

This place covers:

Immobilisation or removal of toxic compounds.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Chemical means for combating harmful chemical agents	A62D 3/00
Chemical reclamation of contaminated soil	B09C 1/08

C02F 11/008

{Sludge treatment by fixation or solidification}

Definition statement

This place covers:

Solidification of the sludge, e.g. by vitrification.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reclamation of contaminated soil by vitrification	B09C 1/067

C02F 11/02

Biological treatment

Definition statement

This place covers:

Aerobic and anaerobic biological sludge treatment.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Biological reclamation of contaminated soils	B09C 1/10

C02F 11/04

Anaerobic treatment; Production of methane by such processes

Definition statement

This place covers:

Comprises all anaerobic processes for sludge treatment (mostly carried out in digesters).

C02F 11/06

by oxidation (incinerators for burning waste liquors, e.g. sulfite liquor from paper-making plant F23G 7/04)

Definition statement

This place covers:

Oxidation of sludge including thermal oxidation such as incineration.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Incinerators for burning sludge from water treatment installations	F23G 7/001
Incineration of waste liquors	F23G 7/04

C02F 11/08

Wet air oxidation

Definition statement

This place covers:

Wet air oxidation is defined as oxidation under elevated temperatures and pressure (p >> 100 bar, T >> 100°C).

Special rules of classification

Exceptionally, treatment of wastewater can also be classified here if this is the most appropriate class.

C02F 11/086

{in the supercritical state}

Definition statement

This place covers:

The supercritical state for water is defined as p > 221 bar, T > 374°C.

C02F 11/10

by pyrolysis

Definition statement

This place covers:

Thermal treatment of sludge under reducing conditions (absence of oxygen or other oxidants).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Destructive distillation of solid carbonaceous materials for production of gas, coke, tar	C10B

C02F 11/12

by de-watering, drying or thickening

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Drying solid materials or objects by removing liquid therefrom	F26B

Special rules of classification

Thermal drying is classified in the head group, if the sludge is heated for other purposes, C02F 11/18 and subgroups should be used.

C02F 11/127

by centrifugation

Definition statement

This place covers:

Extraction of water from sludge using centrifuges, hydrocyclones or other hydrodynamic separators using centrifugal forces.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Centrifugal separation of water, waste water or sewage	C02F 1/38
Centrifugation of aqueous suspensions	C02F 1/385
Centrifuges	B04B
Apparatus using free vortex flow	B04C

C02F 11/128

using batch processes

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Batch process	A batch process is a process in which the feed is not introduced in a continuous stream, but as a series of discrete charges, each of which may be processed over one or more states of treatment.

C02F 11/13

by heating

Definition statement

This place covers:

Drying of sludge by heating includes direct or indirect heating. The actual purpose of treatment is to use heat to dry the sludge.

Special rules of classification

Thermal drying is classified in this group. If the sludge is heated for conditioning, then classification is made in group C02F 11/18 and subgroups thereof or if the sludge is treated by pyrolysis, then classification is made in group C02F 11/10. This group should be used for cases where drying by heating is the actual purpose of the treatment. If heating is a side-effect of treatment, classification is made in other relevant places, e.g. C02F 11/15.

C02F 11/14

with addition of chemical agents

Definition statement

This place covers:

De-watering, drying or thickening of sludge by the addition of chemical agents, e.g. flocculants added during or before the dewatering process.

Special rules of classification

In groups C02F 11/14 - C02F 11/148, if inorganic and organic substances are added independently in different processes steps, the group C02F 11/143 or subgroup thereof, along with C02F 11/147 should be used. If inorganic and organic substances are added in the same treatment step, the group C02F 11/148 should be used.

C02F 11/148

Combined use of inorganic and organic substances, being added in the same treatment step

Special rules of classification

Addition of organic and inorganic compounds having a synergistic effect to the same treatment step. Coated compounds comprising inorganic and organic functions are classified in this group.

C02F 11/15

by treatment with electric, magnetic or electromagnetic fields; by treatment with ultrasonic waves (for the purpose of heating C02F 11/131)

Definition statement

This place covers:

De-watering, drying or thickening of sludge by treatment with electric, magnetic or electromagnetic fields; or with ultrasonic waves, e.g. by treatment with electromagnetic waves or ultrasonic waves in order to disrupt or lyse cellular material, or break cell walls of cells in the sludge, or transform bound water in the sludge into free water.

References

Limiting references

This place does not cover:

Using electromagnetic or ultrasonic waves	C02F 11/131

C02F 11/16

using drying or composting beds

Definition statement

This place covers:

De-watering or drying of sludge with drying or composting beds, e.g. several drainage layers for the separation of the solid from the liquid fraction of sludge.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Composting of household refuse	C05F 9/04

C02F 11/18

by thermal conditioning (by pyrolysis C02F 11/10)

Definition statement

This place covers:

Thermal sludge conditioning other than drying.

References

Limiting references

This place does not cover:

Sludge treatment by pyrolysis	C02F 11/10

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermal conditioning of soil	B09C 1/06

Special rules of classification

Drying, dewatering of sludge is classified in C02F 11/12.

C02F 11/185

{by pasteurisation}

Definition statement

This place covers:

Heating of sludge above 60°C for the purpose of disinfection.

C02F 2101/00

Nature of the contaminant

Definition statement

This place covers:

The nature of the contaminant, i.e. chemical composition or class of chemical is specified here.

C02F 2103/00

Nature of the water, waste water, sewage or sludge to be treated

Definition statement

This place covers:

The nature of the water to be treated such as wastewater from specific origin or pure water for specific applications.

C02F 2201/00

Apparatus for treatment of water, waste water or sewage

Definition statement

This place covers:

Constructional details related to the apparatus used for water treatment.

C02F 2201/008

Mobile apparatus and plants, e.g. mounted on a vehicle

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mobile apparatus and plants, e.g. mounted on a vehicle, for the biological treatment of water, wastewater or sewage	C02F 2203/008

C02F 2201/009

Apparatus with independent power supply, e.g. solar cells, windpower or fuel cells

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrolysis apparatus with special power supply, e.g. solar energy or batteries	C02F 2201/46165

C02F 2201/4619

Supplying gas to the electrolyte

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Gas diffusion electrodes for water treatment by electrolysis	C02F 2001/46166

C02F 2203/00

Apparatus and plants for the biological treatment of water, waste water or sewage

Definition statement

This place covers:

Constructional details related to the apparatus used for biological water treatment.

C02F 2209/00

Controlling or monitoring parameters in water treatment

Definition statement

This place covers:

Controlling or monitoring parameters in water treatment. Details relating to the measuring device and controller used for controlling or monitoring the parameters.

C02F 2301/00

General aspects of water treatment

Definition statement

This place covers:

General aspects of water treatment, such as fluid flow conditions, e.g. flow arrangements, pressure conditions.

C02F 2303/00

Specific treatment goals

Definition statement

This place covers:

Specific treatment goals, e.g. disinfection, corrosion inhibition, removal of agents after treatment.

C02F 2305/00

Use of specific compounds during water treatment

Definition statement

This place covers:

Use of specific compounds in water treatment, e.g. surfactants, nutrients, nanoparticles.

C02F 2307/00

Location of water treatment or water treatment device

Definition statement

This place covers:

Location of water treatment or water treatment device, e.g. as part of a bottle, pitcher or mounted on a faucet.