

C25B

ELECTROLYTIC OR ELECTROPHORETIC PROCESSES FOR THE PRODUCTION OF COMPOUNDS OR NON-METALS; APPARATUS THEREFOR (anodic or cathodic protection [C23F 13/00](#); single-crystal growth [C30B](#))

Definition statement

This place covers:

Electrolytic production of inorganic compounds, of non-metals and of organic compounds

Electrogenerative processes, i.e. processes for producing compounds in which simultaneously electricity is generated

Electrophoretic production of compounds or non-metals

Cells or assemblies of cells, constructional parts of cells, assemblies of constructional parts, e.g. electrode-diaphragm assemblies, as long as they are used in or suitable for one of the above production methods

Electrodes, manufacture thereof not otherwise provided for, as long as they are used in or suitable for one of the above production methods

Diaphragms, spacing elements, as long as they are used in or suitable for one of the above production methods

Operating or servicing of cells, as long as this operating or servicing is part of one of the above production methods

Relationships with other classification places

The compounds of particular interest are also classified in the relevant classes, [C01](#) (inorganic chemistry), [C07](#) (organic chemistry), [C07F](#) (organo-metallic compounds), and [C08](#) (polymer chemistry).

Multi-step processes for surface treatment of metallic material involving at least one process provided for in class [C23](#) and at least one process provided for in class [C25](#) are classified in group [C23F 17/00](#).

Reversible fuel cells which act as electrolyzer, are classified in [H01M 8/18](#).

Production of dissolved species for purposes of water or waste water treatment is classified in [C02F 1/46](#) and subgroups.

The electrolytic or electrophoretic purification of materials is classified according to the nature of the liquid-material, e.g. water, electrolytes, processes solutions in the relevant places, e.g. [A01K 63/00](#), [C02F 1/46](#), [C25B 15/08](#), [C25D 21/16](#), [C25F 7/02](#)

Cold fusion method as such is classified in [G21B 3/00](#) but electrodes and cells for the cold fusion are further classified in [C25B](#).

An electrothermal treatment of ores or metallurgical products for obtaining metals or alloys is classified in [C22B 4/00](#) and does not involve an electrolytic process.

Alloys as such, prepared by electrolytic methods are classified in [C22C](#).

References

Limiting references

This place does not cover:

Treating of water, waste water etc. by electrochemical methods, cells and electrodes therefor	C02F 1/46
Separation or purification of peptides, e.g. of proteins, by electrophoresis	C07K 1/26
Inhibiting corrosion of metals by anodic or cathodic protection	C23F 13/00
Single crystal growth	C30B

Informative references

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

Methods or apparatus for disinfecting or sterilising	A61L 2/03 , A61L 2/035
Making harmful compounds harmless by subjecting to electrochemical processes, electro dialysis	A62D 3/11
Electrodialysis, electroosmosis	B01D13/02 , B01D 61/42
Gas separation, using electrochemical methods	B01D 53/326
Separation, other than separation of solids, by electrophoresis	B01D 61/42
Catalysts	B01J
Processes employing the direct application of electric energy (i.e. electrochemical processes); Apparatus therefor	B01J 19/08
Separation of hydrogen or hydrogen containing gases from gaseous mixtures	C01B 3/50
Carbon masses	C01B 32/00 , C04B 35/52
Electrochemical sensors	G01N 27/00
Cold fusion, the method as such (however, cells and electrodes are classified in C25B)	G21B 3/00
Electrochemical processes or apparatus for generating energy	H01M
Semiconducting devices, photovoltaic cells as conversion devices, sources of energy (in particular for water electrolysis)	H02S 40/44

Special rules of classification

Classification in [C25B](#) is always according to the last place priority rule.

[C25B](#) concerns the production of compounds or non-metals, which includes separating the said products as such, or at least the possibility to separate them.

Illustrative example:

- 1) Electrolysis of sodium chloride developing chlorine gas which is collected as a product is covered by [C25B](#).
- 2) Electrolysis of water comprising sodium chloride which forms chlorine / hypochlorite in solution for disinfection is not covered by [C25B](#).

As a consequence, the electrolytic cells and parts of cells in case 1) are covered by [C25B](#) as well, while the electrolytic cells and parts of cells in case 2) are not.

There are of course cases which are covered by [C25B](#) and another subclass or subgroup.

Glossary of terms

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

Monopolar electrode	Electrode which is connected to a power source and thus acts either as an anode or as a cathode
Bipolar electrode	Field electrode, i.e. an electrode which is positioned in the electrical field between a monopolar anode and a monopolar cathode without being itself connected to a power source. Through the action of the electrical field the side of the bipolar electrode which faces the cathode acts as an anode and the other side which faces the anode acts as a cathode

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

Diaphragm	Membrane
MEA	Membrane Electrode Assembly
DSE	Dimensionally Stable Electrode
DSA	Dimensionally Stable Anode
GDE	Gas Diffusion Electrode

C25B 1/00

Electrolytic production of inorganic compounds or non-metals

Definition statement

This place covers:

Electrolytic production of all those inorganic compounds or non metals which do not fall within the scope of one of the subgroups of [C25B 1/00](#), e.g. electrolytic preparation of ammonia.

Specific compounds like hydrogen, oxygen, silicon, ozone, alkali metal compounds, inorganic acids, per-compounds, etc are classified in the subgroups of [C25B 1/00](#).

C25B 1/003

{by photo-electrolysis with or without external current source}

Definition statement

This place covers:

Photo-electrolysis process only.

References

Limiting references

This place does not cover:

Photocatalysts	B01J 35/004
Light-sensitive devices, e.g. panels or arrays of photoelectrochemical cells	H01G 9/20
Photoelectrochemical cells	H01M 14/005

Special rules of classification

Distinction is to be done between a photoelectrolytic process or cell with two electrodes (even without externally applied voltage), and a photolytic process or cell with a single electrode where the process is catalyzed by a substance producing photoelectrons.

C25B 1/02

of hydrogen or oxygen

Definition statement

This place covers:

Electrolytic production of hydrogen or oxygen.

References

Limiting references

This place does not cover:

Separation of hydrogen or hydrogen containing gases from gaseous mixtures, e.g. hydrogen electrochemical pumps	C01B 3/50
Engines or plants characterised by use of other specific gases, e.g. oxyhydrogen (even when produced by an electrolytic cell)	F02B 43/10
Engine-pertinent apparatus for supplying combustion engine with gas, e.g. hydrogen or oxygen, the apparatus having means for preparing such gas (even when the means is an electrolytic cell)	F02M 25/12

Special rules of classification

Only details of the electrolytic production process present in the document are classified.

A simple reference to the presence of an electrolytic cell, or hydrogen produced by electrolysis, does not justify classification in [C25B](#).

C25B 1/04

by electrolysis of water

Definition statement

This place covers:

Electrolysis of water with production of hydrogen and oxygen from water at the anode and cathode even when this water comprises an electroconductive additive, such as a hydroxide or an acid.

Steam electrolysis is also covered.

C25B 1/10

in diaphragm cells

Definition statement

This place covers:

Electrolytic production of hydrogen or oxygen by electrolysis of water using diaphragm cells, the diaphragm being a barrier between electrodes, e.g. membrane, separator.

References**Informative references**

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

Reversible fuel cells	H01M 8/18
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C25B 1/12**in pressure cells****Definition statement**

This place covers:

Electrolytic production of hydrogen or oxygen by electrolysis of water using cells under pressure, e.g. high pressure water electrolysis system

References**Informative references**

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

Reversible fuel cells	H01M 8/18
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C25B 1/13**of ozone****References****Limiting references**

This place does not cover:

Disinfecting / sterilising using electric current or electrolysis	A02L/03, A02L/03E
Disinfecting / sterilising with "dental water"	A61C 1/0076
Production of dissolved species for treating of water, waste water etc. by electrochemical methods, cells and electrodes therefor	C02F 1/467

C25B 1/24**of halogens or compounds thereof****References****Limiting references**

This place does not cover:

Production of dissolved species for treating of water, waste water etc. by electrochemical methods, cells and electrodes therefor	C02F 1/467
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C25B 1/28

of per-compounds

Definition statement

This place covers:

Electrolytic production of per-compounds (per-compounds being defined in the glossary of terms).

References

Limiting references

This place does not cover:

Disinfecting / sterilising using electric current or electrolysis	A02L/03 , A02L/03E
Disinfecting / sterilising with "dental water"	A61C 1/0076
Treatment of water and waste water by electrochemical disinfection	C02F 1/4672

Glossary of terms

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

per-compounds	compounds with oxyanions. When an element forms 4 oxyanions, the hypo and per prefixes are used in conjunction with -ite or -ate suffixes, "per" being used to indicate more oxygen
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C25B 3/00

Electrolytic production of organic compounds

Definition statement

This place covers:

Production of organic compounds by an electrolytic reaction.

References

Limiting references

This place does not cover:

Electrolytic polymerization	C08G 61/00
Production of hydrocarbons from hydrogen (even when produced by an electrolytic cell) and carbon monoxide	C10G 2/30
Production of hydrocarbons from hydrogen (even when produced by an electrolytic cell) and carbon dioxide	C10G 2/50
Electrocoating a substrate with an organic material	C25D 9/02
Engines or plants characterised by use of other specific gases, e.g. oxyhydrogen (even when produced by an electrolytic cell)	F02B 43/10
Engine-pertinent apparatus for supplying combustion engine with gas, e.g. hydrocarbon gas, the apparatus having means for preparing such gas (even when the means is an electrolytic cell)	F02M 25/12

Glossary of terms

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

Oxidation and reduction	oxidation or reduction directly at the organic molecule
Coupling	reaction without oxidation or reduction directly at the organic molecule, e.g. a Kolbe reaction

C25B 5/00

Electrogenerative processes, i.e. processes for producing compounds in which simultaneously electricity is generated

Definition statement

This place covers:

Processes when electricity is generated while a compound is produced other than water, e.g. hydrogen peroxide

C25B 7/00

Electrophoretic production of compounds or non-metals (separation or purification of peptides, e.g. of proteins, by electrophoresis [C07K 1/26](#))

Definition statement

This place covers:

Production of compounds or non-metals where the process includes a step of reduction or oxidation of the material from which the compound or non-metals is formed, e.g. formation of a polymer.

References

Limiting references

This place does not cover:

Separation or purification of peptides, e.g. of proteins, by electrophoresis	C07K 1/26
Electrocoating, when the coating is only deposited and not produced by an electrolytic reaction	C25D 13/04

C25B 9/00

Cells or assemblies of cells; Constructional parts of cells; Assemblies of constructional parts, e.g. electrode-diaphragm assemblies

Definition statement

This place covers:

Cells, assembly of cells, assemblies of constructional parts used for the electrolytic production processes which are defined in other subgroups of [C25B](#).

References

Limiting references

This place does not cover:

Devices for the electrolytic treatment of water or sewage	C02F 1/46104
The combination of an electrolytic cell with a combustor to improve combustion.	F02B 43/10

Informative references

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

Electrolytic cells for electroplating	C25D 17/00
Reversible fuel cells	H01M 8/18

Glossary of terms

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

Grouping of such cells into batteries	arranging plural cells such that they form a pile (not to form a storage battery)
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C25B 9/04

Devices for current supply (electrical connections in general [H01R](#)); Electrode connections; Electric inter-cell connections

Definition statement

This place covers:

Devices and connections which are monopolar.

References

Limiting references

This place does not cover:

Bipolar plates for electrolytic cells	C25B 9/203
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Informative references

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

Electrical connections in fuel cells or storage batteries	H01M 8/02 , H01M 2/20
Electrical connections in general	H01R

C25B 9/06**Cells comprising dimensionally-stable non-movable electrodes; Assemblies of constructional parts thereof****Definition statement**

This place covers:

Cells and their construction comprising electrodes that are not sacrificial.

Glossary of terms

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

Dimensionally-stable electrode	an electrode that is not intended to dissolve upon electrolysis (not a sacrificial electrode)
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C25B 9/063**{including bipolar electrodes}****Definition statement**

This place covers:

Cells and their construction comprising bipolar electrodes that are not sacrificial

Glossary of terms

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

Bipolar electrode	Field electrode, i.e. an electrode which is positioned in the electrical field between a monopolar anode and a monopolar cathode without being itself connected to a power source. Through the action of the electrical field the side of the bipolar electrode which faces the cathode acts as an anode and the other side which faces the anode acts as a cathode
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C25B 9/10**including an ion-exchange membrane in or on which electrode material is embedded****Definition statement**

This place covers:

Membrane-electrode assemblies (MEA).

C25B 9/12

Cells or assemblies of cells comprising at least one movable electrode, e.g. rotary electrodes; Assemblies of constructional parts thereof

Definition statement

This place covers:

Movable electrode, be it electrodes that move in space or electrodes that move around an axis, such as rotary electrodes.

C25B 9/16

Cells or assemblies of cells comprising at least one electrode made of particles; Assemblies of constructional parts thereof

Definition statement

This place covers:

Electrodes comprising a bed of electrically conductive particles which are arranged such that they at least temporarily touch each other and an electrical conductor (a net, a plate etc.) which provides connection to a power source.

References**Limiting references**

This place does not cover:

Electrodes in particulate form for treatment of water or waste water or sewage	C02F 1/46114
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C25B 9/162

{comprising fluidised bed electrodes}

Definition statement

This place covers:

Electrodes that comprise a bed of electrically conductive particles which are in motion, such that they only temporarily touch each other and the electrical conductor.

C25B 9/166

{comprising static bed electrodes}

Definition statement

This place covers:

Electrodes that comprise a bed of electrically conductive particles which rest, such that they continually touch each other and the electrical conductor.

Synonyms and Keywords

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

- " fixed bed electrode " and " static bed electrode "

C25B 9/18

Assemblies comprising a plurality of cells ({[C25B 9/005](#) takes precedence}; **assemblies of cells with movable electrodes** [C25B 9/12](#); **assemblies of cells with electrodes made of particles** [C25B 9/16](#))

References

Limiting references

This place does not cover:

Assemblies of cells with movable electrodes	C25B 9/12
Assemblies of cells with electrodes made of particles	C25B 9/16

Special rules of classification

[C25B 9/005](#) takes precedence.

C25B 9/20

of the filter-press type

Definition statement

This place covers:

Stack of a plurality of cells in series, as in a filter press, e.g. electrodes are arranged vertically in a stack of vertical frames defining the electrolysis chamber(s)

Glossary of terms

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

Filter-press type cells	generally consist of a stack of vertical frames which define electrolysis chambers in which electrodes are arranged vertically
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C25B 9/203

{with bipolar electrodes}

Definition statement

This place covers:

Stacks of a plurality of cells with bipolar electrodes, as in a filter press.

Glossary of terms

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

Bipolar electrode	field electrode, i.e. an electrode which is positioned in the electrical field between a monopolar anode and a monopolar cathode without being itself connected to a power source. Through the action of the electrical field the side of the bipolar electrode which faces the cathode acts as an anode and the other side which faces the anode acts as a cathode
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C25B 11/00

Electrodes; Manufacture thereof not otherwise provided for

Definition statement

This place covers:

Electrodes used for the electrolytic or electrochemical production processes which are defined somewhere in [C25B](#).

References

Limiting references

This place does not cover:

Electrodes for treatment of water or sewage	C02F 1/46109
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Informative references

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

Photoelectrodes	B01J 35/004
Electrodes for electrowinning	C25C 7/02
Electrodes for electroplating	C25D 17/10
Electrodes for storage batteries	H01M 4/00
Electrodes for fuel cells	H01M 4/86

Special rules of classification

The electrodes corresponding to IPC [C25B11/06](#) - [C25B11/10](#) are classified in [C25B 11/04](#).

C25B 11/02

characterised by shape or form

Definition statement

This place covers:

Special forms of electrodes, such a Venetian blinds, expandable electrodes.

C25B 11/03

perforated or foraminous

Definition statement

This place covers:

Perforated or foraminous structures, e.g. expandable metal.

C25B 11/035**{Porous electrodes}****References****Limiting references***This place does not cover:*

Gas diffusion electrodes (GDE)	H01M 4/86 , H01M 8/02
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C25B 11/0405**{of electrodes having a substrate and a coating}****Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

Substrate	the bulk of the electrode, also including inevitable oxide layers which are present in particular on the valve metals
Coating	all layers on the substrate, i.e. not only the electrocatalytic coating (which is usually on top and in contact with the electrolyte), but also intermediate layers (also those oxide layers which are not inevitable but formed on purpose on the substrate)

C25B 11/12**Electrodes based on carbon (carbon masses in general [C04B 35/52](#))
{([C25B 11/0405](#) takes precedence)}****Definition statement***This place covers:*

Electrodes which have a carbon-based structure, e.g. carbon cloth.

Diamond electrodes which are completely made of diamond, i.e. which are not a substrate with a diamond coating, are also covered

References**Limiting references***This place does not cover:*

Electrodes which comprise carbon either as the substrate or a coating	C25B 11/0405
Diamond electrodes which comprise a diamond coating on a substrate	C25B 11/0447
Diamond electrodes used in treatment of water, waste water etc.	C02F 1/46109 , C02F 2001/46133

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

Carbon masses	C04B 35/52
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C25B 11/16

Electrodes based on manganese dioxide or lead dioxide {(C25B 11/0405 takes precedence)}

References**Limiting references**

This place does not cover:

Electrodes which comprise manganese dioxide or lead dioxide either as the substrate or a coating	C25B 11/0405
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C25B 11/18

Mercury or amalgam electrodes {(C25B 11/0405 takes precedence)}

References**Limiting references**

This place does not cover:

Electrodes which comprise mercury or amalgam either as the substrate or a coating	C25B 11/0405
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C25B 13/00

Diaphragms; Spacing elements

Definition statement

This place covers:

Structural material used to separate the electrodes of an electrolytic or electrophoretic cell, thereby forming two or more compartments, allowing the flow of an electrolytic solution or the migration of particular ions, but preventing the complete intermingling of the two solutions or the migration of all kinds of ions.

References**Informative references**

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

Membranes for separation processes	B01D 67/00- B01D 71/00
Membranes for electrolytic production, recovery or refining of metals or alloys	C25C 7/04
Membranes for fuel cells	H01M 8/0289

Synonyms and Keywords

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

- "diaphragm " and " membrane"

C25B 13/04

characterised by the material

References

Informative references

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

Solid state electrolytes for fuel cells, characterized by the electrolyte material	H01M 8/1016 , H01M 2300/0088 , H01M 2300/0065
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C25B 13/08

based on organic materials

Relationships with other classification places

Organic polymer membranes when the emphasis is on the polymer electrolyte compound are classified in [C08J 5/22](#), and in [H01M 8/1018](#) or [H01M 2300/0082](#) if the polymer electrolyte compound is used in fuel cells.

C25B 15/00

Operating or servicing of cells

Definition statement

This place covers:

Operating or servicing of cells when generally applied to a cell or in a process of [C25B](#).

When related to a specific process only, the operating or servicing is classified with the process, e.g. decomposition of amalgam which is process-related and therefore classified in [C25B 1/42](#).

C25B 15/02

Process control or regulation (controlling or regulating in general [G05](#))

References

Informative references

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

Controlling or regulating in general	G05
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C25B 15/04

Regulation of the inter-electrode distance (electro-machining [B23P](#))

Relationships with other classification places

Regulation of the inter-electrode distance in electrochemical machining, electrolytic grinding and electro-erosion is classified in [B23H](#).