

SECTION C — CHEMISTRY; METALLURGY

C25 ELECTROLYTIC OR ELECTROPHORETIC PROCESSES; APPARATUS THEREFOR

Note(s)

1. Electrolytic or electrophoretic processes or apparatus or operational features are classified
 - i. in the groups for the compounds or articles produced, and
 - ii. in the groups which cover the apparatus or operational features.
2. The electrolytic or electrophoretic purification of materials is classified according to the nature of the liquid in the relevant places, e.g. A01K 63/00, C02F 1/46, C25B 15/08, C25D 21/16, C25F 7/02.

Class index

ELECTROLYTIC PRODUCTION

Inorganic compounds, non-metals.....	C25B 1/00
Organic compounds.....	C25B 3/00
Non-metallic coatings.....	C25D 9/00
Metals.....	C25C 1/00, C25C 3/00, C25C 5/00
Metallic coatings.....	C25D 3/00, C25D 5/00, C25D 7/00

ELECTROLYTIC PRODUCTION OF COMPOUNDS OR NON-METALS WITH SIMULTANEOUS

PRODUCTION OF ELECTRICITY..... C25B 5/00

ELECTROPHORETIC PRODUCTION

Compounds, non-metals.....	C25B 7/00
Coatings.....	C25D 13/00

ELECTROFORMING..... C25D 1/00

ANODISING, PHOSPHATISING, CHROMATISING..... C25D 11/00

COATINGS WITH EMBEDDED MATERIAL..... C25D 15/00

ELECTROLYTIC CLEANING, PICKLING, OR REMOVAL OF METALLIC COATINGS..... C25F 1/00, C25F 5/00

ELECTROLYTIC ETCHING OR POLISHING..... C25F 3/00

CELLS, ELECTRODES, DIAPHRAGMS

Production of compounds or non-metals.....	C25B 9/00, C25B 11/00, C25B 13/00, C25B 15/00
Production of metals.....	C25C 7/00
Production of coatings.....	C25D 17/00, C25D 19/00, C25D 21/00
Cleaning, pickling, surface treatment.....	C25F 7/00

C25B ELECTROLYTIC OR ELECTROPHORETIC PROCESSES FOR THE PRODUCTION OF COMPOUNDS OR NON-METALS; APPARATUS THEREFOR (anodic or cathodic protection C23F; single-crystal growth C30B) [2]

Note(s)

1. In this subclass, in the absence of an indication to the contrary, classification is made in the last appropriate place.
2. Compounds of particular interest are also classified in the relevant classes, e.g. in C01, C07.

1/00 Electrolytic production of inorganic compounds or non-metals [2]	1/20 • • Hydroxides [2]
1/02 • of hydrogen or oxygen [2]	1/21 • of manganese oxides [7]
1/04 • • by electrolysis of water [2]	1/22 • of inorganic acids [2]
1/06 • • • in cells with flat or plate-like electrodes [2]	1/24 • of halogens or compounds thereof [2]
1/08 • • • • of the filter-press type [2]	1/26 • • Chlorine; Compounds thereof [2]
1/10 • • • in diaphragm cells [2]	1/28 • of per-compounds [2]
1/12 • • • in pressure cells [2]	1/30 • • Peroxides [2]
1/13 • of ozone [7]	1/32 • • Perborates [2]
1/14 • of alkali metal compounds [2]	1/34 • Simultaneous production of alkali metal hydroxides and chlorine, its oxyacids or salts [2]
1/16 • • Hydroxides [2]	1/36 • • in mercury cathode cells [2]
1/18 • of alkaline earth metal compounds or magnesium compounds [2]	1/38 • • • with vertical mercury cathode [2]

C25B

- 1/40 • • • with horizontal mercury cathode [2]
- 1/42 • • • Decomposition of amalgams [2]
- 1/44 • • • • with the aid of catalysts [2]
- 1/46 • • in diaphragm cells [2]

- 3/00 Electrolytic production of organic compounds [2]**
- 3/02 • by oxidation [2]
- 3/04 • by reduction [2]
- 3/06 • by halogenation [2]
- 3/08 • • by fluorination [2]
- 3/10 • by coupling reactions, e.g. dimerisation [2]
- 3/12 • of organo-metallic compounds [2]

- 5/00 Electrogenative processes, i.e. processes for producing compounds in which simultaneously electricity is generated [2]**

- 7/00 Electrophoretic production of compounds or non-metals (separation or purification of peptides, e.g. of proteins, by electrophoresis C07K 1/26) [2]**

- 9/00 Cells or assemblies of cells; Constructional parts of cells; Assemblies of constructional parts, e.g. electrode-diaphragm assemblies [2, 7]**
- 9/02 • Holders for electrodes [2]
- 9/04 • Devices for current supply (electrical connections in general H01R); Electrode connections; Electric inter-cell connections [2]
- 9/06 • Cells comprising dimensionally-stable non-movable electrodes; Assemblies of constructional parts thereof [7]
- 9/08 • • with diaphragms [7]
- 9/10 • • • including an ion-exchange membrane in or on which electrode material is embedded [7]
- 9/12 • Cells or assemblies of cells comprising at least one movable electrode, e.g. rotary electrodes; Assemblies of constructional parts thereof [7]
- 9/14 • • Liquid electrodes, e.g. mercury electrodes [7]
- 9/16 • Cells or assemblies of cells comprising at least one electrode made of particles; Assemblies of constructional parts thereof [7]

- 9/18 • Assemblies comprising a plurality of cells (assemblies of cells with movable electrodes C25B 9/12; assemblies of cells with electrodes made of particles C25B 9/16) [7]
- 9/20 • • of the filter-press type [7]

- 11/00 Electrodes; Manufacture thereof not otherwise provided for [2]**
- 11/02 • characterised by shape or form [2]
- 11/03 • • perforated or foraminous [2]
- 11/04 • characterised by the material [2]
- 11/06 • • by the catalytic materials used (catalysts in general B01J) [2]
- 11/08 • • • Noble metals [2]
- 11/10 • • Electrodes based on barrier-type metals, e.g. titanium [2]
- 11/12 • • Electrodes based on carbon (carbon masses in general C04B 35/52) [2]
- 11/14 • • • Impregnation of carbon electrodes (C25B 11/06 takes precedence) [2]
- 11/16 • • Electrodes based on manganese dioxide or lead dioxide [2]
- 11/18 • • Mercury or amalgam electrodes [2]

- 13/00 Diaphragms; Spacing elements [4]**
- 13/02 • characterised by form or shape [2]
- 13/04 • characterised by the material [2]
- 13/06 • • based on asbestos [2]
- 13/08 • • based on organic materials [2]

- 15/00 Operating or servicing of cells [2]**
- 15/02 • Process control or regulation (controlling or regulating in general G05) [2]
- 15/04 • Regulation of the inter-electrode distance (working of metal by the action of a high concentration of electric current B23H) [2]
- 15/06 • Detection or inhibition of short circuits in the cell [2]
- 15/08 • Supplying or removing reactants or electrolytes; Regeneration of electrolytes [2]

C25C PROCESSES FOR THE ELECTROLYTIC PRODUCTION, RECOVERY OR REFINING OF METALS; APPARATUS THEREFOR (anodic or cathodic protection C23F; single-crystal growth C30B) [2]

- 1/00 Electrolytic production, recovery or refining of metals by electrolysis of solutions (C25C 5/00 takes precedence) [2]**
- 1/02 • of light metals [2]
- 1/04 • • in mercury cathode cells [2]
- 1/06 • of iron group metals, refractory metals or manganese [2]
- 1/08 • • of nickel or cobalt [2]
- 1/10 • • of chromium or manganese [2]
- 1/12 • of copper [2]
- 1/14 • of tin [2]
- 1/16 • of zinc, cadmium or mercury [2]
- 1/18 • of lead [2]
- 1/20 • of noble metals [2]
- 1/22 • of metals not provided for in groups C25C 1/02-C25C 1/20 [2]
- 1/24 • Alloys obtained by cathodic reduction of all their ions [2]

- 3/00 Electrolytic production, recovery or refining of metals by electrolysis of melts (C25C 5/00 takes precedence) [2]**
- 3/02 • of alkali or alkaline earth metals [2]
- 3/04 • of magnesium [2]
- 3/06 • of aluminium [2]
- 3/08 • • Cell construction, e.g. bottoms, walls, cathodes [2]
- 3/10 • • • External supporting frames or structures [2]
- 3/12 • • • Anodes [2]
- 3/14 • • Devices for feeding or crust breaking [2]
- 3/16 • • Electric current supply devices, e.g. bus bars [2]
- 3/18 • • Electrolytes [2]
- 3/20 • • Automatic control or regulation of cells (controlling or regulating in general G05) [2]
- 3/22 • • Collecting emitted gases [2]
- 3/24 • • Refining [2]
- 3/26 • of titanium, zirconium, hafnium, tantalum or vanadium [2]
- 3/28 • • of titanium [2]
- 3/30 • of manganese [2]

- 3/32 • of chromium [2]
 - 3/34 • of metals not provided for in groups C25C 3/02-C25C 3/32 [2]
 - 3/36 • Alloys obtained by cathodic reduction of all their ions [2]
- 5/00 Electrolytic production, recovery or refining of metal powders or porous metal masses [2]**
- 5/02 • from solutions [2]
 - 5/04 • from melts [2]

- 7/00 Constructional parts, or assemblies thereof, of cells; Servicing or operating of cells** (for the production of aluminium C25C 3/06-C25C 3/22) [2]
- 7/02 • Electrodes (consumable anodes for the refining of metals C25C 1/00-C25C 5/00); Connections thereof [2]
 - 7/04 • Diaphragms; Spacing elements [2]
 - 7/06 • Operating or servicing [2]
 - 7/08 • • Separating of deposited metals from the cathode [2]

C25D PROCESSES FOR THE ELECTROLYTIC OR ELECTROPHORETIC PRODUCTION OF COATINGS; ELECTROFORMING (manufacturing printed circuits by metal deposition H05K 3/18); **JOINING WORKPIECES BY ELECTROLYSIS; APPARATUS THEREFOR** (anodic or cathodic protection C23F; single-crystal growth C30B) [2, 6]

- 1/00 Electroforming [2]**
- 1/02 • Tubes; Rings; Hollow bodies [2]
 - 1/04 • Wires; Strips; Foils [2]
 - 1/06 • Wholly-metallic mirrors [2]
 - 1/08 • Perforated or foraminous objects, e.g. sieves (C25D 1/10 takes precedence) [2]
 - 1/10 • Moulds; Masks; Masterforms [2]
 - 1/12 • by electrophoresis [2]
 - 1/14 • • of inorganic material [2]
 - 1/16 • • • Metals [2]
 - 1/18 • • of organic material [2]
 - 1/20 • Separation of the formed objects from the electrodes [2]
 - 1/22 • • Separating compounds [2]
- 2/00 Joining workpieces by electrolysis [6]**
- 3/00 Electroplating; Baths therefor [2]**
- 3/02 • from solutions (C25D 5/24-C25D 5/32 take precedence) [2]
 - 3/04 • • of chromium [2]
 - 3/06 • • • from solutions of trivalent chromium [2]
 - 3/08 • • • Deposition of black chromium [2]
 - 3/10 • • • characterised by the organic bath constituents used [2]
 - 3/12 • • of nickel or cobalt [2]
 - 3/14 • • • from baths containing acetylenic or heterocyclic compounds [2]
 - 3/16 • • • • Acetylenic compounds [2]
 - 3/18 • • • • Heterocyclic compounds [2]
 - 3/20 • • of iron [2]
 - 3/22 • • of zinc [2]
 - 3/24 • • • from cyanide baths [2]
 - 3/26 • • of cadmium [2]
 - 3/28 • • • from cyanide baths [2]
 - 3/30 • • of tin [2]
 - 3/32 • • • characterised by the organic bath constituents used [2]
 - 3/34 • • of lead [2]
 - 3/36 • • • characterised by the organic bath constituents used [2]
 - 3/38 • • of copper [2]
 - 3/40 • • • from cyanide baths [2]
 - 3/42 • • of light metals [2]
 - 3/44 • • • Aluminium [2]
 - 3/46 • • of silver [2]
 - 3/48 • • of gold [2]
 - 3/50 • • of platinum group metals [2]

- 3/52 • • • characterised by the organic bath constituents used [2]
 - 3/54 • • of metals not provided for in groups C25D 3/04-C25D 3/50 [2]
 - 3/56 • • of alloys [2]
 - 3/58 • • • containing more than 50% by weight of copper [2]
 - 3/60 • • • containing more than 50% by weight of tin [2]
 - 3/62 • • • containing more than 50% by weight of gold [2]
 - 3/64 • • • containing more than 50% by weight of silver [2]
 - 3/66 • from melts [2]
- 5/00 Electroplating characterised by the process; Pretreatment or after-treatment of workpieces [2]**
- 5/02 • Electroplating of selected surface areas [2]
 - 5/04 • Electroplating with moving electrodes [2]
 - 5/06 • • Brush or pad plating [2]
 - 5/08 • Electroplating with moving electrolyte, e.g. jet electroplating [2]
 - 5/10 • Electroplating with more than one layer of the same or of different metals (for bearings C25D 7/10) [2]
 - 5/12 • • at least one layer being of nickel or chromium [2]
 - 5/14 • • • two or more layers being of nickel or chromium, e.g. duplex or triplex layers [2]
 - 5/16 • Electroplating with layers of varying thickness [2]
 - 5/18 • Electroplating using modulated, pulsed or reversing current [2]
 - 5/20 • Electroplating using ultrasonics [2]
 - 5/22 • Electroplating combined with mechanical treatment during the deposition [2]
 - 5/24 • Electroplating of metal surfaces to which a coating cannot readily be applied (C25D 5/34 takes precedence) [2]
 - 5/26 • • of iron or steel surfaces [2]
 - 5/28 • • of surfaces of refractory metals [2]
 - 5/30 • • of surfaces of light metals [2]
 - 5/32 • • of surfaces of actinides [2]
 - 5/34 • Pretreatment of metallic surfaces to be electroplated [2]
 - 5/36 • • of iron or steel [2]
 - 5/38 • • of refractory metals or nickel [2]
 - 5/40 • • • Nickel; Chromium [2]
 - 5/42 • • of light metals [2]
 - 5/44 • • • Aluminium [2]
 - 5/46 • • of actinides [2]
 - 5/48 • After-treatment of electroplated surfaces [2]
 - 5/50 • • by heat-treatment [2]

C25D

- 5/52 • • by brightening or burnishing [2]
- 5/54 • Electroplating of non-metallic surfaces (C25D 7/12 takes precedence) [2]
- 5/56 • • of plastics [2]

7/00 Electroplating characterised by the article coated [2]

- 7/02 • Slide fasteners [2]
- 7/04 • Tubes; Rings; Hollow bodies [2]
- 7/06 • Wires; Strips; Foils [2]
- 7/08 • Mirrors; Reflectors [2]
- 7/10 • Bearings [2]
- 7/12 • Semiconductors [2]

9/00 Electrolytic coating other than with metals (C25D 11/00, C25D 15/00 take precedence; electrophoretic coating C25D 13/00) [2]

- 9/02 • with organic materials [2]
- 9/04 • with inorganic materials [2]
- 9/06 • • by anodic processes [2]
- 9/08 • • by cathodic processes [2]
- 9/10 • • • on iron or steel [2]
- 9/12 • • • on light metals [2]

11/00 Electrolytic coating by surface reaction, i.e. forming conversion layers [2]

- 11/02 • Anodisation [2]
- 11/04 • • of aluminium or alloys based thereon [2]
- 11/06 • • • characterised by the electrolytes used [2]
- 11/08 • • • • containing inorganic acids [2]
- 11/10 • • • • containing organic acids [2]
- 11/12 • • • Anodising more than once, e.g. in different baths [2]
- 11/14 • • • Producing integrally coloured layers [2]
- 11/16 • • • Pretreatment [2]
- 11/18 • • • After-treatment, e.g. pore-sealing (lacquering B44D) [2]
- 11/20 • • • • Electrolytic after-treatment [2]
- 11/22 • • • • • for colouring layers [2]
- 11/24 • • • • Chemical after-treatment [2]
- 11/26 • • of refractory metals or alloys based thereon [2]
- 11/28 • • of actinides or alloys based thereon [2]
- 11/30 • • of magnesium or alloys based thereon [2]
- 11/32 • • of semiconducting materials [2]
- 11/34 • • of metals or alloys not provided for in groups C25D 11/04-C25D 11/32 [2]
- 11/36 • Phosphatising [2]
- 11/38 • Chromatising [2]

13/00 Electrophoretic coating (C25D 15/00 takes precedence; apparatus for continuously conveying articles into baths B65G, e.g. B65G 49/00; compositions for electrophoretic coating C09D 5/44) [2]

- 13/02 • with inorganic material [2]
- 13/04 • with organic material [2]
- 13/06 • • polymers [2]
- 13/08 • • • by polymerisation *in situ* of monomeric materials [2]

C25F PROCESSES FOR THE ELECTROLYTIC REMOVAL OF MATERIALS FROM OBJECTS; APPARATUS THEREFOR (treatment of water, waste water or sewage by electrochemical methods C02F 1/46; anodic or cathodic protection C23F) [2]

Note(s)

In this subclass, in the absence of an indication to the contrary, classification is made in the last appropriate place.

- 13/10 • characterised by the additives used [2]
- 13/12 • characterised by the article coated [2]
- 13/14 • • Tubes; Rings; Hollow bodies [2]
- 13/16 • • Wires; Strips; Foils [2]
- 13/18 • using modulated, pulsed or reversing current [2]
- 13/20 • Pretreatment [2]
- 13/22 • Servicing or operating [2]
- 13/24 • • Regeneration of process liquids [2]

15/00 Electrolytic or electrophoretic production of coatings containing embedded materials, e.g. particles, whiskers, wires [2]

- 15/02 • Combined electrolytic and electrophoretic processes [2]

17/00 Constructional parts, or assemblies thereof, of cells for electrolytic coating (apparatus for continuously conveying articles into baths B65G, e.g. B65G 49/00; electric devices, see the relevant places, e.g. H01B, H02G) [2]

- 17/02 • Tanks; Installations therefor [2]
- 17/04 • • External supporting frames or structures [2]
- 17/06 • Suspending or supporting devices for articles to be coated [2]
- 17/08 • • Racks [2]
- 17/10 • Electrodes [2]
- 17/12 • • Shape or form (C25D 17/14 takes precedence) [2]
- 17/14 • • for pad-plating [2]
- 17/16 • Apparatus for electrolytic coating of small objects in bulk [2]
- 17/18 • • having closed containers [2]
- 17/20 • • • Horizontal barrels [2]
- 17/22 • • having open containers [2]
- 17/24 • • • Oblique barrels [2]
- 17/26 • • • Oscillating baskets [2]
- 17/28 • • with means for moving the objects individually through the apparatus during the treatment [2]

19/00 Electrolytic coating plants [2]

21/00 Processes for servicing or operating cells for electrolytic coating [2]

- 21/02 • Heating or cooling [2]
- 21/04 • Removal of gases or vapours [2]
- 21/06 • Filtering [2]
- 21/08 • Rinsing [2]
- 21/10 • Agitating of electrolytes; Moving of racks [2]
- 21/11 • Use of protective surface layers on electrolytic baths [3]
- 21/12 • Process control or regulation (controlling or regulating in general G05) [2]
- 21/14 • • Controlled addition of electrolyte components [2]
- 21/16 • Regeneration of process solutions [2]
- 21/18 • • of electrolytes (C25D 21/22 takes precedence) [2]
- 21/20 • • of rinse-solutions (C25D 21/22 takes precedence) [2]
- 21/22 • • by ion-exchange [2]

1/00 Electrolytic cleaning, degreasing, pickling, or descaling [2]

- 1/02 • Pickling; Descaling [2]
- 1/04 • • in solution [2]
- 1/06 • • • of iron or steel [2]
- 1/08 • • • of refractory metals [2]
- 1/10 • • • of actinides [2]
- 1/12 • • in melts [2]
- 1/14 • • • of iron or steel [2]
- 1/16 • • • of refractory metals [2]
- 1/18 • • • of actinides [2]

3/00 Electrolytic etching or polishing [2]

- 3/02 • Etching [2]
- 3/04 • • of light metals [2]
- 3/06 • • of iron or steel [2]
- 3/08 • • of refractory metals [2]
- 3/10 • • of actinides [2]

- 3/12 • • of semiconducting materials [2]
- 3/14 • • locally [2]
- 3/16 • Polishing [2]
- 3/18 • • of light metals [2]
- 3/20 • • • of aluminium [2]
- 3/22 • • of heavy metals [2]
- 3/24 • • • of iron or steel [2]
- 3/26 • • • of refractory metals [2]
- 3/28 • • • of actinides [2]
- 3/30 • • of semiconducting materials [2]

5/00 Electrolytic stripping of metallic layers or coatings [2]**7/00 Constructional parts, or assemblies thereof, of cells for electrolytic removal of material from objects (for both electrolytic coating and removal C25D); Servicing or operating [2]**

- 7/02 • Regeneration of process liquids [2]