

**C25 ELECTROLYTIC OR ELECTROPHORETIC PROCESSES; APPARATUS THEREFOR** (electrodialysis, electro-osmosis, separation of liquids by electricity B01D; working of metal by the action of a high concentration of electric current B23H; treatment of water, waste water or sewage by electrochemical methods C02F 1/46; surface treatment of metallic material or coating involving at least one process provided for in class C23 and at least one process covered by this class C23C 28/00, C23F 17/00; anodic or cathodic protection C23F; single-crystal growth C30B; metallising textiles D06M 11/83; decorating textiles by locally metallising D06Q 1/04; electrochemical methods of analysis G01N; electrochemical measuring, indicating or recording devices G01R; electrolytic circuit elements, e.g. capacitors, H01G; electrochemical current or voltage generators H01M) [4]

#### Notes

- (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]
- (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. [2]

#### 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, 3/00, 5/00  
 Metallic coatings ..... C25D 3/00, 5/00, 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, 5/00

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

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Production of compounds or non-metals ..... C25B 9/00, 11/00, 13/00, 15/00

Production of metals ..... C25C 7/00

Production of coatings ..... C25D 17/00, 19/00, 21/00

Cleaning, pickling, surface treatment ..... C25F 7/00

**C25B ELECTROLYTIC OR ELECTROPHORETIC PROCESSES FOR THE PRODUCTION OF COMPOUNDS OR NON-METALS; APPARATUS THEREFOR [2]**

#### Notes

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

##### **1/00 Electrolytic production of inorganic compounds or non-metals [2]**

1/02 . of hydrogen or oxygen [2]  
 1/04 . . by electrolysis of water [2]  
 1/06 . . . in cells with flat or plate-like electrodes [2]  
 1/08 . . . of the filter-press type [2]  
 1/10 . . . in diaphragm cells [2]  
 1/12 . . . in pressure cells [2]  
 1/13 . of ozone [7]  
 1/14 . of alkali metal compounds [2]  
 1/16 . . Hydroxides [2]  
 1/18 . of alkaline earth metal compounds or magnesium compounds [2]  
 1/20 . . Hydroxides [2]  
 1/21 . of manganese oxides [7]  
 1/22 . of inorganic acids [2]

1/24 . of halogens or compounds thereof [2]  
 1/26 . . Chlorine; Compounds thereof [2]  
 1/28 . of per-compounds [2]  
 1/30 . . Peroxides [2]  
 1/32 . . Perborates [2]  
 1/34 . Simultaneous production of alkali metal hydroxides and chlorine, its oxyacids or salts [2]  
 1/36 . . in mercury cathode cells [2]  
 1/38 . . . with vertical mercury cathode [2]  
 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]
<b>5/00</b>	<b>Electrogenerative processes, i.e. processes for producing compounds in which simultaneously electricity is generated [2]</b>
<b>7/00</b>	<b>Electrophoretic production of compounds or non-metals</b> (separation or purification of peptides, e.g. of proteins, by electrophoresis C07K 1/26) [2]
<b>9/00</b>	<b>Cells or assemblies of cells; Constructional parts of cells; Assemblies of constructional parts, e.g. electrode-diaphragm assemblies [2,7]</b>
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]

<b>11/00</b>	<b>Electrodes; Manufacture thereof not otherwise provided for [2]</b>
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]
<b>13/00</b>	<b>Diaphragms; Spacing elements [4]</b>
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]
<b>15/00</b>	<b>Operating or servicing of cells [2]</b>
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 [2]

<b>1/00</b>	<b>Electrolytic production, recovery or refining of metals by electrolysis of solutions</b> (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 to C25C 1/20 [2]
1/24	. Alloys obtained by cathodic reduction of all their ions [2]
<b>3/00</b>	<b>Electrolytic production, recovery or refining of metals by electrolysis of melts</b> (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 to C25C 3/32 [2]
3/36	. Alloys obtained by cathodic reduction of all their ions [2]

<b>5/00</b>	<b>Electrolytic production, recovery or refining of metal powders or porous metal masses [2]</b>	<b>7/04</b>	. Diaphragms; Spacing elements [2]
<b>5/02</b>	. from solutions [2]	<b>7/06</b>	. Operating or servicing [2]
<b>5/04</b>	. from melts [2]	<b>7/08</b>	. . Separating of deposited metals from the cathode [2]
<b>7/00</b>	<b>Constructional parts, or assemblies thereof, of cells; Servicing or operating of cells (for the production of aluminium C25C 3/06 to C25C 3/22) [2]</b>		
<b>7/02</b>	. Electrodes (consumable anodes for the refining of metals C25C 1/00 to C25C 5/00); Connections thereof [2]		

**C25D PROCESSES FOR THE ELECTROLYTIC OR ELECTROPHORETIC PRODUCTION OF COATINGS; ELECTROFORMING** (decorating textiles by metallising D06Q 1/04; manufacturing printed circuits by metal deposition H05K 3/18); **JOINING WORKPIECES BY ELECTROLYSIS; APPARATUS THEREFOR [2,6]**

<b>1/00</b>	<b>Electroforming [2]</b>	<b>3/50</b>	. . of platinum group metals [2]
<b>1/02</b>	. Tubes; Rings; Hollow bodies [2]	<b>3/52</b>	. . . characterised by the organic bath constituents used [2]
<b>1/04</b>	. Wires; Strips; Foils [2]	<b>3/54</b>	. . of metals not provided for in groups C25D 3/04 to C25D 3/50 [2]
<b>1/06</b>	. Wholly-metallic mirrors [2]	<b>3/56</b>	. . of alloys [2]
<b>1/08</b>	. Perforated or foraminous objects, e.g. sieves (C25D 1/10 takes precedence) [2]	<b>3/58</b>	. . . containing more than 50% by weight of copper [2]
<b>1/10</b>	. Moulds; Masks; Masterforms [2]	<b>3/60</b>	. . . containing more than 50% by weight of tin [2]
<b>1/12</b>	. by electrophoresis [2]	<b>3/62</b>	. . . containing more than 50% by weight of gold [2]
<b>1/14</b>	. . of inorganic material [2]	<b>3/64</b>	. . . containing more than 50% by weight of silver [2]
<b>1/16</b>	. . . Metals [2]	<b>3/66</b>	. from melts [2]
<b>1/18</b>	. . of organic material [2]		
<b>1/20</b>	. Separation of the formed objects from the electrodes [2]	<b>5/00</b>	<b>Electroplating characterised by the process; Pretreatment or after-treatment of workpieces [2]</b>
<b>1/22</b>	. . Separating compounds [2]	<b>5/02</b>	. Electroplating of selected surface areas [2]
<b>2/00</b>	<b>Joining workpieces by electrolysis [6]</b>	<b>5/04</b>	. Electroplating with moving electrodes [2]
<b>3/00</b>	<b>Electroplating; Baths therefor [2]</b>	<b>5/06</b>	. . Brush or pad plating [2]
<b>3/02</b>	. from solutions (C25D 5/24 to C25D 5/32 take precedence) [2]	<b>5/08</b>	. Electroplating with moving electrolyte, e.g. jet electroplating [2]
<b>3/04</b>	. . of chromium [2]	<b>5/10</b>	. Electroplating with more than one layer of the same or of different metals (for bearings C25D 7/10) [2]
<b>3/06</b>	. . . from solutions of trivalent chromium [2]	<b>5/12</b>	. . at least one layer being of nickel or chromium [2]
<b>3/08</b>	. . . Deposition of black chromium [2]	<b>5/14</b>	. . . two or more layers being of nickel or chromium, e.g. duplex or triplex layers [2]
<b>3/10</b>	. . . characterised by the organic bath constituents used [2]	<b>5/16</b>	. Electroplating with layers of varying thickness [2]
<b>3/12</b>	. . of nickel or cobalt [2]	<b>5/18</b>	. Electroplating using modulated, pulsed or reversing current [2]
<b>3/14</b>	. . . from baths containing acetylenic or heterocyclic compounds [2]	<b>5/20</b>	. Electroplating using ultrasonics [2]
<b>3/16</b>	. . . . Acetylenic compounds [2]	<b>5/22</b>	. Electroplating combined with mechanical treatment during the deposition [2]
<b>3/18</b>	. . . . Heterocyclic compounds [2]	<b>5/24</b>	. Electroplating of metal surfaces to which a coating cannot readily be applied (C25D 5/34 takes precedence) [2]
<b>3/20</b>	. . of iron [2]	<b>5/26</b>	. . of iron or steel surfaces [2]
<b>3/22</b>	. . of zinc [2]	<b>5/28</b>	. . of surfaces of refractory metals [2]
<b>3/24</b>	. . . from cyanide baths [2]	<b>5/30</b>	. . of surfaces of light metals [2]
<b>3/26</b>	. . of cadmium [2]	<b>5/32</b>	. . of surfaces of actinides [2]
<b>3/28</b>	. . . from cyanide baths [2]	<b>5/34</b>	. Pretreatment of metallic surfaces to be electroplated [2]
<b>3/30</b>	. . of tin [2]	<b>5/36</b>	. . of iron or steel [2]
<b>3/32</b>	. . . characterised by the organic bath constituents used [2]	<b>5/38</b>	. . of refractory metals or nickel [2]
<b>3/34</b>	. . of lead [2]	<b>5/40</b>	. . . Nickel; Chromium [2]
<b>3/36</b>	. . . characterised by the organic bath constituents used [2]	<b>5/42</b>	. . of light metals [2]
<b>3/38</b>	. . of copper [2]	<b>5/44</b>	. . . Aluminium [2]
<b>3/40</b>	. . . from cyanide baths [2]	<b>5/46</b>	. . of actinides [2]
<b>3/42</b>	. . of light metals [2]		
<b>3/44</b>	. . . Aluminium [2]		
<b>3/46</b>	. . of silver [2]		
<b>3/48</b>	. . of gold [2]		

- 5/48 . After-treatment of electroplated surfaces [2]
- 5/50 . . by heat-treatment [2]
- 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 to 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]
- 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]

**C25F PROCESSES FOR THE ELECTROLYTIC REMOVAL OF MATERIALS FROM OBJECTS; APPARATUS THEREFOR [2]**

**Note**

In this subclass, in the absence of an indication to the contrary, classification is made in the last appropriate place. [2]

<b>1/00</b>	<b>Electrolytic cleaning, degreasing, pickling, or descaling [2]</b>		
1/02	. Pickling; Descaling [2]	3/12	. . . of semiconducting materials [2]
1/04	. . . in solution [2]	3/14	. . . locally [2]
1/06	. . . of iron or steel [2]	3/16	. Polishing [2]
1/08	. . . of refractory metals [2]	3/18	. . . of light metals [2]
1/10	. . . of actinides [2]	3/20	. . . of aluminium [2]
1/12	. . . in melts [2]	3/22	. . . of heavy metals [2]
1/14	. . . of iron or steel [2]	3/24	. . . of iron or steel [2]
1/16	. . . of refractory metals [2]	3/26	. . . of refractory metals [2]
1/18	. . . of actinides [2]	3/28	. . . of actinides [2]
		3/30	. . . of semiconducting materials [2]
<b>3/00</b>	<b>Electrolytic etching or polishing [2]</b>	<b>5/00</b>	<b>Electrolytic stripping of metallic layers or coatings [2]</b>
3/02	. Etching [2]		
3/04	. . . of light metals [2]	<b>7/00</b>	<b>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]</b>
3/06	. . . of iron or steel [2]		
3/08	. . . of refractory metals [2]		
3/10	. . . of actinides [2]	7/02	. Regeneration of process liquids [2]