CLASS 205, ELECTROLYSIS: PROCESSES, COMPOSITIONS USED THEREIN, AND METHODS OF PREPARING THE COMPOSITIONS

SECTION I - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Class 205 is an integral part of Class 204. It incorporates all the definitions and rules as to subject matter of Class 204.

Class 205 is an integral part of Class 204 (placed at the top of the schedule) and follows the schedule hierarchy, retaining all pertinent definitions and class lines of Class 204.

SUBCLASSES

43 ELECTROLYSIS INVOLVING ACTINIDE SERIES ELEMENT OR COMPOUND (AT. NO. 89+) (PRODUCT, PROCESS, COMPOSITION, AND METHOD OF PREPARING COMPOSITION):

This subclass is indented under the class definition. Subject matter wherein the processes involve the electrolysis of, or upon, an actinide element or compound thereof.

(1) Note. The product of the electrolytic process may be an element or compound other than an actinide series element or compound.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 393+ for the chemical production of free actinide series metal.

148, Metal Treatment, subclass 132 for processes involving heat treatment of the actinide series metal.

420, Alloys or Metallic Compositions, subclasses 2+ for the chemical production of actinide base alloys.

423, Chemistry of Inorganic Compounds, subclasses 3+ and 249+ for nonelectrolytic processes of forming actinide series elements or compounds.

534, Organic Compounds -- Part of the Class 532-570 Series, subclasses 11+ for nonelectrolytic processes of forming organic compounds of actinide series elements.

44 Plutonium:

This subclass is indented under subclass 43. Subject matter wherein the actinide series element is plutonium or a compound thereof.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 396+ for the production of free plutonium metal.

423, Chemistry of Inorganic Compounds, subclass 251 for nonelectrolytic processes of forming plutonium compound.

45 Thorium:

This subclass is indented under subclass 43. Subject matter wherein the actinide series element is thorium or a compound thereof.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 394+ for the production of free thorium metal.

423, Chemistry of Inorganic Compounds, subclass 252 for nonelectrolytic processes of forming thorium compound.

46 Uranium:

This subclass is indented under subclass 43. Subject matter wherein the actinide series element is uranium or a compound thereof.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 398+ for the production of free uranium metal.

420, Alloys or Metallic Compositions, subclass 3 for the chemical production of uranium base alloys.

423, Chemistry of Inorganic Compounds, subclasses 253+ for nonelectrolytic processes of forming uranium compound.

47 Utilizing fused bath:
This subclass is indented under subclass 46. Subject matter wherein the electrolytic process is carried out in an electrolytic medium consisting of a substance or combination or mixture of substances which are heated above ordinary, normal room temperature during a process in order to bring the substance or substances to a fluid or liquid condition (e.g., a molten bath, etc.).

48 Involving electrolytic coating, etching, or polishing:
This subclass is indented under subclass 46. Subject matter wherein the process includes an electrolytic coating or etching or polishing step.

49 Uranium containing compound produced:
This subclass is indented under subclass 46. Subject matter wherein a uranium containing compound is produced.

SEE OR SEARCH CLASS:
423, Chemistry of Inorganic Compounds, subclasses 253+ for nonelectrolytic processes of preparing uranium compound.

50 Product produced by electrolysis involving electrolytic marking, battery electrode active material forming, electroforming or electrolytic coating:
This subclass is indented under the class definition. Subject matter wherein a product is made by the process of electrolytic marking, utilizing electrolysis to form battery electrode active material, electroforming or electrolytic coating with the following exception: products which form two or more contiguous metallic layers (see Class 428).

51 Superconductor preparation involving electrolytic marking, electroforming or electrolytic coating, or composition therefor:
This subclass is indented under the class definition. Subject matter wherein an article described as a superconductor is prepared utilizing electrolytic marking, electroforming, or electrolytic coating.

52 Electrolytic marking or composition therefor:
This subclass is indented under the class definition. Subject matter for the development of successive marks, letters, designs and the like, upon a surface or within the body of a carrier, wherein electrical impulses from an electrode are employed to create by electrolysis, at selected areas, different colors, shades, or shapes resulting in the desired symbol (e.g., electroprinting, etc.).

(1) Note. This subclass also includes compositions, not elsewhere provided for, particularly adapted to carry out the processes herein included.

(2) Note. It is the general rule of classification to classify a process of preparing a composition along with the composition. In these circumstances where only a process of preparing a composition is claimed and there is no claim to a composition, the claims would be classified identically as if there were a composition claimed.

(3) Note. The symbols must consist of a series successively formed, otherwise the process will be found in this class, subclass 118 and indented subclasses.

SEE OR SEARCH CLASS:
178, Telegraphy, subclass 62 for chemical or electrical methods of recording messages transmitted by current impulses other than by electrolysis and apparatus for carrying out such processes including those involving electrolysis.
346, Recorders, appropriate subclasses for apparatus involving similar processes and peculiarly adapted to record the movements of instruments, machines, and the like.
358, Facsimile and Static Presentation Processing, subclasses 296 through 304 for processes and apparatus specialized for formation of optical facsimiles wherein the image is developed by

electrolysis or other electrical modes or by chemical changes.

386, Motion Video Signal Processing for Recording or Reproducing, subclass 314 for recording television or video signal on a thermoplastic record.

53 Utilizing inorganic color forming material other than carbon:

This subclass is indented under subclass 52. Subject matter wherein an inorganic color-forming material other than carbon is utilized.

(1) Note. Where the mark is produced by reaction or complex formation between an organic compound and an inorganic material electrolytically released (e.g., iodine, etc.) the subject matter is placed here.

54 Utilizing organic color-forming material:

This subclass is indented under subclass 52. Subject matter wherein an organic color-forming material is utilized.

55 Heterocyclic color-forming material:

This subclass is indented under subclass 54. Subject matter wherein the organic color-forming material contains a heterocyclic ring.

56 Hydroxyl or carboxyl group-containing color-forming material:

This subclass is indented under subclass 54. Subject matter wherein the organic color-forming material contains a hydroxyl (OH) or carboxyl (COOH) group.

57 Utilizing electrolysis to form battery electrode active material or composition therefor:

This subclass is indented under the class definition. Subject matter wherein battery electrode active material is formed or deposited utilizing electrolysis and compositions used for such electrolysis.

58 Organic active material other than organic metal salt:

This subclass is indented under subclass 57. Subject matter wherein the active material is organic and not an organic metal salt.

59 Group IA metal-containing active material (e.g., Li, Na, K, etc.):

This subclass is indented under subclass 57. Subject matter wherein the active material contains a metal from group IA of the Periodic Table of Elements (e.g., Li, Na, K, etc.) as an essential constituent.

60 Nickel-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains nickel as an essential constituent.

61 Cadmium-containing:

This subclass is indented under subclass 60. Subject matter wherein the active material also contains cadmium as an essential ingredient.

62 Cadmium-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains cadmium as an essential constituent.

63 Lead-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains lead as an essential constituent.

64 Zinc-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains zinc as an essential constituent.

65 Silver-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains silver as an essential constituent.

66 Iron- or tin-containing active material:

This subclass is indented under subclass 57. Subject matter wherein the active material contains iron or tin as an essential constituent.

67 Electroforming or composition therefor:

This subclass is indented under the class definition. Subject matter involving the reproduction or formation of objects by electrodeposition in which the deposit does not remain with the base upon which deposition is made and compositions therefor.

(1) Note. Subsequent process steps of separation from the base, backing up the

deposit and conventional steps such as washing, drying and the like are included here when in combination with the electrodeposition step or steps.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 471+ for electrophoretic or electro-osmotic coating or forming of an object and subclasses 192.1+ for processes of forming objects by sputtering.

68 Recording device:

This subclass is indented under subclass 67. Subject matter wherein recordings or records and record matrices or molds are produced (e.g., sound recordings, etc.).

SEE OR SEARCH CLASS:

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclasses for processes, within the class definition, for shaping or moulding plastic materials. In particular, see subclasses 106+ pertaining to forming sound grooves in records.

69 Printing plate or electrotype:

This subclass is indented under subclass 67. Subject matter wherein printing plates or electrotypes are produced.

SEE OR SEARCH THIS CLASS, SUBCLASS:

68, for processes of reproducing to form dies and molds useful in the preparation of records.

72, for processes sometimes referred to as electrotyping, which result in the production of decorative plaques or lettered plates not used in printing.

SEE OR SEARCH CLASS:

101, Printing, subclass 401.1 and indented subclasses for processes in general for making printing members.

70 Mold, mask, or masterform:

This subclass is indented under subclass 67. Subject matter wherein molds, masks, or masterforms are produced.

71 Mirror or reflector:

This subclass is indented under subclass 67. Subject matter wherein mirrors or reflectors are produced.

SEE OR SEARCH THIS CLASS, SUBCLASS:

116, for processes for the preparation of mirror and reflectors wherein the metal coat remains on the deposition base.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 838+ for processes of making mirrors and reflectors not provided for in a particular process class.

72 Ornamental article:

This subclass is indented under subclass 67. Subject matter wherein ornamental articles are produced.

SEE OR SEARCH THIS CLASS, SUBCLASS:

69, and 70, for the preparation of printing plates, molds, or masterforms to be used in the formation of decorative designs on other objects.

120, for the preparation of designs on a base wherein the electrolytic coat remains on the base when finished.

73 Roll, ring, or hollow body:

This subclass is indented under subclass 67. Subject matter wherein rolls, rings, or hollow bodies are produced.

SEE OR SEARCH THIS CLASS, SUBCLASS:

76, for processes wherein rings or rolls are formed, stripped and cut to make sheets or strips.

SEE OR SEARCH CLASS:

29, Metal Working, for diverse manufacturing and metal working processes in general for producing hollow articles, see especially subclasses 1.2+, 435, 454, 455.1, 463, 888+, 889.72+, 890.03+, 890.06, 890.08, 890.12+, 890.14+, 895+, and 899.1.

492, Roll or Roller, for a roll, per se, not elsewhere provided for, and see the notes thereunder.

74 Powder, flakes, or colloidal particles:
This subclass is indented under subclass 67. Subject matter wherein the objects formed are powder, flakes, or colloidal particles.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

75 Perforated or foraminous article:
This subclass is indented under subclass 67. Subject matter wherein the objects formed are perforated or foraminous.

SEE OR SEARCH THIS CLASS, SUBCLASS:
150, for the formation of permanent coats on predominantly single metal or alloy perforated or foraminous substrates.
161, for the formation of permanent coats on predominantly nonmetal perforated or foraminous substrates.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclass 596 for metallic stock material having an aperture or cut.

76 Sheet, web, wire, or filament:
This subclass is indented under subclass 67. Subject matter wherein the object produced is a sheet, web, wire, or filament.

SEE OR SEARCH THIS CLASS, SUBCLASS:
74, for the production of films by electroforming with subsequent reduction to flakes, etc., subclass 75 for production of perforated or foraminous sheets or webs, and subclasses 138 and 152+ for formation of permanent coats on sheets, webs, wires, or filaments.

SEE OR SEARCH CLASS:
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 150 and 151 for laminating processes combined with a Class 204 coating step.
428, Stock Material or Miscellaneous Articles, subclasses 544+ for stock material which is all metal or has adjacent metal components, especially subclasses 606+ for foils and filaments smaller than 6 mils.

77 Of indeterminate length:
This subclass is indented under subclass 76. Subject matter wherein the sheets, webs, wires, or filaments formed are of indeterminate length.

(1) Note. Generally this subclass, as distinguished from the preceding one, includes processes in which the article is produced continuously; however, it is not restricted to such but includes all processes resulting in the formation of such articles of no defined length.

78 Electrical product:
This subclass is indented under subclass 67. Subject matter wherein the product produced is described as having utility as an electrical element.

79 Optical element:
This subclass is indented under subclass 67. Subject matter wherein the product produced is described as having utility as an optical element.

80 Electrolytic coating (process, composition and method of preparing composition):
This subclass is indented under the class definition. Process directed to the formation or deposition by an electrolytic action of a permanent coating material or materials upon a base, electrolyte compositions therefor and methods of making said electrolyte compositions.

(1) Note. It is intended by the phrase "permanent coating" to include those coatings which remain part of the finished article as distinguished from those coatings which are stripped from a base as provided for in subclass 67, and indented subclasses.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 471+ for electrophoretic or electro-osmotic coating or forming of an object and subclasses 192.12+ for glow discharge sputter deposition (e.g., cathode sputtering, etc.).

81 Involving measuring, analyzing, or testing:
This subclass is indented under subclass 80. Subject matter wherein the process includes a step of measuring, analyzing, or testing.

82 Controlling coating process in response to measured or detected parameter:
This subclass is indented under subclass 81. Subject matter wherein the electrolytic coating process is controlled in response to a measured or detected parameter thereof or of a characteristic of the electrolytic coating formed.

83 Parameter is current, current density, or voltage:
This subclass is indented under subclass 82. Subject matter wherein the parameter measured or detected is the current, current density, or voltage of the electrolytic coating process.

84 Parameter is thickness, weight, or composition of coating:
This subclass is indented under subclass 82. Subject matter wherein the characteristic measured, analyzed, or tested is the thickness, weight, or composition of the electrolytic coating.

85 Displacement or replacement coating:
This subclass is indented under subclass 80. Subject matter wherein a coating is formed on a substrate by the phenomenon usually known as displacement or replacement plating wherein a more active metal part of the surface of an object is dissolved and replaced by a less active metal coating derived from a bath composition.

86 Employing internal battery action during coating:
This subclass is indented under subclass 80. Subject matter wherein the electric current is self-generated and without the use of an external power source.

87 Simultaneous deplating and plating:
This subclass is indented under subclass 80. Subject matter wherein a coating is electrolytically deposited or formed on an article while simultaneously electrolytically removing a coating therefrom.

(1) Note. This subclass does not include periodic reversal electroplating wherein plating and deplating occur sequentially.

88 Utilizing subatmospheric or superatmospheric pressure during coating:
This subclass is indented under subclass 80. Subject matter wherein the electrolytic coating process is performed under a subatmospheric or superatmospheric pressure which means a pressure other than the normal atmospheric pressure in the surrounding atmosphere.

89 Utilizing magnet or magnetic field during coating:
This subclass is indented under subclass 80. Subject matter wherein a magnet or magnetic field is used during the electrolytic coating process.

90 Ferromagnetic material deposited:
This subclass is indented under subclass 89. Subject matter wherein a ferromagnetic material is electrolytically deposited under the influence of a magnetic field.

91 Utilizing electromagnetic wave energy during coating (e.g., visible light, etc.):
This subclass is indented under subclass 80. Subject matter wherein the electrolytic action is supplemented by the application of electromagnetic wave energy.

92 Energy produced by laser:
This subclass is indented under subclass 91. Subject matter wherein the electromagnetic wave energy is provided by a laser.

93 Contacting coating as it forms with solid member or material other than electrode:
This subclass is indented under subclass 80. Subject matter wherein the coating is simultaneously contacted by solid material or a solid member other than an electrode as it is formed (e.g., simultaneous electroplating and honing, simultaneous electroplating and burnishing, etc.).

94 Utilizing mist prevention:
This subclass is indented under subclass 80. Subject matter wherein misting of the electrolyte is prevented by, for example, the use of chemical additives or by physical means (e.g., foaming means, particles floating on the bath, etc.).

95 Coating has specified thickness variation:
This subclass is indented under subclass 80. Subject matter wherein the electrolytic coating is carried out in such a manner that the coating is deliberately nonuniform in thickness.

96 Controlling current distribution within bath:
This subclass is indented under subclass 80. Subject matter wherein the electrolytic process is carried out with means present or with control thereof such that a desired current distribution is maintained on the article being coated.

97 Shaped counterelectrode:
This subclass is indented under subclass 96. Subject matter wherein a shaped counterelectrode is used to control the current distribution on the article being coated (e.g., a counterelectrode matching the profile of the article being coated, etc.).

98 Treating process fluid by means other than agitation or heating or cooling:
This subclass is indented under subclass 80. Subject matter wherein fluids used in the process (e.g., electrolytes, rinse water, effluents, etc.) are physically, electrically, or chemically treated (e.g., recovery of chemicals, purification, effluent discharge, etc.).

99 Purifying electrolyte:
This subclass is indented under subclass 98. Subject matter wherein the electrolyte is purified by removing or inactivating contaminants or interferents therefrom (e.g., dummying, ion exchange, precipitation, filtering, activated carbon treatment, complexation, etc.).

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, for processes of chemical or physical purification of liquids in general.

100 Treating rinse solution (e.g., rinse water, etc.):
This subclass is indented under subclass 98. Subject matter wherein the process fluid treated is a rinse solution (e.g., recovery and reuse of rinse water, recovery of plating chemicals from rinse water, etc.).

101 Regenerating or maintaining electrolyte (e.g., self-regulating bath, etc.):
This subclass is indented under subclass 98. Subject matter wherein the electrolyte ingredients are regenerated or maintained to optimum condition (e.g., self-regulating bath, recirculation of electrolyte through metal pieces to supply metal ions for plating, etc.).

102 Depositing predominantly single metal or alloy coating on single metal or alloy using specified waveform other than pure DC:
This subclass is indented under subclass 80. Subject matter wherein a predominantly single metal or alloy coating is deposited on single

metal or alloy utilizing an electric current which is not pure DC (e.g., stepped voltage, etc.).

103 Reversing current or voltage:
This subclass is indented under subclass 102. Subject matter wherein the specified waveform is a reversing current or voltage which has a positive and negative component (e.g., periodic reversed current, superimposed AC on DC, etc.).

104 Nonreversing pulsed current or voltage:
This subclass is indented under subclass 103. Subject matter wherein the specified waveform repetitively changes from one current or voltage level to another (e.g., pulses of current separated by periods of no current flow, etc.).

105 Depositing predominantly single metal or alloy coating on nonmetal using specified waveform other than pure DC or 60 Hz sine wave AC (e.g., single metal or alloy coating within or above pores of anodic oxide layer, etc.):
This subclass is indented under subclass 80. Subject matter wherein the current or voltage used is other than pure DC or 60 Hz sine wave AC (e.g., periodic reversed current, pulsed current, superimposed AC on DC, etc.) and wherein a predominantly single metal or alloy is deposited on nonmetal (e.g., copper on anodic oxide, etc.).

(1) Note. A metal is defined as an electropositive chemical element characterized by ductility, malleability, luster, conductivity of heat and electricity, which can replace the hydrogen of an acid and forms bases with the hydroxyl radical.

106 Forming nonmetal coating using specified waveform other than pure DC or 60 Hz sine wave AC (e.g., anodic oxide coating, etc.):
This subclass is indented under subclass 80. Subject matter wherein the electric current is not pure DC or 60 Hz sine wave AC (e.g., stepped voltage, etc.) and where the coating formed is predominantly a nonmetal (e.g., anodic oxide, chromate, Si, phosphate, Se, etc.).

(1) Note. The terminology “nonmetal” is treated as excluding alloys and elemental metal.

107 Reversing current or voltage:
This subclass is indented under subclass 106. Subject matter wherein the specified waveform is a reversing current or voltage which has a positive and negative component (e.g., periodic reversed current, superimposed AC on DC, etc.).

108 Nonreversing pulsed current or voltage:
This subclass is indented under subclass 106. Subject matter wherein the specified waveform repetitively changes from one current or voltage level to another (e.g., pulses of current separated by periods of no current flow, etc.) and wherein the pulses contain no reversed pulses.

109 Coating contains embedded solid material (e.g., particles, etc.):
This subclass is indented under subclass 80. Subject matter wherein solid material becomes embedded in the coating as a distinct phase and the solid material is supplied by solid material in the electrolyte or solid material sprinkled or placed upon a substrate and embedded in the coating as it forms.

110 Abrasive article produced:
This subclass is indented under subclass 109. Subject matter wherein the article produced has abrasive utility (e.g., substrate coated with a nickel layer containing embedded silicon carbide particles or diamond particles, etc.).

SEE OR SEARCH CLASS:
51, Abrasive Tool Making Process, Material, or Composition, for other methods of preparing an abrasive tool.

111 Coating is dendritic or nodular:
This subclass is indented under subclass 80. Subject matter wherein the coating process is performed to achieve a dendritic or nodular coating (e.g., nodular copper, etc.).

112 Coating is discontinuous single metal or alloy layer (e.g., islands, porous layer, etc.):
This subclass is indented under subclass 80. Subject matter wherein the coating process is performed to achieve a metal layer which has a

plurality of discontinuities therein (e.g., microporous layer, islands, etc.).

113 Coating is microcracked:
This subclass is indented under subclass 112. Subject matter wherein the discontinuous coating is described as microcracked (e.g., microcracked chromium, etc.).

114 Uniting two separate solid materials:
This subclass is indented under subclass 80. Subject matter wherein the electrolytic coating is used to unite distinct articles or parts of an article one to another.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 592+ for miscellaneous process of manufacture, assembly and disassembly; subclasses 424, 458+, 460, and 527.1+ for processes of coating combined with assembly and/or metal working steps.
228, Metal Fusion Bonding, appropriate subclasses for the process of uniting surfaces by a metallurgical bond.

115 Repairing:
This subclass is indented under subclass 80. Subject matter wherein the electrolytic coating is used to restore a previously worn or degraded coating (e.g., worn bearing surfaces, etc.).

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 402.01+ and 402.18 and the notes thereto for other processes of repair.

116 Mirror or reflector produced:
This subclass is indented under subclass 80. Subject matter wherein mirrors and reflectors are produced by electrolytic coating.

SEE OR SEARCH CLASS:
359, Optical: Systems and Elements, subclasses 838+ for processes of making mirrors not provided for in a particular process class.
427, Coating Processes, subclasses 162+ for processes of making optical elements by coating means other than electrodeposition or Class 204 coating process.

117 Utilizing brush or absorbent applicator:
This subclass is indented under subclass 80. Subject matter wherein a brush or absorbent applicator is utilized to apply electrolyte to the substrate and in which the brush or absorbent application comprises a counterelectrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:
93, for subject matter wherein a coating is contacted as it forms with a solid member or material other than an electrode.

118 Coating selected area:
This subclass is indented under subclass 80. Subject matter wherein a coating is formed on at least one restricted or selected area of the substrate, the restricted or selected area or areas including less than the total surface area of the substrate.

(1) Note. Coating the entire substrate followed by removing selected areas of the coating are not herein included.

SEE OR SEARCH THIS CLASS, SUBCLASS:
52+, for electrolytic marking.
221+, for subject matter wherein a selected area of an electrolytic or nonelectrolytic coating is treated after it is formed.

119 Depositing ferromagnetic coating or coating ferromagnetic substrate:
This subclass is indented under subclass 118. Subject matter wherein the coating that is deposited is ferromagnetic or the substrate onto which the coating is deposited is ferromagnetic.

120 Design or ornamental article produced:
This subclass is indented under subclass 118. Subject matter directed to the preparation of designs and ornamental articles wherein decorative effects are produced by restricting the coatings to selected areas.

121 Predominantly nonmetal electrolytic coating (e.g., anodic oxide, etc.):
This subclass is indented under subclass 120. Subject matter wherein the coating is predominantly comprised of nonmetal material such as, for example, an oxide formed by anodizing.

122 Specified product produced:
This subclass is indented under subclass 118. Subject matter for the production of a product which is specified and which has a disclosed or claimed function wherein the coating of a selected area of a substrate either transforms the substrate into the specified product or simply serves to deposit material on a substrate which before coating was already identifiable as the specified product.

123 Product is semiconductor or includes semiconductor:
This subclass is indented under subclass 122. Subject matter wherein the specified product is a semiconductor or includes a semiconductor as part of the product.

(1) Note. "Semiconductor" is a generic term for (a) a substance or material whose electronic conductivity at ordinary temperature is intermediate between that of a metal and an insulator and whose conductivity is capable of being modified by the addition of a dopant, (b) an electronic device the main functioning parts are made from semiconductor materials.

(2) Note. This subclass and subclasses indented hereunder include processes of electrolytic coating, per se, on or with a semiconductor material and combinations of electrolytic coating with an additional step or steps which are preparatory treatments that adapt the material for electrolytic coating or which perfect the electrolytic coating.

SEE OR SEARCH CLASS:
438, Semiconductor Device Manufacturing: Process, for (a) combined processes and (b) certain unit operations of manufacturing a semiconductive substrate or device.

124 Predominantly nonmetal electrolytic coating (e.g., anodic oxide, etc.):
This subclass is indented under subclass 123. Subject matter wherein the coating is predominantly comprised of nonmetal material such as, for example, an oxide formed by anodizing.

125 Product is circuit board or printed circuit:
This subclass is indented under subclass 122. Subject matter wherein the specified product is a circuit board or printed circuit.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 829+ for processes of conductor or circuit manufacturing on a flat or curved insulated substrate (e.g., printed circuit, etc.).
174, Electricity: Conductors and Insulators, subclasses 250+ for structures in which a conductor is formed on or attached to a panel or sheet-like insulating body so as to make a preformed panel circuit arrangement (e.g., printed circuit, etc.)
428, Stock Material or Miscellaneous Articles, appropriate subclasses for a single or plural layer stock material product which involves no more structure than a base having a conductive layer coated thereon or impregnated therein, see especially subclasses 411.1+ for a nonstructural composite product characterized solely by the composition of the layers, subclass 601 for metallic stock having a discontinuous surface component, e.g., printed circuit, and subclass 901 (a cross-reference art collection) for a printed circuit device.

126 Electroless coating from bath containing metal ions and reducing agent prior to electrolytic coating:
This subclass is indented under subclass 125. Subject matter wherein prior to electrolytic coating a coating is deposited by electroless (i.e., autocatalytic) coating from a bath containing metal ions and a reducing agent.

127 Product is printing member:
This subclass is indented under subclass 122. Subject matter for the preparation of the printing surface of a sheet, plate, roll, or other member employed in printing by electrolytically forming a coating on a selected area of the surface.

SEE OR SEARCH CLASS:
101, Printing, subclass 401.1 and indented subclasses.
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 300 through 310 for processes of making a printing plate utilizing radiation imagery chemistry.

128 Simultaneous or sequential coating of a plurality of separate articles:
This subclass is indented under subclass 118. Subject matter wherein a selected area of each of a plurality of separate articles which may be the same as or different from each other are simultaneously or sequentially coated.

(1) Note. The separate articles may be joined together to expedite the coating process.

129 Selectively coating moving substrate of indeterminate length (e.g., strip, wire, fiber, etc.):
This subclass is indented under subclass 118. Subject matter wherein the substrate moves past the location(s) where coating occurs and is characterized by having a length which is indeterminate.

130 Completely coating one side of strip:
This subclass is indented under subclass 129. Subject matter wherein one side of a strip is completely coated.

131 Internal coating (e.g., coating inside of cylinder, etc.):
This subclass is indented under subclass 118. Subject matter wherein the substrate has both internal and external surfaces and a coating is applied to an internal surface.

132 Moving counterelectrode:
This subclass is indented under subclass 131. Subject matter wherein a moving counterelectrode is utilized.

133 Directing electrolyte to selected area (e.g., jet plating, etc.):
This subclass is indented under subclass 118. Subject matter wherein the electrolyte is directed to the selected area to be plated.

(1) Note. Processes wherein the electrolyte is merely confined over a selected area of the substrate are not included herein.

134 Partially submerging substrate in bath:
This subclass is indented under subclass 118. Subject matter wherein during coating the substrate is only partially submerged in the electrolyte bath.

135 Utilizing specified mask material:
This subclass is indented under subclass 118. Subject matter wherein a mask made of specified material is utilized in coating a selected area of the substrate.

136 Utilizing means other than mask:
This subclass is indented under subclass 118. Subject matter wherein a selected area of the substrate is coated without the use of a mask.

137 Coating moving substrate:
This subclass is indented under subclass 80. Subject matter wherein the substrate is moved during coating.

(1) Note. Mere insertion of the substrate into or withdrawal from the electrolyte bath is not considered to be movement for the purposes of this subclass.

138 Indeterminate length (e.g., strip, wire, fiber, etc.):
This subclass is indented under subclass 137. Subject matter wherein the substrate moves past the location(s) where coating occurs and is characterized by having a length which is indeterminate

(1) Note. Unless otherwise specified, a substrate in the form of a strip, wire or fiber

of indeterminate length is considered to be a moving substrate.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material in the form of a composite or plural component web or sheet and not elsewhere provided for. See also Lines With Other Classes and Within This Class, in Class 428, for further discussion of this topic.

139 Predominantly aluminum substrate:
This subclass is indented under subclass 138. Subject matter wherein elemental aluminum is the major or predominant constituent of the substrate.

140 Tin-containing coating:
This subclass is indented under subclass 138. Subject matter wherein the coating contains tin in either free or combined form.

141 Zinc-containing coating:
This subclass is indented under subclass 138. Subject matter wherein the coating contains zinc in either free or combined form.

142 Chromium-containing coating:
This subclass is indented under subclass 138. Subject matter wherein the coating contains chromium in either free or combined form.

143 Rotary (e.g., barrel plating, etc.):
This subclass is indented under subclass 137. Subject matter wherein the article or articles being coated undergo rotary motion or wherein the container or holder supporting the article or articles undergoes rotary motion during coating.

144 Utilizing fluidized bed (e.g., coating particles, flakes, granules, etc.):
This subclass is indented under subclass 137. Subject matter wherein a fluidized bed is utilized for coating substrate which, for example, may be in the form of particles, flakes, or granules.

145 Simultaneous or sequential coating of a plurality of separate articles:
This subclass is indented under subclass 137. Subject matter wherein a plurality of separate articles which may be the same as or different from each other are simultaneously or sequentially coated.

(1) Note. The separate articles may be joined together to expedite the coating process.

146 Reciprocating substrate:
This subclass is indented under subclass 137. Subject matter wherein the substrate is moved back and forth during coating.

147 Applying current to substrate without mechanical contact (e.g., liquid contact, bipolar electrode, etc.):
This subclass is indented under subclass 80. Subject matter wherein electric current is applied to the substrate without mechanically contacting the substrate with a solid current-carrying member.

148 Agitating or moving electrolyte during coating:
This subclass is indented under subclass 80. Subject matter wherein the electrolyte is agitated or moved during coating.

149 Coating predominantly single metal or alloy substrate of specified shape:
This subclass is indented under subclass 80. Subject matter wherein the substrate is predominantly comprised of a single metal or alloy and in which the shape or configuration of the substrate is specified.

150 Perforated, foraminous, or permeable substrate:
This subclass is indented under subclass 149. Subject matter wherein the substrate is perforated, foraminous, or permeable.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 131+ and 596+ for a stock material product in which a component includes apertures. See also Lines With Other Classes and

Within This Class, in Class 428, for further discussion of this topic.

442, Fabric (Woven, Knitted, or Non-woven Textile or Cloth, etc.), subclasses 1+ for a knitted or open mesh fabric.

151 Cylinder, roll, or hollow article:
This subclass is indented under subclass 149. Subject matter wherein the substrate is in the form of a cylinder, roll, or hollow article.

152 Sheet, plate, or foil:
This subclass is indented under subclass 149. Subject matter wherein the substrate is in the form of a sheet, plate, or foil.

SEE OR SEARCH THIS CLASS, SUBCLASS:

150, and 161, for sheets of perforated, foraminous or permeable structure.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 150 and 151 for laminating processes combined with a Class 204 or Class 205 coating step.

428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product in the form of a composite or plural component web or sheet and not elsewhere provided for. See also Lines With Other Classes and Within This Classin Class 428, for further discussion of this topic.

153 Predominantly aluminum substrate:
This subclass is indented under subclass 152. Subject matter wherein elemental aluminum is the major or predominant constituent of the substrate.

154 Tin-containing coating:
This subclass is indented under subclass 152. Subject matter wherein the coating contains tin in either free or combined form.

155 Zinc-containing coating:
This subclass is indented under subclass 152. Subject matter wherein the coating contains zinc in either free or combined form.

156 Chromium-containing coating:
This subclass is indented under subclass 152. Subject matter wherein the coating contains chromium in either free or combined form.

157 Coating predominantly semiconductor substrate (e.g., silicon, compound semiconductor, etc.):
This subclass is indented under subclass 80. Subject matter wherein the major or predominant constituent of the substrate is a semiconductor.

(1) Note. See subclass 123, (1) Note, for the definition of a semiconductor.

(2) Note. This subclass includes processes of electrolytic coating, per se, on a semiconductor material and combinations of electrolytic coating with an additional step or steps which are preparatory treatments that adapt the material for electrolytic coating or which perfect the electrolytic coating.

SEE OR SEARCH CLASS:

438, Semiconductor Device Manufacturing: Process, for (a) combined processes and (b) certain unit operations of manufacturing a semiconductive substrate or device.

158 Coating a substrate predominantly comprised of nonconductive material to which conductive material or material which can be converted into conductive material has been added (e.g., nonconductive polymer substrate containing carbon or copper oxide particles, etc.):
This subclass is indented under subclass 80. Subject matter wherein the substrate predominantly comprises a mixture of a first material the electrical conductivity of which is insufficient to allow it to carry adequate current to be directly electroplated and a second material which is electrically conductive or can be treated to make it electrically conductive.

(1) Note. The substrate may be a homogeneous mixture of the first and second material or the second material may be present only at or near the surface of the substrate.

(2) Note. Coating with a conductive material is excluded and placed below, see subclasses 163 and 165-169.

159 Coating predominantly nonmetal substrate:
This subclass is indented under subclass 80. Subject matter wherein the major or predominant constituent of the substrate is a nonmetal.

160 Fabric substrate:
This subclass is indented under subclass 159. Subject matter wherein the substrate is in the form of a fabric.

(1) Note. For coating of metallic wire cloth, see this class, subclass 150.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 175+, 190, 193, and 196+ for a stock material product embodying mechanically interengaged strands and strand portions (e.g., weave, knit, etc.). See also Lines With Other Classes and Within This Class, in Class 428, for further discussion of this topic.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated fabric.

161 Perforated, foraminous, or permeable substrate:
This subclass is indented under subclass 159. Subject matter wherein the substrate is perforated, foraminous, or permeable.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 131+ and 596+ for a stock material product in which a component includes apertures. See also Lines With Other Classes and Within This Class, in Class 428, for further discussion of this topic.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 1+ for a knitted or open mesh fabric.

162 Ceramic or glass substrate:
This subclass is indented under subclass 159. Subject matter wherein the major or predominant constituent of the substrate is a ceramic or glass.

163 Conductive material applied to substrate by painting, spraying, or immersion (e.g., electroless plating, etc.):
This subclass is indented under subclass 162. Subject matter wherein conductive material is applied to the substrate by painting, spraying, or immersion before the substrate is electrolytically coated.

164 Synthetic resin substrate:
This subclass is indented under subclass 159. Subject matter wherein the major or predominant constituent of the substrate is a synthetic resin.

165 Conductive material applied to substrate by vacuum or vapor deposition:
This subclass is indented under subclass 164. Subject matter wherein conductive material is applied to the substrate by vacuum or vapor deposition before the substrate is electrolytically coated.

166 Conductive material applied to substrate by painting, spraying, or immersion:
This subclass is indented under subclass 164. Subject matter wherein conductive material is applied to the substrate by painting, spraying, or immersion before the substrate is electrolytically coated.

167 Conductive material applied to substrate by plating from bath containing metal ions and reducing agent (e.g., electroless plating, etc.):
This subclass is indented under subclass 164. Subject matter wherein conductive material is applied to the substrate by plating from a bath containing metal ions and a reducing agent before the substrate is electrolytically coated.

168 Resin contains etchable filler:
This subclass is indented under subclass 167. Subject matter wherein the synthetic resin contains a filler material which may be at least partially removed by etching.

169 Conductive material is copper or nickel:
This subclass is indented under subclass 167. Subject matter wherein the major or predominant constituent of the conductive material is copper or nickel.

170 Forming multiple superposed electrolytic coatings:
This subclass is indented under subclass 80. Subject matter wherein a plurality of distinct superposed electrolytic coatings are formed on a substrate.

(1) Note. A single coat, layer, or film built up of a series of substantially identical coatings, one superimposed or added to the other or others, is not placed here but may be found in the appropriate subclass dependent upon the composition of the layer or coat formed. For example, a process of coating copper on a rotating surface that is repeatedly immersed in the electrolyte and withdrawn will be found in subclass 143 even though a great number of thin films join together to form one distinct coat.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, appropriate subclasses for stock material or articles having adjacent metal layers.

171 At least one anodic coating:
This subclass is indented under subclass 170. Subject matter wherein one or more of the coatings consists essentially of an anodic coating or in which the anodic composition is an essential constituent.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclass 628 for composite metallic stock material having an additional nonmetal component which is a compound of an adjacent metal.

172 Predominantly aluminum substrate:
This subclass is indented under subclass 171. Subject matter wherein the substrate coated is predominantly aluminum (e.g., pure aluminum or an alloy in which the predominant ingredient is aluminum, etc.).

173 Electrolytically depositing material only within or above pores of anodic coating (e.g., electrolytic coloring, etc.):
This subclass is indented under subclass 172. Subject matter wherein material is electrolytically deposited only within or above the pores of a porous anodic coating (e.g., electrolytically depositing pigment material in the pores, etc.).

174 Multiple anodic coatings:
This subclass is indented under subclass 173. Subject matter wherein multiple anodic coatings are formed.

175 Multiple anodic coatings:
This subclass is indented under subclass 171. Subject matter wherein multiple anodic coatings are formed.

176 At least one alloy coating:
This subclass is indented under subclass 170. Subject matter wherein one of the coatings consists essentially of an alloy (e.g. brass, bronze, etc.).

(1) Note. The coating must be alloy as deposited form the bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for subject matter wherein the coating forms an alloy as a result of a heat treatment.

177 At least one predominantly zinc metal coating:
This subclass is indented under subclass 170. Subject matter wherein one of the coatings is predominantly zinc.

178 At least one chromium-containing coating:
This subclass is indented under subclass 170. Subject matter wherein one of the coatings contains chromium in the free metal or combined state (e.g., chromium, chromate, chromium oxide, etc.).

179 Multiple chromium-containing coatings:
This subclass is indented under subclass 178. Subject matter wherein more than one of the coatings contain chromium in the free metal or combined state.

180 At least one predominantly nickel metal coating:
This subclass is indented under subclass 178. Subject matter wherein one of the coatings is predominantly nickel metal (e.g., Cu-Ni-Cr, etc.).

181 At least one predominantly nickel metal coating:
This subclass is indented under subclass 170. Subject matter wherein at least one of the coatings is predominantly nickel metal.

182 At least one predominantly copper metal coating:
This subclass is indented under subclass 170. Subject matter wherein at least one of the coatings is predominantly copper metal.

183 Forming nonelectrolytic coating before depositing predominantly single metal or alloy electrolytic coating:
This subclass is indented under subclass 80. Subject matter wherein a permanent coating is formed by a nonelectrolytic coating process before a predominantly single metal or alloy coating is deposited by an electrolytic coating process.

(1) Note. For this subclass and those indented hereunder a permanent coating is considered to comprise any material deposited on the substrate that remains as part of the finished article.

184 Nonelectrolytic coating or coatings all contain single metal or alloy:
This subclass is indented under subclass 183. Subject matter wherein the nonelectrolytic coating or each one of multiple superposed nonelectrolytic coatings at least partially comprises a single metal or alloy.

185 Nonelectrolytic coating from zincate or stannate bath:
This subclass is indented under subclass 184. Subject matter wherein a zincate or stannate bath is utilized to form a nonelectrolytic coating.

186 Nonelectrolytic coating by vacuum or vapor deposition:
This subclass is indented under subclass 184. Subject matter wherein a nonelectrolytic coating is formed by vacuum or vapor deposition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
165, for processes of applying conductive material to a synthetic resin substrate by vacuum or vapor deposition before depositing electrolytic coating.

187 Nonelectrolytic coating by plating from bath containing metal ions and reducing agent (e.g., electroless plating, etc.):
This subclass is indented under subclass 184. Subject matter wherein a nonelectrolytic coating is formed by plating from a bath containing metal ions and a reducing agent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167+, for processes of applying conductive material to a synthetic resin substrate by plating from a bath containing metal ions and reducing agent before depositing electrolytic coating.

188 Forming nonelectrolytic coating before forming nonmetal electrolytic coating:
This subclass is indented under subclass 80. Subject matter wherein a permanent coating is formed by a nonelectrolytic coating process before a nonmetal coating is formed by an electrolytic coating process.

(1) Note. For this subclass and those indented hereunder a permanent coating is considered to comprise any material deposited on the substrate that remains as part of the finished article.

189 Predominantly titanium, vanadium, zirconium, niobium, hafnium, or tantalum nonelectrolytic coating:
This subclass is indented under subclass 188. Subject matter wherein the major or predominant constituent of the nonelectrolytic coating is elemental titanium, vanadium, zirconium, niobium, hafnium, or tantalum.

190 Predominantly aluminum nonelectrolytic coating:
This subclass is indented under subclass 188. Subject matter wherein elemental aluminum is the major or predominant constituent of the nonelectrolytic coating.

191 Forming nonelectrolytic coating after depositing predominantly single metal or alloy electrolytic coating:
This subclass is indented under subclass 80. Subject matter wherein a permanent coating is formed by a nonelectrolytic coating process after a predominantly single metal or alloy coating is deposited by an electrolytic coating process.

(1) Note. For this subclass and those indented hereunder a permanent coating is considered to comprise any material deposited on the substrate that remains as part of the finished article.

192 Nonelectrolytic coating by vacuum or vapor deposition of a predominantly single metal or alloy coating:
This subclass is indented under subclass 191. Subject matter wherein a predominantly single metal or alloy nonelectrolytic coating is formed by vacuum or vapor deposition.

193 Nonelectrolytic coating by immersion in bath of molten metal to form predominantly single metal or alloy coating (e.g., hot dipping, etc.):
This subclass is indented under subclass 191. Subject matter wherein a predominantly single metal or alloy nonelectrolytic coating is formed by immersion in a bath of molten metal.

194 Nonelectrolytic coating is predominantly nonmetal:
This subclass is indented under subclass 191. Subject matter wherein the major or predominant constituent of a nonelectrolytic coating is a nonmetal.

195 Nonelectrolytic coating is ceramic, glass, or vitreous enamel:
This subclass is indented under subclass 194. Subject matter wherein the major or predominant constituent of a nonelectrolytic coating is a ceramic, a glass, or a vitreous enamel.

196 Nonelectrolytic coating is predominantly organic material (e.g., paint, etc.):
This subclass is indented under subclass 194. Subject matter wherein an organic material is the major or predominant constituent of a nonelectrolytic coating.

197 Nonelectrolytic coating is phosphorus- or chromium-containing (e.g., phosphate, chromate, etc.):
This subclass is indented under subclass 194. Subject matter wherein the major or predominant constituent of a nonelectrolytic coating is a phosphorus-containing or chromium-containing material.

198 Forming nonelectrolytic coating after forming nonmetal electrolytic coating:
This subclass is indented under subclass 80. Subject matter wherein a permanent coating is formed by a nonelectrolytic coating process after a nonmetal coating is formed by an electrolytic coating process.

(1) Note. For this subclass and those indented hereunder a permanent coating is considered to comprise any material deposited on the substrate that remains as part of the finished article.

199 Electrolytic coating is oxygen-containing (e.g., chromate, silicate, oxide formed by anodizing, etc.):
This subclass is indented under subclass 198. Subject matter wherein the electrolytic coating is an oxygen-containing material.

200 Predominantly titanium, vanadium, zirconium, niobium, hafnium, or tantalum substrate:
This subclass is indented under subclass 199. Subject matter wherein the major or predominant constituent of the substrate is elemental titanium, vanadium, zirconium, niobium, hafnium, or tantalum.

201 Predominantly aluminum substrate:
This subclass is indented under subclass 199. Subject matter wherein elemental aluminum is the major or predominant constituent of the substrate.

202 Nonelectrolytic coloring (including nonelectrolytic coloring and sealing):
This subclass is indented under subclass 201. Subject matter wherein color is imparted to the substrate by the deposition of material by a nonelectrolytic coating process.

(1) Note. Processes which include both nonelectrolytic coloring and sealing are included herein.

203 Sealing:
This subclass is indented under subclass 201. Subject matter wherein the oxide-containing coating on the aluminum substrate is sealed by the incorporation of material into the oxide-containing coating by a nonelectrolytic coating process.

(1) Note. Sealing by subjecting the substrate to an aqueous environment at an elevated temperature is included herein.

204 Sealing agent includes organic constituent:
This subclass is indented under subclass 203. Subject matter wherein the nonelectrolytic coating process utilizes a sealing agent which includes an organic constituent.

205 Treating substrate prior to coating:
This subclass is indented under subclass 80. Subject matter wherein one or more preliminary preparatory treatments of the substrate to be coated are performed.

(1) Note. For this subclass, and those indented hereunder a substrate is considered to be the object to be coated prior to the execution of any positively recited coating step.

(2) Note. Processes which include the formation of a temporary coating which is completely removed prior to the formation of a permanent coating are included herein.

(3) Note. The preliminary preparatory treatments of the substrate do not result in the deposition of material that remains as part of the finished article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

640+, for electrolytic erosion of a workpiece to change the shape or surface thereof (e.g., etching, polishing, etc.).

687+, for other electrolytic material treatment, especially subclasses 705+ for electrolytic removal of foreign material from a metal or metal alloy (e.g., cleaning, etc.), per se.

206 Contacting substrate with solid member or material (e.g., polishing, rolling, etc.):
This subclass is indented under subclass 205. Subject matter wherein the substrate is contacted with a solid member or material prior to coating.

207 Heating substrate:
This subclass is indented under subclass 206. Subject matter wherein the substrate is heated prior to coating.

(1) Note. The substrate may be heated prior to, simultaneous with or subsequent to the contact with the solid member or material.

208 Blasting substrate with particulate material:
This subclass is indented under subclass 205. Subject matter wherein the substrate is impacted with particulate material prior to coating.

209 Heating substrate other than by contact with liquid:
This subclass is indented under subclass 205. Subject matter wherein the substrate is heated prior to coating by a method which utilizes means other than contacting with a liquid.

(1) Note. Processes which include cooling the substrate subsequent to heating but prior to coating are included herein.

210 Treating substrate with liquid other than tap water (e.g., for removing foreign material, etching, activating, etc.):
This subclass is indented under subclass 205. Subject matter wherein the substrate is treated with a liquid other than tap water prior to coating.

SEE OR SEARCH CLASS:

134, Cleaning and Liquid Contact With Solids, for methods of cleaning in general.

216, Etching a Substrate: Processes, for etching processes.

211 Liquid is nonaqueous (e.g., hydrocarbon solvent, fused bath, etc.):

This subclass is indented under subclass 210. Subject matter wherein the liquid with which the substrate is treated does not contain water.

212 Predominantly titanium, vanadium, zirconium, niobium, hafnium, tantalum, molybdenum, or tungsten substrate:

This subclass is indented under subclass 210. Subject matter wherein the major or predominant constituent of the substrate is elemental titanium, vanadium, zirconium, niobium, hafnium, tantalum, molybdenum, or tungsten.

213 Predominantly aluminum substrate:

This subclass is indented under subclass 210. Subject matter wherein elemental aluminum is the major or predominant constituent of the substrate.

214 Graining or roughening chemically or electrolytically:

This subclass is indented under subclass 213. Subject matter wherein the substrate is either chemically or electrolytically grained or roughened.

215 Predominantly copper, zinc, or tin substrate:

This subclass is indented under subclass 210. Subject matter wherein the major or predominant constituent of the substrate is copper, zinc, or tin.

216 Predominantly cobalt or nickel substrate:

This subclass is indented under subclass 210. Subject matter wherein the major or predominant constituent of the substrate is cobalt or nickel.

217 Predominantly iron or steel substrate:

This subclass is indented under subclass 210. Subject matter wherein elemental iron is the major or predominant constituent of the substrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

712+, for electrolytic removal of nonelemental foreign material from a ferrous metal (e.g., cleaning a ferrous metal, etc.), per se.

218 Steel containing chromium or nickel (e.g., stainless steel, etc.):

This subclass is indented under subclass 217. Subject matter wherein the substrate is predominantly iron which contains elemental chromium or nickel.

219 Electrolytic treatment:

This subclass is indented under subclass 210. Subject matter wherein the substrate is treated electrolytically prior to coating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

704+, for electrolytic treatment of a metal or metal alloy, in general.

220 Treating electrolytic or nonelectrolytic coating after it is formed:

This subclass is indented under subclass 80. Subject matter wherein an electrolytic or a nonelectrolytic coating is treated subsequent to its formation to produce a modification of or change in character of the coating as distinguished from subsequent treatment of the object on which the coating is placed.

(1) Note. If a nonelectrolytic coating is treated, a step of electrolytic coating must precede the step of forming the nonelectrolytic coating or follow the treatment step.

221 Selected area:

This subclass is indented under subclass 220. Subject matter wherein only a restricted selected area of the coating is treated, the restricted or selected area including less than the total surface area of the coating.

222 Contacting with solid member or material (e.g., buffing, burnishing, polishing, etc.):

This subclass is indented under subclass 220. Subject matter wherein the coating is contacted with a solid member or material.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 90.01+ for burnishing in general.

223 Etching of coating:
This subclass is indented under subclass 220. Subject matter wherein the coating is etched.

SEE OR SEARCH THIS CLASS, SUBCLASS:
221, for process in which only a restricted or selected area of the coating is etched.

SEE OR SEARCH CLASS:
216, Etching a Substrate: Processes, for methods of etching glass, per se. See the SEARCH CLASS notes thereunder.

224 Heating:
This subclass is indented under subclass 220. Subject matter wherein the coating is heated.

SEE OR SEARCH CLASS:
148, Metal Treatment, particularly subclass 518 for processes of treating a metal substrate in the solid or semi-solid state by a heating or cooling treatment to modify or maintain the internal physical structure (i.e., microstructure) or chemical properties of the metal. See Class 148, Lines With Other Classes and Within This Class for the line to Class 204.

(1) Note. Class 205 will take electrocoating processes that result in a metal layer formed or in metal being electrocoated by another material and combinations of electrocoating with other chemical treating operations that (a) involve preparatory treatment of metal substrates including heat-treatment which if claimed alone would be proper for Class 148 and (b) post-treatment solely of the electrocoated layer including heat-treatment which if claimed alone would be proper for Class 148. However, if the subsequent treatment modifies the original substrate or a combination of the original substrate and the electrocoated layer, placement will go elsewhere, including Class 148, if the other criteria for Class 148 are met.

(2) Note. Interdiffusion of the electrocoated layer occurring during the coating operation or during the post-treatment operation is proper for Class 205 if limited to the interfacial region between the coating and the substrate, as a perfecting of the bond between the coating and the substrate. If the electrocoated layer is completely melted in the post-treatment operation to perfect the bonding of the coating, this is proper for Class 205. If multiple electrocoated regions are inter diffused to the extent of completely alloying with the loss of coating layer identity, but not substrate identity, this is proper for Class 205. However, if the coating is completely interdiffused into a metal substrate to completely alloy the substrate, leaving no identifying layer on the substrate, placement goes to Class 148.

225 Tin-containing coating:
This subclass is indented under subclass 224. Subject matter wherein the coating contains tin.

226 Coating is fused (e.g., reflowing, flow brightening, etc.):
This subclass is indented under subclass 225. Subject matter wherein sufficient heat is applied to cause the tin-containing coating to melt.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclass 941 (a cross-reference art collection) for material produced by solid state alloying, e.g., diffusion, to the disappearance of an original layer.

227 Single metal or alloy coating on single metal or alloy substrate:

This subclass is indented under subclass 224. Subject matter wherein the coating or each one of multiple superposed coatings is predominantly comprised of a single metal or alloy and the substrate is also predominantly comprised of a single metal or alloy.

228 Coating is at least partially diffused or forms alloy:

This subclass is indented under subclass 227. Subject matter wherein sufficient heat is applied to at least partially diffuse coating material into an adjacent coating material, the substrate or both, or to cause the formation of an alloy of coating material.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 941 (a cross-reference art collection) for material produced by solid state alloying, e.g., diffusion, to the disappearance of an original layer.

229 Predominantly nonmetal electrolytic coating:

This subclass is indented under subclass 220. Subject matter wherein the major or predominant constituent of the coating is a nonmetal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

203, for subject matter wherein an oxide-containing coating on an aluminum substrate is sealed.

230 Utilizing fused bath:

This subclass is indented under subclass 80. Subject matter wherein a nonaqueous electrolyte bath which is a substance or combination or mixture of substances which is heated above ordinary normal room temperature during the electrolysis in order to bring it to a fluid or liquid condition is utilized.

(1) Note. These processes are usually performed at high temperatures.

SEE OR SEARCH THIS CLASS, SUBCLASS:

354+, for processes of electrolytic synthesis from fused bath.

231 Reactive coating (e.g., by diffusion, etc.):

This subclass is indented under subclass 230. Subject matter wherein a coating is formed by the reaction of a constituent of the substrate being coated with a constituent of the fused bath (e.g., boron diffuses into and reacts with iron of a steel substrate to form an iron-boride layer, etc.).

232 Depositing predominantly alloy coating:

This subclass is indented under subclass 230. Subject matter wherein the coating is predominantly an alloy.

(1) Note. The coating must be an alloy as deposited from the bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:

228, for subject matter wherein the coating forms an alloy as the result of a heat treatment.

233 Depositing aluminum coating:

This subclass is indented under subclass 230. Subject matter wherein the coating consists essentially of aluminum.

234 Utilizing nonaqueous bath:

This subclass is indented under subclass 80. Subject matter wherein an electrolyte bath containing no water is employed in the electrolytic coating process (e.g., a hydrocarbon solvent bath, etc.).

(1) Note. This subclass is intended to take water-free baths using solvents such as alcohol, amines, ethers, etc.

235 Coating is predominantly organic material:

This subclass is indented under subclass 234. Subject matter wherein the coating consists of a material which is predominantly organic (e.g., polymer coating, etc.).

236 Depositing predominantly alloy coating:
This subclass is indented under subclass 234. Subject matter wherein the coating is predominantly an alloy.

(1) Note. The coating must be an alloy as deposited from the bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for subject matter wherein the coating forms an alloy as the result of heat treatment.

237 Depositing aluminum coating:
This subclass is indented under subclass 234. Subject matter wherein the coating consists essentially of aluminum.

238 Depositing predominantly alloy coating:
This subclass is indented under subclass 80. Subject matter wherein the coating is predominantly an alloy.

(1) Note. The coating must be an alloy as deposited from the bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for subject matter wherein the coating forms an alloy as the result of a heat treatment.

239 Copper-containing alloy:
This subclass is indented under subclass 238. Subject matter wherein the alloy contains metallic copper (i.e., copper in the free uncombined state) as one of the essential constituents.

SEE OR SEARCH THIS CLASS, SUBCLASS:
291+, for processes of electrolytically coating with copper.

240 Including zinc (e.g., brass, etc.):
This subclass is indented under subclass 239. Subject matter wherein the copper-containing alloy also contains metallic zinc as one of the essential constituents.

241 Including tin (e.g., bronze, etc.):
This subclass is indented under subclass 239. Subject matter wherein the copper-containing alloy also contains metallic tin as one of the essential constituents.

242 Including noble metal (e.g., gold-copper-cadmium alloy, etc.):
This subclass is indented under subclass 239. Subject matter wherein the copper-containing alloy also contains a noble metal (i.e., Au, Ag, and Platinum group metal) as an essential constituent.

243 Chromium is predominant constituent:
This subclass is indented under subclass 238. Subject matter wherein the alloy contains metallic chromium as the major or predominant constituent (e.g., 40% Cr - 30% Fe - 30% Ni etc.).

244 Zinc is predominant constituent:
This subclass is indented under subclass 238. Subject matter wherein the alloy contains metallic zinc as the predominant or major constituent (e.g., 70% Zn - 30% Cd, etc.).

245 Including iron group metal (i.e., Fe, Co, or Ni):
This subclass is indented under subclass 244. Subject matter wherein the zinc alloy also contains metallic iron group metal or metals as essential constituent(s) (e.g., 70% Zn - 30% Fe, 50% Zn - 20%Fe - 30% Co, etc.).

246 Nickel:
This subclass is indented under subclass 245. Subject matter wherein the iron group metal is or wherein the iron group metals include nickel (e.g., 70% Zn - 20%Ni - 10% Co, etc.).

247 Gold is predominant constituent:
This subclass is indented under subclass 238. Subject matter wherein the alloy contains gold as the predominant or major constituent (e.g., 60% Au - 40% Ag, etc.).

248 Utilizing sulfite-containing bath:
This subclass is indented under subclass 247. Subject matter wherein the electrolyte bath contains a source of sulfite as an essential ingredient.

249 Utilizing phosphonic or phosphinic acid or derivative-containing bath:
This subclass is indented under subclass 247. Subject matter wherein the electrolyte bath contains a source of phosphonic acid or phosphinic acid or a derivative thereof (e.g., sodium phosphonate, ethylene diamine tetraphosphonic acid, etc.).

250 Including iron group metal:
This subclass is indented under subclass 247. Subject matter wherein the alloy includes an iron group metal (i.e., Fe, Ni, or Co) as an essential constituent.

251 Including arsenic, indium, or thallium:
This subclass is indented under subclass 247. Subject matter wherein the alloy contains arsenic indium or thallium as an essential constituent.

252 Tin, lead, or germanium is predominant constituent:
This subclass is indented under subclass 238. Subject matter wherein tin, lead, or germanium is the major or predominant alloy constituent.

253 Utilizing organic compound-containing bath:
This subclass is indented under subclass 252. Subject matter wherein the electrolyte bath contains an organic compound as an essential ingredient (e.g., peptone, glue, etc.).

254 Organic sulfoxy-containing:
This subclass is indented under subclass 253. Subject matter wherein the organic compound contains a sulfoxy group(sulfur bonded to at least one oxygen) (e.g., benzyl sulfonic acid, sodium naphthalene sulfonate, etc.).

255 Group VIII metal is predominant constituent (i.e., Fe, Co, Ni, Pt, Pd, Rh, Ru, Ir, or Os):
This subclass is indented under subclass 238. Subject matter wherein a group VIII metal (i.e., Fe, Co, Ni, Pt, Pd, Rh, Ru, Ir, or Os) is the major or predominant constituent in the alloy.

256 Utilizing specified anode:
This subclass is indented under subclass 255. Subject matter wherein a specific anode is used in the process (e.g., Ni-Co alloy anode, platinum anode, etc.).

257 Platinum group metal-containing alloy (i.e., contains Pt, Pd, Rh, Ru, Ir, or Os):
This subclass is indented under subclass 255. Subject matter wherein the alloy contains a platinum group metal (i.e., Pt, Pd, Rh, Ru, Ir, or Os) as an essential constituent.

258 Phosphorus-containing alloy:
This subclass is indented under subclass 255. Subject matter wherein the alloy contains phosphorus as an essential ingredient.

259 Utilizing organic compound-containing bath:
This subclass is indented under subclass 255. Subject matter wherein the electrolyte bath contains an organic compound as an essential ingredient.

260 Organic sulfoxy-containing:
This subclass is indented under subclass 259. Subject matter wherein the organic compound contains a sulfoxy group (e.g., butyne sulfonic acid, sodium naphthalene sulfonate, etc.).

261 Depositing predominantly single metal coating:
This subclass is indented under subclass 80. Subject matter for coating predominantly with a single metallic element (e.g., indium, etc.).

262 Group VIIB transition metal (i.e., Mn, Tc, or Re):
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of manganese, technetium, or rhenium.

(1) Note. Technetium is also known by the names eka-manganese and masurium.

263 Silver:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of silver.

264 Platinum group metal:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of a platinum group metal (i.e., Pt, Pd, Rh, Ru, Ir, or Os).

265 Palladium:
This subclass is indented under subclass 264. Subject matter wherein the single platinum group metal consists essentially of palladium.

266 Gold:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of gold.

267 Utilizing organic compound-containing bath:
This subclass is indented under subclass 266. Subject matter wherein the electrolyte bath contains an organic compound as an essential ingredient.

268 Inorganic cyanide-containing:
This subclass is indented under subclass 267. Subject matter wherein the electrolyte bath contains a source of inorganic cyanide (e.g., sodium cyanide, sodium gold cyanide, etc.).

269 Cobalt:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of cobalt.

270 Iron:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of iron.

271 Nickel:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of nickel.

272 Utilizing specified anode:
This subclass is indented under subclass 271. Subject matter wherein a specified anode (e.g., particular alloy, defined structure, etc.) is used.

273 Utilizing sulfamate-containing bath:
This subclass is indented under subclass 271. Subject matter wherein the electrolyte bath contains sulfamic ions.

274 Utilizing organic sulfoxy compound-containing bath:
This subclass is indented under subclass 271. Subject matter wherein the electrolyte bath contains an organic compound having a sulfoxy group (e.g., naphthalene sulfonic acid, etc.).

275 And acetylenic compound-containing:
This subclass is indented under subclass 274. Subject matter wherein the electrolyte bath also contains an organic compound which has an acetylenic bond (i.e., -CC-) (e.g., 1,4-dihydroxy-2 butyne, etc.).

276 And polyether-containing:
This subclass is indented under subclass 274. Subject matter wherein the electrolyte bath also contains a polyether compound (e.g., having $(C_xH_{2x}0)_y$ groups wherein "y" is an integer greater than 1, etc.).

277 And nitrogen-heterocyclic compound-containing
This subclass is indented under subclass 274. Subject matter wherein the electrolyte bath also contains an organic compound having a nitrogen containing heterocyclic ring.

278 Utilizing oxygen-heterocyclic compound-containing bath:
This subclass is indented under subclass 271. Subject matter wherein the electrolyte bath contains an organic compound having an oxygen containing heterocyclic ring (e.g., coumarin, etc.).

279 Utilizing nitrogen-heterocyclic compound-containing bath:
This subclass is indented under subclass 271. Subject matter wherein the electrolyte bath contains an organic compound having a nitrogen containing heterocyclic ring.

280 Utilizing organic carbonyl compound-containing bath:
This subclass is indented under subclass 271. Subject matter wherein the electrolyte bath contains an organic compound having a carbonyl group (e.g., acetic acid, ketone, aldehyde, etc.).

281 Cadmium:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of cadmium.

282 Utilizing inorganic cyanide-containing bath:
This subclass is indented under subclass 281. Subject matter wherein the electrolyte bath contains a source of inorganic cyanide (e.g., sodium cyanide, potassium cadmium cyanide, etc.).

283 Chromium:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of chromium.

284 Utilizing specified anode:
This subclass is indented under subclass 283. Subject matter wherein a specified anode (e.g., particular alloy special structure, etc.) is used.

285 Colored chromium coating:
This subclass is indented under subclass 283. Subject matter wherein the chromium deposit is described as colored (e.g., black, yellow, blue, iridescent, etc.).

286 Utilizing inorganic fluorine-containing bath:
This subclass is indented under subclass 283. Subject matter wherein the electrolyte bath contains a source of inorganic fluorine (e.g., sodium fluoride, etc.).

287 Utilizing trivalent chromium-containing bath:
This subclass is indented under subclass 283. Subject matter wherein the chromium is present in the bath at least partially in the trivalent state.

288 Thiocyanate-containing:
This subclass is indented under subclass 287. Subject matter wherein the trivalent chromium containing bath also contains a source of thiocyanic ions (i.e., -SCN).

289 Organic carboxyl compound-containing:
This subclass is indented under subclass 287. Subject matter wherein the trivalent chromium-containing bath also contains an organic compound having a carboxyl group (e.g., formic acid, acetic acid, etc.).

290 Utilizing organic compound-containing bath:
This subclass is indented under subclass 283. Subject matter wherein the electrolyte bath contains an organic compound.

291 Copper:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of copper.

292 Utilizing specified anode:
This subclass is indented under subclass 291. Subject matter wherein a specified anode (e.g., particular alloy, defined structure, etc.) is used.

293 Utilizing inorganic cyanide-containing bath:
This subclass is indented under subclass 291. Subject matter wherein the electrolyte bath contains a source of inorganic cyanide ion (e.g., sodium cyanide, potassium copper cyanide, etc.).

294 Selenium or tellurium containing:
This subclass is indented under subclass 293. Subject matter wherein the electrolyte bath also contains selenium or tellurium as a constituent thereof (e.g., sodium selenide, tellurium sulfate, etc.).

295 Utilizing alkaline bath:
This subclass is indented under subclass 291. Subject matter wherein the electrolyte bath has a pH of over 7.

296 Utilizing organic compound-containing bath:
This subclass is indented under subclass 291. Subject matter wherein the electrolyte bath contains an organic compound.

297 Nitrogen-heterocyclic compound-containing:
This subclass is indented under subclass 296. Subject matter wherein the organic compound contains a nitrogen containing heterocyclic ring.

298 And organic sulfur compound-containing:
This subclass is indented under subclass 297. Subject matter wherein the electrolyte bath also contains an organic compound having sulfur as a constituent thereof (e.g., sulfonic acid, etc.).

299 Lead:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of lead.

SEE OR SEARCH THIS CLASS, SUBCLASS:
597+, for electrolytic synthesis of lead from an aqueous bath.

300 Tin:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of tin.

SEE OR SEARCH THIS CLASS, SUBCLASS:
610+, for electrolytic synthesis of tin from an aqueous bath.

301 Utilizing alkaline bath:
This subclass is indented under subclass 300. Subject matter wherein the electrolyte bath has a pH of over 7.

302 Utilizing organic compound-containing bath:
This subclass is indented under subclass 300. Subject matter wherein the electrolyte bath contains an organic compound.

303 Organic carbonyl compound-containing:
This subclass is indented under subclass 302. Subject matter wherein the organic compound contains a carbonyl group as a constituent thereof (e.g., carboxylic acid, ketone, etc.).

304 Aldehyde-containing:
This subclass is indented under subclass 303. Subject matter wherein the organic compound is an aldehyde or contains an aldehyde group (e.g., formaldehyde, benzaldehyde, etc.).

305 Zinc:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of zinc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
602+, for electrolytic synthesis of zinc from an aqueous bath.

306 Utilizing inorganic cyanide-containing bath:
This subclass is indented under subclass 305. Subject matter wherein the electrolyte bath contains a source of inorganic cyanide (e.g., sodium cyanide, potassium zinc cyanide, etc.).

307 Nitrogen-heterocyclic compound-containing:
This subclass is indented under subclass 306. Subject matter wherein the electrolyte bath also contains an organic compound having a nitrogen containing heterocyclic ring.

308 Organic carbonyl compound-containing:
This subclass is indented under subclass 306. Subject matter wherein the electrolyte bath also contains an organic compound having a carbonyl group as a constituent thereof (e.g., carboxylic acid, ketone, aldehyde, etc.).

309 Utilizing alkaline bath:
This subclass is indented under subclass 305. Subject matter wherein the electrolyte bath has a pH of over 7.

310 Nitrogen-heterocyclic compound-containing:
This subclass is indented under subclass 309. Subject matter wherein the electrolyte bath contains an organic compound having a nitrogen-heterocyclic ring as a constituent thereof.

311 Utilizing organic compound-containing bath:
This subclass is indented under subclass 305. Subject matter wherein the electrolyte bath contains an organic compound.

312 Nitrogen-heterocyclic compound-containing:
This subclass is indented under subclass 311. Subject matter wherein the organic compound contains a nitrogen-heterocyclic ring as a constituent thereof.

313 Organic sulfur compound-containing:
This subclass is indented under subclass 311. Subject matter wherein the organic compound contains sulfur as a constituent thereof (e.g., sulfonic acid, etc.).

314 Organic carbonyl compound-containing:
This subclass is indented under subclass 311. Subject matter wherein the organic compound contains a carbonyl group.

315 Antimony:
This subclass is indented under subclass 261. Subject matter wherein the single metal consists essentially of antimony.

316 Forming nonmetal coating:
This subclass is indented under subclass 80. Subject matter for the electrolytic production of coatings which contain nonmetal material which has been electrolytically produced (e.g., anodic oxide, etc.).

(1) Note. Certain nonmetallics may variously be semiconductive. Examples of such include (but are not limited to) selenium, tellurium, silicon carbide, diamond, copper oxide, etc. However, without positive recitation that a nonmetallic material is semiconductive, placement is proper hereunder.

SEE OR SEARCH THIS CLASS, SUBCLASS:
123, for electrolytic coating a selected area on a semiconductor substrate.
157, for electrolytic coating of a semiconductor substrate.

SEE OR SEARCH CLASS:
438, Semiconductor Device Manufacturing: Process, for (a) combined processes and (b) certain unit operations of manufacturing a semiconductive substrate or device.

317 Coating is predominantly organic material:
This subclass is indented under subclass 316. Subject matter wherein the nonmetal material is predominantly organic.

318 Phosphorus-containing coating (e.g., phosphate, etc.):
This subclass is indented under subclass 316. Subject matter wherein the nonmetal containing coating comprises phosphorus as an essential constituent thereof.

319 Chromium-containing coating (e.g., chromate, etc.):
This subclass is indented under subclass 316. Subject matter wherein the nonmetal containing coating comprises chromium as an essential constituent thereof.

320 Predominantly iron or steel substrate:
This subclass is indented under subclass 316. Subject matter wherein the nonmetal coating is formed on an article having an iron or steel surface.

321 Predominantly magnesium substrate:
This subclass is indented under subclass 316. Subject matter wherein the nonmetal coating is formed on an article having a surface of magnesium or an alloy having magnesium as the predominant constituent thereof.

322 Predominantly titanium, vanadium, zirconium, niobium, hafnium, or tantalum substrate:
This subclass is indented under subclass 316. Subject matter wherein the nonmetal coating is formed on an article having a surface of titanium, tantalum, zirconium, niobium (columbium), hafnium, or vanadium or an alloy having one of these metals as the predominant constituent thereof.

323 Predominantly aluminum substrate:
This subclass is indented under subclass 316. Subject matter wherein the nonmetal coating is formed on an article having a surface of aluminum or an alloy having aluminum as the predominant constituent thereof.

SEE OR SEARCH CLASS:
29, Metal Working, subclass 25.03 for processes for the production of barrier layer electrolytic type devices and subclasses 25.41+ for processes for the production of electric condensers.
252, Compositions, subclass 62.2 for electrolytes for electrolytic condensers or rectifiers.
361, Electricity: Electrical Systems and Devices, subclasses 500+ for electrolytic condensers or rectifiers.

324 Anodizing:
This subclass is indented under subclass 323. Subject matter wherein the nonmetal coating is formed by anodizing (e.g., anodic oxide, etc.).

325 Specified alloy substrate:
This subclass is indented under subclass 324. Subject matter wherein the additional metals alloyed with the aluminum substrate are identified.

326 Utilizing alkaline bath:
This subclass is indented under subclass 324. Subject matter wherein the anodizing takes place in an electrolyte bath having a pH of over 7.

327 Utilizing chromium-containing bath:
This subclass is indented under subclass 324. Subject matter wherein the anodizing takes place in an electrolyte bath comprising chromium dissolved therein as an essential constituent.

328 Utilizing sulfuric acid-containing bath:
This subclass is indented under subclass 324. Subject matter wherein the anodizing takes place in an electrolyte bath having sulfuric acid as an essential ingredient.

329 Organic compound-containing:
This subclass is indented under subclass 328. Subject matter wherein the electrolyte bath also contains an organic compound as an essential constituent thereof (e.g., pyridine, etc.).

330 Organic carboxyl compound-containing:
This subclass is indented under subclass 329. Subject matter wherein the organic compound contains a carboxyl radical or a salt thereof (e.g., -COOH, -COONa, etc.) as a constituent thereof.

331 Organic sulfoxy compound-containing:
This subclass is indented under subclass 329. Subject matter wherein the organic compound contains a sulfoxy group (e.g., sulfonic acid, saccharin, etc.) as a constituent thereof.

332 Utilizing organic compound-containing bath:
This subclass is indented under subclass 324. Subject matter wherein the electrolyte bath contains an organic compound (e.g., acetic acid, sulfonic acid, etc.) as an essential constituent thereof.

333 Oxide-containing coating (e.g., lead dioxide, etc.):
This subclass is indented under subclass 316. Subject matter wherein the nonmetal containing coating contains an oxide (e.g., peroxide, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
465+, for electrolytic synthesis of peroxides form an aqueous bath.

334 ELECTROLYTIC SYNTHESIS (PROCESS, COMPOSITION, AND METHOD OF PREPARING COMPOSITION):
This subclass is indented under the class definition. Processes for the preparation of chemical compounds or of elements by means of electrolytic action.

(1) Note. These may be produced either by breaking them down from complex forms to simpler ones or by building up complex forms from simpler ones.

(2) Note. Branching processes for the synthesis of compounds or elements, one branch of which falls within the class definition and one branch of which is excluded thereby and which is provided for elsewhere, are classified in the outside class and cross-referenced here.

(3) Note. Processes of synthesis wherein the products of electrolysis are merely admixed within or outside the cell to produce the desired material are included, here, when claimed in combination with the electrolysis. For example, a metal salt solution may be prepared in the anodic zone of a cell by electrolytic solution of a metal anode, while in the cathodic zone of the same or another cell an alkali hydroxide may be formed. Mixing the two solutions

together to produce a metal hydroxide outside the cell would not be a subsequent step sufficient to take the process outside the class.

(4) Note. Combination processes including precedent steps for the preparation of the material for the electrolytic synthesis step, in which one or more of the precedent steps may result in the preparation of a desired product elsewhere classifiable if claimed alone, are included here and cross-referenced to the outside class. For example, if in a process including the electrolytic preparation of a free metal, the leach solution is treated with a precipitating agent in order to remove one or more of the constituents as insoluble salts or as free metals in precedent operations, thus constituting preparation of the leach solution for electrolytic separation, the process is classified in this class even though crystallization, filtering, or other conventional separation steps for the salt or metal is claimed and such product is considered a valuable by-product of the process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

687+, for the purification of definite chemical compounds by electrolysis which does not include a synthesis of the desired compound. However, when a substance is electrochemically reconstituted, the process is considered electrochemical synthesis. For example, impure oxygen is fed to the cathode of a cell and pure oxygen is recovered at the anode.

335 Involving measuring, analyzing, or testing during synthesis:

This subclass is indented under subclass 334. Subject matter wherein the process includes a step of measuring, analyzing, or testing during synthesis.

336 Utilizing fused bath (e.g., eliminating anode effect in a fused bath, etc.):

This subclass is indented under subclass 335. Subject matter wherein a nonaqueous electrolyte bath which is a solid substance or combination or mixture of substances which is heated above ordinary normal room temperature during synthesis in order to bring it to a fluid or liquid condition is utilized.

(1) Note. These processes are usually performed at high temperatures.

(2) Note. Anode effect is the condition where a high net voltage drop occurs between the electrodes of the electrolytic cell and, consequently, cell efficiency decreases.

SEE OR SEARCH THIS CLASS, SUBCLASS:

354+, for processes of electrolytic synthesis from a fused bath.

337 Current, current density, or voltage:

This subclass is indented under subclass 335. Subject matter wherein the current, current density, or voltage of the electrolytic synthesis process is measured, analyzed, or tested during synthesis.

338 Utilizing subatmospheric or superatmospheric pressure during synthesis:

This subclass is indented under subclass 334. Subject matter wherein the synthesis process is performed under a pressure other than the normal pressure in the surrounding atmosphere.

339 Utilizing magnet or magnetic field during synthesis:

This subclass is indented under subclass 334. Subject matter wherein a magnet or magnetic field is used during synthesis.

340 Utilizing electromagnetic wave energy during synthesis (e.g., visible light, etc.):

This subclass is indented under subclass 334. Subject matter wherein the electrolytic action is supplemented by the application of electromagnetic wave energy.

(1) Note. The term “electromagnetic waves” as employed herein includes, for example, x-rays and gamma rays; ultraviolet, infrared, and visible light rays; and short electric and radio waves. Energy which produces merely a thermal effect or heat waves, per se, is excluded.

341 Utilizing AC or specified wave form other than pure DC:
This subclass is indented under subclass 334. Subject matter wherein the synthesis process utilizes alternating current or an electric current which is not pure DC (e.g., stepped voltage, nonreversing pulsed current or voltage, etc.).

342 Reversing nonpulsed current or voltage:
This subclass is indented under subclass 341. Subject matter wherein the specified wave form is a reversing nonpulsed current or voltage which has a positive and negative component (e.g., periodic reversed current, superimposed AC on DC, etc.).

343 Involving fuel cell:
This subclass is indented under subclass 334. Subject matter wherein an electrolytic synthesis cell is combined with a fuel cell or is converted from a fuel cell to a synthesis cell.

(1) Note. A fuel cell is a device used to produce an electrical current wherein at least one reactant is fed to the cell.

SEE OR SEARCH CLASS:
429, Chemistry: Electrical Current Producing Apparatus, Product, and Process, appropriate subclasses for the various parts or operation of the fuel cell, especially subclasses 400 through 535.

344 Utilizing bipolar membrane:
This subclass is indented under subclass 334. Subject matter wherein at least one membrane of the bipolar type (i.e., a membrane having anionic properties on one side and cationic properties on the other) is utilized during synthesis.

345 Utilizing plural distinct electrolytic cells where the cells are separate containers:
This subclass is indented under subclass 334. Subject matter wherein a plurality of separate and distinct electrolytic containers not having a common wall are utilized during synthesis.

(1) Note. This does not include multiple anodes and cathodes utilized in the same container (e.g., filter press cells, etc.)

346 Including decomposing or purifying cell:
This subclass is indented under subclass 345. Subject matter wherein at least one of the containers is utilized for breaking down the bath, electrolyte, effluent, or product, or for removing undesired constituent electrolytically.

347 Identical plural distinct cells:
This subclass is indented under subclass 345. Subject matter wherein a plurality of identical distinct containers not having a common wall are utilized during synthesis.

348 Utilizing fluidized bed or particulate electrode:
This subclass is indented under subclass 334. Subject matter wherein a fluidized bed or particulate electrode is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 280 for the fluidized bed electrode or particulate electrode structure or composition.

349 Recycling electrolytic product produced during synthesis back to the production cell:
This subclass is indented under subclass 334. Subject matter wherein at least a portion of the product produced during synthesis is sent back to the cell where the product was produced.

350 Treating electrode, diaphragm, or membrane during synthesis (e.g., corrosion prevention, etc.):
This subclass is indented under subclass 334. Subject matter wherein at least one electrode, diaphragm, or membrane is treated during synthesis.

(1) Note. Specific treatment can include electrode polarity reversal, forming coatings on an electrode in situ during synthesis, feeding an oxidizing or reducing gas to an electrode, etc.

351 Treating electrolyte or bath without removal from cell other than agitating, moving, regenerating, replenishing, or replacing consumed material during synthesis:
This subclass is indented under subclass 334. Subject matter wherein the electrolyte or bath is treated during synthesis other than agitating,

moving, regenerating, replenishing, or replacing consumed material.

(1) Note. Specific treatment can include applying energy impulses, varying current density, adding a catalyst to the electrolyte or bath during synthesis, etc.

(2) Note. A bath is the fluid used for electrolytic processes in a cell including the electrolyte.

352 Utilizing emulsion, dispersion, or suspension electrolyte system:

This subclass is indented under subclass 334. Subject matter wherein an emulsion, dispersion, or suspension is utilized as the electrolyte or bath.

(1) Note. An emulsion is a fluid consisting of a microscopically heterogeneous mixture of two normally immiscible liquid phases, in which one liquid forms minute droplets suspended in the other liquid.

(2) Note. A dispersion is a fluid consisting of individual extremely fine particles of solids, which are usually of colloidal size, suspended therein.

(3) Note. A suspension is a fluid consisting of finely divided colloidal particles, too small to settle, but kept in motion by Brownian movement, floating therein.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

353 Utilizing electrolyte system having two or more separate immiscible layers:

This subclass is indented under subclass 334. Subject matter wherein an electrolyte system having two or more separate, immiscible layers are utilized.

(1) Note. Immiscible is used to describe liquids that will not mix; a liquid that dissolves a solute from a solution with which it does not mix.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

354 Utilizing fused bath:

This subclass is indented under subclass 334. Subject matter wherein the electrolytic synthesis is carried out in an electrolytic medium consisting of a substance or combination or

mixture of substances which is heated above normal room temperature during synthesis in order to bring it to a fluid or liquid condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

230+, for coating by electrolysis in a fused bath.

413+, for processes of electrolytic synthesis from an aqueous electrolyte bath containing a portion or a pool of molten material (e.g., source material, etc.).

355 Organic compound produced:

This subclass is indented under subclass 354. Subject matter wherein organic compounds are produced by synthesis.

(1) Note. "Organic" denotes all compounds having carbon therein and which are further characterized by the presence in a molecule of (a) two carbon atoms bonded together or (b) one atom of carbon bonded to at least one atom of hydrogen or halogen or (c) one atom of carbon bonded to at least one atom of nitrogen by a single or double bond, with the proviso that hydrocyanic acid, cyanogen, isocyanic acid, isothiocyanic acid, cyanogen halides, cyanamide, fulminic acid, and metal carbides are excluded from being organic compounds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

413+, for processes of preparing organic compounds from an aqueous bath or bath other than a fused bath by synthesis.

356 Halogen containing:

This subclass is indented under subclass 355. Subject matter wherein the organic compound produced contains halogen.

357 Inorganic compound produced:

This subclass is indented under subclass 354. Subject matter wherein inorganic compounds are produced by synthesis.

(1) Note. An inorganic compound is one that does not meet the definition of "organic" as elaborated in the (1) Note of subclass 355.

SEE OR SEARCH THIS CLASS, SUBCLASS:

464+, for processes of preparing inorganic compounds from an aqueous bath or bath other than a fused bath by synthesis.

358 Silicon, boron, or phosphorus containing:

This subclass is indented under subclass 357. Subject matter wherein the inorganic compound produced contains silicon, boron, or phosphorus.

359 Halogen containing:

This subclass is indented under subclass 357. Subject matter wherein the inorganic compound produced contains halogen.

360 Nitrogen containing:

This subclass is indented under subclass 357. Subject matter wherein the inorganic compound produced contains nitrogen.

(1) Note. The cyanides, hydrocyanic acid, cyanogen, isocyanic acid, cyanamide, dicyandiamide, isothiocyanic acid, fulminic acid, and metal nitrides are included herein; also included is ammonia and inorganic ammonia derivatives.

361 Sulfur containing:

This subclass is indented under subclass 357. Subject matter wherein the inorganic compound produced contains sulfur.

362 Oxygen containing:

This subclass is indented under subclass 357. Subject matter wherein the inorganic compound produced contains oxygen.

363 Alloy produced:

This subclass is indented under subclass 354. Subject matter wherein alloys are produced.

(1) Note. A substance which is recited as an impurity is not considered to be a positive constituent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

557+, for processes of preparing alloys from an aqueous bath or a bath other than a fused bath by synthesis.

364 Silicon or aluminum containing:
This subclass is indented under subclass 363. Subject matter wherein the alloy contains silicon or aluminum (e.g., silicon or aluminum in a free or uncombined state, etc.) as one of the constituents.

SEE OR SEARCH THIS CLASS, SUBCLASS:
372+, for processes of preparing aluminum from a fused bath by synthesis.

365 Iron, cobalt, or nickel containing:
This subclass is indented under subclass 363. Subject matter wherein the alloy contains iron, cobalt, or nickel as one of the constituents.

SEE OR SEARCH THIS CLASS, SUBCLASS:
370, for processes of preparing iron, cobalt, or nickel from a fused bath by synthesis.
587+, for a process of preparing iron and cobalt from an aqueous bath or a bath other than a fused bath by synthesis.
594+, for a process of preparing nickel from an aqueous bath or a bath other than a fused bath by synthesis.

366 Lead, zinc, titanium, zirconium, or hafnium containing:
This subclass is indented under subclass 363. Subject matter wherein the alloy contains elemental lead, zinc, titanium, zirconium, or hafnium as one of the constituents.

SEE OR SEARCH THIS CLASS, SUBCLASS:
369, for processes of preparing lead or zinc from a fused bath by synthesis.
397, for processes of preparing zirconium or hafnium from a fused bath by synthesis.
398+, for processes of preparing titanium from a fused bath by synthesis.
597+, for processes of preparing lead from an aqueous bath or a bath other than a fused bath by synthesis.
602+, for processes of preparing zinc from an aqueous bath or a bath other than a fused bath by synthesis.

367 Single metal produced:
This subclass is indented under subclass 354. Subject matter wherein single metals are produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
230+, for processes of electrolytically coating with a single metal from a fused bath.
234+, for processes of electrolytically coating with a single metal from an nonaqueous bath.
261+, for processes of electrolytically coating with a single metal from an aqueous bath.
560+, for processes of preparing single metals from an aqueous bath or a bath other than a fused bath by synthesis.

368 Rare earth metal (At. No. 21, 39, or 57-71):
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is a rare earth metal (i.e., scandium, yittrium, or lanthanides).

369 Lead, zinc, or cadmium:
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is lead, zinc, or cadmium.

370 Iron, cobalt, nickel, or manganese:
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is iron, cobalt, nickel, or manganese.

371 Vanadium, niobium, tantalum, chromium, molybdenum, or tungsten (V, Nb, Ta, Cr, Mo, or W):
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is vanadium, niobium, tantalum, chromium, molybdenum, or wolfram (tungsten).

372 Aluminum:
This subclass is indented under subclass 367. Subject matter wherein aluminum is the single metal produced.

373 And elemental alkali or alkaline earth metal, magnesium, beryllium, or nonmetal element other than halogen produced:
This subclass is indented under subclass 372. Subject matter wherein elemental alkali or alkaline earth metal, magnesium, beryllium, or a nonmetal element other than halogen is produced (e.g., sodium, magnesium, sulfur, etc.).

374 Utilizing specified current distributing means or method other than wire connecting means:
This subclass is indented under subclass 372. Subject matter wherein specified current distributing means or methods other than wire connection means are utilized (e.g., specified bus or current collector or distributor means arrangement, reduced current at the edge of the cell, etc.)

(1) Note. This subclass does not include a mere current supply.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 228.1+, 229.4+, 229.8+, and 230.2+ for electrolytic apparatus with current, voltage, or power control means.

375 Utilizing specified distance between cathode and anode:
This subclass is indented under subclass 372. Subject matter wherein a specified distance between the anode and cathode is utilized.

(1) Note. The distance (or range) must be specified numerically.

376 Agitating or moving electrolyte or bath during synthesis:
This subclass is indented under subclass 372. Subject matter wherein the electrolyte or bath is agitated or moved during synthesis.

377 Utilizing membrane or diaphragm between electrodes:
This subclass is indented under subclass 372. Subject matter wherein a membrane or diaphragm between electrodes is utilized to separate the electrodes.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 251 for liquid electrode diaphragm-type cells, subclasses 282 and 283 for electrodes with diaphragms, and subclasses 295 and 296 for diaphragm elements and their compositions.

378 Utilizing spacer between electrodes:
This subclass is indented under subclass 372. wherein one or more spacers are utilized between electrodes.

(1) Note. The spacers do not pass ions, gases, electrolyte, or bath material therethrough as membranes or diaphragms. The spacers are utilized, for example, to maintain a constant distance between electrodes of the same polarity or as supports for the electrodes, etc.

379 Utilizing nonmetal cell lining other than inorganic carbon or graphite:
This subclass is indented under subclass 372. Subject matter wherein a nonmetal cell lining other than inorganic carbon or graphite is utilized (e.g., ceramic, cermet, metal borides, nitrides, etc.).

380 Utilizing specified electrode other than consumable electrode (e.g., cylindrical, tapered, etc.):
This subclass is indented under subclass 372. Subject matter wherein a specified electrode shape or structure other than a consumable electrode is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for electrodes utilized in carrying out the processes herein provided for and combinations of such electrodes with other elements not provided for in any foregoing subclasses and subclasses 243.1+ for fused bath electrolytic cells.

381 Inclined electrode (not horizontal or vertical):
This subclass is indented under subclass 380. Subject matter wherein at least one of the electrodes utilized during synthesis is inclined or not horizontal or vertical.

382 Liquid electrode:
This subclass is indented under subclass 380. Subject matter wherein at least one of the electrodes utilized during synthesis is a liquid (e.g., liquid mercury, aluminum, sodium, etc.).

383 Bipolar electrode:
This subclass is indented under subclass 380. Subject matter wherein at least one of the electrodes utilized during synthesis is a bipolar-type electrode (i.e., a planar electrode wherein one surface serves as an anode and the other surface serves as a cathode).

384 Coated electrode:
This subclass is indented under subclass 380. Subject matter wherein at least one of the electrodes is coated or laminated and utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80, for the process directed to the formation or deposition by an electrolytic action of a permanent coating material or materials upon a base, electrolyte compositions therefor, and methods of making said electrolyte compositions.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 290.01 through 290.15 for coated or laminated electrodes.

385 Specified electrode composition other than consumable inorganic carbon or graphite:
This subclass is indented under subclass 380. Subject matter wherein at least one of the electrodes utilized during synthesis has been specified other than a consumable inorganic carbon or graphite containing electrode.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for a specified electrode composition.

386 Nonconsumable electrode having inorganic carbon or graphite and a nonmetal containing material (e.g., cermet, etc.):
This subclass is indented under subclass 385. Subject matter wherein at least one of the electrodes is a nonconsumable electrode composed of inorganic carbon or graphite and a nonmetal containing material (e.g., metal boride, carbide, sulfide, oxide, nitride or cermet, etc.).

387 Nonmetal containing (e.g., metal oxide, carbide, etc.):
This subclass is indented under subclass 385. Subject matter wherein at least one of the electrodes contains a nonmetal (e.g., metal boride, carbide, sulfide, oxide, nitride or cermet, etc.).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 290.01 through 290.15 for laminated or coated electrodes.

388 Utilizing coated or treating electrode connecting or positioning means (e.g., coating, cooling, etc.):
This subclass is indented under subclass 372. Subject matter wherein an electrode connecting or positioning means which is coated or treated is utilized during synthesis (e.g., utilizing cooling fluid through connecting or positioning means, etc.).

389 Specific replenishing, replacing, or feeding of consumable electrode material:
This subclass is indented under subclass 372. Subject matter wherein a specific method of replenishing, replacing, or feeding of consumable electrode material is performed during synthesis.

(1) Note. Self-baking or Soderberg or prebaked electrodes are included.

(2) Note. This subclass includes, for example, utilizing spent potliner as electrode material, electrode support manipulation or feeding methods or means of joining

new electrodes to old, replacing worn or consumed electrode stubs, etc.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 294 for the composition of the carbonaceous electrodes.

390 Involving specific process startup other than mere turn on:
This subclass is indented under subclass 372. Subject matter wherein a specific process startup other than mere turn on is utilized.

(1) Note. This subclass includes, for example, initially raising the temperature, conditioning or treating the electrode at startup, etc.

391 Collecting or controlling fumes or gases produced during synthesis:
This subclass is indented under subclass 372. Subject matter wherein the fumes or gases produced during synthesis are collected or controlled.

(1) Note. This subclass includes, for example, utilizing a collection hood, a vacuum, purifying generated gases, etc.

392 Utilizing specific method or means to feed or replenish electrolyte or bath material:
This subclass is indented under subclass 372. Subject matter wherein a specific method or means to feed or replenish electrolyte or bath material is utilized during synthesis.

(1) Note. This subclass includes, for example, utilizing specifically placed feeding pipe or conduit, utilizing a dam, a movable piston in a conduit, etc.

393 Purifying or treating electrolyte or bath prior to or after synthesis:
This subclass is indented under subclass 372. Subject matter wherein the electrolyte or bath is purified or treated prior to or after synthesis.

394 Bath contains fluorine or bromine containing compound other than cryolite (NA_3AlF_6):
This subclass is indented under subclass 372. Subject matter wherein a bath containing fluorine or bromine containing compounds other than cryolite (Na_3AlF_6) is utilized during synthesis (e.g., potassium, sodium, lithium fluorides or borides, etc.).

(1) Note. This also excludes the mixture of aluminum fluoride and sodium fluoride.

395 Fluorine or bromine containing compound contains alkaline earth metal, beryllium, or magnesium (Ca, Sr, Ba, Ra, Be, or Mg):
This subclass is indented under subclass 394. Subject matter wherein the fluorine or bromine containing compound contains calcium, strontium, barium, radium, beryllium, or magnesium.

396 Utilizing specified process step to maintain bath temperature:
This subclass is indented under subclass 372. Subject matter wherein a specified process step is utilized to maintain bath temperature.

(1) Note. This subclass includes, for example, recycling heated air or gas during the process, utilizing a flammable liquid, utilizing a heater, etc.

397 Titanium, zirconium, or hafnium (Ti, Zr, or Hf):
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is titanium, zirconium, or hafnium.

398 Titanium:
This subclass is indented under subclass 397. Subject matter wherein the single metal produced is titanium.

399 Utilizing specified electrode structure or anode alloy composition:
This subclass is indented under subclass 398. Subject matter wherein a specified electrode shape or structure or a specific anode alloy is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure and composition.

400 Utilizing diaphragm or barrier between anode and cathode:
This subclass is indented under subclass 398. Subject matter wherein a diaphragm or barrier between the anode and cathode is utilized.

401 Bath contains metal oxide or fluorine containing compound:
This subclass is indented under subclass 398. Subject matter wherein the fused electrolyte bath for producing titanium contains a metal oxide (e.g., titanium oxide, etc.) or a fluorine containing compound (e.g., potassium fluoride, etc.).

402 Alkaline earth metal, beryllium, or magnesium:
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is calcium, strontium, barium, radium, beryllium, or magnesium.

403 Beryllium:
This subclass is indented under subclass 402. Subject matter wherein the single metal produced is beryllium.

404 Magnesium:
This subclass is indented under subclass 402. Subject matter wherein the single metal produced is magnesium.

405 Bath contains alkali metal or fluorine containing compound:
This subclass is indented under subclass 404. Subject matter wherein the fused electrolyte bath contains an alkali metal or fluorine containing compound (e.g., sodium chloride or magnesium fluoride, etc.).

406 Alkali metal (Li, Na, K, Rb, Cs, or Fr):
This subclass is indented under subclass 367. Subject matter wherein the single metal produced is an alkali metal (i.e., Li, Na, K, Rb, Cs, or Fr).

407 Lithium, sodium, or potassium:
This subclass is indented under subclass 406. Subject matter wherein the alkali metal is lithium, sodium, or potassium.

408 Sodium:
This subclass is indented under subclass 407. Subject matter wherein the alkali metal is sodium.

409 Bath contains halide other than sodium chloride:
This subclass is indented under subclass 408. Subject matter wherein the fused electrolyte bath contains a halide other than or in addition to sodium chloride (e.g., calcium chloride, sodium fluoride, etc.).

410 Silicon, boron, or phosphorus produced:
This subclass is indented under subclass 354. Subject matter wherein elemental silicon, boron, or phosphorus is produced.

411 Halogen produced:
This subclass is indented under subclass 354. Subject matter wherein elemental halogen (i.e., fluorine, chlorine, bromine, iodine, or astatine) is produced.

412 Heating or cooling electrolyte or bath in production cell during synthesis except in fused bath:
This subclass is indented under subclass 334. Subject matter wherein the electrolyte or bath is heated or cooled in the cell in which synthesis is taking place except in a fused or molten bath.

413 Preparing organic compound:
This subclass is indented under subclass 334. Subject matter wherein organic compound is produced from an aqueous bath or other bath.

(1) Note. See subclass 355, (1) Note, for the definition of "organic compound."

SEE OR SEARCH THIS CLASS, SUBCLASS:
316, for processes of forming a nonmetal coating which is predominantly organic material.
354+, for processes of preparing organic compounds from a fused bath.

414 By polymerization:
This subclass is indented under subclass 413. Subject matter wherein the organic compound is a polymer produced by a reaction in which

two or more molecules of the same or different substance (monomer or reactant) combine to form a single compound (polymer).

(1) Note. A polymer requires two or more repeating units or moieties derived from monomers or reactants.

SEE OR SEARCH CLASS:
522, Synthetic Resins and Natural Rubbers-Part of the Class 520 Series, for processes of preparing a solid polymer utilizing wave energy.

415 By dimerization:
This subclass is indented under subclass 414. Subject matter wherein the polymer produced is a dimer (a polymer of two molecules of the same substance) formed by a electrochemical coupling process.

(1) Note. The term "coupling" as employed herein refers to the joining together of two molecules of the same compound and does not include the coupling of two different compounds.

416 Nitrogen containing dimer produced:
This subclass is indented under subclass 415. Subject matter wherein the dimer produced contains nitrogen.

417 Adiponitrile:
This subclass is indented under subclass 416. Subject matter wherein the dimer produced is adiponitrile (i.e., $NC(CH_2)_4CN$, dimer of acrylonitrile).

418 Carbonyl or hydroxy containing dimer produced:
This subclass is indented under subclass 415. Subject matter wherein the dimer contains a carbonyl (>C=O) or hydroxyl (-OH) group (e.g., pinacols, dimethyl sebacate, etc.).

419 From ring containing reactant:
This subclass is indented under subclass 414. Subject matter wherein the polymer is produced from a reactant (monomer) which contains a ring structure (e.g., benzene ring, pyridine, etc.).

420 Silicon, boron, or phosphorus containing compound produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains silicon, boron, or phosphorus.

421 Carbohydrate or derivative containing compound produced (e.g., streptomycin, etc.):
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is a carbohydrate or derivative (e.g., streptomycin, ribose, etc.).

(1) Note. See Class 536, subclass 1.11, for the definition of "carbohydrate or derivative."

422 Heterocyclic compound produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains a hetero(cyclic) ring system having carbon and least one hetero atom of oxygen, sulfur, nitrogen, selenium, or tellurium as ring members.

423 Nitrogen containing hetero ring:
This subclass is indented under subclass 422. Subject matter wherein the hetero ring system contains a nitrogen atom as a ring member.

424 Polycyclo ring system having the hetero ring as one of the cyclos:
This subclass is indented under subclass 423. Subject matter wherein the hetero ring system is a polycyclo ring system (i.e., a fused or bridged ring system) having the hetero ring as one of the cyclos in the ring system.

425 Diverse hetero atoms in the polycyclo ring system:
This subclass is indented under subclass 424. Subject matter wherein the polycyclo ring system contains at least two different hetero atoms as ring members.

426 The hetero ring is six-membered:
This subclass is indented under subclass 423. Subject matter wherein the nitrogen containing hetero ring has six ring members.

427 Oxygen containing hetero ring:
This subclass is indented under subclass 422. Subject matter wherein the hetero ring system contains an oxygen atom as a ring member.

428 The hetero ring is three-membered:
This subclass is indented under subclass 427. Subject matter wherein the oxygen containing hetero ring has three ring members.

429 Cyclopentanohydrophenanthrene ring system containing compound produced (e.g., steroids, etc.)
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains a cyclopentanohydrophenanthrene ring nucleus.

430 By fluorination of organic compound other than hydrocarbon or halogenated hydrocarbon:
This subclass is indented under subclass 413. Subject matter wherein the organic compound is fluorinated during synthesis with the exception of hydrocarbons or halocarbons.

(1) Note. The organic compound which is fluorinated during synthesis may contain fluorine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
460, for processes of preparing fluorine containing hydrocarbons.

431 Nitrogen containing compound produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains nitrogen.

432 Nitrogen bonded to nitrogen:
This subclass is indented under subclass 431. Subject matter wherein two nitrogens of the organic compound are bonded directly to each other (e.g., azo compounds, hydrazide, etc.).

433 Carbon triple bonded to nitrogen:
This subclass is indented under subclass 431. Subject matter wherein the nitrogen is triple bonded to carbon (-C=N).

434 Carboxamide:
This subclass is indented under subclass 431. Subject matter wherein the nitrogen containing compound is an amide (-C-N) of a carboxylic acid.

435 -COO- group containing:
This subclass is indented under subclass 431. Subject matter wherein the nitrogen containing compound contains a -C-O group (e.g., carbamate, amino acid, etc.).

436 Oxygen containing:
This subclass is indented under subclass 431. Subject matter wherein the nitrogen containing compound also contains oxygen.

437 Hydroxy containing:
This subclass is indented under subclass 436. Subject matter wherein the oxygen containing compound contains a hydroxyl group (-OH).

438 Carbocyclic ring containing:
This subclass is indented under subclass 431. Subject matter wherein the nitrogen containing compound contains a ring or ring system in which all ring members are carbons.

439 Carbonate or peroxy compound produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is a carbonate (-O-C-O- containing) or a peroxide (-O-O- containing).

SEE OR SEARCH THIS CLASS, SUBCLASS:
427, for processes of preparing a cyclic carbonate from an aqueous bath or a bath other than a fused bath.

440 Carboxylic acid or derivative produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is a carboxylic acid (-COOH containing) or functional derivative (including carboxylic acid ester, nonhetero anhydride, salt, and acyl halide).

441 Carboxylic acid ester produced:
This subclass is indented under subclass 440. Subject matter wherein the compound produced is a carboxylic acid ester (-C-O-C containing).

442 **Carbocyclic ring containing:**
This subclass is indented under subclass 440. Subject matter wherein the carboxylic acid or derivative produced contains a ring or ring system in which all ring members are carbons.

443 **Carbonyl or hydroxy group containing other than as part of the carboxylic acid or derivative:**
This subclass is indented under subclass 440. Subject matter wherein the carboxylic acid or derivative produced contains a carbonyl group (C=O) or a hydroxyl group (-OH) which is other than as part of a -C-OH or derivative group.

444 **Sulfur containing compound produced:**
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains sulfur.

445 **Oxygen containing:**
This subclass is indented under subclass 444. Subject matter wherein the sulfur containing compound also contains oxygen.

446 **Ketone produced:**
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is ketone (-C-C-C containing).

447 **By electrolytic oxidation only:**
This subclass is indented under subclass 446. Subject matter wherein the ketone is produced by an electrolytic oxidation process only.

SEE OR SEARCH THIS CLASS, SUBCLASS:
446, for processes of preparing ketone involving an electrolytic or chemical reduction process step.

448 **Aldehyde produced:**
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is aldehyde (-C-H containing).

449 **By electrolytic oxidation only:**
This subclass is indented under subclass 448. Subject matter wherein the aldehyde is produced by an electrolytic oxidation process only.

SEE OR SEARCH THIS CLASS, SUBCLASS:
448, for processes of preparing aldehyde involving an electrolytic or chemical reduction process step.

450 **Alcohol or alcoholate produced:**
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced is an alcohol or alcholate (C-OM wherein M is a metal) (e.g., sodium methylate CH_3ONa, etc.).

451 **Halogen containing:**
This subclass is indented under subclass 450. Subject matter wherein the alcohol or alcoholate produced contains halogen.

452 **By electrolytic oxidation only:**
This subclass is indented under subclass 450. Subject matter wherein the alcohol or alcoholate is produced by an electrolytic oxidation process only.

453 **Carbocyclic ring containing:**
This subclass is indented under subclass 450. Subject matter wherein the alcohol or alcoholate produced contains a ring or ring system in which all ring members are carbons.

454 **Four or more hydroxy groups:**
This subclass is indented under subclass 450. Subject matter wherein the alcohol or alcoholate produced contains four or more hydroxyl groups (e.g., sorbitol, etc.).

455 **Oxygen containing compound produced:**
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains oxygen (e.g., ethyl ether, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
427+, for processes of preparing a cyclic ether or a cyclic acetal from an aqueous bath or a bath other than a fused bath.

456 **Carbocyclic ring containing:**
This subclass is indented under subclass 455. Subject matter wherein the oxygen containing compound produced contains a ring or ring

system in which all the ring members are carbons.

457 Metal containing compound produced:
This subclass is indented under subclass 413. wherein the organic compound produced contains a metal (elements of atomic number 3-4, 11-13, 19-33, 37-51, 55-84 or 87).

458 Lead containing:
This subclass is indented under subclass 457. Subject matter wherein the metal is lead.

459 Halogen containing compound produced:
This subclass is indented under subclass 413. Subject matter wherein the organic compound produced contains halogen (fluorine, chlorine, bromine, iodine, or astatine).

460 Fluorine containing:
This subclass is indented under subclass 459. Subject matter wherein the halogen containing compound produced contains fluorine.

461 Acyclic:
This subclass is indented under subclass 459. Subject matter wherein the halogen containing compound contains no ring system (e.g., methyl chloride, etc.).

462 Hydrocarbon produced:
This subclass is indented under subclass 413. wherein the organic compound produced consists of carbon and hydrogen only.

463 Carbocyclic ring containing:
This subclass is indented under subclass 462. wherein the hydrocarbon compound produced contains a ring or ring system in which all the ring members are carbons.

464 Preparing inorganic compound:
This subclass is indented under subclass 334. Subject matter wherein inorganic compounds are produced from an aqueous bath or a bath other than a fused bath by synthesis.

(1) Note. See subclass 357, (1) Note, for the definition of "inorganic compound."

SEE OR SEARCH THIS CLASS, SUBCLASS:
357+, for processes of preparing inorganic compounds from a fused bath by synthesis.

465 Peroxy compound produced:
This subclass is indented under subclass 464. Subject matter wherein a peroxy compound is produced during synthesis.

(1) Note. A peroxy compound contains the O-O or O_2 group in which two oxygen atoms are singly linked.

(2) Note. This subclass does not contain quadrivalent metal dioxides (i.e., MnO_2, PbO_2, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
333, for processes of electrolytically coating with peroxides.

466 Hydrogen peroxide:
This subclass is indented under subclass 465. Subject matter wherein hydrogen peroxide is produced during synthesis.

467 Utilizing mercury or amalgam electrode:
This subclass is indented under subclass 466. Subject matter wherein a mercury or amalgam electrode is utilized during synthesis.

468 Utilizing inorganic carbon containing electrode:
This subclass is indented under subclass 466. Subject matter wherein at least one electrode containing inorganic carbon is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 294 for specified inorganic carbon electrode compositions.

469 Boron containing:
This subclass is indented under subclass 465. Subject matter wherein a boron containing peroxy is produced during synthesis.

470 Phosphorus containing:
This subclass is indented under subclass 465. Subject matter wherein a phosphorus containing peroxy is produced during synthesis.

471 Sulfur containing:
This subclass is indented under subclass 465. Subject matter wherein a sulfur containing peroxy is produced during synthesis.

472 Utilizing specified electrode:
This subclass is indented under subclass 471. Subject matter wherein an electrode of specified structure or composition is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

473 Perhalogen acid or salt thereof produced:
This subclass is indented under subclass 464. Subject matter wherein the inorganic compound produced is a perhalogen acid or salt thereof (e.g., periodic acid, etc.).

474 Perchlorate or perchloric acid:
This subclass is indented under subclass 473. Subject matter wherein the perhalogen acid or salt thereof produced is a perchlorate (e.g., sodium perchlorate $NaClO_4$, etc.) or perchloric acid ($HClO_4$).

475 Permanganate produced:
This subclass is indented under subclass 464. Subject matter wherein the inorganic compound produced is a permanganate (e.g., sodium permanganate $NaMnO_4$, etc.).

476 Potassium containing:
This subclass is indented under subclass 475. Subject matter wherein the permanganate or permanganic produced contains potassium.

477 Metal containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein the inorganic compound produced contains a metal (elements of atomic number 3-4, 11-13, 19-33, 37-51, 55-84 or 87).

478 Carbon containing:
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains carbon.

479 Cyanide:
This subclass is indented under subclass 478. Subject matter wherein the carbon containing compound produced is a cyanide in which the carbon is bound to nitrogen by a triple bond (e.g., potassium ferricyamide $K_3Fe(CN)_6$ etc.).

480 Carbonate or bicarbonate:
This subclass is indented under subclass 478. Subject matter wherein the carbon containing compound produced is a carbonate (CO_3 containing) or a bicarbonate (HCO_3 containing).

SEE OR SEARCH THIS CLASS, SUBCLASS:
465, for processes of preparing a percarbonate or peroxycarbonate from an aqueous bath or a bath other than a fused bath.

481 Lead containing:
This subclass is indented under subclass 480. Subject matter wherein the carbonate or bicarbonate produced contains lead.

482 Alkali metal containing:
This subclass is indented under subclass 480. Subject matter wherein the carbonate or bicarbonate produced contains an alkali metal (Li, Na, K, Rb, Cs, or Fr).

483 Chromium containing:
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains chromium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178+, for processes of forming multiple superposed electrolytic coatings wherein at least one of the coatings contains chromium.
243, for processes of depositing predominantly alloy coating having chromium as the predominate constituent.
283+, for processes of depositing predominantly chromium coating.

484 Chromate:
This subclass is indented under subclass 483. Subject matter wherein the chromium containing compound produced is chromate (CrO_4 containing).

SEE OR SEARCH THIS CLASS, SUBCLASS:
199, for processes of forming nonelectrolytic coating after forming electrolytic coating where the electrolytic coating contains chromate.
319, for processes of forming a nonmetal coating which contains chromate.

485 Alkali metal containing:
This subclass is indented under subclass 484. Subject matter wherein the chromate produced contains an alkali metal (Li, Na, K, Rb, Cs, or Fr).

486 Chromic acid:
This subclass is indented under subclass 483. Subject matter wherein the chromium containing compound is chromic acid (H_2CrO_4).

487 Utilizing specified electrode:
This subclass is indented under subclass 486. Subject matter wherein a specified electrode structure or composition is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for specified electrode structure and composition.

488 Phosphorus containing:
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains phosphorus.

489 Phosphate:
This subclass is indented under subclass 488. Subject matter wherein the phosphorus containing compound produced is a phosphate (PO_4 containing).

490 Alkali or alkaline earth metal, beryllium, or magnesium containing:
This subclass is indented under subclass 489. Subject matter wherein the phosphate produced contains an alkali or alkaline earth metal, beryllium, or magnesium (Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, or Ra).

491 Nitrogen containing:
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains nitrogen (e.g., nitrosodisulfonate, etc.).

492 Nitrite:
This subclass is indented under subclass 491. Subject matter wherein the nitrogen containing metal compound is a nitrite (NO_2 containing).

493 Nitrate:
This subclass is indented under subclass 491. Subject matter wherein the nitrogen containing metal compound is a nitrate (NO_3 containing).

494 Sulfur containing (e.g., sulfide, etc.):
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains sulfur (e.g., sodium sulfide, etc.).

495 Sulfite, bisulfite, or dithionite:
This subclass is indented under subclass 494. Subject matter wherein the sulfur containing compound produced is a sulfite (SO_3 containing), a bisulfite (HSO_3 containing), or a dithionite (S_2O_4 containing).

(1) Note. Dithionite may be termed hydrosulfite or hyposulfite in the patents.

496 Sulfate or bisulfate:
This subclass is indented under subclass 494. Subject matter wherein the sulfur containing compound produced is a sulfate (SO4 containing) or a bisulfate (HSO4 containing).

497 Group VIII metal, lead, or copper containing (Fe, Co, Ni, Rn, Rh, Pd, Os, Ir, Pt, Pb, or Cu):
This subclass is indented under subclass 496. Subject matter wherein the sulfate produced contains a group VIII metal or lead or copper.

498 Halogen containing:
This subclass is indented under subclass 477. Subject matter wherein the metal containing compound produced contains halogen (i.e., fluorine, chlorine, bromine, iodine, and astatine).

499 Oxygen containing:
This subclass is indented under subclass 498. Subject matter wherein the halogen containing compound produced contains oxygen (e.g., potassium bromate, etc.).

500 Hypochlorite or chlorite:
This subclass is indented under subclass 499. Subject matter wherein the oxygen containing compound produced is a hypochlorite (ClO containing) or chlorite (ClO_2 containing).

501 Utilizing tubular or coated electrode:
This subclass is indented under subclass 500. Subject matter wherein a tubular or coated electrode is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280 through 294 for electrodes utilized in carrying out the processes herein provided for and subclasses 290.01-290.15 for laminated or coated electrodes.

502 Chlorate:
This subclass is indented under subclass 499. Subject matter wherein the oxygen containing compound produced is a chlorate (ClO_3 containing).

SEE OR SEARCH THIS CLASS, SUBCLASS:
474, for processes of preparing perchlorate or perchloric acid from an aqueous bath or a bath other than a fused bath.

503 Alkali metal containing:
This subclass is indented under subclass 502. Subject matter wherein the chlorate produced contains an alkali metal.

504 Utilizing graphite or inorganic carbon containing electrode:
This subclass is indented under subclass 503. Subject matter wherein a graphite or inorganic carbon electrode is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 294 for carbon containing electrode.

505 Utilizing coated electrode:
This subclass is indented under subclass 503. Subject matter wherein a coated electrode is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 290.01 through 290.15 for laminated or coated electrodes.

506 Germanium, tin, or lead (containing Ge, Sn, or Pb):
This subclass is indented under subclass 498. Subject matter wherein the halogen containing compound produced contains germanium, tin, or lead.

507 Copper, silver, or gold containing (Cu, Ag, or Au):
This subclass is indented under subclass 498. Subject matter wherein the halogen containing compound produced contains copper, silver, or gold.

508 Hydroxide:
This subclass is indented under subclass 477. wherein a metallic hydroxide is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
316+, for processes of applying a hydroxide coating to a substrate electrolytically.

509 Group VIII metal containing:
This subclass is indented under subclass 508. Subject matter wherein a group VIII metal hydroxide is produced.

510 Alkali metal containing:
This subclass is indented under subclass 508. Subject matter wherein the metal hydroxide produced contains an alkali metal.

511 Utilizing bipolar electrode:
This subclass is indented under subclass 510. Subject wherein at least one bipolar-type electrode is utilized during synthesis.

(1) Note. See subclass 383 for the definition of "bipolar electrode."

512 Potassium hydroxide produced:
This subclass is indented under subclass 510. Subject matter wherein potassium hydroxide is produced.

513 Utilizing filter press cell configuration:
This subclass is indented under subclass 512. Subject matter wherein a filter press-type cell is utilized during synthesis.

(1) Note. A filter press-type cell is a cell containing at least one alternating anode unit and cathode unit having a membrane or diaphragm disposed therebetween and means to compress the units and membranes or diaphragms together where the compression means can be springs, bolts, clamps, etc.

514 Utilizing cell having three or more compartments or units:
This subclass is indented under subclass 512. Subject matter wherein a cell having three or more compartments or units is utilized during synthesis (e.g., a buffer compartment, etc.).

515 Including gas compartment:
This subclass is indented under subclass 514. Subject matter wherein at least one of the cell compartments or units contains gas.

516 And elemental halogen produced:
This subclass is indented under subclass 510. Subject matter wherein a halogen is also produced in the elemental state during synthesis (e.g., F, Cl, Br, I, etc.).

517 Utilizing structurally defined diaphragm or membrane or diaphragm or membrane other than nonstructurally defined single layer cation exchange membrane having single-type cation exchange groups (e.g., anion exchange membrane, etc.):
This subclass is indented under subclass 516. Subject matter wherein a diaphragm or membrane having a specified composition or configuration other than a nonstructurally defined single layer cation exchange membrane having single-type cation exchange groups is utilized during synthesis.

(1) Note. Anion exchange groups include, for example, quaternary ammonium groups, quaternary pyridinium groups, sulfonium bases, primary, secondary and tertiary amino groups, pyridine groups, imino groups, etc.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 45+ for selective diffusion of gases through a substantially solid barrier using a solid electrolyte membrane (SEM) which functions without electrodes and without externally applied voltage. These membranes are used where the partial pressure of the gas to be diffused through the membrane on the permeate side is lower than that on the feed side. Electrodeless solid electrolyte membrane cells are operated by maintaining a pressure on the feed side such that a positive driving force for ion transport can be achieved in the absence of an externally applied voltage and power source. Class 204 takes the use of a SEM situated between two electrodes positioned to apply external voltage across the membrane. These are used where the partial pressure of the gas is to be diffused through the permeate side. Molecules on the feed electrochemically dissociated into ions are transported across the matrix of the membrane by the applied voltage and recombined to form molecules on the anode.

204, Chemistry: Electrical and Wave Energy, subclasses 295 and 296 for a specified membrane or diaphragm composition.

518 Asbestos containing:
This subclass is indented under subclass 517. Subject matter wherein a diaphragm or membrane containing asbestos is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 295 for a specified membrane or diaphragm containing asbestos.

519 And polymer containing:
This subclass is indented under subclass 518. Subject matter wherein the asbestos containing membrane or diaphragm also includes a polymer constituent.

520 Membrane having two or more different ion exchange groups in a single layer:
This subclass is indented under subclass 517. Subject matter wherein a membrane containing two or more different ion exchange groups are utilized during synthesis.

(1) Note. This subclass can include a mixture of cationic exchange groups (e.g., carboxylic, sulfonic, and phosphoric groups; cationic and anionic groups; etc.).

521 Multilayered membrane:
This subclass is indented under subclass 517. Subject matter wherein a membrane having more than one layer is utilized during synthesis.

522 Roughened membrane:
This subclass is indented under subclass 517. Subject matter wherein a membrane having at least one surface thereof roughened is utilized during synthesis.

523 Diaphragm or membrane having a specified porosity:
This subclass is indented under subclass 517. Subject matter wherein a diaphragm or membrane having a specified porosity is utilized during synthesis.

(1) Note. This subclass does not include a diaphragm or membrane which broadly states that it is porous without giving a specific pore size or range.

524 Diaphragm or membrane having nonelectrode layer bonded thereto or embedded therein:
This subclass is indented under subclass 517. Subject matter wherein a diaphragm or membrane having a nonelectrode layer bonded thereto or embedded therein is utilized during synthesis.

525 Electrode bonded diaphragm or membrane:
This subclass is indented under subclass 517. Subject matter wherein a diaphragm or membrane having at least one electrode bonded thereto is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 282 and 283 for the structure and composition of electrodes bonded to a membrane or diaphragm.

526 Utilizing specified electrode (e.g., rod, cylinder, etc.):
This subclass is indented under subclass 516. Subject matter wherein at least one specified electrode structure or composition is utilized during synthesis.

527 Mercury or amalgam cathode:
This subclass is indented under subclass 526. Subject matter wherein a mercury or amalgam cathode is utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
529, for treating the amalgamated mercury cathode with water or other agent to generate the hydroxide when combined with the electrolytic synthesis step of producing the amalgam even though no electrolytic action is claimed for the amalgamated mercury treatment step.

SEE OR SEARCH CLASS:
423, Chemistry of Inorganic Compounds, subclass 180 for the mere treatment of mercury amalgam which may be prepared electrolytically unless an inter-

nal or external current is impressed to facilitate the action by electrolysis.

528 Specified anode composition:
This subclass is indented under subclass 527. Subject matter wherein an anode of specified composition is utilized during synthesis.

529 Purifying the cathode:
This subclass is indented under subclass 527. Subject matter wherein the mercury or amalgam cathode is purified.

(1) Note. This subclass includes treating the amalgamated mercury cathode with water or other agent to generate the hydroxide when combined with the electrolytic synthesis step of producing the amalgam even though no electrolytic action is claimed for the amalgamated mercury treatment step.

SEE OR SEARCH CLASS:
423, Chemistry of Inorganic Compounds, subclass 180 for the mere treatment of mercury amalgam which may be prepared electrolytically unless an internal or external current is impressed to facilitate the action by electrolysis.

530 Concentrically arranged electrodes:
This subclass is indented under subclass 526. Subject matter wherein two or more electrodes arranged concentrically one within the other are utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 272 for concentrically arranged electrodes.

531 Foraminous or perforated (e.g., mesh, screen, etc.):
This subclass is indented under subclass 526. Subject matter wherein at least one of the electrodes which is foraminous or perforated is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 284 for foraminous or perforated electrodes.

532 Laminated or coated:
This subclass is indented under subclass 526. Subject matter wherein at least one electrode which is laminated or coated is utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80+, for processes of applying a coating electrolytically.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 284 for foraminous or perforated electrodes.
427, Coating Processes, subclasses 58+ for processes of producing electrical products by a coating operation.

533 Polymer or graphite or inorganic carbon containing coating:
This subclass is indented under subclass 532. Subject matter wherein an electrode having at least one polymer or graphite or inorganic carbon containing coating is utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
517+, for a process of preparing a hydroxide and halogen wherein a coated or laminated membrane or diaphragm is used.

534 Raney metal containing coating (e.g., Ni-Al alloy, etc.):
This subclass is indented under subclass 532. Subject matter wherein the electrode has at least one Raney metal containing coating.

(1) Note. Raney metal is an alloy of any two or more metals having the property of forming a catalytically active porous surface upon the leaching of an inactive soluble component metal (sacrificial metal) from the alloy, usually by a strong base such as sodium hydroxide, to leave an active metal. Some specific Raney metals are, for example, Raney silver and Raney Cobalt. This subclass includes both the alloy or the active catalyst produced by dissolving out the sacrificial metal.

535 Valve metal containing electrode substrate (i.e., Ta, Nb, Hf, Zr, Ti, V, W, Be, or Al):
This subclass is indented under subclass 532. Subject matter wherein the electrode substrate contains a valve metal.

(1) Note. For purposes of this subclass, a valve metal is a metal which forms an electrically insulating, corrosion-resistant oxide film upon exposure to acidic materials under anodic conditions. The valve metals are also referred to as the film-forming metals.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 290.01 through 290.15 for laminated or coated electrodes, especially subclasses 290.12-290.13 for a two-layer electrode containing a refractory metal.

536 Treating electrolyte or bath material prior to synthesis other than heating, cooling, or replacing consumed material during synthesis:
This subclass is indented under subclass 516. Subject matter wherein the electrolyte or bath material is treated prior to synthesis other than by heating, cooling, or replacing material consumed during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
351, for treating the electrolyte or bath without removal from the cell other than regenerating, replenishing, or replacing consumed material during synthesis.

537 Controlling electrolyte flow other than by flow through a diaphragm or membrane:
This subclass is indented under subclass 516. Subject matter wherein the flow of electrolyte is controlled during the synthesis other than by flow through a diaphragm or membrane (e.g., utilizing baffles, conduits, differences in solution densities, specific electrolyte feed rate, entrained gas in solution, etc.).

538 Oxide:
This subclass is indented under subclass 477. Subject matter wherein a metallic oxide is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
333, for processes of applying an oxide coating to a substrate electrolytically.

539 Manganese containing:
This subclass is indented under subclass 538. Subject matter wherein a manganese oxide is produced during synthesis.

540 And elemental zinc or elemental manganese produced:
This subclass is indented under subclass 539. Subject matter wherein elemental zinc or elemental manganese is also produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
262, for processes of electrolytically coating with manganese from an aqueous bath.
305+, for processes of electrolytically coating with zinc from an aqueous bath.
369, for the processes of preparing metallic zinc from a fused bath by synthesis.
370, for the processes of preparing metallic manganese from a fused bath by synthesis.
602+, for the processes of preparing metallic zinc from an aqueous bath or a bath other than a fused bath by synthesis.

541 Utilizing specified electrode:
This subclass is indented under subclass 539. Subject matter wherein at least one specified electrode is utilized during synthesis.

(1) Note. This subclass includes specified composition and/or configuration.

542 Titanium, zirconium, hafnium, vanadium, niobium, or tantalum containing (Ti, Zr, Hf, V, Nb, or Ta):
This subclass is indented under subclass 541. Subject matter wherein the electrode contains titanium, zirconium, hafnium, vanadium, niobium, or tantalum.

543 Group VIII metal containing:
This subclass is indented under subclass 538. Subject matter wherein a group VIII metal containing oxide is produced during synthesis (e.g., an oxide of Fe, Ni, or Co.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
269, for processes of electrolytically coating with cobalt from an aqueous bath.
270, for processes of electrolytically coating with iron from an aqueous bath.
271+, for processes of electrolytically coating with nickel from an aqueous bath.
370, for processes of preparing iron, cobalt, or nickel from a fused bath by synthesis.
587+, for processes of preparing iron or cobalt from an aqueous bath or a bath other than a fused bath by synthesis.
594+, for processes of preparing nickel from an aqueous bath or a bath other than a fused bath by synthesis.

544 Germanium, tin or lead containing:
This subclass is indented under subclass 538. Subject matter wherein germanium, tin, or lead containing oxide is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299, for processes of electrolytically coating with lead from an aqueous bath.
300+, for processes of electrolytically coating with tin from an aqueous bath.
369, for processes of preparing lead from a fused bath by synthesis.
597+, for processes of preparing lead from an aqueous bath or a bath other than a fused bath by synthesis.
610+, for processes of preparing tin form an aqueous bath or a bath other than a fused bath by synthesis.

545 Copper, silver, gold, zinc, cadmium, or mercury containing (Cu, Ag, Au, Zn, Cd, Hg):
This subclass is indented under subclass 538. Subject matter wherein copper, silver, gold, zinc, cadmium, or mercury containing oxide is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
263, for processed of electrolytically coating with silver from an aqueous bath.
266+, for processes of electrolytically coating with gold from an aqueous bath.
281+, for processes of electrolytically coating with cadmium from an aqueous bath.
291+, for processes of electrolytically coating with copper from an aqueous bath.
305+, for processes of electrolytically coating with zinc from an aqueous bath.
369, for processes of preparing zinc or cadmium from a fused bath by synthesis.
562, for processes of preparing mercury from an aqueous bath or a bath other than a fused bath by synthesis.
571, for processes of preparing silver or gold from an aqueous bath or a bath other than a fused bath by synthesis.
574+, for processes of preparing copper from an aqueous bath or a bath other than a fused bath by synthesis.
602+, for processes of preparing zinc from an aqueous bath or a bath other than a fused bath by synthesis.

546 Hydrate:
This subclass is indented under subclass 477. Subject matter wherein a metallic hydrate is produced during synthesis.

(1) Note. A hydrate is a substance containing water combined in the molecular form.

547 Germanium, tin, or lead containing:
This subclass is indented under subclass 477. Subject matter wherein a compound containing germanium, tin, or lead is produced during synthesis (e.g., lead borate, sodium stannate, etc.).

548 Iron, cobalt, or nickel containing:
This subclass is indented under subclass 477. Subject matter wherein a compound containing iron, cobalt, or nickel is produced during synthesis (e.g., potassium ferrate, etc.).

549 Silicon, boron, or phosphorus containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein an inorganic compound containing silicon, boron, or phosphorus is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
358, for processes of preparing inorganic silicon, boron, or phosphorus compounds from a fused bath by synthesis.
420, for processes of preparing organic silicon, boron, or phosphorus containing compounds from an aqueous bath or a bath other than a fused bath by synthesis.
477+, for processes of preparing metal containing silicon or boron compounds from an aqueous bath or a bath other than a fused bath by synthesis.
488+, for processes of preparing metal containing phosphorus compounds from an aqueous bath or a bath other than a fused bath by synthesis.

550 Phosphine:
This subclass is indented under subclass 549. Subject matter wherein the compound produced is phosphine (PH_3).

(1) Note. The aqueous electrolyte bath utilized herein may contain a portion or a pool of molten phosphorus.

551 Nitrogen containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein a compound containing nitrogen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
491+, for processes of producing metal containing nitrogen compounds by synthesis.
617, for processes of producing elemental nitrogen by synthesis.

552 Ammonia:
This subclass is indented under subclass 551. Subject matter wherein the compound produced is ammonia.

553 Nitric acid or oxide of nitrogen:
This subclass is indented under subclass 551. Subject matter wherein the compound produced is nitric acid or an oxide of nitrogen.

554 Sulfur containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein a compound containing sulfur is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
361, for processes of preparing inorganic sulfur containing compounds from a fused bath by synthesis.
444+, for processes of preparing organic sulfur containing compounds from an aqueous bath or bath other than a fused bath by synthesis.
494, for processes of preparing metal containing sulfur compounds from an aqueous bath or a bath other than a fused bath by synthesis.
617, for processes of preparing elemental sulfur from an aqueous bath or a bath other than a fused bath by synthesis.

555 Carbon containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein an inorganic compound containing carbon is produced by synthesis (e.g., carbon dioxide, carbon monoxide, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
478+, for processes of preparing metal containing inorganic carbon compounds from an aqueous bath or a bath other than a fused bath by synthesis.

556 Halogen containing compound produced:
This subclass is indented under subclass 464. Subject matter wherein a compound containing halogen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
356, for processes of preparing organic halogen containing compounds from a fused bath by synthesis.
359, for processes of preparing inorganic halogen containing compounds from a fused bath by synthesis.

411, for processes of preparing elemental halogen from a fused bath by synthesis.

459+, for processes of preparing organic halogen containing compounds from an aqueous bath or a bath other than a fused bath by synthesis.

498+, for processes of preparing metal containing halogen compounds from an aqueous bath or a bath other than a fused bath by synthesis.

618+, for processes of preparing elemental halogen from an aqueous bath or a bath other than a fused bath by synthesis.

557 Preparing alloy:

This subclass is indented under subclass 334. Subject matter wherein an alloy is produced during synthesis utilizing an aqueous bath or other bath.

(1) Note. See Class 420, Glossary, for the definition of "alloy."

SEE OR SEARCH THIS CLASS, SUBCLASS:

238+, for processes of depositing a predominantly alloy coating from an aqueous bath.

363+, for processes of preparing an alloy from a fused bath.

558 Amalgam produced (e.g., utilizing mercury or amalgam electrode during synthesis, etc.):

This subclass is indented under subclass 557. Subject matter wherein the alloy produced is an amalgam (alloy of mercury with another metal) which may be synthesized by alloying a metal with a mercury or amalgam cathode.

559 Precious metal containing (Ru, Rh, Pd, Os, Ir, Pt, Ag, or Au):

This subclass is indented under subclass 558. Subject matter wherein the amalgam produced contains a precious metal (i.e., Ru, Rh, Pd, Os, Ir,Pt, Ag, or Au).

560 Preparing single metal:

This subclass is indented under subclass 334. Subject matter wherein a single metal (free metal or elemental metal) is produced from an aqueous bath or other bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:

261+, for processes of depositing a predominantly single metal coating from an aqueous bath.

367, for processes of preparing a single metal from a fused bath.

561 Utilizing bipolar electrode:

This subclass is indented under subclass 560. Subject matter wherein the electrode utilized during synthesis is a bipolar-type electrode which is a planar electrode wherein one surface serves as an anode and the other surface serves as a cathode.

562 Mercury produced:

This subclass is indented under subclass 560. Subject matter wherein the single metal produced is mercury.

SEE OR SEARCH THIS CLASS, SUBCLASS:

559+, for processes of preparing an alloy of mercury (amalgam) from an aqueous bath or a bath other than a fused bath.

563 Arsenic, antimony, or bismuth produced (As, Sb, or Bi):

This subclass is indented under subclass 560. Subject matter wherein the single metal produced is arsenic, antimony, or bismuth.

564 Gallium, germanium, indium, vanadium, or molybdenum produced (Ga, Ge, In, V, or Mo):

This subclass is indented under subclass 560. Subject matter wherein the single metal produced is gallium, germanium, indium, vanadium, or molybdenum.

565 Precious metal produced:

This subclass is indented under subclass 560. Subject matter wherein the single metal produced is a precious metal (i.e., Ru, Rh, Pd, Os, Ir, Pt, Ag, or Au).

566 Utilizing specified electrode other than consumable precious metal containing electrode:

This subclass is indented under subclass 565. Subject matter wherein a specified electrode structure or composition is utilized other than a

precious metal containing electrode which is used up during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

567 Alloy electrode:
This subclass is indented under subclass 566. Subject matter wherein the specified electrode is an alloy electrode.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 293 for an electrode composed of a particular alloy.

568 Leaching, dissolving, or extracting prior to synthesis:
This subclass is indented under subclass 565. Subject matter wherein a source material (raw material) containing the precious metal is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

569 Utilizing nitrogen containing material:
This subclass is indented under subclass 568. Subject matter wherein a nitrogen containing material (e.g., nitric acid, sodium cyanide, etc.) is used in the leaching, dissolving, or extracting process (e.g., cyaniding leach, etc.).

570 Utilizing halogen containing material:
This subclass is indented under subclass 568. Subject matter wherein a halogen containing material (e.g., hydrochloric acid, ferric chloride, etc.) is used in the leaching, dissolving, or extracting process (i.e., halogenating leach).

571 Silver or gold:
This subclass is indented under subclass 565. Subject matter wherein the precious metal is silver or gold.

572 Chromium produced:
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is chromium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
283+, for processes of depositing a chromium coating from an aqueous bath.

573 Manganese produced:
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is manganese.

574 Copper produced:
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is copper.

SEE OR SEARCH THIS CLASS, SUBCLASS:
291+, for processes of depositing a copper coating from an aqueous bath.

575 Utilizing specified electrode other than consumable copper containing electrode:
This subclass is indented under subclass 574. Subject matter wherein a specified electrode structure or composition is utilized other than a copper containing electrode which is used up during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

576 Specified anode:
This subclass is indented under subclass 575. Subject matter wherein the specified electrode is an anode.

577 Elemental carbon containing (e.g., graphite, etc.):
This subclass is indented under subclass 576. Subject matter wherein the specified anode contains carbon in a free state (e.g., graphite, etc.).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 294 for a carbon containing electrode composition.

578 Lead containing:
This subclass is indented under subclass 576. Subject matter wherein the specified anode contains lead.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 291+ for an electrode made of a specified composition.

579 Iron, cobalt, or nickel containing:
This subclass is indented under subclass 576. Subject matter wherein the specified anode contains iron, cobalt, or nickel.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 291+ for an electrode made of a specified composition.

580 Leaching, dissolving, or extracting prior to synthesis:
This subclass is indented under subclass 574. Subject matter wherein a source material (raw material) containing the copper is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

581 Utilizing organic material:
This subclass is indented under subclass 580. Subject matter wherein an organic material (e.g., oximes, diketones, etc.) is used in the leaching, dissolving, or extracting process.

582 Utilizing halogen containing material:
This subclass is indented under subclass 580. Subject matter wherein a halogen containing material is used in the leaching, dissolving, or extracting process (i.e., halogenating leach).

583 Utilizing sulfur containing material:
This subclass is indented under subclass 580. Subject matter wherein a sulfur containing material (e.g., sulfuric acid, etc.) is used in the leaching, dissolving, or extracting process (e.g., sulfating leach, etc.).

584 Recycling electrolyte or bath material back to production cell after synthesis:
This subclass is indented under subclass 583. Subject matter wherein at least a portion of the electrolyte or bath material is sent back to the electrolytic cell where copper was produced after synthesis.

585 Bath contains organic material:
This subclass is indented under subclass 574. Subject matter wherein the electrolyte bath contains an organic material.

586 Purifying or treating electrolyte or bath prior to or after synthesis:
This subclass is indented under subclass 574. Subject matter wherein the electrolyte or bath is purified or treated prior to or after electrolytic synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
351, for processes of treating electrolyte or bath without removal from cell other than regenerating, replacing, or replenishing consumed material during synthesis.

587 Iron, cobalt, or nickel produced:
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is iron, cobalt, or nickel.

588 Specified anode other than consumable iron, cobalt, or nickel containing electrode:
This subclass is indented under subclass 587. Subject matter wherein a specified anode structure or composition is utilized other than an iron, cobalt, or nickel containing electrode which is used up during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

589 Leaching, dissolving, or extracting prior to synthesis:
This subclass is indented under subclass 587. Subject matter wherein a source material (raw material) containing the iron group metal (Fe, Co, or Ni) is subjected to a process of leaching,

dissolving, or extracting prior to electrolytic synthesis.

590 **Utilizing organic material:**
This subclass is indented under subclass 589. Subject matter wherein an organic material is used for any purpose in the leaching, dissolving, or extracting process.

591 **Utilizing halogen containing material:**
This subclass is indented under subclass 589. Subject matter wherein a halogen containing material is used in the leaching, dissolving, or extracting process.

592 **Of iron:**
This subclass is indented under subclass 591. Subject matter wherein a source material containing iron is subjected to leaching, dissolving, or extracting with a halogen containing material (halogenating leach).

593 **Of iron:**
This subclass is indented under subclass 589. Subject matter wherein a source material containing iron is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

594 **Nickel:**
This subclass is indented under subclass 587. Subject matter wherein the iron group metal produced is nickel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
271+, for processes of depositing a nickel coating from an aqueous bath.

595 **Bath contains organic material:**
This subclass is indented under subclass 594. Subject matter wherein the electrolyte bath contains an organic material.

596 **Bath pH below 5:**
This subclass is indented under subclass 594. Subject matter wherein the PH of the electrolyte bath is less than 5.0.

597 **Lead produced:**
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is lead.

598 **Utilizing specified electrode other than consumable lead containing electrode:**
This subclass is indented under subclass 597. Subject matter wherein a specified electrode structure or composition is utilized other than a lead containing electrode which is used up during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

599 **Leaching, dissolving, or extracting prior to synthesis:**
This subclass is indented under subclass 597. Subject matter wherein a source material (raw material) containing lead is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

600 **Utilizing halogen containing material:**
This subclass is indented under subclass 599. Subject matter wherein a halogen containing material is used in the leaching, dissolving, or extracting process.

601 **Bath contains organic material:**
This subclass is indented under subclass 597. Subject matter wherein the electrolyte bath contains an organic material.

602 **Zinc produced:**
This subclass is indented under subclass 560. Subject matter wherein the single metal produced is zinc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
305+, for processes of depositing zinc from an aqueous bath.

603 **Utilizing specified electrode other than consumable zinc containing electrode:**
This subclass is indented under subclass 602. Subject matter wherein a specified electrode structure or composition is utilized other than a zinc containing electrode which is used up during synthesis.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

604 Leaching, dissolving, or extracting prior to synthesis:

This subclass is indented under subclass 602. Subject matter wherein a source material containing zinc is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

605 Utilizing organic material:

This subclass is indented under subclass 604. Subject matter wherein an organic material is used in the leaching, dissolving, or extracting process.

606 Utilizing halogen containing material:

This subclass is indented under subclass 604. Subject matter wherein a halogen containing material is used in the leaching, dissolving, or extracting process.

607 Utilizing sulfur containing material:

This subclass is indented under subclass 604. Subject matter wherein a sulfur containing material is used in the leaching, dissolving, or extracting process (e.g., sulfating leach, etc.).

608 Removing iron or iron containing material:

This subclass is indented under subclass 607. Subject matter wherein iron or iron containing material is removed in the process.

(1) Note. Included herein is the removal of iron or iron containing material derived from the source or raw material which is used for the production of zinc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

357+, for processes of preparing an iron containing inorganic compound from a fused bath.

370, for processes of preparing iron from a fused bath.

548, for processes of preparing iron containing inorganic compound from an aqueous bath or a bath other than a fused bath.

587+, for processes of preparing iron from an aqueous bath or a bath other than a fused bath.

609 Bath contains silver, strontium, or organic material:

This subclass is indented under subclass 602. Subject matter wherein the electrolyte bath contains silver, strontium, or organic material.

610 Tin produced:

This subclass is indented under subclass 560. Subject matter wherein the single metal produced is tin.

SEE OR SEARCH THIS CLASS, SUBCLASS:

300+, for processes of depositing a tin coating from an aqueous bath.

611 Leaching, dissolving or extracting prior to synthesis:

This subclass is indented under subclass 610. Subject matter wherein a source material (raw material) containing tin is subjected to a process of leaching, dissolving, or extracting prior to electrolytic synthesis.

612 Utilizing halogen containing material:

This subclass is indented under subclass 611. Subject matter wherein a halogen containing material is used in the leaching, dissolving, or extracting process.

613 Utilizing sulfur containing material:

This subclass is indented under subclass 611. Subject matter wherein a sulfur containing material is used for any purpose in the leaching, dissolving, or extracting process (e.g., sulfating leach, etc.).

614 Bath contains silicon or organic material:

This subclass is indented under subclass 610. Subject matter wherein the electrolyte bath contains silicon or organic material.

615 Preparing nonmetal element:

This subclass is indented under subclass 334. Subject matter wherein a nonmetallic element is produced during synthesis.

616 Utilizing bipolar electrode:
This subclass is indented under subclass 615. Subject matter wherein at least one bipolar electrode is utilized during synthesis.

(1) Note. See subclass 383 (Class 205) for the definition of "bipolar electrode."

617 Sulfur or nitrogen produced:
This subclass is indented under subclass 615. Subject matter wherein elemental sulfur or nitrogen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
360, for processes of preparing inorganic nitrogen containing compounds from a fused bath by synthesis.
361, for processes of preparing inorganic sulfur containing compounds from a fused bath by synthesis.
431+, for processes of preparing organic nitrogen containing compounds from an aqueous bath or a bath other than a fused bath by synthesis.
444+, for processes of preparing organic sulfur containing compounds from an aqueous bath or a bath other a fused bath by synthesis.
491+, for processes of preparing meal containing nitrogen compounds from an aqueous bath or a bath other than a fused bath by synthesis.
494+, for processes of preparing metal containing sulfur compounds from an aqueous bath or a bath other than a fused bath by synthesis.
551+, for processes or preparing inorganic, nonmetal containing nitrogen compound from an aqueous bath or a bath other than a fused bath by synthesis.
554, for processes of preparing inorganic, nonmetal containing sulfur compound from an aqueous bath or a bath other than a fused bath by synthesis.

618 Halogen produced:
This subclass is indented under subclass 615. Subject matter wherein elemental halogen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
356, for processes of preparing organic halogen containing compounds from a fused bath.
359, for processes of preparing inorganic halogen compounds from a fused bath by synthesis.
411, for processes of preparing elemental halogen from a fused bath by synthesis.
459+, for processes of preparing organic halogen containing compounds from an aqueous bath or a bath other than a fused bath by synthesis.
498+, for processes of preparing metal containing halogen compounds from an aqueous bath or a bath other than a fused bath by synthesis.
556, for processes of preparing inorganic halogen containing compounds from an aqueous bath or a bath other than a fused bath by synthesis.

619 Fluorine, bromine, or iodine produced:
This subclass is indented under subclass 618. Subject matter wherein elemental fluorine, bromine, or iodine is produced during synthesis.

620 Chlorine and hydrogen produced:
This subclass is indented under subclass 618. Subject matter wherein both elemental chlorine and hydrogen are produced during synthesis.

621 Utilizing specified metal or alloy cathode:
This subclass is indented under subclass 620. Subject matter wherein a specified metal or alloy cathode is utilized during synthesis.

622 Utilizing specified electrode other than graphite or inorganic carbon:
This subclass is indented under subclass 618. Subject matter wherein at least one specified electrode structure or composition other than graphite or inorganic carbon is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

623 Mercury or amalgam cathode:
This subclass is indented under subclass 622. Subject matter wherein a mercury or amalgam cathode is utilized during synthesis.

(1) Note. Amalgam is an alloy of a metal with mercury. See Class 420, Glossary, for the definition of "alloy."

624 Diaphragm or membrane bonded electrode:
This subclass is indented under subclass 622. Subject matter wherein a diaphragm or membrane bonded to at least one electrode or wherein at least one electrode bonded to a diaphragm or membrane is utilized during synthesis.

(1) Note. The membrane or diaphragm must be a separately made preform bonded to the electrode.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 282 and 283 for the structure and composition of electrodes and membranes or diaphragms bonded together.

625 Coated electrode:
This subclass is indented under subclass 622. Subject matter wherein at least one electrode which is coated is utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80+, for processes of applying a coating electrolytically.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 290.01 through 290.15 for laminated or coated electrodes.
427, Coating Processes, subclasses 58+ for processes of producing electrical products by a coating operation.

626 Ozone produced:
This subclass is indented under subclass 615. Subject matter wherein ozone (O_3) is produced during synthesis.

627 Deuterium or tritium produced:
This subclass is indented under subclass 615. Subject matter wherein deuterium or tritium (D_2 or H_3) is produced during synthesis.

628 Oxygen and hydrogen produced:
This subclass is indented under subclass 615. Subject matter wherein both elemental oxygen and hydrogen are produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
633+, for processes of preparing elemental oxygen from an aqueous bath or a bath other than a fused bath by synthesis.
637+, for processes of preparing hydrogen from an aqueous bath or a bath other than a fused bath by synthesis.

629 Utilizing inorganic solid electrolyte:
This subclass is indented under subclass 628. Subject matter wherein an inorganic solid electrolyte is utilized during synthesis (e.g., ceramic, metallic, etc.).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 295 for specified electrolyte composition.

630 Utilizing specified electrode:
This subclass is indented under subclass 628. Subject matter wherein at least one specified electrode structure or composition is utilized during synthesis.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for an electrode of specified structure or composition.

631 Specified single metal or alloy:
This subclass is indented under subclass 630. Subject matter wherein at least one specified single metal or alloy electrode is utilized during synthesis.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 292 and 293 for specified electrode single metal or alloy compositions, respectively.

632 Group VIII metal:

This subclass is indented under subclass 631. wherein the electrode containing a group VIII metal (e.g., Fe, Ni, or Co) or alloy is utilized during synthesis.

633 Oxygen produced:

This subclass is indented under subclass 615. Subject matter wherein elemental oxygen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

628+, for processes of preparing oxygen and hydrogen from an aqueous bath or a bath other than a fused bath.

634 Utilizing inorganic solid electrolyte:

This subclass is indented under subclass 633. Subject matter wherein an inorganic solid electrolyte is utilized during synthesis (e.g., ceramic, metallic, etc.).

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 295 for specified electrolyte composition.

635 Utilizing nonmetal containing electrode:

This subclass is indented under subclass 633. Subject matter wherein at least one electrode containing a nonmetal is utilized during synthesis (e.g., metal boride, carbide, oxide, nitride, cermet, etc.).

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 291 and 294 for specified nonmetal electrode compositions.

636 Utilizing group VIII metal alloy electrode:

This subclass is indented under subclass 633. Subject matter wherein at least one electrode containing a group VIII metal alloy (e.g., Fe, Ni, Co alloy) is utilized during synthesis.

637 Hydrogen produced:

This subclass is indented under subclass 615. Subject matter wherein elemental hydrogen is produced during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

510+, for processes of preparing alkali metal hydroxide and hydrogen from an aqueous bath or a bath other than a fused bath.

620+, for processes of preparing hydrogen and chlorine from an aqueous bath or a bath other than a fused bath.

628+, for processes of preparing oxygen and hydrogen from an aqueous bath or a bath other than a fused bath.

638 Utilizing specified electrode:

This subclass is indented under subclass 637. Subject matter wherein at least one specified electrode structure or composition is utilized during synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

280+, for an electrode of specified structure or composition.

639 Specified single metal or alloy:

This subclass is indented under subclass 638. Subject matter wherein at least one electrode containing a single metal or alloy is utilized during synthesis.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 292 and 293 for specified metal or alloy electrode compositions.

640 Electrolytic erosion of a workpiece for shape or surface change (e.g., etching, polishing, etc.) (process and electrolyte composition):

This subclass is indented under the class definition. Subject matter in which the chemical change occurs as a result of an electrolytic current between a tool electrode and a workpiece electrode and involves removing material from the workpiece in order to change the shape or surface configuration thereof, including electrolyte compositions for use therein.

(1) Note. For this subclass and the subclasses indented hereunder, some of the terms in the schedule and definitions are found at the end of this subclass definition.

(2) Note. This subclass and the subclasses indented hereunder include the electrolyte technology employed in electrolytic erosion processes. The regeneration, per se, of such electrolytes is classified in subclass 673 and the electrolyte compositions are classified in subclasses 674+.

(3) Note. The products of electrolytic erosion processes are excluded from this and the subclasses indented hereunder as a specific exception to the general rule of Class 204; see section (B) of the class definition.

(4) Note. Processes included in this and the indented subclasses are those in which the net result is stripping or removal of material to change the shape or surface configuration of a workpiece. Processes of electrolytic erosion combined with electrolytic deposition of a desired product are found in the above appropriate subclasses. However, if electrolytic coating is followed by electrolysis to entirely remove the electrolytically coated layer, no net coating has taken place, and no desired product has been synthesized (other than an electrolytically eroded or treated article); therefore placing the process in this subclass or the subclasses indented hereunder when such erosion or treatment has resulted in a change of shape or surface configuration of the base article (workpiece) and in subclasses 687+ in other cases.

(5) Note. This subclass (640) is the locus for patents directed to manufacturing or repairing of tools used in an electrolytic erosion process; such manufacturing or repairing not being provided for in any of the above subclasses in this class. The manufacturing or repairing of these tools by electrolytic erosion and the manufacturing or repairing of these tools combined with their use in electrolytic erosion are properly classified in the subclasses indented hereunder when provided for in these subclasses.

(6) Note. Although this subclass and the subclasses indented hereunder are intended to provide for electrolytic polishing (electropolishing as defined above), other processes which do not clearly or necessarily involve electrolytic erosion (e.g., "brightening," forming a surface "luster," etc.) may only be classified herein if such operations are clearly electrolytic and are the result of a shape or surface change of a workpiece. Otherwise, such operations are assumed to be mere cleaning or removal of a surface coating (e.g., metal oxide, sulfide, scale, etc.), the electrolytic variety of which is provided for below, under subclasses 687+, electrolytic material treatment. "Burnishing" is generally mere mechanical compacting, smoothing, or rubbing of material to produce a shiny or lustrous surface thereon, unless clearly indicated otherwise.

SEE OR SEARCH THIS CLASS, SUBCLASS:

52, for electrolytic marking (e.g., electroprinting, etc.) involving electrolytic erosion.

70, for a process of making a die by electroforming in which the die may or may not be used as a tool for electrolytic erosion.

80+, for a process where a polished surface is produced by electrolytic coating.

205+, for electrolytic erosion followed by electrolytic coating.

220+, for electrolytic coating followed by electrolytic erosion of the coating to remove only a portion thereof.

687+, for electrolytic erosion performed upon solid coherent objects for purposes other than a change in the shape or surface configuration of the workpiece.

705+, for electrolytic metal treatment in which brightening results from a cleaning action only. Processes in which electrolytic polishing is preceded by an electrolytic cleaning action are found in subclasses 660+.

717+, for a process in which an entire layer of elemental material is removed from a metallic substrate by electrolytic erosion, the material removed not being limited to a portion of the workpiece surface.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 89.5+ and 90.01+ for processes and apparatus for producing a smooth surface by burnishing (e.g., by rubbing with a smooth surface of greater hardness than the workpiece, etc.).

51, Abrasive Tool Making Process, Material, or Composition, for processes, materials, or compositions used to make tools employed in changing the shape or surface configuration of an object by grinding or other mechanical material removal without also employing electrolytic erosion.

76, Metal Tools and Implements, Making, appropriate subclasses for special machines, processes, blanks, and dies for making tools, in particular, subclasses 107.1+ for blanks and processes of making dies.

134, Cleaning and Liquid Contact With Solids, appropriate subclasses for processes and apparatus in general for cleaning or assuring contact of a solid material with a treating liquid.

148, Metal Treatment, appropriate subclasses for the treatment (e.g., tempering, ageing, etc.) of solid or semisolid metal to modify or maintain internal physical structure (i.e., microstructure) or chemical properties of the metal which may or may not be combined with a Class 205 procedure (e.g., carburizing or nitriding of solid metal combined with electrolytic erosion, etc.). Processes of electrolytic removal of metal by erosion combined with a broadly claimed heat treatment are properly classified in Class 205, subclasses 640+.

216, Etching a Substrate: Processes, for processes of chemical etching or erosion which do not employ an electrolytic current, but may involve an electrical discharge.

219, Electric Heating, especially subclasses 68+, for processes of electrical erosion which do not employ an electrolyte or involve an added chemical reagent (e.g., spark gap erosion, etc.).

252, Compositions, especially subclass 62.2 for electrolytes specialized or designed for an electrical device used merely as an electrical component (e.g., rectifier, condenser, etc.) and subclasses 79.1+ for etching compositions which, although not intended for use in electrolysis, may be identical in composition to such electrolytes.

428, Stock Material or Miscellaneous Articles, subclass 612 for a composite metallic stock material having a microscopic interfacial wave or roughness.

451, Abrading, appropriate subclasses for apparatus, processes, and compositions for changing the shape or surface configuration of an object by grinding or other mechanical material removal, without electrolytic erosion.

483, Tool Changing, for a process or apparatus involving electrolytic erosion in which changing a tool electrode using a tool transfer means and a tool support or storage means is the sole significantly recited feature.

GLOSSARY

ELECTROPOLISHING

The electrolytic erosion of solid surfaces to produce bright or mirrorlike surfaces. The effect usually results from a selective electrolytic erosion of the high points of a base material surface to thus reduce surface irregularities.

ELEMENT

An electrode, a workpiece, a tool, or an electrolyte.

TOOL

A solid (including a gel) coherent object which cooperates with a workpiece and an electrolyte, either mechanically or electrically, to remove some of the material from the workpiece. Thus, for example, a tool may be an electrode, a grinding wheel, an insulating spacer, etc.

WORKPIECE

A solid coherent object which serves as an electrode and is subjected to electrolytic erosion, some of which is removed during the process and some of which remains as a product. The workpiece may be a layer of one material supported by another material.

641 With control responsive to sensed condition:
This subclass is indented under subclass 640. Process in which the material removal is regulated by detecting a characteristic or a change in a characteristic of the process and by implementing an action in the process based upon the detected characteristic or change therein.

(1) Note. In this subclass and the subclasses indented hereunder a single means may be used both to detect a characteristic or a change in a characteristic of the process and to implement an action in the process based upon the detected characteristic or change therein. There must be a positive action made by a control means because of the detected characteristic or change therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645, for electrolytic erosion with measuring, testing, or sensing; but without involving control responsive to a sensed condition.

646+, for electrolytic erosion with programmed, cyclic, or time responsive control; but without control responsive to sensed condition.

652+, for electrolytic erosion in which the tool-workpiece gap size is either specified or maintained constant; without using (1) control responsive to a sensed condition, (2) measuring, testing, or sensing, or (3) programmed, cyclic, or time responsive control.

775+, for electrolytic methods of analysis or testing, per se. See the (1) note in subclass 775.

SEE OR SEARCH CLASS:

73, Measuring and Testing, as the residual class for processes and apparatus for measuring or testing, per se. See also the (3) Note in the class definition of Class 73 for additional loci of other measuring and testing processes and apparatus of different types.

324, Electricity: Measuring and Testing, for measuring, testing, or sensing, per se, to determine electrical properties by electrical means even though non-electrical values may be derived from the electrical properties determined.

642 To adjust voltage across or size of tool-workpiece gap:
This subclass is indented under subclass 641. Process in which the detected characteristic or change therein is used (a) to establish proper gap or spacing between a tool and a workpiece, (b) to adjust or keep this gap or spacing constant, or (c) to vary the voltage across this gap or spacing.

(1) Note. This subclass and the subclass indented hereunder are not intended to provide for mere process shutdown in response to a sensed condition unless the shutdown is clearly accompanied by or is the result of an interruption in the gap voltage. Subclasses 641 and 644 provide for mere process shutdown in response to a sensed condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

652+, for electrolytic erosion in which the tool-workpiece gap size is either specified or maintained constant without using (1) control responsive to a sensed condition, (2) measuring, testing, or sensing, or (3) programmed, cyclic, or time responsive control.

643 In response to sensed voltage:
This subclass is indented under subclass 642. Process in which the gap voltage or size or a change in the gap voltage or size are adjusted or controlled in response to a detected voltage or change therein.

(1) Note. The detected voltage may either be the gap voltage or any other process voltage.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for electrolytic erosion in which a sensed voltage or current is used to control the process without being used to adjust the voltage across or size of the tool-workpiece gap.

644 In response to sensed voltage or current:

This subclass is indented under subclass 641. Process in which a detected voltage or current or a change in a detected voltage or current is used to control the process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for electrolytic erosion in which a sensed voltage is used to adjust the voltage across or size of the tool-workpiece gap.

645 With measuring, testing, or sensing:

This subclass is indented under subclass 640. Process which includes measuring, detecting, or testing of a characteristic, condition, or property of the process or an element used in the process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

641+, for electrolytic erosion which is controlled in response to a sensed condition.

775+, for electrolytic methods of analysis or testing, per se. See the (1) Note in subclass 775.

SEE OR SEARCH CLASS:

73, Measuring and Testing, as the residual class for processes and apparatus for measuring or testing, per se. See also the (3) Note in the class definition of Class 73 for additional loci of other measuring and testing processes and apparatus of different types.

324, Electricity: Measuring and Testing, for measuring, testing, or sensing, per se, to determine electrical properties by electrical means even though nonelectrical values may be derived from the electrical properties determined.

646 With programmed, cyclic, or time responsive control:

This subclass is indented under subclass 640. Process which is not directly responsive to a sensed condition, but involves (a) storing coded instructions or other data which is used to regulate the process, (b) repetitively regulating a sequence of process steps, or (c) regulating the process according to preset timing sequences (e.g., limiting various process steps to predetermined durations of time, etc.).

(1) Note. This subclass and the subclasses indented hereunder are not intended to include the use of alternating current (AC), per se, or the use of direct current (DC) pulses which are not clearly repetitive (i.e., with multiple complete cycles) or predetermined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

641+, for electrolytic erosion with control responsive to a sensed condition.

652+, for electrolytic erosion in which the tool-workpiece gap is either specified or maintained constant; but without using programmed, cyclic, or time responsive control.

647 Including nonelectrolytic erosion:

This subclass is indented under subclass 646. Process which includes both electrolytic and nonelectrolytic removal of material from the workpiece.

(1) Note. The nonelectrolytic erosion may be carried out either simultaneously with the electrolytic erosion or as a separate step.

SEE OR SEARCH THIS CLASS, SUBCLASS:

661, for electrolytic erosion with preliminary nonelectrolytic cleaning or shaping of the workpiece; but without programmed, cyclic, or time responsive control.

662+, for electrolytic erosion with mechanical abrasion or grinding, in general.

709, for electrolytic cleaning involving moving contact of a solid member with a workpiece.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 280 through 294 for electrode structure and compositions used in electrolysis, including those also having a non-electrolytic action. See the Class 204 definition for an elaboration of the class line with chemical etching, especially the Lines With Other Classes and Within This Class and the References to Other Classes, Lines Between Classes sections.

216, Etching a Substrate: Processes, appropriate subclasses for a combination process of Class 205 electrolytic erosion followed by a Class 216 chemical etching step.

648 Using diverse-type tool electrodes:

This subclass is indented under subclass 646. Process which employs two or more different types of tool electrodes (e.g., moving and stationary tools, layered composite and pure metal tools, etc.).

649 Eroding workpiece to match nonplanar surface shape of tool electrode:

This subclass is indented under subclass 646. Process in which the workpiece is eroded to match the surface shape of a tool electrode having a nonplanar machining surface (e.g., a tool electrode having a concave surface is used to erode a workpiece until it possesses a convex shape with the same radius of curvature as that of the tool surface, etc.).

650 Cleaning, recycling, or reusing electrolyte:

This subclass is indented under subclass 646. Process in which the electrolyte is purified by removing unwanted material (e.g., by filtering, etc.), recycled, or reused.

SEE OR SEARCH THIS CLASS, SUBCLASS:

673, for the regeneration, per se, of an electrolyte used in electrolytic erosion.

651 Moving tool or workpiece:

This subclass is indented under subclass 646. Process in which the tool, workpiece, or both are moved during erosion of the workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:

654, for electrolytic erosion in which a moving tool electrode is used with gap maintenance or a defined tool-workpiece gap.

663, for electrolytic erosion using a rotating tool or workpiece with mechanical abrasion or grinding; but without programmed, cyclic, or time responsive control.

686, for electrolytic erosion, in general, using a moving tool electrode.

652 Gap maintenance or defined tool-workpiece gap:

This subclass is indented under subclass 640. Process in which a method is recited for keeping a gap or spacing between the tool and workpiece essentially constant or in which this gap or spacing is mathematically specified.

(1) Note. The spacing may be maintained by the presence of a solid, insulating, nonabrasive material (e.g., stencil, mask, etc.) between the tool and workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:

642+, for electrolytic erosion in which a sensed condition is used to adjust the voltage across or size of the tool-workpiece gap.

662+, for electrolytic erosion in which the spacing may be maintained somewhat constant by the presence of abrasive particles between the tool and workpiece, but in which the use of such particles is not intended to maintain such spacing constant.

666+, for electrolytic erosion in which a stencil or mask is attached to the workpiece, but is not used to maintain the spacing between the tool and workpiece.

653 Using tool electrode with two or more holes for passage of electrolyte:

This subclass is indented under subclass 652. Process in which the tool electrode is provided with two or more perforations in the working surface thereof, usually to allow electrolyte to be supplied to or removed from the workpiece.

654 Moving tool electrode:
This subclass is indented under subclass 652. Process in which the tool electrode is moved during erosion of the workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:
651, for electrolytic erosion using a moving tool or workpiece with programmed, cyclic, or time responsive control.
663, for electrolytic erosion using a rotating tool or workpiece with mechanical abrasion or grinding.
686, for electrolytic erosion, in general, using a moving tool electrode.

655 With irradiation or illumination:
This subclass is indented under subclass 640. Process in which electromagnetic waves (e.g., ultraviolet light, gamma rays, etc.) or corpuscular radiation (e.g., stream of alpha particles, electron beam, etc.) are applied to an element during the erosion.

656 Eroding workpiece of nonuniform internal electrical characteristics:
This subclass is indented under subclass 640. Process in which the workpiece has electrical characteristics which vary within its interior (e.g., doped semiconductor with n and p regions, etc.), so that erosion proceeds at differing rates on one or more localized areas or portions thereof, usually to confine the erosion to desired locations.

(1) Note. The electrical nonuniformity need not be "normal," and may be brought about by processing (e.g., by short-circuiting, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
666+, for electrolytic erosion in which the workpiece has a distinguishable surface layer called a mask, usually having different electrical characteristics than the workpiece itself.

SEE OR SEARCH CLASS:
438, Semiconductor Device Manufacturing: Process, for chemical etching of a semiconductive substrate utilizing a p-n junction as an etch stop.

657 Internal battery action:
This subclass is indented under subclass 640. Process conducted without an external source of electrolytic current; usually the electrolytic current is derived from an internal chemical reaction (e.g., galvanic action, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
706+, for an electrolytic metal cleaning process which employs internal battery action, but does not result in a change of the shape or surface configuration thereof.

658 Simple alternating current:
This subclass is indented under subclass 640. Process in which electric current passing through the electrolyte (usually between the tool and workpiece) can be represented by a smooth sine wave having equal amplitude above and below a straight line ordinate at zero current (e.g., pure alternating current, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
711, for an electrolytic metal cleaning process which employs simple alternating current.

659 Plural separate currents or voltages applied:
This subclass is indented under subclass 658. Process which employs separate currents or voltages differing in magnitude, character, or type (e.g., simultaneous AC and DC, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
646+, for electrolytic erosion with programmed, cyclic, or time responsive control.

660 Preliminary cleaning or shaping of workpiece:
This subclass is indented under subclass 640. Process which includes a step of removing foreign matter from the workpiece or altering the

form of the workpiece before at least one step of electrolytic erosion on the same workpiece.

(1) Note. Plural steps of electrolytic erosion for shape or surface change of the same workpiece are included in this subclass and the subclasses indented hereunder.

(2) Note. Mere coating of the workpiece is not considered shaping.

661 Nonelectrolytic (e.g., mechanical grinding, milling, machining, etc.):
This subclass is indented under subclass 660. Process in which at least one step of preliminary cleaning or shaping is nonelectrolytic (e.g., mechanical grinding, milling, machining, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
647, for electrolytic erosion combined with nonelectrolytic erosion and programmed, cyclic, or time responsive control.
662+, for electrolytic erosion with simultaneous or subsequent mechanical abrasion or grinding.
709, for electrolytic cleaning involving moving contact of a solid member with a workpiece.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 212+ for electrolytic apparatus having a rotary electrode and subclasses 280+ for electrode structure and compositions used in electrolytic apparatus, including those also having a nonelectrolytic action.

662 With mechanical abrasion or grinding:
This subclass is indented under subclass 640. Process in which a solid makes moving contact with the workpiece to scrape or rub material from a surface of the workpiece.

(1) Note. The abrasive solid may be attached to a tool or may be loose.

(2) Note. The abrasion or grinding may occur simultaneously with or subsequent to electrolytic erosion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
647, for electrolytic erosion combined with nonelectrolytic erosion and programmed, cyclic, or time responsive control.
652+, for electrolytic erosion in which solid nonabrasive particles are used to maintain a tool-workpiece gap.
661, for electrolytic erosion with preliminary nonelectrolytic cleaning or shaping of the workpiece.
709, for electrolytic cleaning involving moving contact of a solid member with a workpiece.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 280+ for electrode structure and compositions used in electrolytic apparatus, including those having an abrading action.

663 Rotating tool or workpiece:
This subclass is indented under subclass 662. Process in which the tool or workpiece is rotated about an axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
651, for electrolytic erosion with programmed, cyclic, or time responsive control using a moving tool or workpiece.
654, for electrolytic erosion in which a moving tool electrode is used with gap maintenance or a defined tool-workpiece gap.
686, for other processes of electrolytic erosion using a moving tool electrode.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 212+ for electrolytic apparatus having a rotary electrode.

664 Sharpening or point making:
This subclass is indented under subclass 640. Process in which the workpiece is given a tapered end or side configuration by electrolytic erosion resulting in a sharp or pointed workpiece or portion thereof.

665 Aperture making:
This subclass is indented under subclass 640. Process in which material removal is continued until a passage is made to penetrate completely through the entire workpiece or a distinct layer thereof (i.e., having a discernable boundary).

SEE OR SEARCH THIS CLASS, SUBCLASS:
641+, for electrolytic erosion in which the creation of an aperture is part of sensing a condition used to control the process.
645, for electrolytic erosion in which the creation of an aperture is part of a test or measurement of a condition.
666+, for electrolytic erosion in which a complex pattern is etched using a mask.
717+, for a process in which an entire layer of elemental material is removed from a metallic substrate by electrolytic erosion, the material removed not being limited to a portion of the workpiece surface.

666 Using mask:
This subclass is indented under subclass 640. Process in which a workpiece surface to be eroded is provided with a distinguishable nonuniform covering which allows only part of the workpiece to contact the electrolyte.

(1) Note. The covering may be an adherent coating, a stencil, etc.

(2) Note. The nonuniformity of the covering is produced by a procedure or phenomenon other than the electrolytic erosion process itself.

(3) Note. The composition of the mask may bear a resemblance to that of the workpiece (e.g., the mask and workpiece may be different alloys of the same base metal) provided that the mask is identifiably separate from the workpiece and will not be eroded at the same rate as the workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:
656, for electrolytic erosion in which the workpiece has nonuniform internal electrical characteristics.

SEE OR SEARCH CLASS:
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for laminating processes. See the search class note to Class 156 at the beginning of this class for the class line.
427, Coating Processes, subclasses 256+ for processes of forming a nonuniform coating, in general.

667 Of photoresist or radiation resist:
This subclass is indented under subclass 666. Process in which the mask is composed of a material which exhibits physical changes when exposed to light or radiation and is more resistant to electrolytic erosion than is the workpiece.

SEE OR SEARCH CLASS:
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, appropriate subclasses for creating a coating imagewise through a radiation imagery process. However, Class 205,subclasses 640+, accepts the combination of electrolytic erosion with a Class 430 imaging step.

668 Local application of electrolyte:
This subclass is indented under subclass 640. Process in which only a portion of a workpiece surface is contacted with electrolyte.

SEE OR SEARCH THIS CLASS, SUBCLASS:
652+, for electrolytic erosion in which an insulating member serves both to maintain spacing between the tool and workpiece and to confine electrolyte contact to a portion of a workpiece surface.
666+, for electrolytic erosion in which contact of the electrolyte is confined to only a portion of a workpiece surface by positioning a mask against the workpiece.

671+, for electrolytic erosion in which an entire workpiece surface is in contact with an agitated electrolyte.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 224+ for electrolytic apparatus having a localized area applicator.

669 Using surface tension or capillary action to hold electrolyte in contact with workpiece:
This subclass is indented under subclass 668. Process in which the electrolyte is held into contact with a portion of the workpiece surface by surface tension or capillary action.

(1) Note. The surface tension forces may be due to an adjacent gas or an immiscible liquid.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

670 Through open nozzle or flow-through piping (e.g., unsupported jet, etc.):
This subclass is indented under subclass 668. Process in which the electrolyte is selectively contacted with a portion of the workpiece surface by directing a stream of the electrolyte towards the workpiece through either an open nozzle or enclosed piping.

671 Agitation or vibration of electrolyte:
This subclass is indented under subclass 640. Process in which an element is given a rhythmic back and forth or oscillatory movement resulting in the formation of pressure waves, mixing, or swinging within the electrolyte.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 222+ for electrolytic apparatus having an electrode oscillator, reciprocator, or agitator.

672 Defined electrolyte movement or pressure:
This subclass is indented under subclass 640. Process in which a particular path of motion or pressure is imparted to the electrolyte during the erosion process (e.g., submerged jet action, etc.).

(1) Note. A recitation of merely passing electrolyte between the tool and workpiece is not sufficient for classification in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
668+, for electrolytic erosion with local application of the electrolyte to contact only a portion of a workpiece surface.

673 Regenerating or rehabilitating, per se, of electrolyte:
This subclass is indented under subclass 640. Process for the, per se, regeneration or cleaning of an electrolyte used in electrolytic erosion (usually to permit reuse thereof).

SEE OR SEARCH THIS CLASS, SUBCLASS:
650, for cleaning, recycling, or reusing an electrolyte used in electrolytic erosion combined with programmed, cyclic, or time responsive control.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, appropriate subclasses for processes and apparatus for purifying liquids, in general.

674 Electrolyte composition or defined electrolyte:

This subclass is indented under subclass 640. Subject matter drawn to (a) electrolyte compositions, (b) processes of preparing an electrolyte of specified composition, or (c) electrolytic erosion processes which employ an electrolyte of specified composition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

673, for a process of regenerating or rehabilitating an electrolyte, per se.

SEE OR SEARCH CLASS:

252, Compositions, especially subclass 62.2 for electrolytes specialized or designed for an electrical device used merely as an electrical component (e.g., rectifier, condenser, etc.) and subclasses 79.1+ for etching compositions which, although not intended for use in electrolysis, may be identical in composition to such electrolytes.

675 Less than 50 weight percent water:

This subclass is indented under subclass 674. Subject matter in which the major portion by weight of the electrolyte is a material other than water.

676 More than 20 weight percent organic material:

This subclass is indented under subclass 675. Subject matter in which more than 20 percent by weight of the electrolyte is composed of organic material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

684, for an aqueous-base electrolyte containing organic material.

677 With one or more phosphoric acids:

This subclass is indented under subclass 676. Subject matter in which the electrolyte also contains one or more phosphoric acids (e.g., orthophosphoric acid, metaphosphoric acid, polyphosphoric acid, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

680, for an electrolyte containing more than 20 percent by weight of one or more phosphoric acids but less than or equal to 20 percent by weight organic material.

682, for an aqueous-base electrolyte containing phosphorus.

678 With sulfuric acid:

This subclass is indented under subclass 676. Subject matter in which the electrolyte also contains sulfuric acid.

679 More than 20 weight percent chromium compound:

This subclass is indented under subclass 675. Subject matter in which more than 20 percent by weight of the electrolyte is made of one or more chromium (Cr) compounds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

681, for an aqueous-base electrolyte containing chromium.

680 More than 20 weight percent of one or more phosphoric acids:

This subclass is indented under subclass 675. Subject matter in which more than 20 percent by weight of the electrolyte is made up of one or more phosphoric acids (e.g., orthophosphoric acid, metaphosphoric acid, polyphosphoric acid, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

677, for an electrolyte containing one or more phosphoric acids and more than 20 percent by weight organic material.

682, for an aqueous-base electrolyte containing phosphorous.

681 Chromium containing:

This subclass is indented under subclass 674. Subject matter in which the electrolyte contains chromium (Cr).

SEE OR SEARCH THIS CLASS, SUBCLASS:

679, for an electrolyte in which less than 50 percent by weight is water and more than 20 percent by weight is composed of one or more of chromium or its compounds.

682 Phosphorus containing:

This subclass is indented under subclass 674. Subject matter in which the electrolyte contains phosphorus (P).

SEE OR SEARCH THIS CLASS, SUBCLASS:

677, for an electrolyte containing one or more phosphoric acids and more than 20 percent by weight organic material.

680, for an electrolyte containing more than 20 percent by weight of one or more phosphoric acids.

683 Cyano compound containing (e.g., hydrogen cyanide, etc.):

This subclass is indented under subclass 674. Subject matter in which the electrolyte contains a compound with an inorganic radical having carbon doubly or triply bonded to nitrogen (e.g., hydrogen cyanide, etc.).

(1) Note. Included under cyano compound radicals are cyanide radicals and their iso- and thio-variants.

684 Organic material containing:

This subclass is indented under subclass 674. Subject matter in which the electrolyte contains an organic material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

676+, for an electrolyte containing more than 20 percent by weight organic material.

685 Nitrate containing (e.g., nitric acid, sodium nitrate, etc.):

This subclass is indented under subclass 674. Subject matter in which the electrolyte contains at least one nitrate cation or a compound thereof.

686 Moving tool electrode:

This subclass is indented under subclass 640. Process in which the tool electrode is moved during electrolytic erosion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

651, for electrolytic erosion in which a moving tool or workpiece is used with programmed, cyclic, or time responsive control.

654, for electrolytic erosion in which a moving tool electrode is used with gap maintenance or a defined tool-workpiece gap.

663, for electrolytic erosion in which the use of a rotating tool or workpiece is combined with mechanical abrasion or grinding.

687 Electrolytic material treatment (product, process, and electrolyte composition):

This subclass is indented under the class definition. Subject matter directed to the chemical modification of material by electrolysis, including products thereof where not provided for elsewhere and electrolyte compositions for use therein.

(1) Note. For this subclass and the subclasses indented hereunder, some of the terms in the schedule and definitions are defined as follows:

Platinum group metal: A metal element from the group consisting of osmium (Os), iridium (Ir), platinum (Pt), ruthenium (Ru), rhodium (Rh), and palladium (Pd).

(2) Note. The processes in this section of subclasses are intended to provide for electrolytic purification, concentration, or another desirable modification of an element, compound, or composition of matter; as distinguished from electrolytic synthesis of a desired element or compound, found in subclasses 334+. When a starting material is electrolytically altered and then electrolytically reconstituted the process is classified as electrolytic synthesis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67+, for electroforming processes and compositions therefore.

80+, for processes intended to produce a permanent coating on a substrate by electrolysis.

640+, for electrolytic erosion resulting in a change of workpiece shape or surface configuration.

775+, for electrolytic methods of analysis or testing, per se. See the (1) Note in subclass 775.

SEE OR SEARCH CLASS:

134, Cleaning and Liquid Contact With Solids, appropriate subclasses for cleaning processes and apparatus, in general.

204, Chemistry: Electrical and Wave Energy, subclasses 194+ for electrolytic material treatment apparatus.

252, Compositions, especially subclass 62.2 for electrolytes specialized or designed for an electrical device used merely as an electrical component (e.g., rectifier, condenser, etc.) and subclasses 79.1+ for etching compositions which, although not intended for use in electrolysis, may be identical in composition to such electrolytes.

688 Organic:

This subclass is indented under subclass 687. Subject matter in which at least a portion of the material treated is organic.

SEE OR SEARCH CLASS:

47, Plant Husbandry, subclass 1.3 for processes of culturing plants using electricity.

131, Tobacco, subclasses 295 and 299 for electrical and wave energy processes of treating tobacco.

689 Fibrous:

This subclass is indented under subclass 688. Subject matter in which the organic material contains long ribbon or threadlike filaments or particles, usually cells or tissue of vegetable or animal origin.

(1) Note. Fibrous material provided for in this subclass and the subclasses indented hereunder includes that formed from synthetic or artificial organic material.

690 Bleaching:

This subclass is indented under subclass 689. Subject matter in which the fibrous material is treated to remove color or colored impurities, usually to make the fibrous material lighter or whiter in appearance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

693, for electrolytic cleaning or refining of fibrous organic material which does not involve bleaching.

700, for electrolytic bleaching of nonfibrous organic material.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclasses 101+ for bleaching, in general.

691 Dyeing:

This subclass is indented under subclass 689. Subject matter in which the fibrous material is stained or colored.

(1) Note. This subclass does not provide for tanning of hides or skins, per se, for which see subclass 692.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, appropriate subclasses for dyeing, in general, of fibrous material.

692 Hides or skins:

This subclass is indented under subclass 689. Subject matter in which the fibrous material treated is a hide or skin.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, especially subclasses 94.1+ for processes in general of treating hides, skins, leather, or other animal tissues.

693 Cleaning or refining:

This subclass is indented under subclass 689. Subject matter in which the fibrous material is purified by removing foreign material therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

690, for electrolytic bleaching of fibrous organic material.

702, for electrolytic removal of a metal or metal compound from nonfibrous organic material.

705, for electrolytic removal of foreign material from a metal or metal alloy.

771+, for electrolytic removal of a metal or metal compound from inorganic material.

694 Protection:

This subclass is indented under subclass 689. Subject matter in which an electrolytic current or potential is utilized (a) to prevent corrosion, scale formation, or other objectionable action in or on the fibrous organic material or (b) to neutralize or correct such action when the material is in normal use.

SEE OR SEARCH THIS CLASS, SUBCLASS:

724+, for electrolytic protection of metal objects.

695 Oil or fat:

This subclass is indented under subclass 688. Subject matter in which the organic material is an oil or fat.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 450+ for electrophoresis or electro-osmosis of an oil or fat and subclasses 554+ for electrical separation or purification of an oil or fat, without employing electrolysis, electrophoresis, or electro-osmosis.

696 Hydrocarbon oil:

This subclass is indented under subclass 695. Subject matter in which the organic material is a hydrocarbon oil.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 513+ for separation or purification of hydrocarbon oil by electrophoresis or electro-osmosis and subclasses 559+ for electrical separation or purification of a hydrocarbon (including oil), without employing electrolysis, electrophoresis, or electro-osmosis.

697 Sugar:

This subclass is indented under subclass 688. Subject matter in which the organic material is a sugar or sugars (e.g., syrup, molasses, cane and beet sugar compositions, etc.).

SEE OR SEARCH CLASS:

127, Sugar, Starch, and Carbohydrates, for other processes and apparatus for general nonelectrolytic treatment of sugar, starch, and carbohydrates; including some products resulting therefrom.

260, Chemistry of Carbon Compounds, especially Class 536 as an integral part thereof for carbohydrates or derivatives thereof.

698 Cellulosic:

This subclass is indented under subclass 688. Subject matter in which the organic material contains cellulose or derivatives thereof in which the basic molecular structure of cellulose remains intact.

699 Rubber or latex:

This subclass is indented under subclass 688. Subject matter in which the organic material contains (a) a natural or synthetic elastic polymer commonly known as rubber (e.g., caoutchouc, neoprene, etc.) or (b) a dispersion or emulsion of a natural or synthetic elastic polymer in water commonly known as latex.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 53+ for colloid systems of aqueous continuous phase with discontinuous phase primarily organic liquid (such as latex emulsions, or dispersions) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

700 Bleaching:

This subclass is indented under subclass 688. Subject matter in which the organic material is treated to remove color or colored impurities, usually to make the organic material lighter or whiter in appearance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

690, for electrolytic bleaching of organic fibrous material.

702, for electrolytic removal of a metal or metal compound from nonfibrous organic material which does not involve bleaching.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclasses 101+ for bleaching in general.

701 Biological (e.g., sterilizing, etc.):

This subclass is indented under subclass 688. Subject matter in which the organic material includes living organisms (e.g., sterilizing, etc.).

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 527, 540, and 543 for electrophoretic or electro-osmotic barrier separation to prepare, recover, or treat biological material.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1+ for sterilizing in general.

435, Chemistry: Molecular Biology and Microbiology, for a process or apparatus involving electrical or wave energy treatment (other than mere sterilization) of a micro-organism or an enzyme when the treatment is solely disclosed for use with a viable micro-organism or a catalytically active enzyme.

702 Removing metal:

This subclass is indented under subclass 688. Subject matter in which a metal or metal compound is removed from the organic material usually either by deposition of a free metal or metal alloy or by precipitation of an insoluble metal compound or complex.

SEE OR SEARCH THIS CLASS, SUBCLASS:

693, for electrolytic cleaning or refining of fibrous organic material.

700, for electrolytic bleaching of nonfibrous organic material.

705+, for electrolytic removal of foreign material from a metal or metal alloy.

750, for electrolytic removal of a metal or metal compound from water, sewage, or other waste water using a membrane.

771+, for electrolytic removal of a metal or metal compound from nonmetallic inorganic material.

703 Using membrane:

This subclass is indented under subclass 688. Subject matter in which a semipermeable solid barrier or diaphragm (e.g., ion exchange membrane, etc.) is used in the treatment of organic material; usually the barrier or diaphragm is placed between the electrodes in an electrolytic cell to provide separate compartments.

SEE OR SEARCH THIS CLASS, SUBCLASS:

746+, for electrolytic treatment of water, sewage, or other waste water using a membrane.

770, for electrolytic treatment of other nonmetallic inorganic material using a membrane.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 450+ and particularly subclasses 518+ for electrophoretic or electro-osmotic barrier separation.

704 Metal or metal alloy:

This subclass is indented under subclass 687. Subject matter in which the material treated is either a metal in a free or uncombined state or a metal alloy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

771+, for electrolytic removal of a metal or metal compound from a nonmetallic inorganic liquid.

SEE OR SEARCH CLASS:

148, Metal Treatment, subclasses 95+ for heat treatment of a metal in order to modify or maintain the internal physical structure (i.e., microstructure) or chemical properties thereof, including electrical heat treatment.

705 Removing foreign material (e.g., cleaning, etc.):

This subclass is indented under subclass 704. Subject matter in which foreign or undesired material having a different chemical composition from that of the metal or metal alloy is removed therefrom (e.g., cleaning, etc.).

(1) Note. Electrolytic removal of metal followed by a broadly recited heat treatment are included in this subclass and the subclasses indented hereunder.

(2) Note. Processes which employ a Class 205 electrolytic cleaning step in combination with a Class 134 cleaning step are properly classified herein and cross-referenced to Class 134 when appropriate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

693, for electrolytic cleaning or refining of fibrous organic material, includingremoval of an undesirable metal or metal compound.

702, for electrolytic removal of a metal or metal compound from nonfibrous organic material.

750, for electrolytic removal of a metal or metal compound from water, sewage, or other waste water using a membrane.

771+, for electrolytic removal of a metal or metal compound from nonmetallic inorganic material.

SEE OR SEARCH CLASS:

134, Cleaning and Liquid Contact With Solids, for cleaning and analogous processes which are physical or chemical in nature, but which do not use an electric current.

706 Internal battery action:

This subclass is indented under subclass 705. Subject matter conducted without an external source of electrolytic current; usually the electrolytic current is derived from an internal chemical reaction (e.g., galvanic action, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

657, for electrolytic erosion by internal battery action and resulting in a change of workpiece shape or surface configuration.

730+, for electrolytic protection of objects containing metal or metal alloy by internal battery action.

745, for electrolytic treatment of water, sewage, or other waste water by internal battery action.

764, for electrolytic treatment of an inorganic gas, vapor, or critical fluid by internal battery action.

707 From precious metal or precious metal alloy:

This subclass is indented under subclass 706. Subject matter in which foreign material is removed from a base metal or metal alloy containing silver (Ag), gold (Au), or a platinum group metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

718, for electrolytic removal of a precious metal layer from a ferrous metal base.

767, for electrolytic treatment of a solid containing a precious metal compound.

708 Using anode containing aluminum:
This subclass is indented under subclass 707. Subject matter which employs a positively charged electrode (other than the metal or metal alloy under treatment) containing aluminum (Al), usually with the precious metal or alloy thereof serving as a negatively charged electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:
732, for electrolytic protection of a ferrous metal object by internal battery action using an anode containing aluminum.

709 With solid-workpiece moving contact (e.g., brushing, etc.):
This subclass is indented under subclass 705. Subject matter in which a workpiece of the metal or metal alloy is contacted with a relatively moving solid object (e.g., brushing, etc.).

(1) Note. This subclass includes the relative moving contact of two or more workpieces. Solid-workpiece moving contact may occur at any time before, during, or after the electrolytic treatment; and need not result in mechanical removal of foreign material from the metal or metal alloy workpiece, provided that there is relative movement between the workpiece and a contacting solid object. The relative moving contact of a conductive brush against the workpiece for sliding electrical contact is appropriate for this subclass, but the use of idling rollers contacting the workpiece and moving only therewith are classified below on some other basis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
662+, for electrolytic erosion combined with mechanical abrasion or grinding and resulting in a change of workpiece shape or surface configuration.

710 With changing current:
This subclass is indented under subclass 705. Subject matter in which the metal or metal alloy is treated with alternating current, pulsed direct current, or any other electric current which is varied in direction or intensity during the electrolytic removal of foreign material.

(1) Note. This subclass and the subclasses indented hereunder do not include alterations in electric current which occur for or during a noncleaning treatment unless there is also some current change during the electrolytic removal of foreign material.

711 Simple alternating current:
This subclass is indented under subclass 710. Subject matter in which electric current passing through the electrolyte (usually between an electrode and a workpiece) can be represented by a smooth sine wave having equal amplitude above and below a straight line ordinate at zero current (e.g., pure alternating current, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
658+, for electrolytic erosion using simple alternating current and resulting in a change of workpiece shape or surface configuration.

712 Nonelemental material from ferrous metal:
This subclass is indented under subclass 705. Subject matter in which the foreign material is a chemical compound of two or more atoms and the metal or metal alloy treated is iron (Fe) or contains at least 50 percent iron.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217+, for nonaqueous liquid cleaning of a ferrous metal base combined with electrolytic coating.

713 Using fused bath (e.g., molten salt, etc.):
This subclass is indented under subclass 712. Subject matter in which the nonelemental material is removed from ferrous metal using an electrolyte bath consisting of a substance or mixture of substances which is heated to bring it to a liquid or fluid condition (e.g., molten salt, etc.) during electrolysis.

714 Using acidic electrolyte:
This subclass is indented under subclass 712. Subject matter in which the nonelemental material is removed from ferrous metal using an electrolyte with a pH less than 7.

SEE OR SEARCH THIS CLASS, SUBCLASS:
723, for other removal of foreign material from a metal or metal alloy using an acidic electrolyte.

715 Containing one or more phosphoric acids:
This subclass is indented under subclass 714. Subject matter in which the electrolyte contains one or more phosphoric acids (e.g., orthophorphoric acid, metaphosphoric acid, polyphosphoric acid, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
677, 680, and 682, for electrolytic erosion using an electrolyte containing phosphorus or one or more phosphoric acids and resulting in a change of workpiece shape or surface configuration.

716 Containing nitric acid:
This subclass is indented under subclass 714. Subject matter in which the electrolyte contains nitric acid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
685, for electrolytic erosion using an electrolyte containing a nitrate, such as nitric acid, and resulting in a change of workpiece shape or surface configuration.

717 Entire identifiable elemental layer or portion removed (e.g., stripping, etc.):
This subclass is indented under subclass 705. Subject matter in which the foreign material removed comprises an entire layer or portion thereof existing in elemental form (e.g., metal, metal alloy, metal carbide, metal nitride, etc.) on a base containing the metal or metal alloy, and is identifiable therefrom with a naked eye (e.g., electrolytic stripping, etc.).

(1) Note. A body or workpiece of the metal or metal alloy may consist of metal alone, contain free metal as part of its composition, or consist of a coating or lamination thereon containing free metal.

(2) Note. This subclass and the subclasses indented hereunder include mere electrolytic stripping or removal of elemental material into solution or suspension where there is no deposition of a desired material (but may include the deposition of an undesired precipitate). Electrolytic stripping, together with electrolytic deposition of a desired material, is classified in the above appropriate subclasses.

(3) Note. The removal of an entire surface layer or a portion thereof provided for in this subclass and the subclasses indented hereunder does not include that which is intended to change the shape or surface configuration of a workpiece which is specifically provided for in the electrolytic erosion subclasses (640+) above.

SEE OR SEARCH THIS CLASS, SUBCLASS:
363+, 367+, 477+, 557+, and 560+, for electrolytic synthesis in which a metal, metal alloy, or metal compound is produced.

718 Precious metal removed:
This subclass is indented under subclass 717. Subject matter in which the elemental layer or portion removed contains silver (Ag), gold (Au), or a platinum group metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
707+, for electrolytic removal of foreign material from a precious metal or precious metal alloy by internal battery action.

719 Tin removed:
This subclass is indented under subclass 717. Subject matter in which the elemental layer or portion removed contains tin (Sn).

720 Nickel removed:
This subclass is indented under subclass 717. Subject matter in which the elemental layer or portion removed contains nickel (Ni).

721 Copper removed:
This subclass is indented under subclass 717. Subject matter in which the elemental layer or portion removed contains copper (Cu).

SEE OR SEARCH THIS CLASS, SUBCLASS:
772, for electrolytic removal of copper from a nonmetallic inorganic liquid.

722 Using electrolyte containing surface active agent (e.g., foaming or wetting agent, etc.):
This subclass is indented under subclass 705. Subject matter in which the foreign material is removed using an electrolyte containing a surface active agent (e.g., foaming or wetting agent, etc.).

723 Using acidic electrolyte:
This subclass is indented under subclass 705. Subject matter in which the foreign material is removed using an electrolyte with a pH less than 7.

SEE OR SEARCH THIS CLASS, SUBCLASS:
714+, for electrolytic removal of nonelemental material from ferrous metal using an acidic electrolyte.

724 Object protection:
This subclass is indented under subclass 704. Subject matter in which an electrolytic current or potential is utilized (a) to prevent corrosion, scale formation, or other objectionable action in or on an object containing the metal or metal alloy or (b) to neutralize or correct such action when the object is in normal use.

(1) Note. This section is not intended to provide for the electrolytic treatment of fluids in order to modify their properties so that they do not cause or accelerate electrolytic action. Processes of this type are classified in other appropriate subclasses of this section (687+) based on the material treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
694, for electrolytic protection of fibrous organic material.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 155+ for electrical or wave energy treatment in a magnetic field, including object protection, and subclasses 196.01+ for electrolytic object protection apparatus.
307, Electrical Transmission or Interconnection Systems, subclass 95 for electrical systems having means to prevent electrolysis as a result of the operation of such systems.

725 With control responsive to sensed condition:
This subclass is indented under subclass 724. Subject matter in which the object protection is regulated by detecting a characteristic or a change in a characteristic of the process and by implementing an action in the process based upon the detected characteristic or change therein.

(1) Note. In this subclass and the subclasses indented hereunder a single means may be used both to detect a characteristic or a change in a characteristic of the process and to implement an action in the process based upon the detected characteristic or change therein. There must be a positive action made by a control means because of the detected characteristic or change therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
641+, for electrolytic erosion resulting in a change of workpiece shape or surface configuration with control responsive to a sensed condition.
729, for electrolytic protection of an object containing a metal or metal alloy with programmed, cyclic, or time responsive control; but without involving control responsive to a sensed condition.
743, for electrolytic treatment of water, sewage, or other waste water with

control responsive to a sensed condition.

775+, for electrolytic methods of analysis or testing, per se, see the (1) note in subclass 775.

SEE OR SEARCH CLASS:

73, Measuring and Testing, as the residual class for processes and apparatus for measuring or testing, per se. See also the (3) Note in the class definition of Class 73 for additional loci of other measuring and testing processes and apparatus of different types.

324, Electricity: Measuring and Testing, for measuring, testing, or sensing, per se, to determine electrical properties by electrical means even though non-electrical values may be derived from the electrical properties determined.

726 Current sensed:

This subclass is indented under subclass 725. Subject matter in which a detected current or a change in a detected current is used to control the object protection.

727 Voltage sensed:

This subclass is indented under subclass 725. Subject matter in which a detected voltage or a change in a detected voltage is used to control the object protection.

728 And programmed, cyclic, or time responsive control:

This subclass is indented under subclass 727. Subject matter which also involves (a) storing coded instructions or other data which is used to regulate the object protection, (b) repetitively regulating a sequence of process steps, or (c) regulating the object protection according to preset timing sequences (e.g., limiting various process steps to predetermined durations of time, etc.).

(1) Note. This subclass is not intended to include the use of direct current (DC) pulses which are not clearly repetitive (i.e., with multiple complete cycles) or predetermined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

729, for electrolytic protection of objects containing a metal or metal alloy with programmed, cyclic, or time responsive control; but without involving control responsive to a sensed condition.

729 With programmed, cyclic, or time responsive control:

This subclass is indented under subclass 724. Subject matter which involves (a) storing coded instructions or other data which is used to regulate the object protection, (b) repetitively regulating a sequence of process steps, or (c) regulating the object protection according to preset timing sequences (e.g., limiting various process steps to predetermined durations of time, etc.).

(1) Note. This subclass is not intended to include the use of direct current (DC) pulses which are not clearly repetitive (i.e., with multiple complete cycles) or predetermined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

646+, for electrolytic erosion resulting in a change of workpiece shape or surface configuration with programmed, cyclic, or time responsive control.

725+, for electrolytic protection of objects containing a metal or metal alloy with control responsive to a sensed condition.

728, for electrolytic protection of objects containing a metal or metal alloy involving both control responsive to a sensed voltage and programmed, cyclic, or time responsive control.

744, for electrolytic treatment of water, sewage, or other waste water with programmed, cyclic, or time responsive control.

730 Internal battery action (e.g., using sacrificial anode, etc.):

This subclass is indented under subclass 724. Subject matter in which the object protection is performed without an external source of electrolytic current; usually the electrolytic current

is derived from an internal chemical reaction (e.g., galvanic action, using a sacrificial anode, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

706+, for electrolytic removal of foreign material from a metal or metal alloy by internal battery action.

745, for electrolytic treatment of water, sewage, or other waste water by internal battery action.

764, for electrolytic treatment of an inorganic gas, vapor, or critical fluid by internal battery action.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 196.04, 196.07, and 196.1+ for electrolytic object protection apparatus using internal battery action.

731 Ferrous metal:

This subclass is indented under subclass 730. Subject matter in which the object protected is iron (Fe) or contains at least 50 percent iron.

SEE OR SEARCH THIS CLASS, SUBCLASS:

735+, for electrolytic protection of a ferrous metal object without employing internal battery action.

741, for other electrolytic treatment of a metal or metal alloy containing iron.

732 Using anode containing aluminum:

This subclass is indented under subclass 731. Subject matter in which a positive electrode containing aluminum (Al) is used to protect the ferrous metal object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

708, for electrolytic removal of foreign material from a precious metal or precious metal alloy by internal battery action using an anode containing aluminum.

733 Using anode containing magnesium:

This subclass is indented under subclass 731. Subject matter in which a positive electrode containing magnesium (Mg) is used to protect the ferrous metal object.

734 Metal imbedded in asphalt, concrete, stone, or masonry (e.g., reinforced concrete, etc.):

This subclass is indented under subclass 724. Subject matter in which the object protected consists of a metal imbedded in asphalt, concrete, stone, or masonry (e.g., reinforced concrete, etc.).

735 Ferrous metal:

This subclass is indented under subclass 724. Subject matter in which the object protected is iron (Fe) or contains at least 50 percent iron.

SEE OR SEARCH THIS CLASS, SUBCLASS:

731+, for electrolytic protection of a ferrous metal object by internal battery action.

741, for other electrolytic treatment of a metal or metal alloy containing iron.

736 Stainless steel:

This subclass is indented under subclass 735. Subject matter in which the ferrous metal is steel containing at least 9 weight percent chromium (Cr).

737 Using anode containing free carbon (e.g., graphite, carbon fibers, etc.):

This subclass is indented under subclass 735. Subject matter in which a positive electrode containing free carbon (C) (e.g., graphite, carbon fibers, etc.) is used to protect the ferrous metal object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

739, for electrolytic protection of a nonferrous metal or metal alloy object using an anode containing free carbon.

760, for electrolytic treatment of water, sewage, or other waste water using an electrode containing a precious metal or free carbon.

738 Using anode containing precious metal:
This subclass is indented under subclass 724. Subject matter in which a positive electrode containing silver (Ag), gold (Au), or a platinum group metal is used to protect object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
760, for electrolytic treatment of water, sewage, or other waste water using an electrode containing a precious metal or free carbon.

739 Using anode containing free carbon (e.g., graphite, carbon fibers, etc.):
This subclass is indented under subclass 724. Subject matter in which a positive electrode containing free carbon (C) (e.g., graphite, carbon fibers, etc.) is used to protect the object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
760, for electrolytic treatment of water, sewage, or other waste water using an electrode containing precious metal or free carbon.

740 Vessel (e.g., ship hull, steam boiler, etc.):
This subclass is indented under subclass 724. Subject matter in which the metal object is a container of any structural shape or configuration (e.g., ship hull, steam boiler, etc.), provided that it is used to hold solid or fluid material.

741 Containing iron:
This subclass is indented under subclass 704. Subject matter in which the metal or metal alloy contains iron (Fe).

SEE OR SEARCH THIS CLASS, SUBCLASS:
731+, for electrolytic protection of ferrous metal objects by internal battery action.
735+, for electrolytic protection of ferrous metal objects without using internal battery action.

742 Water, sewage, or other waste water:
This subclass is indented under subclass 687. Subject matter in which the material treated is water, sewage, or any other waste water.

(1) Note. This subclass and the subclasses indented hereunder are intended to provide for purification or other treatment of water or waste water as the desired product. Electrolytic treatment of water, sewage, or other waste water to obtain other products are classified elsewhere in this class, depending on the particular process and type of material produced, and are cross-referenced here when necessary.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 450 through 553, for electrophoretic or electro-osmotic separation or purification of aqueous liquids and subclasses 554-573 for other electrical separation or purification of aqueous liquids. See the Class 204 definition for an elaboration of the class line with liquid purification or separation, especially the References to Other Classes section.
210, Liquid Purification or Separation, subclasses 748.01 through 748.2 for nonelectrolytic purification or separation of a liquid utilizing electrical or wave energy directly applied to liquid or material being treated.

743 With control responsive to sensed condition:
This subclass is indented under subclass 742. Subject matter in which the water treatment is regulated by detecting a characteristic or a change in a characteristic of the process and by implementing an action in the process based upon the detected characteristic or change therein.

(1) Note. In this subclass and the subclasses indented hereunder a single means may be used both to detect a characteristic or a change in a characteristic of the process and to implement an action in the process based upon the detected characteristic or change therein. There must be a positive action made by a control means because of the detected characteristic or change therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

641+, for electrolytic erosion resulting in a change of workpiece shape or surface configuration with control responsive to a sensed condition.

725+, for electrolytic protection of objects with control responsive to a sensed condition.

744, for electrolytic treatment of water, sewage, or other waste water with programmed, cyclic, or time responsive control; but without involving control responsive to a sensed condition.

775+, for electrolytic methods of analysis or testing, per se. See the (1) Note in subclass 775.

SEE OR SEARCH CLASS:

73, Measuring and Testing, as the residual class for processes and apparatus for measuring or testing, per se. See also the (3) Note in the class definition of Class 73 for additional loci of other measuring and testing processes and apparatus of different types.

324, Electricity: Measuring and Testing, for measuring, testing, or sensing, per se, to determine electrical properties by electrical means even though non-electrical values may be derived from the electrical properties determined.

744 With programmed, cyclic, or time responsive control:

This subclass is indented under subclass 742. Subject matter which involves (a) storing coded instructions or other data which is used to regulate the treatment of water, sewage, or other waste water, (b) repetitively regulating a sequence of process steps, or (c) regulating the treatment according to preset timing sequences (e.g., limiting various process steps to predetermined durations of time, etc.).

(1) Note. This subclass is not intended to include the use of direct current (DC) pulses which are not clearly repetitive (i.e., with multiple complete cycles) or predetermined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

646+, for electrolytic erosion resulting in a change of workpiece shape or surface configuration with programmed, cyclic, or time responsive control.

728, for electrolytic protection of objects containing a metal or metal alloy involving both control responsive to a sensed voltage and programmed, cyclic, or time responsive control.

729, for electrolytic protection of objects containing a metal or metal alloy with programmed, cyclic, or time responsive control; but not involving control responsive to a sensed condition.

743, for electrolytic treatment of water, sewage, or other waste water with control responsive to a sensed condition.

745 Internal battery action:

This subclass is indented under subclass 742. Subject matter in which the water, sewage, or other waste water is treated by electrolysis without an external source of electrolytic current; usually the electrolytic current is derived from an internal chemical reaction (e.g., galvanic action, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

706+, for electrolytic removal of foreign material from a metal or metal alloy by internal battery action.

730+, for electrolytic protection of objects containing a metal or metal alloy by internal battery action.

764, for electrolytic treatment of an inorganic gas, vapor, or critical fluid by internal battery action.

746 Using membrane:

This subclass is indented under subclass 742. Subject matter in which a semipermeable solid barrier or diaphragm (e.g., ion exchange membrane, etc.) is used in the treatment of water, sewage, or other waste water; usually the barrier or diaphragm is placed between the electrodes in an electrolytic cell to provide separate compartments.

SEE OR SEARCH THIS CLASS, SUBCLASS:

703, for electrolytic treatment of organic material using a membrane.

770, for electrolytic treatment of other nonmetallic inorganic material using a membrane.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 450+ particularly subclasses 518+ for electrophoretic or electro-osmotic barrier separation.

747 With filtering:

This subclass is indented under subclass 746. Subject matter in which the water, sewage, or other waste water is passed through a porous substance to mechanically remove a solid therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

751+, for electrolytic treatment of water, sewage, or other waste water with filtering; but without the use of a membrane.

748 Plural membranes:

This subclass is indented under subclass 746. Subject matter in which two or more membranes are used.

749 With recycle or reuse:

This subclass is indented under subclass 748. Subject matter in which material is either circulated outside the treatment process and returned thereto or used again later (e.g., in plural steps with or without regeneration, etc.).

750 Removing metal:

This subclass is indented under subclass 746. Subject matter in which a metal or a metal compound is removed from the water, sewage, or other waste water; usually either by deposition of a free metal or metal alloy or by precipitation of an insoluble metal compound or complex.

SEE OR SEARCH THIS CLASS, SUBCLASS:

702, for electrolytic removal of a metal or metal compound from organic material.

705+, for electrolytic removal of foreign material from a metal or metal alloy.

771+, for electrolytic removal of a metal or metal compound from nonmetallic inorganic material.

751 With filtering:

This subclass is indented under subclass 742. Subject matter in which the water, sewage, or other waste water is passed through a porous substance to mechanically remove a solid therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

747, for electrolytic treatment of water, sewage, or other waste water using a membrane; and with filtering.

752 And treatment with oxygen or ozone:

This subclass is indented under subclass 751. Subject matter in which the water, sewage, or other waste water is also exposed to oxygen or ozone which may either be provided from an external source or be produced during electrolysis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

756, for electrolytic treatment of water, sewage, or other waste water using an oxygenating gas; but without filtering.

753 Using particle bed:

This subclass is indented under subclass 742. Subject matter in which a discrete body of solid particles is used in the treatment of water, sewage, or other waste water.

(1) Note. This subclass and the subclasses indented hereunder are not intended to provide for the use of a bed consisting only of solid particles produced or precipitated during the electrolytic treatment.

754 As electrode:
This subclass is indented under subclass 753. Subject matter in which the particle bed is used as an electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:
758, for electrolytic treatment of water, sewage, or other waste water using a porous electrode other than a particle bed.

755 With mixing, agitating, or gas-liquid contacting:
This subclass is indented under subclass 742. Subject matter in which the water, sewage, or other waste water under treatment is (a) mixed, agitated, or otherwise intermingled or (b) contacted with a gas or vapor.

(1) Note. The gas or vapor may either be provided from an external source or be produced during electrolysis, provided that such gas or vapor is clearly disclosed as intentionally contacting the water, sewage, or other waste water. For the purpose of this subclass and the subclasses indented hereunder, such contact is not assumed as an inevitable result of electrolysis and does not provide for the mere liberation of gas or vapor produced thereby.

756 Using oxygenating gas (e.g., ozone, air, etc.):
This subclass is indented under subclass 755. Subject matter in which the water, sewage, or other waste water is contacted with a gas containing oxygen in a form which may be used to saturate the water, sewage, or other waste water with oxygen (e.g., ozone, air, etc.).

757 Bubbling (e.g., for flotation of solids, etc.):
This subclass is indented under subclass 755. Subject matter in which the water, sewage, or other waste water is contacted with a gas by allowing gas bubbles to rise in a body of the water, sewage, or other waste water (e.g., for flotation of solids, etc.).

758 Using porous electrode (e.g., perforated, etc.):
This subclass is indented under subclass 742. Subject matter in which at least one electrode used in the treatment of water, sewage, or other waste water is provided with two or more penetrating holes passing through the entire depth thereof (e.g., perforated, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
754, for electrolytic treatment of water, sewage, or other waste water using a particle bed electrode.

759 Using coated electrode (e.g., having electrocatalytic coating, etc.):
This subclass is indented under subclass 742. Subject matter in which at least one electrode used in the treatment of water, sewage, or other waste water is provided with a distinguishable layer of different composition (e.g., having electrocatalytic coating, etc.).

(1) Note. The electrode coating may be formed during the water treatment.

760 Using electrode containing precious metal or free carbon (e.g., insoluble electrode, etc.):
This subclass is indented under subclass 742. Subject matter in which at least one electrode used in the treatment of water, sewage, or other waste water contains silver (Ag), gold (Au), a platinum group metal, or free carbon (C) (e.g., insoluble electrode, etc.).

761 Using electrode containing ferrous metal:
This subclass is indented under subclass 742. Subject matter in which at least one electrode used in the treatment of water, sewage, or other waste water contains a ferrous metal (i.e., containing at least 50 percent iron).

762 Alkali-forming metal hydroxide:
This subclass is indented under subclass 687. Subject matter in which the material treated is a metal hydroxide which dissociates on dissolution in water to provide a pH greater than 7.

763 Gas, vapor, or critical fluid:
This subclass is indented under subclass 687. Subject matter in which the material treated is a gas, vapor, or fluid beyond its critical point

(i.e., in which all liquid and vapor merge into a single continuous fluid phase having properties different from either the liquid or vapor).

764 Internal battery action:
This subclass is indented under subclass 763. Subject matter in which the material treatment is conducted without an external source of electrolytic current; usually the electrolytic current is derived from an internal chemical reaction (e.g., galvanic action, using a sacrificial anode, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
657, for electrolytic erosion by internal battery action and resulting in a change of workpiece shape or surface configuration.
706+, for electrolytic removal of foreign material from a metal or metal alloy by internal battery action.
730+, for electrolytic protection of an object containing a metal or metal alloy by internal battery action.
745, for electrolytic treatment of water, sewage, or other waste water by internal battery action.

765 Using solid electrolyte:
This subclass is indented under subclass 763. Subject matter in which the material treatment is conducted using a solid electrolyte.

766 Solid (e.g., articles, particles, ore, etc.):
This subclass is indented under subclass 687. Subject matter in which the material under treatment is an inorganic, nonmetallic solid (e.g., articles, particles, ore, etc.).

767 Containing precious metal (e.g., beneficiating ore, etc.):
This subclass is indented under subclass 766. Subject matter in which the solid material contains silver (Ag), gold (Au), or a platinum group metal (e.g., beneficiating ore, etc.).

768 Containing free carbon (e.g., graphite, carbon black, etc.):
This subclass is indented under subclass 766. Subject matter in which the solid material contains carbon (C) in a free or uncombined state (e.g., graphite, carbon black, etc.).

769 Glass, silica, quartz, or optical material (e.g., contact lenses, etc.):
This subclass is indented under subclass 766. Subject matter in which the solid material is glass, silica, quartz, or a material used for optical purposes (e.g., contact lenses, etc.).

770 Using membrane:
This subclass is indented under subclass 687. Subject matter in which a semipermeable solid barrier or diaphragm (e.g., ion exchange membrane, etc.) is used in the material treatment; usually the barrier or diaphragm is placed between the electrodes in an electrolytic cell to provide separate compartments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
703, for electrolytic treatment of organic material using a membrane.
746+, for electrolytic treatment of water, sewage, or other waste water using a membrane.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 450+ and particularly subclasses 518+ for electrophoretic or electro-osmotic barrier separation.

771 Removing metal:
This subclass is indented under subclass 687. Subject matter in which a metal or a metal compound is removed from the material under treatment, usually either by deposition of free metal or metal alloy or by precipitation of an insoluble metal compound or complex.

SEE OR SEARCH THIS CLASS, SUBCLASS:
693, for electrolytic cleaning or refining of fibrous organic material.
702, for electrolytic removal of a metal or metal compound from organic material.
705+, for electrolytic removal of foreign material from a metal or metal alloy.
750, for electrolytic removal of a metal or metal compound from water, sewage, or other waste water using a membrane.

772 Copper:
This subclass is indented under subclass 771. Subject matter in which copper (Cu) is removed.

775 ELECTROLYTIC ANALYSIS OR TESTING (PROCESS AND ELECTROLYTE COMPOSITION):
This subclass is indented under the class definition. Subject matter involving an electrolytic method of analysis or testing, including electrolyte compositions for use therein.

(1) Note. Processes drawn to combinations of electrolytic analysis or testing with other electrolytic processes provided for above are placed in the appropriate above subclass or subclasses and cross-referenced in this section when desired. However, electrolytic processes carried out merely for the purpose of analysis or testing (e.g., stripping of a coating from a substrate by electrolysis merely to determine the bonding strength of the coating, etc.) are properly classified here.

(2) Note. Classification in this subclass and the subclasses indented hereunder is based on electrolytic analysis or testing to obtain a desired result. Therefore, analysis or testing of a sample for the presence or amount of a specific component is classified based on the specific component (when provided for) even if a test electrode only senses an intermediate second component to deduce the presence of the specific component. Cross-referencing to any other appropriate subclass or subclasses which provide for the detection of the intermediate second component is merely discretionary.

SEE OR SEARCH CLASS:
73, Measuring and Testing, as the residual class for processes and apparatus for measuring or testing, per se. See also the (3) Note in the class definition of Class 73 for additional loci of other measuring and testing processes and apparatus of different types.
204, Chemistry: Electrical and Wave Energy, subclasses 400+ for corresponding apparatus utilizing electrolytic action for analysis or testing.
324, Electricity: Measuring and Testing, for measuring, testing, or sensing, per se, to determine electrical properties by electrical means even though non-electrical values may be derived from the electrical properties determined; especially subclasses 323+ for testing of underground formations by electrolytic methods (e.g., testing an oil well bore for water strata, etc.), subclasses 425+ for testing of an electrolyte to determine electrical properties thereof, and other appropriate subclasses for any other electrolytic-type testing, in general, which is combined with a significant electrical testing circuit or is unrelated to the subject matter of Class 205.
436, Chemistry: Analytical and Immunological Testing, for a qualitative or quantitative chemical analysis including (1) a step involving electrochemistry followed by another chemical reaction not involving electrochemistry or (2) a step which may alternatively involve either electrochemistry or another chemical reaction not involving electrochemistry.

775.5 For corrosion:
This subclass is indented under subclass 775. Subject matter in which the gradual electrochemical disintegration of a material is determined, usually to test the ability of a solid material (e.g., ferrous metal, etc.) to withstand such disintegration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
694, for electrolytic protection of fibrous organic material.
724+, for electrolytic protection of metal objects.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 404 for electrolytic apparatus for analysis and testing of corrosion and subclasses 196.01+ for

electrolytic object protection apparatus.

252, Compositions, subclasses 387+ for compositions for use as or in agents for preventing, inhibiting, or reducing corrosion or chemical attack of metals or other solid materials.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 7+ for a process of maintaining an environment nondestructive to metal, usually by continuous or regular addition of a chemical agent to inhibit corrosion of a metal object.

776 Testing by internal battery action:

This subclass is indented under subclass 775.5. Subject matter in which a material or system is tested for corrosion without an external source of electric current; usually the electrolytic current is derived from an internal chemical reaction (e.g., galvanic action, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

730+, for electrolytic protection of metal objects by internal battery action.

776.5 Of coating, coated substrate, or imbedded object:

This subclass is indented under subclass 775.5. Subject matter in which the material is a coating, coated substrate, or imbedded object (e.g., reinforced concrete, etc.).

(1) Note. The coating, coated substrate, or imbedded object must exist as such apart from any base material or matrix which is included merely for the purpose of supporting the coating, coated substrate, or imbedded object during electrolytic analysis or testing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

734, for electrolytic protection of metal imbedded in asphalt, concrete, stone, or masonry.

791, for electrolytic analysis or testing of a solid coating or coated substrate for material properties thereof, in general.

794, for electrolytic analysis or testing of a reactant or product during the formation of a coating on a substrate.

777 Of ferrous metal:

This subclass is indented under subclass 775.5. Subject matter in which the material is iron (Fe) or contains at least 50 percent iron.

SEE OR SEARCH THIS CLASS, SUBCLASS:

735+, for electrolytic protection of ferrous metal objects.

777.5 Involving enzyme or micro-organism:

This subclass is indented under subclass 775. Subject matter in which the method involves an enzyme or micro-organism (e.g., animal or plant cells, bacteria, virus, etc.).

(1) Note. Measuring or testing for the activity of an enzyme or micro-organism by change in electrolytic action is an example of the subject matter provided for in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

701, for electrolytic treatment of biological organic material.

779, for electrolytic analysis or testing of a biological fluid for halogen or a halogen containing compound, but without involving an enzyme or micro-organism.

792, for electrolytic analysis or testing of a biological fluid or tissue, but without involving an enzyme or micro-organism.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 403.01+ for electrolytic apparatus for biological analysis and testing.

435, Chemistry: Molecular Biology and Microbiology, subclasses 4+ for nonelectrolytic, nonelectrophoretic, and nonelectro-osmotic measuring or testing processes involving enzymes or micro-organisms; a composition or test strip therefor; and processes of forming such a composition or test strip. This includes processes in

which a micro-organism is cultured or an enzyme functions catalytically when a nonelectrical property is measured, processes of purification and immobilization of enzymes, and processes using an enzyme to produce a product.

436, Chemistry: Analytical and Immunological Testing, appropriate subclasses for related processes of measuring or testing (1) in which an enzyme reacts noncatalytically or (2) involving an antigen antibody (which is not living) for the nondiagnostic identification of chemical species.

778 And using semipermeable membrane:

This subclass is indented under subclass 777.5. Subject matter in which a semipermeable solid barrier or diaphragm is utilized, often as a support for an enzyme.

SEE OR SEARCH THIS CLASS, SUBCLASS:

782.5+, for electrolytic analysis or testing for an oxygen or oxygen containing compound using a semipermeable membrane, but not involving an enzyme or micro-organism.

793, for electrolytic analysis or testing using a semipermeable membrane, in general, but not involving an enzyme or micro-organism.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 415 for electrolytic apparatus for analysis and testing using a selectively permeable membrane.

778.5 For halogen or halogen containing compound:

This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for halogen (i.e., F, Cl, Br, I, or At) or a halogen containing compound.

779 In biological fluid (e.g., urine, etc.):

This subclass is indented under subclass 778.5. Subject matter in which the material analyzed or tested is a biological fluid (e.g., urine, etc.).

(1) Note. This subclass does not provide for electrolytic analysis or testing of a fluid (e.g., air, carbon dioxide, etc.) which may be metabolized or may be the result of a metabolic process unless the fluid is specifically disclosed in connection with a metabolic or biological process or organism.

SEE OR SEARCH THIS CLASS, SUBCLASS:

701, for electrolytic treatment of biological organic material.

777.5+, for electrolytic analysis or testing involving an enzyme or micro-organism.

792, for electrolytic analysis or testing of a biological material in general.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 403.01+ for electrolytic apparatus for biological analysis and testing.

779.5 Gaseous halogen or halogen containing compound:

This subclass is indented under subclass 778.5. Subject matter in which the material analyzed or tested contains gaseous halogen or a gaseous halogen containing compound.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 424+ and 431+ for electrolytic apparatus for analysis and testing of a gas with or without the use of a solid electrolyte, respectively.

780 Using electrode containing precious metal or free carbon:

This subclass is indented under subclass 778.5. Subject matter in which an electrode containing silver (Ag), gold (Au), a platinum group metal, or free carbon (C) (e.g., graphite, carbon fibers, etc.) is used.

SEE OR SEARCH THIS CLASS, SUBCLASS:

786, for electrolytic analysis or testing for oxygen or an oxygen containing compound other than water using anelec-

trode containing precious metal or free carbon.

794.5, for other processes of electrolytic analysis or testing using an electrode containing precious metal or free carbon.

780.5 For nitrogen or nitrogen containing compound:

This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for nitrogen (N) or a nitrogen containing compound.

781 Nitrogen oxide (e.g., gaseous nitrogen dioxide, dissolved sodium nitrate, etc.):

This subclass is indented under subclass 780.5. Subject matter in which the material is analyzed or tested for a nitrogen oxide (e.g., gaseous nitrogen dioxide, dissolved sodium nitrate, etc.).

781.5 For alkali metal, alkaline earth metal, or compound thereof:

This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for an alkali metal (i.e., Li, Na, K, Rb, Cs, or Fr), an alkaline earth metal (i.e., Be, Mg, Ca, Sr, Ba, or Ra), or a compound of an alkali metal or alkaline earth metal.

782 For oxygen or oxygen containing compound (except water):

This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for oxygen (O) or an oxygen containing compound other than water.

(1) Note. This subclass and the subclasses indented hereunder also provide for the analysis or testing for the chemical potential of oxygen or an oxygen containing compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

788, for processes of analyzing or testing a material for water.

782.5 Using semipermeable membrane:

This subclass is indented under subclass 782. Subject matter in which a semipermeable solid barrier or diaphragm is utilized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

778, for electrolytic analysis or testing involving an enzyme or micro-organism and using a semipermeable membrane.

793, for electrolytic analysis or testing using a semipermeable membrane, in general.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 415 for electrolytic apparatus for analysis and testing using a selectively permeable membrane.

783 Gaseous oxygen or oxygen containing compound:

This subclass is indented under subclass 782.5. Subject matter in which the material analyzed or tested contains gaseous oxygen or a gaseous oxygen containing compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

784+, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound using a solid electrolyte, but not using a semipermeable membrane.

785.5, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound, but without using a semipermeable membrane or a solid electrolyte.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 424+ and 431+ for electrolytic apparatus for analysis and testing of a gas, in general.

783.5 Using solid electrolyte:

This subclass is indented under subclass 782. Subject matter in which a solid ionic conductor (i.e., electrolyte) is utilized.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 410 and 421+ for electrolytic apparatus for analysis and testing using a solid electrolyte.

784 Gaseous oxygen or oxygen containing compound:

This subclass is indented under subclass 783.5. Subject matter in which the material analyzed or tested contains gaseous oxygen or a gaseous oxygen containing compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

783, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound using a semipermeable membrane.

785.5, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound, in general.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 424+ for electrolytic apparatus for analysis and testing of a gas using a solid electrolyte.

784.5 In combustible gas (e.g., air/fuel mixture for internal combustion engine, etc.):

This subclass is indented under subclass 784. Subject matter in which the gaseous oxygen or gaseous oxygen containing compound is either flammable or is found in a flammable mixture of gases.

(1) Note. This subclass is not intended to include sensing of an exhaust gas to control an air/fuel feed mixture to an internal combustion engine unless the exhaust gas is specifically disclosed as comprising a combustible gas containing gaseous oxygen or a gaseous oxygen containing compound.

785 With heating or temperature sensing:

This subclass is indented under subclass 784. Subject matter which includes heating or detection of temperature, often used in connection with temperature control.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 408 for electrolytic apparatus for analysis and testing with means for temperature or pressure compensation.

785.5 Gaseous oxygen or oxygen containing compound:

This subclass is indented under subclass 782. Subject matter in which the material analyzed or tested contains gaseous oxygen or a gaseous oxygen containing compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

783, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound using a semipermeable membrane.

784+, for electrolytic analysis or testing for gaseous oxygen or a gaseous oxygen containing compound using a solid electrolyte, but not using a semipermeable membrane.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 424+ and 431+ for electrolytic apparatus for analysis and testing of a gas, in general.

786 Using electrode containing precious metal or free carbon:

This subclass is indented under subclass 782. Subject matter in which an electrode containing silver (Ag), gold (Au), a platinum group metal, or free carbon (C) (e.g., graphite, carbon fibers, etc.) is used.

SEE OR SEARCH THIS CLASS, SUBCLASS:

780, for electrolytic analysis or testing for halogen or a halogen containing compound using an electrode containing precious metal or free carbon.

794.5, for other processes of electrolytic analysis or testing using an electrode containing precious metal or free carbon.

786.5 For sulfur or sulfur containing compound:

This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for sulfur (S) or a sulfur containing compound.

787 For organic compound:
This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for an organic compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:
688+, for electrolytic treatment of organic material.

787.5 For pH:
This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for the logarithm of the reciprocal of hydrogen (H) ion concentration.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 433 for electrolytic apparatus used to measure carbon content or pH.

788 For water (e.g., moisture, etc.):
This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for water (e.g., moisture, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
782+, for electrolytic analysis or testing for oxygen or an oxygen containing compound other than water.

788.5 Including titration:
This subclass is indented under subclass 775. Subject matter which involves the volumetric determination of the concentration of a desired substance in a known volume of a solution by adding a standard reacting solution of known strength and volume until the reaction is completed as indicated electrometrically (e.g., potentiometric titration, coulometric titration, etc.).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 405 for electrolytic titration apparatus.

789 For ion concentration (e.g., ion activity, pKa, etc.):
This subclass is indented under subclass 775. Subject matter in which a material is analyzed or tested for ion concentration (e.g., ion activity, pKa, etc.).

(1) Note. The electrolytic analysis or testing of a material for the mere presence of one or more ionic species in solution is insufficient for placement in this subclass or the subclass indented hereunder, which are intended to provide for determination of at least the relative quantity of ions in solution.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 416+ for electrolytic apparatus for analysis and testing using an ion sensitive electrode.

789.5 Cations:
This subclass is indented under subclass 789. Subject matter in which the material is analyzed or tested for the concentration of one or more cationic species.

790 For composition of metal or metal alloy:
This subclass is indented under subclass 775. Subject matter in which the chemical composition of a metal or metal alloy is determined.

(1) Note. This subclass does not provide for analysis or testing for localized variations in composition unless combined with the determination of the overall chemical composition of a metal or metal alloy.

SEE OR SEARCH THIS CLASS, SUBCLASS:
790.5+, for electrolytic analysis or testing of a solid material for other properties, particularly subclass 791.5 for defects in solid material.

790.5 For properties of solid material (e.g., surface area, etc.):
This subclass is indented under subclass 775. Subject matter in which a physical, chemical, or electrical property of a solid material

(including manufactured articles or subassemblies) is determined (e.g., surface area, etc.).

791 Of coating or coated substrate (e.g., thickness, bonding strength, etc.):
This subclass is indented under subclass 790.5. Subject matter in which the solid material is a coating or coated substrate (e.g., thickness, bonding strength, etc.).

(1) Note. The coating or coated substrate must exist as such apart from any base material or matrix which is included merely for the purpose of supporting the coating or coated substrate during electrolytic analysis or testing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
776.5, for electrolytic analysis or testing of a coating, coated substrate, or imbedded object for corrosion.
794, for electrolytic analysis or testing of a reactant or product during the deposition of a coating on a substrate.

791.5 Defects:
This subclass is indented under subclass 790.5. Subject matter which involves detecting undesirable localized variations in a solid material or component (e.g., localized microstructure defects in a solid metal article which may result in mechanical or electrical failure, etc.).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 401 for electrolytic apparatus for analysis and testing having means for fault testing of a sensor or component used therein.

792 Of biological material (e.g., urine, etc.):
This subclass is indented under subclass 775. Subject matter in which a biological material (e.g., urine, etc.) is analyzed or tested.

(1) Note. This subclass does not provide for electrolytic analysis or testing of a fluid (e.g., air, carbon dioxide, etc.) which may be metabolized or may be the result of a metabolic process unless the fluid is specifically disclosed in connection with a metabolic or biological process or organism.

SEE OR SEARCH THIS CLASS, SUBCLASS:
701, for electrolytic treatment of biological organic material.
777.5+, for electrolytic analysis or testing involving an enzyme or micro-organism.
779, for electrolytic analysis or testing of a biological fluid for halogen or a halogen containing compound.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 403.01+ for electrolytic apparatus for biological analysis and testing.

792.5 Using ion exchange resin:
This subclass is indented under subclass 775. Subject matter in which an ion exchange resin is employed.

793 Using semipermeable membrane:
This subclass is indented under subclass 775. Subject matter in which a semipermeable solid barrier or diaphragm is utilized.

SEE OR SEARCH THIS CLASS, SUBCLASS:
778, for electrolytic analysis or testing involving an enzyme or micro-organism and using a semipermeable membrane.
782.5+, for electrolytic analysis or testing for an oxygen or oxygen containing compound using a semipermeable membrane.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 415 for electrolytic apparatus for analysis and testing using a selectively permeable membrane.

793.5 Tracking chemical reactions:
This subclass is indented under subclass 775. Subject matter which involves electrolytic analysis or testing of a reactant or product during a chemical reaction.

794 Coating (e.g., electroless, etc.):
This subclass is indented under subclass 793.5. Subject matter in which the chemical reaction results in the deposition of a coating on a substrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
776.5, for electrolytic analysis or testing of a coating, coated substrate, or imbedded object for corrosion.
791, for electrolytic analysis or testing for material properties of a solid coating or coated substrate.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclass 434 for electrolytic apparatus for analysis and testing involving plating, coating, or stripping.

794.5 Using electrode containing precious metal or free carbon:
This subclass is indented under subclass 775. Subject matter in which an electrode containing silver (Ag), gold (Au), a platinum group metal, or free carbon (C) (e.g., graphite, carbon fibers, etc.) is used.

SEE OR SEARCH THIS CLASS, SUBCLASS:
780, for electrolytic analysis or testing for halogen or a halogen containing compound using an electrode containing precious metal or free carbon.
786, for electrolytic analysis or testing for oxygen or an oxygen containing compound other than water using an electrode containing precious metal or free carbon.

799 MISCELLANEOUS ELECTROLYSIS:
This subclass is indented under the class definition. Subject matter involving electrolysis which is not provided for above.

CROSS-REFERENCE ART COLLECTIONS

915 ELECTROLYTIC DEPOSITION OF SEMICONDUCTOR:
Subject matter wherein a semiconductor is deposited.

SEE OR SEARCH THIS CLASS, SUBCLASS:
123, for subject matter directed to the selected area electrolytic coating wherein the product is or includes a semiconductor.

916 SEQUENTIAL ELECTROLYTIC AND NONELECTROLYTIC, OR NONELECTROLYTIC AND ELECTROLYTIC COATING FROM THE SAME BATH:
Subject matter wherein electrolytic and nonelectrolytic coating steps are sequentially performed in any order from the same bath.

(1) Note. Compare with this class, subclass 109 for subject matter directed to depositing a coating which contains embedded solid material, such processes often involving simultaneous electrolytic and nonelectrolytic coating from the same bath.

917 TREATMENT OF WORKPIECE BETWEEN COATING STEPS:
Subject matter wherein the workpiece is treated after one coating step and before another coating step.

918 USE OF WAVE ENERGY OR ELECTRICAL DISCHARGE DURING PRETREATMENT OF SUBSTRATE OR POSTTREATMENT OF COATING:
Subject matter wherein wave energy or electrical discharge is used during the pretreatment of a substrate prior to coating or during the posttreatment of a coating after it has been deposited.

919 WATERPROOFING:
Subject matter wherein one or more steps of water-proofing the substrate prior to electrolytic coating are performed or wherein the electrolytic coating itself serves to waterproof the substrate.

920 ELECTROLYTIC COATING OF CIRCUIT BOARD OR PRINTED CIRCUIT (OTHER THAN SELECTED AREA COATING):
Subject matter directed to the production of a circuit board or printed circuit wherein an electrolytic coating step either transforms a sub-

strate into the circuit board or printed circuit or simply deposits material on a substrate which before coating was already identifiable as a circuit board or printed circuit and wherein the electrolytic coating is applied to the entire substrate.

921 ELECTROLYTIC COATING OF PRINTING MEMBER (OTHER THAN SELECTED AREA COATING):
Subject matter directed to the preparation of the printing surface of a sheet, plate, roll or other member employed in printing by electrolytically depositing a coating over the entire surface.

922 ELECTROLYTIC COATING OF MAGNETIC STORAGE MEDIUM (OTHER THAN SELECTED AREA COATING):
Subject matter directed to the production of a magnetic storage medium wherein an electrolytic coating step either transforms a substrate into the magnetic storage medium or simply deposits material on a substrate which before the electrolytic coating step was already identifiable as a magnetic storage medium and wherein the electrolytic coating is applied to the entire substrate.

923 SOLAR COLLECTOR OR ABSORBER:
Subject matter wherein an electrolytic coating is provided on a substrate designed to serve as a device or as a part of a device for absorbing or collecting solar energy.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, cross-reference art collection subclass 901 for an absorber coating other than electrolytic coating.

924 ELECTROLYTIC COATING SUBSTRATE PREDOMINANTLY COMPRISED OF SPECIFIED SYNTHETIC RESIN:
Subject matter wherein a coating is electrolytically deposited on a substrate the major or predominant constituent of which is a synthetic resin of specified composition.

925 SYNTHETIC RESIN IS ELECTRICALLY CONDUCTIVE:
This subclass is indented under subclass 924. Subject matter wherein the major or predominant constituent of the substrate is a synthetic resin which is itself sufficiently electrically conductive to allow direct electroplating.

926 POLYAMIDE OR POLYIMIDE (E.G., NYLON, ETC.):
This subclass is indented under subclass 924. Subject matter wherein the major or predominant constituent of the substrate is a polyamide or polyimide.

927 POLYOLEFIN (E.G., POLYETHYLENE, POLYPROPYLENE, ETC.):
This subclass is indented under subclass 924. Subject matter wherein the major or predominant constituent of the substrate is a polyolefin.

928 ABS COPOLYMER:
This subclass is indented under subclass 924. Subject matter wherein the major or predominant constituent of the substrate is a copolymer made from acrylonitrile, butadiene, and styrene.

END