CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

METALLURGY

C22 METALLURGY; FERROUS OR NON-FERROUS ALLOYS; TREATMENT OF ALLOYS OR NON-FERROUS METALS

C22B PRODUCTION AND REFINING OF METALS (electrolytic C25); PRETREATMENT OF RAW MATERIALS

NOTE

In this subclass, groups for obtaining metals include obtaining the metals by non-metallurgical processes, and obtaining metal compounds by metallurgical processes, {as far as specifically indicated in the relevant groups} . Thus, for example, group C22B 11/00 covers the production of silver by reduction of ammoniacal silver oxide in solution, and group C22B 17/00 includes the production of cadmium oxide by a metallurgical process. Furthermore, although compounds of arsenic and antimony are classified in C01G, production of the elements themselves is included in C22B, as well as the production of their compounds by metallurgical processes.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

C22B 9/187 - C22B 9/193	covered by	C22B 9/18
C22B 9/21	covered by	C22B 9/20
C22B 15/02	covered by	C22B 15/0032
C22B 15/04	covered by	C22B 15/0036
C22B 15/06	covered by	C22B 15/0041, C22B 15/0043
C22B 15/14	covered by	C22B 15/006

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Preliminary treatment of ores or scrap

1/005 . {Preliminary treatment of scrap (C22B 1/02 - C22B 1/26 take precedence)}
1/02 . Roasting processes (C22B 1/16 takes precedence)
1/04 . . Blast roasting
1/06 . . Sulfating roasting
1/08 . . Chloridising roasting
1/10 . . in fluidised form
1/11 . Removing sulfur, phosphorus or arsenic other than by roasting
1/14 . Agglomerating; Briquetting; Binding; Granulating
1/16 . . Sintering; Agglomerating
1/18 . . . in sinter pots
1/20 . . . in sintering machines with movable grates
1/205 . . . . {regulation of the sintering process}
1/212 . . . in tunnel furnaces
1/214 . . . in shaft furnaces
1/216 . . . in rotary furnaces
1/22 . . . in other sintering apparatus
1/24 . . Binding; Briquetting {; Granulating}
1/2406 . . . {pelletizing}
1/2413 . . . {enduration of pellets}
1/242 . . . with binders
1/243 . . . . inorganic
1/244 . . . . organic
1/245 . . . . . with carbonaceous material for the production of coked agglomerates
1/248 . . . of metal scrap or alloys
1/26 . Cooling of roasted, sintered, or agglomerated ores

3/00 Extraction of metal compounds from ores or concentrates by wet processes

NOTES

1. When classifying in this group, the nature of any metal which is considered to represent information of interest for search may also be classified in the main groups only of C22B 11/00 - C22B 25/00, in group C22B 19/34 or in any of groups C22B 26/00 - C22B 61/00. This can for example, be the case when it is considered of interest to enable searching for extraction of specific metals or their compounds. Such non-obligatory classification should be given as "additional information".
2. {This group covers methods directed to the extraction of three or more metals. For the recovery of one or two metals, see the other groups of this subclass concerning these metals}

3/02 . Apparatus therefor
3/04 . by leaching (C22B 3/18 takes precedence)
3/045 . . {Leaching using electrochemical processes}

3/06 . . in inorganic acid solutions {, e.g. with acids generated in situ; in inorganic salt solutions other than ammonium salt solutions}
3/065 . . . {Nitric acids or salts thereof}
3/08 . . . Sulfuric acid {, other sulfurated acids or salts thereof}
3/10 . . . Hydrochloric acid {, other halogenated acids or salts thereof}
3/12 . . in inorganic alkaline solutions
3/14 . . . containing ammonia or ammonium salts
3/16 . . in organic solutions
3/1608 . . . {Leaching with acyclic or carbocyclic agents}
3/1616 . . . . {Leaching with acyclic or carbocyclic agents of a single type}
3/1625 . . . . . {with amines (amino acids C22B 3/165)}
3/1633 . . . . . {with oximes}
3/1641 . . . . . {with ketones or aldehydes}
3/165 . . . . . {with organic acids}
3/1658 . . . . {Leaching with acyclic or carbocyclic agents of different types in admixture, e.g. with organic acids added to oximes}
3/1666 . . . {Leaching with heterocyclic compounds}
3/1675 . . . . {Leaching with a mixture of organic agents wherein one agent at least is a heterocyclic compounds (C22B 3/1683 takes precedence)}
3/1683 . . . {Leaching with organo-metallic compounds}
3/1691 . . . . {Leaching with a mixture of organic agents wherein at least one agent is an organo-metallic compound}
3/18 . with the aid of microorganisms or enzymes, e.g. bacteria or algae
3/20 . Treatment or purification of solutions, e.g. obtained by leaching (C22B 3/18 takes precedence)
3/205 . . {using adducts or inclusion complexes}
3/22 . . by physical processes, e.g. by filtration, by magnetic means {, or by thermal decomposition} (treatment or purification of solutions by liquid-liquid extraction C22B 3/26)
3/24 . . . by adsorption on solid substances, e.g. by extraction with solid resins
3/26 . . by liquid-liquid extraction using organic compounds

NOTE

In groups {C22B 3/262 - C22B 3/41:}
a. the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, compounds are classified in the last appropriate place;
b. when two or more compounds are used successively, each compound is classified as such;
c. mixtures containing two or more compounds covered individually by the same one of groups {C22B 3/262 - C22B 3/387,} are classified only in that group.

3/262 . . . {using alcohols or phenols}
3/28 . . . Amines
3/282 . . . . {Aliphatic amines}
3/284 . . . . {Aromatic amines}
3/286 . . . . {Amino-alcohols}
3/288 . . . . {Quaternary ammonium}
3/30 . . . Oximes
3/302 . . . {Ethers or epoxides}
3/304 . . . . {Crown ethers}
3/306 . . . {Ketones or aldehydes}
3/32 . . . Carboxylic acids
3/322 . . . . {Oxalic acids}
3/324 . . . . {Naphthenic acids}
3/326 . . . . {Ramified chain carboxylic acids or derivatives thereof, e.g. "versatic" acids}
3/33 . . . {Cyanic acids, derivatives thereof}
3/34 . . . containing sulfur {, e.g. sulfonium}
3/36 . . . Heterocyclic compounds (C22B 3/34 takes precedence)
3/362 . . . . {Heterocyclic compounds of a single type}
3/364 . . . . . {Quinoline}
3/37 . . . {containing boron, silicon, selenium or tellurium}
3/38 . . . containing phosphorus
3/381 . . . . {Phosphines, e.g. compounds with the formula PR_nH_{3-n}, with n = 0-3}
3/382 . . . . {Phosphine chalcogenides, e.g. compounds of the formula $R_3P{=}X$ with X = O, S, Se or Te}
3/383 . . . . {Tervalent phosphorus oxyacids, esters thereof}
3/384 . . . . {Pentavalent phosphorus oxyacids, esters thereof}
3/3842 . . . . . {Phosphinic acid, e.g. $H_2P(O)(OH)$}
3/3844 . . . . . {Phosphonic acid, e.g. $H_2P(O)(OH)_2$}
3/3846 . . . . . {Phosphoric acid, e.g. $(O)P(OH)_3$}
3/385 . . . . {Thiophosphoric acids, or esters thereof}
3/386 . . . . {Polyphosphoric oxyacids, or derivatives thereof}
3/387 . . . . {Cyclic or polycyclic compounds}
3/40 . . . Mixtures
3/402 . . . . {of acyclic or carbocyclic compounds of different types}
3/404 . . . . . {of organic acids and oximes}
3/406 . . . . {at least one compound thereof being a heterocyclic compound}
3/408 . . . . {using a mixture of phosphorus-based acid derivatives of different types}
3/409 . . . . {at least one compound being an organo-metallic compound}
3/41 . . . {using a solution of normally solid organic compounds, e.g. dissolved polymers, sugars, or the like}
3/42 . . by ion-exchange extraction
3/44 . . by chemical processes (treatment or purification of solutions by liquid-liquid extraction C22B 3/26, by ion-exchange extraction C22B 3/42)
3/46 . . . by substitution, e.g. by cementation

4/00 Electrothermal treatment of ores or metallurgical products for obtaining metals or alloys (obtaining iron or steel C21B, C21C)

4/005 . {using plasma jets (smelting, remelting, refining of metals using a plasma as heat source C22B 9/22; generating or handling plasma in general H05H 1/00; gas-filled discharge tubes for processing materials in general H01J 37/32)}
4/02 . Light metals {(C22B 4/005 takes precedence)}
4/04 . Heavy metals {(C22B 4/005 takes precedence)}

4/06 . Alloys {(C22B 4/005 takes precedence)}
4/08 . Apparatus ({C22B 4/005 takes precedence; } electric heating elements H05B)

5/00 General methods of reducing to metals
5/02 . Dry methods {smelting of sulfides or formation of mattes}
5/04 . . by aluminium, other metals or silicon
5/06 . . by carbides or the like
5/08 . . by sulfides; Roasting reaction methods
5/10 . . by solid carbonaceous reducing agents
5/12 . . by gases
5/14 . . . fluidised material
5/16 . . with volatilisation or condensation of the metal being produced
5/18 . . Reducing step-by-step
5/20 . . from metal carbonyls

7/00 Working up raw materials other than ores, e.g. scrap, to produce non-ferrous metals and compounds thereof; {Methods of a general interest or applied to the winning of more than two metals (briquetting of scrap C22B 1/248; preliminary treatment of scrap C22B 1/005)**}**
7/001 . {Dry processes}
7/002 . . {by treating with halogens, sulfur or compounds thereof; by carburising, by treating with hydrogen (hydriding)}
7/003 . . {only remelting, e.g. of chips, borings, turnings; apparatus used therefor}
7/004 . . {separating two or more metals by melting out (liquation), i.e. heating above the temperature of the lower melting metal component(s); by fractional crystallisation (controlled freezing)}
7/005 . {Separation by a physical processing technique only, e.g. by mechanical breaking}
7/006 . {Wet processes}
7/007 . . {by acid leaching}
7/008 . . {by an alkaline or ammoniacal leaching}
7/009 . {General processes for recovering metals or metallic compounds from spent catalysts (for recovering specific metals C22B 11/00 - C22B 61/00)}
7/02 . Working-up flue dust
7/04 . Working-up slag

9/00 General processes of refining or remelting of metals; Apparatus for electroslag or arc remelting of metals
9/003 . {by induction}
9/006 . {with use of an inert protective material including the use of an inert gas}
9/02 . Refining by liquating, filtering, centrifuging, distilling, or supersonic wave action {including acoustic waves; (C22B 9/003, C22B 9/006, C22B 9/05, C22B 9/22 take precedence)}
9/023 . . {By filtering (filtration of aluminium C22B 21/066)}
9/026 . . {by acoustic waves, e.g. supersonic waves}
9/04 . Refining by applying a vacuum
9/05 . Refining by treating with gases, e.g. gas flushing {also refining by means of a material generating gas in situ}
9/055 . . {while the metal is circulating, e.g. combined with filtration}
9/10 . with refining or fluxing agents; Use of materials therefor, {e.g. slagging or scorifying agents}(C22B 9/18 takes precedence){(C22B 9/006 takes precedence)}
9/103 . . {Methods of introduction of solid or liquid refining or fluxing agents}
9/106 . . {the refining being obtained by intimately mixing the molten metal with a molten salt or slag}
9/14 . Refining in the solid state
9/16 . Remelting metals (liquating C22B 9/02)
9/18 . . Electroslag remelting {(electroslag casting B22D 23/10)}
9/20 . . Arc remelting
9/22 . . with heating by wave energy or particle radiation {(by acoustic waves C22B 9/026)}
9/221 . . . {by electromagnetic waves, e.g. by gas discharge lamps}
9/223 . . . . {by laser beams (working by laser beam B23K 26/00)}
9/225 . . . . {by microwaves}
9/226 . . . {by electric discharge, e.g. plasma (C22B 9/20 takes precedence; apparatus therefor H01J, H05B, H05H; chemical reactions with metals in a plasma C22B 4/005)}
9/228 . . . {by particle radiation, e.g. electron beams}

11/00 Obtaining noble metals
11/02 . by dry processes
11/021 . . {Recovery of noble metals from waste materials}
11/023 . . . {from pyrometallurgical residues, e.g. from ashes, dross, flue dust, mud, skim, slag, sludge}
11/025 . . . {from manufactured products, e.g. from printed circuit boards, from photographic films, paper, or baths}
11/026 . . . {from spent catalysts}
11/028 . . . . {using solid sorbents, e.g. getters or catchment gauzes}
11/04 . {by wet processes (extraction of metal compounds by leaching in organic solutions C22B 3/16; treatment or purification of solutions by liquid-liquid extraction C22B 3/26)}
11/042 . . {Recovery of noble metals from waste materials}
11/044 . . . {from pyrometallurgical residues, e.g. from ashes, dross, flue dust, mud, skim, slag, sludge}
11/046 . . . {from manufactured products, e.g. from printed circuit boards, from photographic films, paper or baths}
11/048 . . . {from spent catalysts}
11/06 . Chloridising
11/08 . by cyaniding
11/10 . by amalgamating
11/12 . . Apparatus therefor

13/00 Obtaining lead
13/02 . by dry processes
13/025 . . {Recovery from waste materials}
13/04 . {by wet processes}
13/045 . . {Recovery from waste materials}
13/06 . Refining
13/08 . . Separating metals from lead by precipitating, e.g. Parkes process
13/10 . . Separating metals from lead by crystallising, e.g. by Pattison process

15/00 Obtaining copper

15/0002 . {Preliminary treatment}
15/0004 . . {without modification of the copper constituent}
15/0006 . . . {by dry processes}
15/0008 . . . {by wet processes (by flotation B03D)}
15/001 . . {with modification of the copper constituent}
15/0013 . . . {by roasting}
15/0015 . . . . {Oxidizing roasting}
15/0017 . . . . {Sulfating or sulfiding roasting}
15/0019 . . . . {Chloridizing roasting (segregation C22B 15/0023)}
15/0021 . . . {by reducing in gaseous or solid state (slag reduction C22B 15/0054)}
15/0023 . . . . {Segregation}
15/0026 . {Pyrometallurgy}
15/0028 . . {Smelting or converting}
15/003 . . . {Bath smelting or converting}
15/0032 . . . . {in shaft furnaces, e.g. blast furnaces}
15/0034 . . . . {in rotary furnaces, e.g. kaldo-type furnaces}
15/0036 . . . . {in reverberatory furnaces}
15/0039 . . . . {in electric furnaces}
15/0041 . . . . {in converters}
15/0043 . . . . . {in rotating converters}
15/0045 . . . . {in muffles, crucibles, or closed vessels}
15/0047 . . . {flash smelting or converting}
15/005 . . . {in a succession of furnaces}
15/0052 . . . {Reduction smelting or converting}
15/0054 . . {Slag, slime, speiss, or dross treating}
15/0056 . . {Scrap treating}
15/0058 . . . {Spent catalysts}
15/006 . . {working up of molten copper, e.g. refining}
15/0063 . {Hydrometallurgy}
15/0065 . . {Leaching or slurrying (with organic compounds C22B 3/16)}
15/0067 . . . {with acids or salts thereof}
15/0069 . . . . {containing halogen}
15/0071 . . . . {containing sulfur}
15/0073 . . . . {containing nitrogen}
15/0076 . . . . . {Cyanide groups}
15/0078 . . . {with ammoniacal solutions, e.g. ammonium hydroxide}
15/008 . . . {with non-acid solutions containing salts of alkali or alkaline earth metals}
15/0082 . . . {with water}
15/0084 . . {Treating solutions (with organic compounds C22B 3/20)}
15/0086 . . . {by physical methods}
15/0089 . . . {by chemical methods}
15/0091 . . . . {by cementation}
15/0093 . . . . {by gases, e.g. hydrogen or hydrogen sulfide}
15/0095 . {Process control or regulation methods}
15/0097 . . {Sulfur release abatement}

17/00 Obtaining cadmium
17/02 . by dry processes
17/04 . {by wet processes}
17/06 . Refining

19/00 Obtaining zinc or zinc oxide
19/02 . Preliminary treatment of ores; Preliminary refining of zinc oxide
19/04 . Obtaining zinc by distilling
19/06 . . in muffle furnaces
19/08 . . in blast furnaces
19/10 . . in reverberatory furnaces
19/12 . . in crucible furnaces
19/14 . . in vertical retorts
19/16 . . Distilling vessels
19/18 . . . Condensers, Receiving vessels
19/20 . Obtaining zinc otherwise than by distilling
19/22 . . {with leaching with acids}
19/24 . . {with leaching with alkaline solutions, e.g. ammonia}
19/26 . . {Refining solutions containing zinc values, e.g. obtained by leaching zinc ores (treatment or purification of solutions by liquid-liquid extraction, by ion exchange or by adsorption C22B 3/00)}
19/28 . from muffle furnace residues
19/30 . from metallic residues or scraps
19/32 . Refining zinc
19/34 . Obtaining zinc oxide (purifying zinc oxide C01G 9/02)
19/36 . . in blast or reverberatory furnaces
19/38 . . in rotary furnaces

21/00 Obtaining aluminium
21/0007 . {Preliminary treatment of ores or scrap or any other metal source (Bayer processes C01F)}
21/0015 . {by wet processes (C22B 21/02, C22B 21/04 and C22B 21/06 take precedence)}
21/0023 . . {from waste materials}
21/003 . . . {from spent catalysts}
21/0038 . {by other processes (electrolysis C25C; C22B 21/02 and C22B 21/04 take precedence)}
21/0046 . . {from aluminium halides}
21/0053 . . {from other aluminium compounds}
21/0061 . . . {using metals, e.g. Hg or Mn}
21/0069 . . {from scrap, skimmings or any secondary source aluminium, e.g. recovery of alloy constituents (C22B 21/0046, C22B 21/0053 and C22B 21/0092 take precedence)}
21/0076 . . . {from spent catalysts}
21/0084 . {melting and handling molten aluminium (C22B 21/02, C22B 21/04 and C22B 21/06 take precedence)}
21/0092 . . {Remelting scrap, skimmings or any secondary source aluminium}
21/02 . with reducing {(C22B 21/04 takes precedence)}
21/04 . with alkali metals {earth alkali metals included}
21/06 . refining {(electrolytic refining C25C; C22B 21/0046, C22B 21/0061 take precedence)}
21/062 . . {using salt or fluxing agents (C22B 21/064, C22B 21/066, and C22B 21/068 take precedence)}
21/064 . . {using inert or reactive gases (C22B 21/066 and C22B 21/068 take precedence)}
21/066 . . {Treatment of circulating aluminium, e.g. by filtration (C22B 21/068 takes precedence)}
21/068 . . {handling in vacuum}

23/00 Obtaining nickel or cobalt
23/005 . {Preliminary treatment of ores, e.g. by roasting or by the Krupp-Renn process}
23/02 . by dry processes
23/021 . . {by reduction in solid state, e.g. by segregation processes}

23/023 . . {with formation of ferro-nickel or ferro-cobalt}
23/025 . . {with formation of a matte or by matte refining or converting into nickel or cobalt, e.g. by the Oxford process (leaching of mattes C22B 23/04)}
23/026 . . {from spent catalysts}
23/028 . . {separation of nickel from cobalt}
23/04 . {by wet processes (recovery or separation of nickel or cobalt using organic agents C22B 3/00)}
23/0407 . . {Leaching processes}
23/0415 . . . {with acids or salt solutions except ammonium salts solutions}
23/0423 . . . . {Halogenated acids or salts thereof}
23/043 . . . . {Sulfurated acids or salts thereof}
23/0438 . . . . {Nitric acids or salts thereof}
23/0446 . . . {with an ammoniacal liquor or with a hydroxide of an alkali or alkaline-earth metal}
23/0453 . . {Treatment or purification of solutions, e.g. obtained by leaching (C22B 23/0407 takes precedence)}
23/0461 . . . {by chemical methods}
23/0469 . . . . {by chemical substitution, e.g. by cementation}
23/0476 . . {Separation of nickel from cobalt}
23/0484 . . . {in acidic type solutions}
23/0492 . . . {in ammoniacal type solutions}
23/06 . Refining
23/065 . . {carbonyl methods}

25/00 Obtaining tin
25/02 . by dry processes
25/04 . {by wet processes}
25/06 . from scrap, especially tin scrap (by electrolytic procedure C25C 1/14)
25/08 . Refining

26/00 Obtaining alkali, alkaline earth metals or magnesium
26/10 . Obtaining alkali metals
26/12 . . Obtaining lithium
26/20 . Obtaining alkaline earth metals or magnesium
26/22 . . Obtaining magnesium

30/00 Obtaining antimony, arsenic or bismuth
30/02 . Obtaining antimony
30/04 . Obtaining arsenic {(extraction of metal compounds by leaching in organic solutions C22B 3/16; treatment or purification of solutions by adsorption on solids C22B 3/24, by liquid-liquid extraction C22B 3/26, by ion-exchange extraction C22B 3/42)}
30/06 . Obtaining bismuth

34/00 Obtaining refractory metals
34/10 . Obtaining titanium, zirconium or hafnium
34/12 . . Obtaining titanium {or titanium compounds from ores or scrap by metallurgical processing; preparation of titanium compounds from other titanium compounds see C01G 23/00 - C01G 23/08}
34/1204 . . . {preliminary treatment of ores or scrap to eliminate non- titanium constituents, e.g. iron, without attacking the titanium constituent}
34/1209 . . . . {by dry processes, e.g. with selective chlorination of iron or with formation of a titanium bearing slag}
34/1213 . . . . {by wet processes, e.g. using leaching methods or flotation techniques}
34/1218 . . . {obtaining titanium or titanium compounds from ores or scrap by dry processes}
34/1222 . . . . {using a halogen containing agent}
34/1227 . . . . {using an oxygen containing agent}
34/1231 . . . . {treatment or purification of titanium containing products obtained by dry processes, e.g. condensation}
34/1236 . . . {obtaining titanium or titanium compounds from ores or scrap by wet processes, e.g. by leaching}
34/124 . . . . {using acidic solutions or liquors}
34/1245 . . . . . {containing a halogen ion as active agent}
34/125 . . . . . {containing a sulfur ion as active agent}
34/1254 . . . . {using basic solutions or liquors}
34/1259 . . . . {treatment or purification of titanium containing solutions or liquors or slurries (C01G 23/001 takes precedence)}
34/1263 . . . {obtaining metallic titanium from titanium compounds, e.g. by reduction (C22B 34/129 takes precedence)}
34/1268 . . . . {using alkali or alkaline-earth metals or amalgams}
34/1272 . . . . . {reduction of titanium halides, e.g. Kroll process}
34/1277 . . . . {using other metals, e.g. Al, Si, Mn}
34/1281 . . . . {using carbon containing agents, e.g. C, CO, carbides (C22B 34/1286 takes precedence)}
34/1286 . . . . {using hydrogen containing agents, e.g. H_2, CaH_2, hydrocarbons}
34/129 . . . {obtaining metallic titanium from titanium compounds by dissociation, e.g. thermic dissociation of titanium tetraiodide, or by electrolysis or with the use of an electric arc}
34/1295 . . . {Refining, melting, remelting, working up of titanium}
34/14 . . Obtaining zirconium or hafnium {(treatment or purification of solutions by liquid-liquid extraction, by ion exchange or by adsorption C22B 3/00, C01G 25/003, C01G 27/003)}
34/20 . Obtaining niobium, tantalum or vanadium
34/22 . . Obtaining vanadium
34/225 . . . {from spent catalysts}
34/24 . . Obtaining niobium or tantalum
34/30 . Obtaining chromium, molybdenum or tungsten
34/32 . . Obtaining chromium
34/325 . . . {from spent catalysts}
34/34 . . Obtaining molybdenum {(treatment or purification of solutions by adsorption on solids C22B 3/24, by liquid-liquid extraction C22B 3/26, by ion-exchange extraction C22B 3/42; preparation of molybdenum involving liquid-liquid extraction, adsorption or ion-exchange C01G 39/003)}
34/345 . . . {from spent catalysts}
34/36 . . Obtaining tungsten
34/365 . . . {from spent catalysts}

35/00 Obtaining beryllium

41/00 **Obtaining germanium {**(treatment or purification of solutions by adsorption on solids C22B 3/24, by liquid-liquid extraction C22B 3/26, by ion-exchange extraction C22B 3/42)**}**

43/00 **Obtaining mercury**

47/00 **Obtaining manganese**

47/0009 . {from spent catalysts}

47/0018 . {Treating ocean floor nodules}

47/0027 . . {Preliminary treatment}

47/0036 . . {by dry processes, e.g. smelting}

47/0045 . . {by wet processes}

47/0054 . . . {leaching processes}

47/0063 . . . . {with acids or salt solutions (C22B 47/0072 takes precedence)}

47/0072 . . . . {with an ammoniacal liquor or with a hydroxide of an alkali or alkaline-earth metal}

47/0081 . . . {Treatment or purification of solutions, e.g. obtained by leaching (C22B 47/0054 takes precedence)}

47/009 . . {refining, e.g. separation of metals obtained by the above methods}

58/00 **Obtaining gallium or indium {**(treatment or purification of solutions by liquid-liquid extraction, by ion-exchange or by adsorption C22B 3/20)**}**

59/00 **Obtaining rare earth metals**

60/00 **Obtaining metals of atomic number 87 or higher, i.e. radioactive metals**

60/02 . Obtaining thorium, uranium, or other actinides

60/0204 . . {obtaining uranium}

60/0208 . . . {preliminary treatment of ores or scrap}

60/0213 . . . {by dry processes}

60/0217 . . . {by wet processes}

60/0221 . . . . {by leaching}

60/0226 . . . . . {using acidic solutions or liquors}

60/023 . . . . . {halogenated ion as active agent}

60/0234 . . . . . {sulfurated ion as active agent}

60/0239 . . . . . {nitric acid containing ion as active agent}

60/0243 . . . . . {phosphorated ion as active agent}

60/0247 . . . . . {using basic solutions or liquors}

60/0252 . . . . {treatment or purification of solutions or of liquors or of slurries (C22B 60/0221 takes precedence)}

60/0256 . . . . . {using biological agents, e.g. microorganisms or algae}

60/026 . . . . . {liquid-liquid extraction with or without dissolution in organic solvents}

60/0265 . . . . . {extraction by solid resins}

60/0269 . . . . . {Extraction by activated carbon containing adsorbents}

60/0273 . . . . . {Extraction by titanium containing adsorbents, e.g. by hydrous titanium oxide (C22B 60/0269 takes precedence)}

60/0278 . . . . . {by chemical methods (C22B 60/0256, C22B 60/026, C22B 60/0265 take precedence)}

60/0282 . . . . . {Solutions containing P ions, e.g. treatment of solutions resulting from the leaching of phosphate ores or recovery of uranium from wet-process phosphoric acid}

60/0286 . . . {refining, melting, remelting, working up uranium}

60/0291 . . {obtaining thorium}

60/0295 . . {obtaining other actinides except plutonium}

60/04 . . Obtaining plutonium

61/00 **Obtaining metals not elsewhere provided for in this subclass** (iron C21)