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 3/26 - C22B 3/40 covered by C22B 3/0005
   - C22B 9/187 - C22B 9/193 covered by C22B 9/18
   - C22B 9/20 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 (furnaces, sintering apparatus F27B)
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

NOTE
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

3/0001 . . . {Leaching of ores not used, see subgroups}
3/0002 . . . {Leaching with an ammoniacal liquor or with a hydroxide of an alkali or an alkaline earth metal}

WARNING
Group C22B 3/0002 is no longer used for the classification of new documents from May 1st, 2005. The backlog of this group is being continuously transferred to the relevant groups of C22B
WARNING
Not used, see subgroups

3/0005 . . . . . . . [by liquid-liquid extraction using organic compounds, e.g. acyclic or carbocyclic compounds, heterocyclic compounds, organo-metallic compounds, alcohols, ethers, or the like (C22B 3/205 takes precedence)]

3/0022 . . . . . . . (using organic acids (C22B 3/0031, C22B 3/0035, C22B 3/004 take precedence))

3/0024 . . . . . . . [using acids of the carboxylic type or derivatives thereof, e.g. amino acids, nitriles, amides, hydroxamic acids]

3/0028 . . . . . . . [using ramified chain carboxylic acids or derivatives thereof, e.g. "versatic" acids]

3/0031 . . . . . . . [using organic compounds containing sulfur atom(s), e.g. sulfonium (C22B 3/004 takes precedence)]

3/0032 . . . . . . . [using mixtures of acyclic or carbocyclic compounds of different types (C22B 3/0035, C22B 3/004 take precedence)]

3/0033 . . . . . . . [using organic acids added to oximes]

3/0035 . . . . . . . [using heterocyclic compounds (C22B 3/0018, C22B 3/002 and C22B 3/0031 take precedence)]

3/0036 . . . . . . . [using heterocyclic compounds of a single type]

3/0037 . . . . . . . [using quinoline]

3/0039 . . . . . . . [using a mixture of organic agents wherein one agent at least is a heterocyclic compound (C22B 3/004 takes precedence)]

3/004 . . . . . . . [using organo-metallic compounds or organo compounds of boron, silicon, phosphorus, selenium or tellurium]

3/0041 . . . . . . . [using organo-metallic compounds of a single type]

3/0043 . . . . . . . [of a single type]

3/0045 . . . . . . . [Acyclic compounds]

3/0047 . . . . . . . [of the phosphine or phosphane (PHn) type]

3/0048 . . . . . . . [Primary (RPH2) compounds]

3/005 . . . . . . . [Secondary (R2PH) compounds]

3/0051 . . . . . . . [Tertiary (R3PH) compounds]

3/0052 . . . . . . . [Chalcogenides of phosphine, e.g. (R,P=X) type with X = O, S, Se or Te; Oxides, Thio-oxides of phosphine]

3/0054 . . . . . . . [of the phosphorane (PH5) type]

3/0055 . . . . . . . [of the phosphonium (PR4) type]

3/0056 . . . . . . . [Mononuclear oxyacids of tervalent phosphorus or their esters(-ite)]

3/0058 . . . . . . . [Phosphenous (HOP) type]

3/0059 . . . . . . . [Phosphinous (H2POH) type]

3/006 . . . . . . . [Phosphonic (H3POH) type]

3/0062 . . . . . . . [Phosphorous (P(O)3) type]

3/0063 . . . . . . . [Mononuclear oxyacids of pentavalent phosphorus or their esters(-ate)]

3/0064 . . . . . . . [Phosphenic (HOP(O)2) or metaphosphoric type]

3/0066 . . . . . . . [Phosphinic (H2PO(OH)) type]

3/0067 . . . . . . . [Phosphinic (H2PO(OH)) type]

3/0068 . . . . . . . [Phosphoric ((O)P(OH)2) type]

3/007 . . . . . . . [Thiophosphoric acids or their esters]

3/0071 . . . . . . . [Dinuclear or polynuclear oxyacids and their derivatives]

3/0072 . . . . . . . [Compounds with phosphorus-nitrogen (P=N) double bonds]

3/0074 . . . . . . . [compounds with (P-P) bonds]

3/0075 . . . . . . . [compounds with (P-Xn-P) bonds (n, 0, X: other than P), e.g. pyro- or di-]

3/0077 . . . . . . . [Cyclic compounds, e.g. aryl-, phenyl-, benzyl-compounds]

3/0078 . . . . . . . [using a mixture of phosphorus-based acid derivatives of different types]

3/0079 . . . . . . . [(of the acyclic type)]

3/0081 . . . . . . . [two or more of the phosphine type]

3/0082 . . . . . . . [two or more of the phosphine oxides or sulfides type]

3/0083 . . . . . . . [two or more of the phosphorane type]

3/0085 . . . . . . . [two or more of the phosphonium type]

3/0086 . . . . . . . [two or more of the mononuclear oxyacids of tervalent phosphorus or their esters]

3/0087 . . . . . . . [two or more mononuclear oxyacids of quinquevalent phosphorus or their esters]

3/0089 . . . . . . . [two or more thosphosphoric acids or their esters]

3/009 . . . . . . . [two or more dinuclear or polynuclear oxyacids or their derivatives]

3/0091 . . . . . . . [combinations of the above]

3/0093 . . . . . . . [comprising cyclic compounds only]
3/0094 . . . . . {comprising cyclic and acyclic compounds}
3/0095 . . . . . {using a mixture of organic agents wherein one agent at least is an organo-metallic compound}
3/0097 . . . . . {using a solution of normally solid organic compounds, e.g. dissolved polymers, sugars, or the like}
3/0098 . . . . . {by ion exchange extraction or by adsorption on solid substances, e.g. by extraction with solid resins (C22B 3/0097 takes precedence)}

WARNING
Group C22B 3/0098 is no longer used for the classification of new documents from May 1st, 2005. The backlog of this group is being continuously transferred to the relevant groups of C22B.

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

WARNING
Group C22B 3/14 was introduced on May 1st, 2005. This group covers the subject-matter of group C22B 3/0002 which is no longer used for classification of new documents

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 compound (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, by adsorption on solid substances, e.g. by extraction with solid resins (C22B 3/0097 takes precedence)
3/24 . . . . by adsorption on solid substances, e.g. by extraction with solid resins

WARNING
Group C22B 3/24 was introduced on May 1st, 2005. This group covers the subject-matter of group C22B 3/0098 which is no longer used for classification of new documents.

3/42 . . . . by ion-exchange extraction

WARNING
Group C22B 3/42 was introduced on May 1st, 2005. This group covers the subject-matter of group C22B 3/0098 which is no longer used for classification of new documents.

3/44 . . . . by chemical processes
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 1/10; 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 matts}
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
5/20 . . . . 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}
Obtaining noble metals

- by dry processes
- [Recovery of noble metals from waste materials]
- [Recovery from waste materials]
- Refining
- Separating metals from lead by precipitating, e.g. Parkes process
- Separating metals from lead by crystallising, e.g. by Pattison process

Obtaining copper

- [Preliminary treatment]
- [without modification of the copper constituent]
- [by dry processes]
- [by wet processes]
- [Recovery from waste materials]
- Refining
- [Chloridizing roasting (segregation C22B 15/0023)]
- [Chloridizing roasting (segregation C22B 15/0023)]
- [Reducing in gaseous or solid state (slag reduction C22B 15/0054)]
- [Segregation]
- [Pyrometallurgy]
- [Smelting or converting]
- [Bath smelting or converting]
- [in shaft furnaces, e.g. blast furnaces]
- [in rotary furnaces, e.g. kaldo-type furnaces]
- [in reverberatory furnaces]
- [in electric furnaces]
- [in converters]
- [in rotating converters]
- [in muffles, crucibles, or closed vessels]
- [Flash smelting or converting]
- [in a succession of furnaces]
- [Reduction smelting or converting]
- [Slag, slime, spess, or dross treating]
- [Scrap treating]
Obtaining aluminium

21/007 Preliminary treatment of ores or scrap or any other metal source (Bayer processes C01E)
21/0015 (by wet processes (C22B 21/02, C22B 21/04 and C22B 21/06 take precedence))
21/0023 (from waste materials)
Obtaining refractory metals

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. H2, CaH2, 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 {(C22B 3/0005, C22B 3/0098 and C01G 39/003 take precedence; from catalyst or superalloy scrap : see also C22B 7/000}]
34/345 . . . . . [from spent catalysts]
34/36 . . . Obtaining tungsten
34/365 . . . . . [from spent catalysts]

58/00 Obtaining gallium or indium {(treatment or purification of solutions by liquid-liquid extraction, by ion exchange or by adsorption C22B 3/0004)}

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
60/024 . . . [obtaining uranium]
60/028 . . . . [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]
C22B

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)