C22B

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

Definition statement

This subclass/group covers:

Metallurgical or chemical processes for producing or recovering metals from metal compounds, ores, waste or scrap metal and for refining metal. Included in this subclass are processes drawn to:

the production of metal by smelting, roasting or furnace method;

the extraction of metal compounds from ore and concentrates by wet processes;

electrochemical treatment of ores and metallurgical products for obtaining metals or alloys; apparatus thereof;

preliminary treatment of ores, concentrates and scrap;

general process for refining or remelting metals;

apparatus for electroslag or arc remelting of metals;

obtaining specific metals;

consolidating metalliferous charges or treating agents that are subsequently used in other processes of this subclass, by agglomerating, compacting, indurating or sintering.

Relationship between large subject matter areas

This subclass covers the treatment, e.g. decarburization, of metallferrous material for purposes of refining. C21C, C21D and C22F provide decarburization of metal for modifying the physical structure of ferrous and nonferrous metals or alloys, respectively.

C22B also possesses groups for obtaining metals including obtaining metals by chemical processes, and obtaining metal compounds by metallurgical processes. Thus, for example, group C22B 11/00 covers the production of silver by reduction of ammoniacal silver oxide in solution, and group C22B 25/00 covers the production of titanium oxide by metallurgical process. Furthermore, although compounds of arsenic and antimony are classified in C01G, production of the elements themselves is covered by C22B, as well as the production of their compounds by metallurgical processes.

Multi-step processes for surface treatment of metallic material involving at least one process provided for in class C23 and at least one process covered by subclass C21D or C22F or class C25

References relevant to classification in this subclass

This subclass/group does not cover:

Working metallic powder; manufacture of articles from metallic powder; making metallic powder	B22F 9/00
Flotation of ores	B03D
Processing of pig-iron, manufacture of wrought iron or steel, treatment in molten state of ferrous alloys	C21C
Manufacture of iron and steel	C21B
Electrolytic production or refining of metals	C25C
Silicon	C01B 33/02

Informative references

Attention is drawn to the following places, which may be of interest for search:

Casting of metals	B22D
Coating material with metallic material	C23C
Obtaining metal compounds by non-metallurgical processes	C01G
Processes of non-metallurgical separating of materials.	B01D
Destroying solid waste or transforming solid waste into something useful or harmless	B09B 3/00
Autoclaves	B01J 3/04
Treatment of slag	C04B 5/00
Alloys, making alloys	C22C

Separating solids from solids	B07
Furnaces	F27B

Special rules of classification within this subclass

In this subclass, groups for obtaining metals include obtaining metals by non-metallurgical process, and obtaining metal compounds by metallurgical process.

Process using enzymes or micro-organisms in order to liberate, separate or purify a pre-existing compound or composition, or to treat textiles or clean solid materials are further classified in subclass C12S.

Classification of additional information

When classifying in groups C22B 1/00 to C22B 9/00, the nature of any metal which is considered to represent the information of interest for search may also be classified in the main groups only of C22B 11/00 to C22B 61/00. Such classification is not compulsory, however, very desirable. This can, for example, be the case when it is considered of interest to enable searching for extraction of specific metal or their compounds.

The Indexing Codes are present but are not compulsory.

Subgroups and head groups

As a general rule the last place priority rule applies.

If a document concerns embodiments which are covered by several subgroups (e.g. C22B 3/065 - C22B 3/10) dependent on a higher hierarchy group (head group, e.g. C22B 3/06), the following rules apply:

the specific technical information relevant for some of the subgroups is classified (EC) in all said subgroups;

if relevant, the combination of the elements covered by the subgroups is classified (EC) in the head group;

analogously, if generic technical information common to all of the subgroups is disclosed and only schematic embodiments of the specific subgroup embodiments are represented, the document is classified (EC) in the head group

For example:

If a document discloses an acidic leaching process of an ore or concentrate in general, then classify in the head group C22B 3/06;

If a document discloses a leaching of ores or concentrate by hydrochloric or

sulphuric acid, then classify in C22B 3/08 and C22B 3/10;

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Carburizing	Treatment of a metal with an externally supplied source of carbon resulting in the chemical reaction or diffusion of the carbon into the metal.
Decarburization	Treatment of a metal to remove carbon therefrom.
Hydrometallurgy	A generic term for processes involving solution in water or other liquid in which metalliferous material or metal is treated to prepare metal, to purify or to refine metal or to prepare intermediate materials more suitable for use in preparing metal (e.g. extracting, leaching, beneficiating, etc.)
Leaching	Extraction by dissolving soluble constituents from insoluble materials. Either the extracted solution or the insoluble material may contain the desired metalliferous material from which metal is obtained.
Pyrometallurgy	A generic term for processes carried out at relatively high temperatures, usually in furnaces, in which metalliferous material or metal is treated to prepare metal, to purify or to refine free metal, or to prepare intermediate materials more suitable for use in preparing metals (e.g. smelting, roasting, etc)
Reducing	Changing from a higher to a lower oxidation state such as, for example, from ferric to ferrous state or to the elemental state
Refining	Purification of metal by removal of impurities therefrom.

Roasting	The treatment of an ore or concentrate with heat and causing partial or full oxidation of the reactive species present in the ore or concentrate to facilitate metal extraction.
Slag	A vitreous mass that separates from fused metals during smelting or refining of metalliferous material.
Smelting	Treatment of metalliferous material, typically a metal sulfide ore or concentrate, with sufficient heat to cause melting of the sulfide mineral(s) in the ore or concentrate such that a molten metal sulfide phase is formed.

Synonyms and Keywords

In patent documents the following abbreviations are often used:

Working-up	pre-treatment of ores or concentrates such as by consolidation
Beneficiating	processes of enrichment of ores and concentrates such as by leaching
Indurating	heat treatment of ores or concentrates such as by forming hardened pellets of metalliferous material.
Cementation	connection with hydrometallurgical processes refers to the precipitation of metalliferous material

C22B 1/00

Preliminary treatment of ores or scraps (furnaces, sintering apparatus F27B)

Definition statement

This subclass/group covers:
Roasting processes (C22B 1/02 to C22B 1/10).

Removing sulfur, phosphorus or arsenic other than by roasting (C22B 1/11).

Agglomerating; Briquetting; Binding; Granulating (C22B 1/14 to C22B 1/248).

Cooling of roasted, sintered and agglomerated ore (C22B 1/26).

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sintering apparatus	F27B 1/005, F27B 21/00
Flotation	B03D

C22B 3/00

Extraction of metal compounds from ores or concentrates by wet processes

Definition statement

This subclass/group covers:
Apparatus for wet processes (C22B 3/02).

Leaching process (C22B 3/04 to C22B 3/46).

Special rules of classification within this group

In subgroups C22B 3/0005 to C22B 3/0097 compounds are classified in the last appropriate place

C22B 4/00

Electrochemical treatment of ores or metallurgical products for obtaining metals and alloys (obtaining iron or steel C21B, C21C)

Definition statement

This subclass/group covers:
Waste metallurgical products such as slags or ores treated electrochemically, electrothermally, e.g. microwaves; electrochemical treatment of platinum group metals or noble metals

The following subgroups are used when the light or heavy metals or non-ferrous alloys are directly produced via electrochemical treatment.

Light metals (C22B 4/02).

Heavy metals (C22B 4/04).

Non-ferrous alloys (C22B 4/06)

Apparatus (C22B 4/08).

References relevant to classification in this subclass

This subclass/group does not cover:

Electrolytic production or refining of metals	C25C

Informative references

Attention is drawn to the following places, which may be of interest for search:

Discharge tubes with the provision for introducing objects or materials to be exposed to the discharge, e.g. gas filled discharge tubes (plasma apparatus)	H01J 37/32

Special rules of classification within this group

When a ore is processed by electrochemical treatment and the metal is obtained e.g. by smelting or leaching, it's also classified in C22B 4/00 and subgroups

C22B 5/00

General methods of reducing to metals

Definition statement

This subclass/group covers:

Dry methods for reducing different metal bearing materials to pure metal (C22B 5/02 to C22B 5/20).

Informative references

Attention is drawn to the following places, which may be of interest for search:

Manufacture of iron and steel	C21B

C22B 7/00

Working up raw materials other than ores, e.g. scrap, to produce non-ferrous metals and compounds thereof [N: Methods of a general interest or applied to the winning of more than two metals (briquetting of scrap C22B1/248; preliminary treatment of scrap C22B1/005)].

Definition statement

This subclass/group covers:

Dry methods (C22B 7/001 to C22B 7/004).

Separation by a physical processing (C22B 7/005)

General method for recovering metals from spent catalysts (C22B 7/009)

Working-up flue dust (C22B 7/02)

Working-up slag (C22B 7/04)

C22B 9/00

General processes of refining or remelting of metals; Apparatus for electroslag or arc remelting of metals

Definition statement

This subclass/group covers:

Diverse methods for refining metals in liquid state (C22B 9/003 to C22B 9/106).

Refining metals in solid state (C22B 9/14).

Remelting materials for purpose of refinining (C22B 9/16 to C22B 9/228).

Informative references

Attention is drawn to the following places, which may be of interest for search:

Treatment of fused masses in the ladle or the supply runners before casting	B22D 1/00

C22B 11/00

Obtaining noble metals

Definition statement

This subclass/group covers:
Obtaining noble metals by dry methods (C22B 11/02 to C22B 11/00R12G).

Obtaining noble metals by wet methods (C22B 11/04 to C22B 11/048).

Chloridising and cyaniding (C22B 11/06 and C22B 11/08).

Amalgamating and the apparatus thereof (C22B 11/10 and C22B 11/12).

C22B 13/00

Obtaining lead

Definition statement

This subclass/group covers:
Obtaining lead by dry methods (C22B 13/02 and C22B 13/025).

Obtaining lead by wet methods (C22B 13/04 to C22B 13/045).

Refining (C22B 13/06 to C22B 13/10).

C22B 15/00

Obtaining copper

Definition statement

This subclass/group covers:
Preliminary treatment of copper raw materials (C22B 15/0002 to C22B 15/0023).

Obtaining copper by means of pyrometallurgy (C22B 15/0026 to C22B 15/006).

Obtaining copper by means of hydrometallurgy (C22B 15/0063 to C22B 15/0093).

Process or regulation methods (C22B 15/0095 and C22B 15/0097).

C22B 17/00

Obtaining cadmium

Definition statement

This subclass/group covers:

The extraction metallurgy of cadmium including refining (C22B 17/02 to C22B 17/06).

C22B 19/00

Obtaining zinc or zinc oxide

Definition statement

This subclass/group covers:

Preliminary treatment of zinc ores as well as preliminary refining of zinc oxide (C22B 19/02).

Obtaining zinc by distilling (C22B 19/04 to C22B 19/18).

Obtaining zinc other than by distilling (C22B 19/20 to C22B 19/26).

Obtaining zinc from residues (C22B 19/28 and C22B 19/30).

Refining zinc (C22B 19/32).

Obtaining zinc oxide (C22B 19/34 to C22B 19/38).

References relevant to classification in this group

This subclass/group does not cover:

Zinc oxide obtained by non-metallurgical process	C01G 9/02

C22B 21/00

Obtaining aluminium

Definition statement

This subclass/group covers:

Preliminary treatment of aluminium raw materials (C22B 21/0007).

Obtaining aluminium by wet processes (C22B 21/0015 to C22B 21/003).

Obtaining aluminium by other processes (C22B 21/0038 to C22B 21/0076, C22B 21/02 and C22B 21/04).

Melting, remelting and refining (C22B 21/0084 and J2, C22B 21/06 to C22B 21/068).

References relevant to classification in this group

This subclass/group does not cover:

Bayer process	C01F 7/00
Electrolytic production and refining	C25C

C22B 23/00

Obtaining nickel or cobalt

Definition statement

This subclass/group covers:

Preliminary treatment of ores (C22B 123/00B).

By dry processes (C22B 23/02 to C22B 23/028).

By wet processes (C22B 23/04 to C22B 23/004P4).

Refining (C22B 23/06 and C22B 23/065).

C22B 25/00

Obtaining tin

Definition statement

This subclass/group covers:

Obtaining tin by dry process, wet process and from scrap (C22B 25/02 to C22B 25/06).

Refining (C22B 25/08).

References relevant to classification in this group

This subclass/group does not cover:

Electrolytic production of tin	C25C 1/14

C22B 26/00

Obtaining alkali, alkaline earth metals or magnesium

Definition statement

This subclass/group covers:
Extractive metallurgy of the above metals (C22B 26/02 to C22B 26/22).

C22B 30/00

Obtaining antimony, arsenic or bismuth

Definition statement

This subclass/group covers:
Extractive metallurgy of the above metals (C22B 30/02 to C22B 30/06).

C22B 34/00

Obtaining refractory metals

Definition statement

This subclass/group covers:
Obtaining titanium, zirconium or hafnium (C22B 34/10 to C22B 34/14).

Obtaining niobium, tantalum or vanadium (C22B 34/20 to C22B 34/24).

Obtaining chromium, molybdenum or tungsten (C22B 34/30 to C22B 34/365).

C22B 35/00

Obtaining beryllium

C22B 41/00

Obtaining germanium [N: (C22B3/0005 and C22B3/0098 takes precedence)]

C22B 43/00

Obtaining mercury

C22B 47/00

Obtaining manganese

Definition statement

This subclass/group covers:

From spent catalysts (C22B 47/0009).

Treating ocean floor nodules (C22B 47/0018 to C22B 47/009).

C22B 58/00

Obtaining gallium or indium [N: (treatment or purification of solutions by liquid-liquid extraction, by ion exchange or by adsorption C22B3/0004)]

C22B 59/00

Obtaining rare earth metals

C22B 60/00

Obtaining metals of atomic number 87 or higher, i.e. radioactive metals

Definition statement

This subclass/group covers:

Obtaining thorium, uranium and other actinides (C22B 60/02 to C22B 60/0295).

Obtaining plutonium (C22B 60/04).

References relevant to classification in this group

This subclass/group does not cover:

Nuclear fuel reprocessing	G21C 19/42-G21C 19/50
Conversion of chemical elements; radioactive sources	G21G

Informative references

Attention is drawn to the following places, which may be of interest for search:

Isotopic separation effect	B01D 59/00
Uranium compounds	C01G 43/00

Decontamination process	G21F 9/00

C22B 61/00

Obtaining metals not elsewhere provided for in this subclass (iron C21)

Definition statement

This subclass/group covers:

Production of metals not elsewhere provided for in the subclass C22B.