12 Chemical processes and apparatus, not covered by special classes

12a	**Boiling processes and vessels for chemical purposes, evaporating, concentrating, distillation for the purposes of the chemical industry, condensation**
12b	**Calcination, melting**
12c	**Dissolving, lixiviating, crystallising, concentration of liquid substances**
12d	**Purification, separation and filtration of liquids and liquid materials**
12e	**Absorption, purification and separation of gases and vapours, mixing of solid and liquid materials and of gases and vapours together and with liquids**
12f	**Siphons, vessels and closures for acids, feeding devices, supply and discharge flow regulators**
12g	**General, purely chemical processes of the chemical industry, and related apparatus**
12h	**General electromechanical processes and apparatus**
12i	**Non-metals and compounds thereof, except 12k**
12i	**(IPC: C01B) Non-metallic elements; metalloids and their compounds, except those covered by 12k**
12k	**Ammonia, cyanogen and compounds thereof**
12k	**(IPC: C01C) Ammonia and cyanogen and their compounds**
12l	**Alkali metal compounds**
12l	**(IPC: C01D) Compounds of alkali metals**
12m	**Earth-alkali and earth-metal compounds**
12m	**(IPC: C01F) Compounds of the metals beryllium, magnesium, aluminium, calcium, strontium, barium, radium, thorium, and of the rare-earth metals**
12n	**Heavy-metal compounds**
12n	**(IPC: C01G) Compounds of metals not covered by subclasses 12i to 12m**
12o	**Hydrocarbons, alcohols, aldehydes, ketones, organic sulphur compounds, hydrogenated compounds, carboxylic acids, carboxylic-acid amides, ureas, and other unnamed compounds**
12p	**Nitrogen rings, nitrogen containing compounds of unknown constitution**
12q	**Amines, phenols, naphtols, aminophenols, aminonaphtols, aminoanthracene compounds, antrol compounds; oxygen, sulphur and selenium rings**

12r **Processing of tars and tar fractions from solid fuels, e.g. from crude benzene and pitch; wood vinegar, extraction from coal, peat, and the like; extraction and refining of montan wax**

12s **Preparation of dispersions, emulsions and suspensions, i. e. distribution of any chemical substance, in any medium, or utilisation of chemical substances or mixtures thereof as dispersing agents or stabilisers in general, chemical part**

12a **Boiling processes and vessels for chemical purposes, evaporating, concentrating, distillation for the purposes of the chemical industry** (dry distillation of wood 12r; of coal 10a, 26a; distillation of spirits 6b; heat exchange 17e, 17f)**, condensation** (steam condensers 17d, 14g; mechanical liquefaction of not easily liquefiable gases 17g)

12a-1 Boiling for chemical purposes (for the kitchen 34l-1 – 34l:9; of animal feed 53g; for the sugar production 89d, 89e; electrical 21h, laboratory apparatus 42l)

12a-2 Evaporating or concentrating for chemical purposes (55b-3; 89d; 89e; electrical 21h)

12a-3 Evaporating or concentrating by spraying (12e-4/01; 82a; of milk 53e-4; 85g-3)

12a-4 Evaporating or concentrating by utilising and condensing vapours (14c-17; 14h-3; 24n)

12a-5 Distillation for general chemical purposes (6b; 23a; 23b; dry distillation 12r; laboratory apparatus 42l)

12a-6 Condensation of vipers for general chemical purposes by cooling (14g; 17d; liquefaction of gases 17g-1) recovery of volatile solvents generally by cooling (29b; 39a; 78c; 78e)

12a-7 Working media in refrigerating machines: coolants, solvents, cooling media, cooling mixtures (17a – 17g)

12b **Calcination, melting**

12b (No subdivision)

12c **Dissolving, lixiviating, crystallising, concentration of liquid substances** (solidification of spirit 10b-11/03; of petroleum 10b-11/02, 23c)

12c-1 Dissolving and lixiviating in general

12c-2 Crystallisation in general (12l-4; 12m-1/30; 89d-2)

12c-3 Concentration of liquid substances, converting liquids, e.g. acids or other chemicals into pasty or solid materials, also for shipping

12d **Purification, separation and filtration of liquids and liquid materials**

Purification and separation of liquids from one another, and separation of liquids and solid substances in general (purifying and separating by centrifuging 82b)

12d-1/01 Separation of solid substances from liquids by sedimentation, also fractional separation (of ores, solid fuels and other minerals 1a-1 – 1a-19; 1b-1; 55d-13/10; 85c-6/01 – 85c-6/04; 89c-11)

12d-1/02 Separation of liquids with different specific weights by settlings (85e-9)

12d-1/03 Purification of liquids by means of clarification agents (23b-1/05; 89c-14)

12d-1/04 Purification of liquids by dialysis (89c-11)

12d-1/05 Separation of solids from liquids or of liquids from one another by means of an electric current: electroosmosis, electrodialysis (22i-5; 23e-5; 89c-15)

Filtering plants

12d-2 Filtering plants with loose filtering material

12d-3	Filtering plants with solid filtering material, e.g. stone, artificial stone
12d-4	Filling and draining devices for filtering plants
	Filtering apparatus
	Filter presses and press filters (presses for the production of oils, fruit juices, and the like, 58a, 58b)
12d-5/01	with screens and cloths
12d-5/02	with loose, granular or fibre-like filtering material
12d-5/03	with solid filtering members, e.g. stone, artificial stone
12d-5/04	Automatic
12d-6	Closures for filter presses
12d-7	Lixiviating and washing in filter presses
12d-8	Feeding devices for filter presses
12d-9	Devices for formation of filter cakes (58a; 58b)
12d-10/01	Filtering apparatus with louver like walls
12d-10/02	Filtering apparatus with filtering nozzles
12d-11	Coal filters (production and regeneration of activated carbon 12i-33)
12d-12/01	Filtering apparatus with porous solid filter members, e.g. stone, artificial stone
12d-12/02	Filtering apparatus with spaced filter elements
12d-13	Filtering apparatus with screens or cloths, and the like, in general
12d-14	Filtering apparatus with deposited filtering substances
	Rotary filters with cylindrical filtering surfaces (55d-13/20; 55d-13/30; 55d-23)
12d-15/01	with loose, granular or fibre-like filtering material
12d-15/02	with solid filtering material: screens, cloths, stone, artificial stone, etc.
12d-15/03	with endless filtering belt
	Rotary filters with flat filtering surfaces (55d-13/01)
12d-16/01	with loose, granular or fibre-like filtering material
12d-16/02	with solid filtering material: screens, cloths, stone, artificial stone, etc.
12d-17	Filtering apparatus with an endless filtering surface moving in the same fashion as a conveyor belt (55d-22)
12d-18	Bag filters
12d-19	Filtering apparatus with tubular filtering elements (85d-1)
12d-20	Filtering apparatus with trough-shaped filtering elements
12d-21	Filtering funnels and holders therefor, laboratory filters
12d-22	Filters for pipes, pumps, cocks, and the like
12d-23	Filters for viscous liquids, e.g. oil and fusible solids, e.g. resins, wax (46c1-14; 63c-75)
	Concentrating filtering apparatus in general
12d-24/01	Concentrators with stationary filtering elements
12d-24/02	Concentrators with moving filtering elements
	Filtering materials and preparation
12d-25/01	Loose filtering masses (cellulose 55f-12/10; preparation and reactivation of solvents carbon 12i-33, 12i-31/08)
12d-25/02	Solid filtering materials and cakes formed by pressing filtering materials bound by hydraulic or ceramic agents 80b-18/06)
12d-25/03	Filter cloths
12d-25/04	Filter screens
12d-26	Cleaning devices for loose filtering material
12d-27	Cleaning devices for solid filtering material
12d-28	Ultrafilters
12d-29/01	Filters utilising electricity

12d-29/02 Electric ultrafilters
12d-30 Filtering methods

12e **Absorption, purification and separation of gases and vapours, mixing of solid and liquid materials and of gases and vapours together and with liquids** (purification of flue gases 24g-6; purification of distillation gases and acetylene 26d; separation of not easily condensable gases by liquefaction 17g; preparation of air for ventilation purposes 36d; dust separation 50e; air cleaners for internal combustion engines 46c2-49; purification of exhaust gases in internal combustion engines 46c6-6)

Absorption of gases and vapours

12e-1/01 Absorbing agents
12e-1/02 Absorption devices
12e-1/03 Fillers [packing beds] for absorption and reaction devices
12e-2/01 Wet purification of gases, air and vapours, i.e. wet separation of solid and liquid suspended particles from gases, air and vapours (special fields: 1a-28/01; 10b-9/06; 13d-26 – 13d-30; 17e-4/01; 24g-6; 24g-7; 26d; 30i-5/01; 36d-1 – 36d-3; 45e-10/05; 46e2-49; 46c6-6; 50e; 61a-29/20; 61a-29/21; 61a-29/30; 61b-1/02; 75a-22; 75c-23; 81e-67; 81e-70; 82a-26)
12e-2/50 Drying of gases, air and vapours
12e-3/01 Separation of gases, air and vapours from one another, from liquid or solid substances, and recovery of volatile solvents (recovery of volatile solvents by condensation 12a-6; separation of not easily condensable gases by liquefaction 17g; 24g-6/80; 26d; 46c6-6/02)
12e-3/02 by adsorption
12e-3/03 by absorption
12e-3/04 by diffusion
12e-3/05 by means of centrifugal force
12e-3/10 Foam dispersion or prevention, mechanical part (during boiling, concentration and distillation 12a; during fermentation 6a, 6b, 6c; during production of paper or pulp 55b-1/01)
12e-3/11 Foam dispersion or prevention, chemical part (during boiling, concentration and distillation 12a; during fermentation 6a, 6b, 6c; during production of paper or pulp 55b-1/01)
12e-4/01 Mixing of gases, air and vapours with one another and with liquids, mixing of solid and liquid substances, and mechanical means for producing suspensions and colloidal solutions (mixing of dry substances, general 50f; mixing valves for gases and liquids 47g-20/02; preparation of colloidal, preponderantly inorganic solid substances and their solutions 12g-5/01; dispersions, suspensions, and emulsions, in general, chemical part 12s; mixing of briquetting materials with binders l0b-7)
12e-4/50 Mechanical means for emulsifying and homogenising (preparation of colloidal, preponderantly inorganic solid substances and their solutions 12g-5/01; dispersions, suspensions and emulsions, in general, chemical part 12s; for asphalt and tar in road construction 19c, 80a; colloid mills 50c-18)
12e-5 Separation and precipitation of liquid or vapour-like components from gases and vapours by electrical means (dry and wet flue gas purification 24g-6)
12e-6 Processes and devices for the separation of isotopes, general (special processes and devices in the classes and groups in which solid, liquid or gaseous media are separated on the basis of the same physical or physicochemical principles, e.g. by diffusion 12e-3/04, for analytical purposes 42l-3/09)

12f Siphons, vessels and closures for acids, feeding devices (24h; 26e, etc.); supply and discharge flow regulators (pumps 59; cock and valve designs 47g1)

12f-1	Acid siphons and closures for acid-containing vessels (compressed-air siphons for acids 59c-7; closures for vessels 47f-21; 64a-19 – 64a-55)
12f-3	Acid-proof vessels (21b-1)
12f-4	Feeding devices, supply and discharge flow regulators for chemical purposes

12g General, purely chemical processes of the chemical industry, and related apparatus

12g-1/01	General, purely chemical processes of the chemical industry and apparatus (laboratory apparatus 42l-13)
12g-1/02	Gas reactions
12g-1/03	photochemical reactions
12g-2/01	Autoclaves, pressure vessels, furnaces for all chemical purposes (vessel closures 47f-21)
12g-2/02	Material loading and discharging in connection with pressure vessels
12g-3	Gas generating apparatus for all chemical purposes
12g-4/01	Contact processes, contact substances and contact carriers in general (12i-24; 12i-17/76; 12k-3; 12k-1/04; 12o-27)
12g-4/02	Devices for carrying out catalytic processes
12g-5/01	Preparation of colloidal, preponderantly inorganic solid substances and their solutions - sols and gels - (dispersions, suspensions, and emulsions, in general 12s)
12g-11/00	**(IPC: B01J) Metal catalysts; Their preparation** (production of the metal per se 18, 40)**; Catalytic compositions or systems, e.g. special combinations of carrier and catalysts; Treatment of substances to influence, e.g. to enhance their catalytic activity; Regeneration of catalysts; Carriers for catalysts; The use of substances as catalysts**
	Note: **- A non-metallic single substance and/or its manufacture must be primarily classified in the place appropriate to the chemical nature of the substance, e.g. in 12g, 12l – 12q, 39b** **- A particular chemical process (e.g. manufacture of a polyamide or polyester, the curing of an epoxy resin or of an aminoplast; the polymerisation of substances containing carbon-to-carbon unsaturation, or hydrogenation of a specific substance or narrow class of substances) characterised by the use of a particular catalyst is classified primarily with the process, by in the case of the use of a particular material as a catalyst in general, i.e. in chemical reactions applicable to a number of different types of starting material (examples are hydrogenation or esterification in general, or the Fischer-Tropsch reaction), the primary classification must be in the present group.**
12g-11/02	. General methods for the regeneration of catalysts
12g-11/04	. . with oxygen-containing gases
12g-11/06	. Metal catalysts; Catalytic combinations of metals and oxides or silicates; Preparation
12g-11/08	. . Metals of the platinum or palladium group; Silver; Gold
12g-11/10	. . . Regeneration (12g-11/14 takes precedence)
12g-11/12	. . . Platinum or palladium metals
12g-11/14	. . . . Regeneration (12g-11/18 takes precedence)
12g-11/16	. . . . on non-metallic carriers
12g-11/18	. . . . . Regeneration
12g-11/20	. . . Catalysts containing silver and/or gold
12g-11/22	. . Metals of the iron group; Copper; Thorium

12g-11/24 . . . Deposition on to pre-formed carriers from solutions
12g-11/26 . . . Mixtures of metals with oxides which are not reducible to metal by hydrogen or carbon monoxide, e.g. produced by co-precipitation
12g-11/28 . . . Metals in the form of suspensions or powders
12g-11/30 . . . Regeneration
12g-11/32 . Oxides; Silicates; Metal salts such as molybdates having an anion composed of metal and oxygen only; Catalytic systems based thereon (12g-11/06 takes precedence)
12g-11/34 . . made by precipitation from liquids
12g-11/36 . . . from a gel as intermediary form
12g-11/38 . . . . the gel being derived from an organic compound (12g-11/44 takes precedence)
12g-11/40 . . . . consisting mainly of alumina and/or silica (12g-11/38, 12g-11/44 take precedence)
12g-11/42 . . . . consisting mainly of magnesia and silica (12g-11/38, 12g-11/44 take precedence)
12g-11/44 . . . . in the form of spheroids, beads and the like
12g-11/46 . . made by impregnation and/or precipitation
12g-11/48 . . . on gels
12g-11/50 . . made by heating with decomposition
12g-11/52 . . made by blending the components (mixing of gels 12g-11/34)
12g-11/54 . . . oxides only
12g-11/56 . . . followed by fusion
12g-11/58 . . Treatment, e.g. activation, of synthetic clays, alumina, silica, or of minerals, e.g. bauxite, kieselguhr, natural clay (12g-11/64 takes precedence)
12g-11/60 . . . of synthetic clays, alumina, and silica
12g-11/62 . . . of natural clays
12g-11/64 . . Activation with halogens or halogen-containing compounds (activating platinum, group and/or palladium-group metals on non-metallic carriers 12g-11/16)
12g-11/66 . . Regeneration
12g-11/68 . . . by using oxygen-containing gases
12g-11/70 . . . of catalysts containing exclusively alumina, silica, or silicates
12g-11/72 . . . . by using oxygen-containing gases
12g-11/74 . Sulphide-containing catalysts
12g-11/76 . . Regeneration
12g-11/78 . Catalysts based on halides
12g-11/80 . . Regeneration
12g-11/82 . Catalysts based on acids, salts, or mixtures thereof, other than sulphides and halides (12g-11/32 takes precedence)
12g-11/84 . Mixtures or complexes of metallic compounds reducible to a lower valency with reducing agents, i.e. Ziegler-type catalysts

12g-17/00 (IPC: B01J) Single crystals; Semiconductor materials with small controlled amounts of added "impurities"; Processes for the production of such crystals or of materials which contain small controlled amounts of added "impurities" (shapes or constructions of crystals for particular purposes, see the appropriate subclasses)

12g-17/02 . Crystallisation with or without the addition of small controlled quantities of substances to the crystals (crystallisation in general 12c)
12g-17/04 . . Crystallisation from solutions
12g-17/06 . . Crystallisation from the liquid state (from solutions 12g-17/04)
12g-17/08 . . . Zone melting
12g-17/10 . . . . without a crucible
12g-17/12 . . . . . in which the material in each molten zone is only partially melted
12g-17/14 . . . . with a solvent
12g-17/16 . . . . continuous
12g-17/18 . . . Pulling crystals from a melt
12g-17/20 . . . Growing on to a seed crystal which remains in the melt
12g-17/22 . . . in which the material to be crystallised is supplied in the particle form or as a vapour or a gaseous compound

12g-17/24	. . . . Supplying the material as solid or liquid, e.g. the Verneuil method
12g-17/26	. . . . Supplying gaseous compounds which react or decompose to form the material to be crystallised
12g-17/28	. . directly from the vapour phase (sublimation in general 12a, 12e; apparatus for gas plating with metals 48b-11/00; apparatus for vacuum deposition of thin films of metals 48b-13/00 to 48b-15/00)
12g-17/30	. . . by condensing vapours of the material to be crystallised
12g-17/32	. . . combined with a chemical reaction, e.g. decomposition
12g-17/34	. Diffusion processes
12g-17/36	. Doped materials
12g-17/38	. . Doped germanium
12g-17/40	. . Doped silicon

12h General electromechanical processes and apparatus

12h-1	Electrolytic processes and apparatus in general (10; 12d-1; 12i; 12l; 40c-1; 40c-1/00; 48a-5)
12h-2	Electrodes for all electrolytic purposes (10a; 12i-13; 12i-13/04; 18b; 18c; 21b-7; 21f-76; 21h-1; 21h-2; 21h-20; 40b; 40c-3; 40c-4; 40c-1/02; 40d; 48a-15/01; 48a-5/72)
12h-3	Diaphragms for all electrolytic purposes (12d-2; 12i-13; 12i-13/06; 21b-2; 40c-3; 40c-4)
12h-4	Electrochemical processes excluding electrolysis, e.g. electrochemical treatment of liquids, gases, and vapours in general (12e-5; 12g; 12i-26; 12i-1/04; 12o-1; 18b-21; 21h-14 – 21h-19; 40c-16; 40c-7/00)

12i Non-metals and compounds thereof, except 12k

12i-1/01	Hydrogen, including chemical purification and separation from gas mixtures (26c-d) and hydrides (12i-13)
12i-1/02	Water (electrolysis of water 12i-13; hydrogen peroxide 12i-16; mineral and soda water 85a; water purification 85b; c; mechanical purification of boiler feed water 13b; water supply 85d)

Halogens and halogen compounds

12i-2	Chlorine from hydrochloric acid, also electrolytically
12i-3	Chlorine and hydrochloric acid from chlorides
12i-4	Chlorine, miscellaneous
12i-5	Hydrochloric acid, miscellaneous
12i-6	Hypochlorites, also chloride of lime
12i-7	Chlorates and perchlorates
12i-8	Hypochlorites, chlorates and perchlorates, electrolytic preparation
12i-9	Bromine and iodine and compounds thereof
12i-10	Fluorine and fluorine compounds (12l-32; 12l-38)

Oxygen and oxygen compounds

12i-11	Preparation of oxygen by the Brin process
12i-12	Preparation of oxygen by the Tessié du Motay process
12i-13	Preparation of oxygen and hydrogen by the electrolysis of water
12i-14	Preparation of oxygen according to miscellaneous processes (17g)
12i-15	Ozone, preparation (30i-5)
12i-16	Hydrogen peroxide, the true peroxides, e.g. sodium, barium, magnesium peroxides, also zinc peroxide (peroxides of the other heavy metals, e.g. manganese and lead peroxide 12n), and the inorganic peracids and their salts: persulphates, percarbonates, perborates

Sulphur and sulphur compounds

12i-17	Sulphur, selenium and tellurium (26d-8)
12i-18	Hydrogen sulphide and sulphides: alkali and alkali earth sulphides (26d-8)
12i-19	Sulphides obtained from sulphates by reduction

12i-20	Chlorine-containing sulphur compounds: sulphur monochloride, sulphuryl chloride thionyl chloride
12i-21	Sulphurous acid and sulphites: alkali and alkali earth sulphites (26d-8)
12i-22	Hyposulphites and thiosulphates
12i-23	Concentration of sulphuric acid
12i-24	Sulphuric trioxide and preparation of sulphuric acid by the contact process
12i-25	Sulphuric acid, miscellaneous, lead chamber process (lead chamber structures 37f-7)
	Nitrogen and nitrogen compounds
12i-26	Nitrogen (17g) and nitrogen oxides, excluding 12i-28 (synthetic preparation of nitrogen-oxygen compounds 12h-4; 12l-6)
12i-27	Noble gases
12i-28	Preparation of nitric acid from nitrates, distillation, condensation, concentration, purification, recovery
12i-29	Nitrites
12i-30	Nitrides: metallic nitrides, metallic amides, hydrazoic acid, hydrazine, hydroxylamine, imido and amido compounds, insofar as purely inorganic, and amino halides
12i-31	Phosphorus and phosphorus compounds (16-1 – 16-5)
12i-32	Arsenic, antimony, vanadium (40a-45; 40a-46; 40c-12; 40c-13) and their compounds, including fluorine-containing
	Carbon and carbon compounds
12i-33	Carbon: graphite, diamond, and preparation and revivification of activated carbon (12d-1; 12d-11; 12d-25; carbon black 22f-14)
12i-34	Carbon monoxide and carbon disulphide (26d-8)
12i-35	Carbon dioxide and chemical purification
12i-36	Carbon dioxide generators
12i-37	Carbides: metal and non-metal carbides
12i-38	Silicon and silicon compounds, silicates, e.g. water glass, metallic silicides
12i-38/01	Base exchangers (85b-1/05)
12i-38/02	Fuller's earth
12i-38/03	Silica gels
12i-38/04	Silicon fluorine compounds
12i-39	Titanium compounds (22f-7)
12i-40	Boron and boron compounds, borax

12i (IPC: C01B) Non-metallic elements; metalloids and their compounds, except those covered by 12k (arsenic, antimony 40a)

Note(s)
Within this sub-class in the absence of a reference to the contrary, a compound is classified in the last appropriate place.

Hydrogen; Hydrides; Water; Synthesis gas from hydrocarbons

12i-1/00	**Hydrogen**
12i-1/02	. Preparation of hydrogen
12i-1/04	. . by decomposition of ammonia
12i-1/06	. . by chemical decomposition of water (electrolysis of water 12i-13/04)
12i-1/08	. . . by reaction of steam with metals
12i-1/10	. . . by reaction of steam with gas mixtures containing carbon monoxide
12i-1/12	. . by reaction of acids and metals
12i-1/14	. . by reaction of alkali metal hydroxides and water
12i-1/16	. . by decomposition of hydrocarbons
12i-1/18	. . . catalytic
12i-1/20	. . . . with moving catalysts
12i-1/22	. . . . . in a moving bed
12i-1/24	. . . . . in a fluidised bed

12i-1/26 . Separation; Purification (by liquefying 17g)
12i-1/28 . . by chemical means
12i-1/30 . . catalytic
12i-1/32 . . by adsorption and/or absorption
12i-1/34 . Deuterium; metal compounds of deuterium; tritium; metal compounds of tritium

12i-1/00 Hydrogen
12i-1/02 . Preparation of hydrogen
12i-1/03 . . by decomposition or partial oxidation of inorganic compounds
12i-1/04 . . . by decomposition of ammonia
12i-1/05 . . by reaction of compounds containing electropositively-bound hydrogen, e.g. water, acids, bases, alcohols, ammonia, with inorganic reducing agents (electrolysis of water 12i-13/04)
12i-1/07 . . . with metals
12i-1/08 . . . by reaction of steam with inorganic reducing agents, e.g. metals
12i-1/09 . . . . with moving solid inorganic reducing agents
12i-1/11 . . . by reaction of metal hydroxides with carbon monoxide
12i-1/13 . . by decomposition of gaseous or liquid organic compounds (12n takes precedence)
12i-1/16 . . . of hydrocarbons
12i-1/18 . . . . catalytic (12i-1/20 takes precedence)
12i-1/20 . . . . with moving solid particles, e.g. of catalyst
12i-1/26 . Separation; Purification (by liquefying 17g)
12i-1/27 . . by diffusion
12i-1/28 . . by chemical means
12i-1/30 . . . catalytic
12i-1/32 . . by adsorption and/or absorption
12i-1/33 . . . by washing; Regeneration of the washing liquids
12i-1/35 . . . by solids; Re-activation of used adsorbents

12i-2/00 Gaseous mixtures containing a substantial proportion of hydrogen together with nitrogen and/or oxides of carbon; Similar mixtures, also containing insignificant proportions of hydrocarbon (production of water gas and synthesis gas from solid carbonaceous material 26a)
12i-2/02 . Production of gaseous mixtures containing a substantial proportion of hydrogen together with nitrogen or oxides of carbon
12i-2/04 . . by decomposition of ammonia
12i-2/06 . . by reaction of steam with carbon monoxide
12i-2/08 . . . Handling of heat and steam, also in connection with purification by washing (purification of hydrogen 12i-1/26)
12i-2/10 . . . Use of catalysts
12i-2/12 . . . Use of moving solid particles, e.g. of catalyst
12i-2/14 . by reaction of hydrocarbons with gasifying agents, e.g. water, carbon dioxide, air
12i-2/16 . . catalytic (12i-2/18 takes precedence)
12i-2/18 . . with moving solid particles, e.g. of catalyst
12i-2/20 . . . according to the "moving bed" type
12i-2/22 . . . according to the "fluidised bed" type
12i-2/24 . . using solid oxidising agent as the gasifying agent (12i-2/18-12i-2/22 take precedence)
12i-2/26 . . followed by a reaction covered by group 12i-2/06
12i-2/28 . by decomposition of gaseous liquid organic compounds (23b takes precedence; coking liquid carbonaceous materials 10a)
12i-2/30 . Preparation or purification of gas mixtures for the synthesis of ammonia

12i-3/00 Hydrides of metals
12i-3/02 . Complex hydrides, e.g. $LiBH_4$

12i-4/00 Hydrogen isotopes; Inorganic compounds thereof, and their preparation by isotope exchange, e.g. $NH_3+D_2 \rightarrow NH_2+HD$ (deuterides or tritiides of metal or boron 12i-6/00; heavy water 12i-5/02)
12i-4/02 . Concentration by separation from mixtures with hydrogen or hydrogen compounds

12i-4/04 . . by fractional distillation, condensation or liquefaction
12i-4/06 . . by isotope exchange, e.g. phase inversion
12i-4/08 . . . dual temperature exchange
12i-4/10 . . by electrolytic methods
12i-4/12 . . by adsorption or diffusion
12i-4/14 . . by combinations of methods covered by more than one of groups 12i-4/02-12i-4/12

12i-5/00 Water
12i-5/02 . Heavy water; Preparation by chemical reaction of hydrogen isotopes or their compounds, e.g. 4 ND_3+7 O_2 –> 4 NO_2+6 D_2O or 2 D_2 +O_2 –> 2 D_2O

12i-6/00 Hydrides, deuterides, tritiides of metals or boron; Addition complexes thereof
12i-6/02 . Hydrides of transition element
12i-6/04 . Hydrides of a metal from group Ia or IIa of the Periodic System
12i-6/06 . Hydrides of aluminium, gallium, indium, thallium, germanium, tin, lead, arsenic, antimony, bismuth or polonium; Monoborane; Diborane; Addition complexes thereof
12i-6/08 . Hydrides of boron
12i-6/10 . . Diborane
12i-6/12 . . Metal boranates
12i-6/14 . . . of alkali metals
12i-6/16 . . . of alkaline earth metals
12i-6/18 . . Non-metallic complexes of borane or diborane, e.g. with phosphine, with arsine
12i-6/20 . . . containing nitrogen
12i-6/22 . . Complex compounds of higher hydrides of boron
12i-6/24 . Complex hydrides containing at least two metals, e.g. Li(AlH4)
12i-6/26 . . Preparation from the metal with the highest valency or from its oxides and/or salts of its oxyacids
12i-6/28 . . . Preparation of aluminium compounds
12i-6/30 . . Preparation from other compounds of the metal with the highest valency
12i-6/32 . . . Preparation of aluminium compounds
12i-6/34 . Purification; Stabilisation

Halogens; Compounds thereof

12i-7/00 Halogens; Halogen acids (oxyacids 12i-11/00)
12i-7/02 . Chlorine
12i-7/04 . . Preparation from HCl
12i-7/06 . . Preparation by electrolysis (12i-11/26 takes precedence)
12i-7/08 . HCl
12i-7/10 . Bromine
12i-7/12 . HBr
12i-7/14 . Iodine
12i-7/16 . . Preparation from seaweed
12i-7/18 . Hydrogen iodine
12i-7/20 . Fluorine
12i-7/22 . Hydrogen fluoride
12i-7/24 . Inter-halogen compounds

12i-9/00 General methods of preparing halides (particular individual halides, see the relevant groups in 12i – 12g according to the element combined with the halogen)
12i-9/02 . chlorides
12i-9/04 . bromides
12i-9/06 . iodides
12i-9/08 . fluorides

12i-11/00 Oxides or oxyacids of halogens; Salts thereof
12i-11/02 . Oxides of chlorine
12i-11/04 . Hypochlorous acid
12i-11/06 . . Hypochlorites, e.g. chlorinated lime

12i-11/08 . Chlorous acid
12i-11/10 . . Chlorites
12i-11/12 . Chloric acid
12i-11/14 . . Chlorates
12i-11/16 . Perchloric acid
12i-11/18 . . Perchlorates
12i-11/20 . Oxygen compounds of bromine
12i-11/22 . Oxygen compounds of iodine
12i-11/24 . Oxygen compounds of fluorine
12i-11/26 . Preparation by electrolysis

Oxygen; Oxides in general; Per-compounds

12i-13/00 Oxygen; Ozone
12i-13/02 . Preparation of oxygen (by liquefying 17g)
12i-13/04 . . by electrolysis of water
12i-13/06 . . . Apparatus
12i-13/08 . . from air with the aid of metal oxides, e.g. barium oxide, manganese oxide
12i-13/10 . Preparation of ozone
12i-13/12 . . Apparatus
12i-13/14 . Methods for preparing oxides or hydroxides in general (particular individual oxides or hydroxides, see the relevant groups in 12i – 12n, according to the element combined with the oxygen or hydroxyl)

12i-15/00 Peroxides; Peracids; Salts thereof (peroxyacids of halogens, salts thereof 12i-11/00)
12i-15/02 . Hydrogen peroxide
12i-15/04 . Metal peroxides
12i-15/06 . Persulphuric acids (H_2SO_5, $H_2S_2O_8$)
12i-15/08 . Persulphates
12i-15/10 . Percarbonates
12i-15/12 . Perborates
12i-15/14 . Persilicates
12i-15/16 . Perphosphates

Sulphur; Selenium; Tellurium; Compounds thereof

12i-17/00 Sulphur; Compounds thereof
12i-17/02 . Preparation of sulphur; Purification
12i-17/04 . . from gaseous sulphur compounds
12i-17/06 . . from sulphides and/or material containing sulphides, e.g. ores
12i-17/08 . . Recovery of sulphur from elemental sulphur-containing material, e.g. luxmasses
12i-17/10 . . Finely-divided sulphur
12i-17/12 . . Insoluble sulphur (m-sulphur)
12i-17/14 . . Purification
12i-17/16 . Hydrogen sulphides
12i-17/18 . . Hydrogen polysulphides
12i-17/20 . Methods for preparing sulphides or polysulphides, in general (ammonium sulphides or polysulphides 12k; sulphides or polysulphides of metals, other than alkali metals, magnesium, calcium, strontium, and barium, see the relevant groups in 12m or 12n according to the metal)
12i-17/22 . Alkali metal sulphides or polysulphides
12i-17/24 . . Preparation by reduction
12i-17/26 . . . with carbon
12i-17/28 . . . with reducing gases
12i-17/30 . . Preparation from sodium or potassium amalgam with sulphur or sulphides
12i-17/32 . . Hydrosulphides of sodium and/or potassium
12i-17/34 . . Polysulphides of sodium and/or potassium
12i-17/36 . . Purification
12i-17/38 . . Dehydration
12i-17/40 . . Making shaped products, e.g. granules
12i-17/42 . Sulphides or polysulphides of magnesium, calcium, strontium, or barium

12i-17/43 . . from oxides or hydroxides with sulphur or hydrogen sulphide
12i-17/44 . . by reduction of sulphates
12i-17/45 . Compounds containing sulphur and halogen, with or without oxygen
12i-17/46 . Compounds containing sulphur, halogen, hydrogen, and oxygen
12i-17/48 . Sulphur dioxide; Sulphurous acid
12i-17/50 . . Preparation of sulphur dioxide
12i-17/52 . . . by roasting sulphides (18a-1/02 take precedence)
12i-17/54 . . . by burning elemental sulphur
12i-17/56 . . . Separation; Purification
12i-17/58 . . . Recovery of sulphur dioxide from acid tar and the like
12i-17/60 . . . Isolation of sulphur dioxide from gases
12i-17/62 . Methods of preparing sulphites in general (particular individual sulphites, see the relevant groups in 12i – 12g according to the cation)
12i-17/64 . Thiosulphates; Hyposulphites; Polythionates
12i-17/66 . . Hyposulphites
12i-17/68 . Sulphur trioxide (12i-17/76 takes precedence)
12i-17/70 . . Stabilisation of the gamma-form
12i-17/72 . Sulphuric acid
12i-17/74 . . Preparation
12i-17/76 . . . Contact process
12i-17/78 . . . . Use of special catalysts
12i-17/80 . . . . Apparatus
12i-17/82 . . . Nitrogen oxide processes
12i-17/84 . . . . Chamber process
12i-17/86 . . . . Tower processes
12i-17/88 . . Concentration
12i-17/90 . . Separation; Purification
12i-17/92 . . . Recovery from acid tar and the like
12i-17/94 . . . Recovery from nitration acids
12i-17/96 . Methods for the preparation of sulphates in general (particular individual sulphates, see the relevant groups in 12i – 12g according to the cation)
12i-17/98 . Other compounds containing sulphur and oxygen (persulphuric acids 12i-15/06; persulphates 12i-15/08)

12i-19/00 Selenium; Tellurium; Compounds thereof (phosphorus compounds 12i-25/14)

Nitrogen; Compounds thereof

12i-21/00 Nitrogen; Compounds thereof
12i-21/02 . Preparation of nitrogen (from ammonia 12i-1/04)
12i-21/04 . Purification and/or separation of nitrogen (by liquefying 17g)
12i-21/06 . Nitrides (hard alloys 40b)
12i-21/08 . Hydrazoic acid; Azides
12i-21/10 . Imido and amido compounds (takes precedence over other groups of 12i; cyanamide 12k)
12i-21/12 . . Carbamic acid; Inorganic salts thereof (organic salts 12o, 12p, 12q)
12i-21/14 . . Hydroxylamine; Salts thereof
12i-21/16 . . Hydrazine; Salts thereof
12i-21/18 . . containing halogen, e.g. chloramine
12i-21/20 . Nitrogen oxides; Oxyacids of nitrogen; Salts thereof
12i-21/22 . . Nitrous oxide (N_2O)
12i-21/24 . . Nitric oxide (NO)
12i-21/26 . . . Preparation by catalytic oxidation of ammonia
12i-21/28 . . . . Apparatus
12i-21/30 . . . Preparation by oxidation of nitrogen
12i-21/32 . . . . Apparatus
12i-21/34 . . Nitrogen trioxide (N_2O_3)
12i-21/36 . . Nitrogen dioxide (NO_2, N_2O_4) (12i-21/26, 12i-21/30 take precedence)
12i-21/38 . . Nitric acid
12i-21/40 . . . Preparation by absorption of oxides of nitrogen

12i-21/42 . . . Preparation from nitrates
12i-21/44 . . . Concentration
12i-21/46 . . . Purification; Separation
12i-21/48 . . Methods for the preparation of nitrates in general (particular individual nitrates, see the relevant groups in 12i – 12g according to the cation)
12i-21/50 . . Nitrous acid; Salts thereof
12i-21/52 . Halogen compounds of nitrogen (12i-21/18 takes precedence)
12i-21/54 . Sulphur compounds of nitrogen

Noble gases

12i-23/00 Noble gases; Compounds thereof; Radon (liquefying 17g)

Phosphorus; Compounds thereof

12i-25/00 Phosphorus; Compounds thereof (nitrides 12i-21/06)
12i-25/02 . Preparation of phosphorus
12i-25/04 . Purification of phosphorus
12i-25/06 . Hydrogen phosphides
12i-25/08 . Other phosphides
12i-25/10 . Halides of phosphorus including compounds containing chalcogens, i.e. sulphur, selenium, tellurium, oxygen
12i-25/12 . Oxides of phosphorus
12i-25/14 . Sulphur, selenium, or tellurium compounds of phosphorus
12i-25/16 . Oxyacids of phosphorus; Salts thereof
12i-25/18 . . Phosphoric acid
12i-25/20 . . . Preparation from elemental phosphorus
12i-25/22 . . . Preparation by the wet process
12i-25/24 . . Condensed phosphoric acids
12i-25/26 . . Phosphates (perphosphates 12i-15/16)
12i-25/28 . . . Ammonium phosphates
12i-25/30 . . . Alkali metal phosphates
12i-25/32 . . . Phosphates of magnesium, calcium, strontium, or barium
12i-25/34 . . . Magnesium phosphates
12i-25/36 . . . Aluminium phosphates
12i-25/38 . . . Condensed phosphates

Compounds of arsenic or antimony (the elements themselves 40a)

12i-27/00 Arsenic compounds
12i-27/02 . Arsenates; Arsenites

12i-29/00 Antimony compounds
12i-29/02 . Antimonates; Antimonites

Carbon; Compounds thereof

12i-31/00 Carbon; Compounds thereof (carbon black 22f; gas carbon 10a, 26b)
12i-31/02 . Preparation of carbon; Purification
12i-31/04 . . Graphite
12i-31/06 . . Diamond
12i-31/07 . Preparation of fibres or fabrics of carbon
12i-31/08 . Active carbon
12i-31/10 . . Preparation by using gaseous activating agents
12i-31/12 . . Preparation by using non-gaseous activating agents
12i-31/14 . . Granulation
12i-31/16 . Preparation of ion-exchanging materials from carbonaceous material
12i-31/18 . Carbon monoxide (metal carbonyls 12n)
12i-31/20 . Carbon dioxide
12i-31/22 . . Solidifying
12i-31/24 . Methods for the preparations of carbonates or bicarbonates in general (percarbonates 12i-15/10; particular individual carbonates, see the relevant groups in 12i – 12n according to the cation)

12i-31/26 . Compounds containing carbon and sulphur, e.g. carbon disulphide, carbon oxysulphide; Thiophosgene
12i-31/28 . Phosgene
12i-31/30 . Carbides (hard alloys 40b)
12i-31/32 . . Calcium carbide
12i-31/34 . . Tungsten or molybdenum carbides
12i-31/36 . . Carbides of silicon or boron

Silicon; Compounds thereof

12i-33/00 Silicon; Compounds thereof (nitrides 12i-21/06; carbides 12i-31/36)
12i-33/02 . Silicon; Preparation; Purification
12i-33/04 . Hydrides of silicon
12i-33/06 . Metal silicides (nitrides 12i-21/06, carbides 12i-31/36)
12i-33/08 . Halides of silicon
12i-33/10 . . Compounds containing silicon, fluorine, and other elements
12i-33/12 . Silica; Hydrates thereof
12i-33/14 . . Colloidal silica (sols and hydrogels)
12i-33/16 . . Silica gel
12i-33/18 . . Finely-divided silica
12i-33/20 . Silicates (persilicates 12i-15/14)
12i-33/22 . . Magnesium silicates
12i-33/24 . . Alkaline-earth metal silicates
12i-33/26 . . Aluminium-containing silicates
12i-33/28 . . . Base exchange silicates
12i-33/30 . . . Bleaching earth
12i-33/32 . . Alkali metal silicates

Boron; Compounds thereof

12i-35/00 Boron; Compounds thereof (boron hydrides 12i-6/00; perborates 12i-15/12; nitrides 12i-21/06; phosphides 12i-25/08; carbides 12i-31/36; hard alloys 40b)

12k Ammonia, cyanogen and compounds thereof

Ammonia and ammonia compounds

12k-1 Separation of ammonia from liquids, e.g. from gas liquor
12k-2 Separation of ammonia from gases and vapours (26d-9/10; 26d-9/11; 26d-9/50); saturators
12k-3 Preparation of ammonia by synthesis (12g-4/01 – 12g-4/02)
12k-4 Preparation of ammonia from molasses slop
12k-5 Preparation of ammonia from nitrogen-containing organic substances, excluding molasses slop
12k-6 Ammonia, miscellaneous: ammonium nitrate
12k-7 Ammonium salts, excluding ammonium nitrate (12l-5; 12l-8)

Cyanogen and cyanogen compounds: hydrocyanic acid, thiocyanic acid, cyanic acid, cyanamide and metal compounds thereof

12k-8 Preparation of cyanogen compounds by decomposition of nitrogen-containing organic material
12k-9 Preparation of cyanogen compounds by synthesis
12k-10 Separation of the cyanogen compounds from cyanogen-containing gases and vapours (26d-8/01; 26d-8/03; 26d-9/01; 26d-9/03)
12k-11 Preparation of cyanogen compounds from other cyanogen compounds or other cyanogen-con¬taining materials, miscellaneous

12k (IPC: C01C) Ammonia and cyanogen and their compounds (12i takes precedence in respect of salts of oxyacids of halogens 12i-11/00; peroxides, persalts 12i-15/00; compounds containing selenium or tellurium 12i-19/00; azides 12i-21/08; imido and amido compounds

other than cyanamide and its salts 12i-21/10; nitrites 12i-21/50; phosphides 12i-25/08; salts of oxyacids of phosphorus 12i-25/16; arsenic 12i-27/00; silicates 12i-33/20; antimony 12i-29/00, or boron 12i-35/00)

12k-1/00 **Ammonia; Compounds thereof** (12k-3/08, 12k-3/14, 12k-3/16, 12k-3/20 take precedence)
12k-1/02 . Preparation or separation of ammonia
12k-1/04 . . Preparation of ammonia by synthesis (preparation or purification of gas mixtures for ammonia synthesis 12i-2/30)
12k-1/08 . . Preparation of ammonia from nitrogenous organic substances
12k-1/10 . . Separation of ammonia from ammonia liquors, e.g. gas liquors
12k-1/12 . . Separation of ammonia from gases and vapours
12k-1/14 . . . Saturators
12k-1/16 . Halides of ammonium
12k-1/18 . Nitrates of ammonium
12k-1/20 . Sulphides; Polysulphides
12k-1/22 . Sulphites of ammonium
12k-1/24 . Sulphates of ammonium (12k-1/14 takes precedence)
12k-1/26 . Carbonates or bicarbonates of ammonium
12k-1/28 . Methods of preparing ammonium salts in general

Note:
Salts of polybasic acids with ammonium and a metal as cations are classified as though the ammonium were hydrogen. Ammonium salts of complex acids [other than complex cyanides] which contain a metal in the anion are classified in the relevant groups in 12l – 12n according to the metal; complex ammine salts are also classified in the relevant groups in 12l – 12n according to the metal.

12k-3/00 **Cyanogen; Compounds thereof**
12k-3/02 . Preparation of hydrogen cyanide
12k-3/04 . . Separation from gases
12k-3/06 . Stabilisation of hydrogen cyanide
12k-3/08 . Cyanides of metals; Complex cyanides
12k-3/10 . . Alkali metal cyanides
12k-3/12 . . Iron cyanides; Complexes thereof
12k-3/14 . Cyanic acid; Salts thereof (has precedence over 12k-1/00, 12l, 12m and 12n)
12k-3/16 . Cyanamide; Salts thereof (dicyandiamide 12o)
12k-3/18 . . Calcium cyanamide
12k-3/20 . Thiocyanic acid; Salts thereof

12l Alkali metal compounds

Alkali salts excluding carbonates

12l-1 Evaporation of sodium chloride solutions, sols (12a-2; 17d; 17e; 17f)
12l-2 Purification of sodium chloride solutions, sols
12l-3 Sodium chloride, miscellaneous
12l-4 Processing the mixed natural salt sediments, especially the so-called Stassfurt industry (12c)
12l-5 Alkali sulphates (12b; 12i-25; 12k; 40a-3 – 40a-6; 40a-16)
12l-6 Alkali nitrates (12l-26; 12l-16)

Alkali oxides, hydroxides and carbonates

12l-7 Preparation of alkali oxides (alkali peroxides 12l-16; 30i)
12l-8 Preparation of alkali carbonates and bicarbonates by the ammonia-soda process (12k-1; 12k-2; 12k-6)
12l-9 Preparation of alkali hydroxides and carbonates by electrolysis (12h-1)

12l-10	Preparation of alkali hydroxides by electrolysis with a liquid cathode (decomposition of amalgams 12l-12)
12l-11	Preparation of alkali hydroxides, carbonates, and other salts, from waste liquors (12k-4; purification of alkali waste liquors, e.g. from the viscose production 12l-15)
12l-12	Preparation of alkali hydroxides from alkali carbonates or bicarbonates or from alkali-metal alloys (12g)
12l-13	Preparation of alkali hydroxides, carbonates and salts, including double salts according to various methods, excluding 12l-7 – 12l-12, and from potassium hydroxide-containing minerals, natural salt springs and plants (12g; 12m)
12l-14	Preparation of alkali carbonates from alkali monocarbonates (12i-35)
12l-15	Miscellaneous, in connection with the production of alkali oxides, hydroxides and carbonates excluding 12l-7 – 12l-14, e.g. evaporation, purification, crystallisation, comminution, packing, and the like
12l-16	Compounds of the rare alkali metals, e.g. caesium, lithium, rubidium,

12l	**(IPC: C01D) Compounds of alkali metals [lithium, sodium, potassium, rubidium, caesium]** (12m, 12n take precedence; metal hydrides 12i-3/00, 12i-6/00; salts of oxyacids of halogens 12i-11/00; salts of peracids, metal peroxides 12i-15/00; sulphides 12i-17/22; thiosulphates, hyposulphites, polythionates 12i-17/64; compounds containing selenium or tellurium 12i-19/00; nitrides 12i-21/06; azides 12i-21/08; imido or amido compounds 12i-21/10; nitrites 12i-21/50; phosphides 12i-25/08; salts of oxyacids of phosphorus 12i-25/16; compounds containing arsenic 12i-27/00; compounds containing antimony 12i-29/00; carbides 12i-31/30; compounds containing silicon 12i-33/00; compounds containing boron 12i-35/00; cyanides 12k-3/08; salts of cyanamide 12k-3/16; thiocyanates 12k-3/20)
12l-1/00	**Oxides or hydroxides of sodium and/or potassium**
12l-1/02	. Oxides of sodium and/or potassium
12l-1/04	. Hydroxides of sodium and/or potassium
12l-1/06	. . Preparation by electrolysis
12l-1/08	. . . with the aid of a liquid cathode
12l-1/10	. . . . with a vertical cathode
12l-1/12	. . . . with a horizontal cathode
12l-1/14	. . . . Regulating the distance between the solid anode(s) and the liquid cathode
12l-1/16	. . . . Working up the amalgam
12l-1/18	. . . . . with the aid of catalysts
12l-1/20	. . Preparation by reacting oxides or hydroxides with salts of sodium or potassium
12l-1/22	. . . Causticisation of carbonates or bicarbonates of sodium or potassium
12l-1/24	. . . from or via fluorides or silico-fluorides of sodium and/or potassium
12l-1/26	. . Preparation from or via cyano coumpounds, e.g. cyanides, cyanamides
12l-1/28	. . Purification; Separation
12l-1/30	. . . by crystallisation
12l-1/32	. . . by adsorption and/or precipitation
12l-1/34	. . . with selective solvents
12l-1/36	. . . by oxidation
12l-1/38	. . . by dialysis
12l-1/40	. . . by electrolysis
12l-1/42	. . Concentration; Dehydration
12l-1/44	. . Preparation in the form of granules, pieces, or other shaped products
12l-3/00	**Halides of sodium and/or potassium**
12l-3/02	. Fluorides
12l-3/04	. Chlorides
12l-3/06	. . Preparation by working up brines, seawater or spent lyes
12l-3/08	. . Preparation by working up natural or industrial salt mixtures or siliceous minerals
12l-3/10	. Bromides

12l-3/12 . Iodides
12l-3/14 . Purification
12l-3/16 . . by precipitation and/or adsorption
12l-3/18 . . with selective solvents
12l-3/20 . . by melting
12l-3/22 . Preparation in the form of granules, pieces, or other shaped products
12l-3/24 . . Influencing the crystallisation process
12l-3/26 . Preventing the absorption of moisture and/or caking of the crystals

12l-5/00 Sulphates or sulphites of sodium and/or potassium

12l-5/02 . Preparation of sulphates from salts sodium and/or potassium sulphuric acid or bisulphates; Preparation of bisulphates
12l-5/04 . Preparation of sulphates with the aid of sulphurous acid or sulphites, e.g. Hargreaves process
12l-5/06 . Preparation of sulphates of sodium or potassium by double decomposition
12l-5/08 . . with each other or with ammonium sulphate
12l-5/10 . . with sulphates of magnesium, calcium, strontium, or barium
12l-5/12 . . . Preparation of double sulphates of magnesium with sodium and/or potassium
12l-5/14 . Preparation of sulphites (12l-5/04 takes precedence)
12l-5/16 . Purification
12l-5/18 . Dehydration

12l-7/00 Carbonates of sodium and/or potassium

12l-7/02 . Preparation by double decomposition
12l-7/04 . . with a fluoride or silico-fluoride (12l-1/24 takes precedence)
12l-7/06 . Preparation via sodium or potassium magnesium carbonate
12l-7/08 . Preparation from or via cyano compounds of sodium or potassium (12l-1/26 takes precedence)
12l-7/10 . Preparation of bicarbonates from carbonates (12l-7/18 takes precedence)
12l-7/12 . Preparation of carbonates from bicarbonates
12l-7/14 . Preparation of sesquicarbonates
12l-7/16 . Preparation from compounds of sodium or potassium with amines and carbon dioxide
12l-7/18 . Preparation by the ammonia-soda process
12l-7/20 . Preparation by electrolysis
12l-7/22 . Purification
12l-7/24 . . Crystallisation
12l-7/26 . . by precipitation and/or adsorption
12l-7/28 . . with selective solvents
12l-7/30 . . by oxidation
12l-7/32 . . by dialysis
12l-7/34 . . by electrolysis
12l-7/36 . Varying the crystal water content of sodium carbonate
12l-7/38 . Preparation in the form of granules, pieces, or other shaped products
12l-7/40 . . Influencing the crystallisation process
12l-7/42 . Preventing the absorption of moisture and/or caking

12l-9/00 Nitrates of sodium and/or potassium

12l-9/02 . Preparation by working-up natural salt mixtures
12l-9/04 . Preparation with liquid nitric acid
12l-9/06 . Preparation with gaseous nitric acid or nitrogen oxides
12l-9/08 . Preparation by double decomposition
12l-9/10 . . with ammonium nitrate
12l-9/12 . . with nitrates of magnesium, calcium, strontium, or barium
12l-9/14 . . of salts of potassium with sodium nitrate
12l-9/16 . Purification
12l-9/18 . Preparation in the form of shaped products, e.g. granules
12l-9/20 . Preventing the absorption of moisture and/or caking

12l-11/00 Other compounds of alkali metals

12l-11/02 . Compounds of lithium
12l-11/04 . Compounds of rubidium and/or caesium

12m Earth-alkali and earth-metal compounds

Earth-alkali metal compounds

12m-1 Oxides and hydroxides of the earth-alkali metals calcium, barium and strontium (peroxides 12i-16)
12m-2 Salts of the earth-alkali metals calcium, barium and strontium
12m-3 Magnesium compounds (magnesium peroxide 12i-16)
12m-4 Beryllium compounds

Earth metal compounds

12m-5 Aluminates and alumina preparation therefrom
12m-6 Preparation of alumina, also of emery and corundum, through intermediate compounds other than aluminates
12m-7 Aluminium salts: aluminium chloride, sulphide, sulphate, alum
12m-8 Chromium compounds
12m-9 Compounds of the rare-earth metals: cerium, thorium, etc., and of radium (21g-21/10 – 21g-21/12)

12m **(IPC: C01F) Compounds of the metals beryllium, magnesium, aluminium, calcium, strontium, barium, radium, thorium, and of the rare-earth metals** (12k-3/14 takes precedence; metal hydrides 12i-3/00, 12i-6/00; salts of oxyacids of halogens 12i-11/00; salts of peracids, metal peroxides 12i-15/00; sulphides of magnesium, calcium, strontium, or barium 12i-17/42; thiosulphates, hyposulphites, polythionates 12i-17/64; compounds containing selenium or tellurium 12i-19/00; nitrides 12i-21/06; azides 12i-21/08; imido or amido compounds 12i-21/10; nitrites 12i-21/50; phosphides 12i-25/08; salts of oxyacids of phosphorus 12i-25/16; compounds containing arsenic 12i-27/00; compounds containing antimony 12i-29/00; carbides 12i-31/30; compounds containing silicon 12i-33/00; compounds containing boron 12i-35/00; cyanides 12k-3/08; salts of cyanamide 12k-3/16; thiocyanates 12k-3/20)

Note:
Compounds containing at least two different metals are classified in the last appropriate place in 12m or 12n.

12m-1/00 **Methods of preparing compounds of the metals beryllium, magnesium, aluminium, calcium, strontium, barium, radium, thorium, and the rare earths, in general**

12m-3/00 **Compounds of beryllium**

12m-5/00 **Compounds of magnesium** (double sulphates with sodium and/or potassium 12l-5/12)
12m-5/02 . Magnesia
12m-5/04 . . by oxidation of metallic magnesium
12m-5/06 . . by thermal decomposition of magnesium compounds (calcining magnesite or dolomite 80b-8/01, 80b-8/02)
12m-5/08 . . . by calcining magnesium hydroxide
12m-5/10 . . . by thermal decomposition of magnesium chloride with water vapour
12m-5/12 . . . by thermal decomposition of magnesium sulphate, with or without reduction
12m-5/14 . Magnesium hydroxide
12m-5/16 . . by treating magnesia, e.g. calcined dolomite, with water or solutions of salts not containing magnesium
12m-5/18 . . by electrolysis
12m-5/20 . . by precipitation from solutions of magnesium salts with ammonia

12m-5/22 . . from magnesium compounds with alkali hydroxides or alkaline-earth oxides or hydroxides
12m-5/24 . Magnesium carbonates
12m-5/26 . Magnesium halides
12m-5/28 . . Fluorides
12m-5/30 . . Chlorides
12m-5/32 . . . Preparation of anhydrous magnesium chloride by chlorinating magnesium compounds
12m-5/34 . . . Dehydrating magnesium chloride containing water of crystallisation
12m-5/36 . . Bromides
12m-5/38 . Magnesium nitrates
12m-5/40 . Magnesium sulphates
12m-5/42 . Magnesium sulphites

12m-7/00 Compounds of aluminium

12m-7/02 . Aluminium oxide; Aluminium hydroxide; Aluminates
12m-7/04 . . Preparation of alkali metal aluminates; Aluminium oxide or hydroxide therefrom
12m-7/06 . . . by treating aluminous minerals with alkali hydroxide
12m-7/08 . . . by treating aluminous minerals with sodium carbonate
12m-7/10 . . . by treating aluminous minerals with alkali sulphates and reducing agents
12m-7/12 . . . Alkali metal aluminates from alkaline-earth metal aluminates
12m-7/14 . . . Aluminium oxide or hydroxide from alkali metal aluminates
12m-7/16 . . Preparation of alkaline-earth metal aluminates; Aluminium oxide or hydroxide therefrom
12m-7/18 . . . Aluminium oxide or hydroxide from alkaline-earth metal aluminates
12m-7/20 . . Preparation of aluminium oxide or hydroxide from aluminous ores with acids or salts
12m-7/22 . . . with halides
12m-7/24 . . . with nitric acid and/or nitrogen oxides
12m-7/26 . . . with sulphuric acids or sulphates
12m-7/28 . . . with sulphurous acid
12m-7/30 . . Preparation of aluminium oxide or hydroxide by thermal decompositon of aluminium compounds
12m-7/32 . . . of sulphates
12m-7/34 . . Preparation of aluminium hydroxide by precipitation from solutions containing aluminium salts
12m-7/36 . . . from organic aluminium salts
12m-7/38 . . Preparation of aluminium oxide by thermal reduction of aluminous minerals
12m-7/40 . . . in the presence of aluminium sulphide
12m-7/42 . . Preparation of aluminium oxide or hydroxide from metallic aluminium, e.g. by oxidation
12m-7/44 . . Dehydration of aluminium hydroxide
12m-7/46 . . Purification of aluminium hydroxide or oxide
12m-7/48 . Aluminium halides
12m-7/50 . . Fluorides
12m-7/52 . . . Double compounds containing both fluorine and other acid groups (12m-7/54 takes precedence)
12m-7/54 . . . Double compounds containing both aluminium and alkali metals or alkaline-earth metals
12m-7/56 . . Chlorides
12m-7/58 . . . Preparation of anhydrous aluminium chloride
12m-7/60 . . . . from oxygen-containing aluminium compounds
12m-7/62 . . . Purification
12m-7/64 . . Bromides
12m-7/66 . Aluminium nitrates
12m-7/68 . Aluminium compounds containing sulphur
12m-7/70 . . Sulphides
12m-7/72 . . Sulphites
12m-7/74 . . Sulphates
12m-7/76 . . . Double salts, e.g. alum

12m-9/00	**Preparation of synthetic gem bodies containing compounds of beryllium, magnesium, and/or aluminium**
12m-11/00	**Compounds of calcium, strontium, and/or barium**
12m-11/02	. Oxides or hydroxides (production of lime 80b-2/01)
12m-11/04	. . by thermal decomposition
12m-11/06	. . . of carbonates
12m-11/08	. . by reduction of sulphates
12m-11/10	. . from sulphides
12m-11/12	. . from silicates
12m-11/14	. . by electrolysis
12m-11/16	. . Purification
12m-11/18	. Carbonates
12m-11/20	. Halides
12m-11/22	. . Fluorides
12m-11/24	. . Chlorides
12m-11/26	. . . from sulphides
12m-11/28	. . . by chlorination of alkaline-earth metal compounds
12m-11/30	. . . Concentrating; Dehydrating; Preventing the adsorption of moisture and/or caking
12m-11/32	. . . Purification
12m-11/34	. . Bromides
12m-11/36	. Nitrates
12m-11/38	. . Preparation with nitric acid and/or nitrogen oxides
12m-11/40	. . Preparation by double decomposition with nitrates
12m-11/42	. . Double salts (with magnesium 12m-5/38)
12m-11/44	. . Concentrating; Crystallising; Dehydrating; Preventing the adsorption of moisture and/or caking
12m-11/46	. Sulphates
12m-11/48	. Sulphites
12m-13/00	**Compounds of radium**
12m-15/00	**Compounds of thorium**
12m-17/00	**Compounds of the rare-earth metals, i.e. scandium, yttrium, lanthanum, and the group of the lanthanides**
12n	**Heavy-metal compounds** (smelting and chemical processes for the preparation of intermediate products, especially mixtures, which lead through special processes to pure compounds 40a; processes which lead to products used in subsequent electrolytic processes 40c; processes which lead to substances especially suitable for colour pigments 22f; arsenic compounds 12i; 38h; 45l)
12n-1	Heavy-metal oxides and salts in general; colloidal heavy metals and compounds; preparation of heavy metals and metal powders by purely chemical methods, e.g. by thermal decomposition of metallic carbonyls and reduction of heavy-metal compounds by means of hydrogen; production of heavy-metal compounds by electrolysis
12n-2	Iron compounds in general (22f)
12n-3	Manganese compounds, including manganese peroxide (21b), rhenium compounds
12n-4	Nickel and cobalt compounds
12n-5	Copper compounds
12n-6	Zinc compounds, cadmium compounds (22f)
12n-7	Lead compounds, including lead peroxide (22f; 21b)
12n-8	Mercury, silver and gold compounds (1a), compounds of the platinum metals
12n-9	Tin compounds (48c)
12n-10	Tungsten, molybdenum, bismuth (30h-10), uranium compounds
12n	**(IPC: C01G) Compounds of metals not covered by subclasses 12i to 12m** (metal hydrides 12i-3/00, 12i-6/00; salts of oxyacids of halogens

12i-11/00; salts of peracids, metal peroxides 12i-15/00; thiosulphates, hyposulphites, polythionates 12i-17/64; compounds containing selenium or tellurium 12i-19/00; nitrides 12i-21/06; azides 12i-21/08; imido or amido compounds 12i-21/10; nitrites 12i-21/50; phosphides 12i-25/08; salts of oxyacids of phosphorus 12i-25/16; compounds containing arsenic 12i-27/00; compounds containing antimony 12i-29/00; carbides 12i-31/30; compounds containing silicon 12i-33/00; compounds containing boron 12i-35/00; cyanides 12k-3/08; salts of cyanamide 12k-3/16; thiocyanates 12k-3/20)

Note:
Compounds containing at least two different metals are classified in the last appropriate place in 12m or 12n.

12n-1/00 Methods of preparing compounds of metals not provided for in 12i, 12k, 12l or 12m in general
12n-1/02 . oxides
12n-1/04 . carbonyls
12n-1/06 . halides
12n-1/08 . nitrates
12n-1/10 . sulphates
12n-1/12 . sulphides
12n-1/14 . sulphites

12n-3/00 Compounds of copper
12n-3/02 . Oxides; Hydroxides
12n-3/04 . Halides
12n-3/06 . . Oxychlorides
12n-3/08 . Nitrates
12n-3/10 . Sulphates
12n-3/12 . Sulphides
12n-3/14 . Complexes with ammonia

12n-5/00 Compounds of silver

12n-7/00 Compounds of gold

12n-9/00 Compounds of zinc
12n-9/02 . Oxides
12n-9/04 . Halides
12n-9/06 . Sulphates
12n-9/08 . Sulphides

12n-11/00 Compounds of cadmium

12n-13/00 Compounds of mercury
12n-13/02 . Oxides
12n-13/04 . Halides

12n-15/00 Compounds of gallium, indium, or thallium

12n-17/00 Compounds of germanium
12n-17/02 . Germanium dioxide
12n-17/04 . Halides of germanium

12n-19/00 Compounds of tin
12n-19/02 . Oxides
12n-19/04 . Halides
12n-19/06 . . Stannous chloride
12n-19/08 . . Stannic chloride

12n-21/00 Compounds of lead
12n-21/02 . Oxides

12n-21/04 . . Lead suboxide (Pb_2O)
12n-21/06 . . Lead monoxide (PbO)
12n-21/08 . . Lead dioxide (PbO_2)
12n-21/10 . . Red lead (Pb_3O_4)
12n-21/12 . Hydroxides
12n-21/14 . Carbonates
12n-21/16 . Halides
12n-21/18 . Nitrates
12n-21/20 . Sulphates
12n-21/22 . Plumbates; Plumbites

12n-23/00 Compounds of titanium
12n-23/02 . Halides of titanium
12n-23/04 . Titanium oxides
12n-23/06 . . by hydrolysing titanium salts
12n-23/08 . . Drying; Calcining

12n-25/00 Compounds of zirconium
12n-25/02 . Oxides
12n-25/04 . Halides
12n-25/06 . Sulphates

12n-27/00 Compounds of hafnium
12n-27/02 . Oxides
12n-27/04 . Halides
12n-27/06 . Sulphates

12n-29/00 Compounds of bismuth

12n-31/00 Compounds of vanadium

12n-33/00 Compounds of columbium

12n-35/00 Compounds of tantalum

12n-37/00 Compounds of chromium
12n-37/02 . Chromium oxides or hydroxides
12n-37/04 . Chromium halides
12n-37/06 . . Chromylhalides
12n-37/08 . Chromium sulphates
12n-37/10 . . Chrome alum
12n-37/12 . Chromium trioxide, Chromic acid
12n-37/14 . Chromates; Bichromates

12n-39/00 Compounds of molybdenum

12n-41/00 Compounds of tungsten

12n-43/00 Compounds of uranium
12n-43/02 . Oxides of uranium
12n-43/04 . Halides of uranium
12n-43/06 . . Fluorides
12n-43/08 . . Chlorides
12n-43/10 . . Bromides
12n-43/12 . . Iodides

12n-45/00 Compounds of manganese
12n-45/02 . Oxides; Hydroxides
12n-45/04 . Carbonyls
12n-45/06 . Halides
12n-45/08 . Nitrates
12n-45/10 . Sulphates
12n-45/12 . Manganates; Permanganates

12n-47/00 Compounds of rhenium

12n-49/00 Compounds of iron
12n-49/02 . Oxides; Hydroxides
12n-49/04 . . Ferrous oxide (FeO)
12n-49/06 . . Ferric oxide (Fe_2O_3)
12n-49/08 . . Ferroso-ferric oxide (Fe_3O_4)
12n-49/10 . Halides
12n-49/12 . Sulphides
12n-49/14 . Sulphates
12n-49/16 . Carbonyls

12n-51/00 Compounds of cobalt
12n-51/02 . Carbonyls
12n-51/04 . Oxides; Hydroxides
12n-51/06 . Carbonates
12n-51/08 . Halides
12n-51/10 . Sulphates
12n-51/12 . Complexes with ammonia

12n-53/00 Compounds of nickel
12n-53/02 . Carbonyls
12n-53/04 . Oxides; Hydroxides
12n-53/06 . Carbonates
12n-53/08 . Halides
12n-53/10 . Sulphates
12n-53/12 . Complexes with ammonia

12n-55/00 Compounds of ruthenium, rhodium, palladium, osmium, iridium, or platinum

12n-56/00 Compounds of transuranic elements

12n-57/00 Compounds of metals not covered elsewhere in 12n

12o Hydrocarbons, alcohols, aldehydes, ketones, organic sulphur compounds, hydrogenated compounds, carboxylic acids, carboxylic-acid amides, ureas, and other unnamed compounds

Note:
The following series of product substituents determines the boundary lines of classes 12o, 12p and 12q; compounds with nitrogen rings 12p-1 – 12p-10; heterocyclic compounds with oxygen, sulphur and selenium as ring members 12q-24 – 12q-28; aldehydes 12o-7 – 12o-9; hydrogenated cyclic compounds 12o-25; carboxylic-acid amides 12o-16; ureas 12o-17; compounds with unsaturated open chains 12o-19 – 12o-22; aminophenols , phenols and thiophenols 12q-14 – 12q-38; amines, aminocarboxylic and sulphonic acids 12q-1 – 12q-13, 12q-37; sulphur compounds 12o-23, 12o-24; carboxylic acids, also nitriles 12o-11 – 12o-15; miscellaneous other organic compounds 12o

Hydrocarbons and hydrocarbon substitution products

12o-1/01 Preparation of saturated hydrocarbons by condensation, reduction, dissociation, etc.
12o-1/02 Preparation of saturated hydrocarbons by hydrogenation of the unsaturated compounds (hydrogenation of mineral oils for refining purposes 23b-1/05; hydrogenated cyclic compounds 12o-25)
12o-1/03 Preparation of solid, liquid and gaseous hydrocarbons from oxides of carbon (refining the products 23b; production of methane, also 26a-18/01, 26a-18/03)
12o-1/04 Preparation of pure hydrocarbons by refining raw products (refining of mixtures of hydrocarbons 23b-1/05; refining of paraffin and mineral wax 23b-2/02; refining and dehydration of mineral oil 23b-1/05, 23b-2/01. purification of tar fractions 12r-1/04)
12o-1/05 Preparation of hydrocarbons by hydrogenation of coal, tar, mineral oils under high pressure, coal liquefaction (cracking of high-boiling mineral oils into lower boiling

mineral oils 23b-1/04; cracking tar and tar fractions 12r-1/03; refining of the products of pressure hydrogenation 23b-1/05, 23b-2/01)

12o-1/06 Preparation of the higher molecular-weight hydrocarbons from gaseous hydrocarbons, e.g. by polymerisation or condensation (refining of the products 23b; condensation of gaseous hydrocarbons into rubberlike products 39c-20/01, 39c-25/01, 39c-25/05; condensation of liquid hydrocarbons 12o-1/01)

12o-2/01 Halogen compounds of hydrocarbons

12o-2/05 General organic halogenation processes

12o-3/01 Nitro and nitroso compounds of hydrocarbons in general

12o-3/05 General organic nitration processes

12o-4 Polynitrohydrocarbons as musk substitutes

Alcohols, aldehydes, ketones, and the like

12o-5/01 Methanol

12o-5/02 Monovalent alcohols with more than one carbon atom in the molecule (spirits 6b, 6d)

12o-5/03 Polyvalent alcohols

12o-5/04 Derivates and substitution products of mono- and polyvalent alcohols: esters of inorganic acids, halogenated alcohols, and the like (sulphuric acid esters, also 12o-23/02)

12o-5/05 Alkylene oxides

12o-5/09 Ethers of monovalent and polyvalent alcohols

12o-6 Synthetic derivatives of carbohydrates and the like, e.g. cellulose esters, and viscose (sugar and starch production 89)

12o-7/01 Formaldehyde

12o-7/02 Acetaldehyde

12o-7/03 Other saturated and unsaturated aliphatic and hydrocyclic aldehydes, amino aldehydes

12o-8 Aromatic aldehydes

12o-9 Aromatic oxyaldehydes

12o-10 Ketones and quinones (aminoketones 12q-32/20)

Carboxylic acids and derivatives, nitriles

12o-11 Aliphatic carboxylic acids in general, processing of oxidation products into fatty acids (23d-4)

12o-12 Acetic acid (wood vinegar production 12r-2; vinegar preparation 6e)

12o-13 Tartaric acid

12o-14 Aromatic carboxylic acids and resin acids (phenol carboxylic and naphtol carboxylic acids 12q-29 – 12q-30)

12o-15 Ketocarboxylic acids

12o-16 Carboxylic acid amides

Carbamic acids and derivatives

12o-17/01 Carbamic acids and urethans

12o-17/02 Dithiocarbamates and thiuram sulphides

12o-17/03 Ureas and thioureas

12o-17/04 Guanidine

12o-18 Benzoic acid sulphimide, saccharin

Compounds with unsaturated chains

12o-19/01 Unsaturated hydrocarbons (separation from the coking furnace and similar gases 26d)

12o-19/02 Unsaturated halogenated hydrocarbons

12o-19/03 Unsaturated alcohols and esters thereof, unsaturated ketones and amines, other compounds with unsaturated chains, excluding 12o-19/01, 12o-19/02, 12o-20 – 12o-22 (unsaturated aldehydes 12o-7 – 12o-9)

12o-20 Phenols with unsaturated, open chains, e.g. eugenol and isoeugenol

12o-21 Carboxylic acids with unsaturated chains, e.g. cinnamic acid

12o-22 Compounds with unsaturated nitrogen carbon bonds N:C, e.g. benzylidene compounds, also fulminic acid and fulminates, e.g. mercury fulminate

Miscellaneous organic compounds and general chemical processes in organic chemistry

Organic sulphur compounds

12o-23/01 Sulphonic acids, with the exception of amino, phenol and naphtol sulphonic acids (the latter 12q-6/03; 12q-6/04; 12q-20/04; 12q-22/01; 12q-22/02; 12q-23; 12q-33; 12q-34)

12o-23/02 Sulphuric acid esters

12o-23/03 Mercaptans, sulphides and other non-nitrogen-containing sulphur compounds, sulphinic acids, sulphones, sulphinic acid chlorides, sulphonic acid amides, aldehyde and ketone sulphoxyl acids (sulphur-nitrogen rings 12p-4, 12p-9, 12p-10; thiophenols, thionaphtols, arylthioglycolic acids 12q-18/01 – 12q-18/03; thioanthracene compounds 12d-38; 39b-4/03; 39c-21)

12o-24 Organic sulphur compounds of unknown constitution, such as ichtyol, thiol, and the like (39b-4/03; 39c-21)

12o-25 Hydrogenated cyclic compounds, general

12o-25/01 Compounds of the cyclopentanophenanthrene series, general

12o-25/02 Sterines and compounds thereof

12o-25/03 Bile acids and compounds thereof

12o-25/04 Compounds of the androstane series

12o-25/05 Compounds of the pregnane series

12o-25/06 Hormones of the adrenal cortex and derivatives therof

12o-25/07 Follicle hormones and derivatives thereof

12o-26/01 Miscellaneous organic compounds, excluding 12o-1 – 12o-25, 12p and 12q; compounds with phosphorus-carbon bonds

12o-26/03 Organometallic and organosilicon compounds

12o-27 General chemical processes of the organic chemistry

12p Nitrogen rings, nitrogen containing compounds of unknown constitution

Note:
- The following series of product substituents determines the boundary lines of classes 12o, 12p and 12q; compounds with nitrogen rings 12p-1 – 12p-10; heterocyclic compounds with oxygen, sulphur and selenium as ring members 12q-24 – 12q-28; aldehydes 12o-7 – 12o-9; hydrogenated cyclic compounds 12o-25; carboxylic-acid amides 12o-16; ureas 12o-17; compounds with unsaturated open chains 12o-19 – 12o-22; aminophenols , phenols and thiophenols 12q-14 – 12q-38; amines, aminocarboxylic and sulphonic acids 12q-1 – 12q-13, 12q-37; sulphur compounds 12o-23, 12o-24; carboxylic acids, also nitriles 12o-11 – 12o-15; miscellaneous other organic compounds 12o

- Inventions that in their different embodiments can be classified in several groups within subclass 12p are classified in the group which represents the centre of the invention. If there is no obvious centre the invention is classified in the group in the last place. Hydrated compounds are classified in the group that covers the non-hydrated compounds.

- Compounds in which at least one nitrogen-free ring is condensed to a nitrogen-containing ring and which do not contain further nitrogen-containing rings are, unless otherwise indicated, classified in the group that covers the nitrogen-containing ring.

- Compounds with at least two nitrogen-containing rings, which neither directly nor via nitrogen-free rings are condensed to each other are, unless otherwise indicated, classified in the last group in the scheme that covers any of the nitrogen-containing rings.

Nitrogen rings of the heterocyclic series with one nitrogen atom

12p-1/01	Pyridines and acetonamines
12p-1/10	Quinolines
12p-1/20	Isoquinolines
12p-1/30	Acridine
12p-2	Five-membered carbon-nitrogen rings with one nitrogen atom, e.g. pyrrols, indoles, carboles (indigo 22e-1)
12p-3	Oxygen-nitrogen rings, e.g. oxazoles, oxazines, morpholines
12p-4	Sulphur-nitrogen rings, e.g. thiazoles, thiazines (rings with phosphorous or boron 12p-5)
12p-5	Miscellaneous nitrogen rings with one nitrogen atom, e.g. naphtostyriles
12p-1/01	Pyridines, piperidines
12p-1/10	Quinolines
12p-1/20	Isoquinolines
12p-1/30	Acridine
12p-2	Five-membered carbon-nitrogen rings with one nitrogen atom and no other hetero-atoms; bilirubine, porphyrine, chlorophyll
12p-3	Rings with one nitrogen atom and at least one oxygen atom and no other hetero-atoms (rings with phosphorous or boron 12p-5)
12p-4/01	Rings with one nitrogen atom and at least one sulphur or selenium atom, without any other hetero atoms, e.g. saccharine (rings with phosphorous or boron 12p-5); vitamin B1, penicillins and cephalosporins (including those which as substituents contain a further hetero-ring), penicillane acids (biologic total synthesis 30h-6)
12p-4/05	Phentiazines, also those which as substituents contain a further hetero-ring, e.g. a pyrimidine ring

12p-5	Miscellaneous nitrogen rings with one nitrogen atom, e.g. rings with phosphorous or boron; rings with one nitrogen atom, at least one oxygen atom and at least one sulphur atom or selenium atom; lactams (piperidone 12p-1/01; pyrrolidone, phtalimidine and naphtostyrile 12p-2); ethylene imines, chinuclidines, camphidines, chinolizines

Nitrogen rings of the heterocyclic series with two or more nitrogen atoms

12p-6	Pyrazines, such as piperazines and quinoxalines
12p-7/01	Pyrimidine derivatives and barbituric acids
12p-7/02	Double compounds and salts of barbituric acids, e.g. with pyrazolone derivatives
12p-7/10	Purine derivatives, synthetic preparation
12p-7/11	Purine derivatives, extraction from natural substances (caffeine-free coffee 53d-5; alkaloid-free tea 53d-7)
12p-8/01	Pyrazole derivatives, general
12p-8/10	Preparation of aminoantipyrine and pyramidon and compounds thereof (salt containing barbituric acids 12p-7/02)
12p-9	Imidazoles, thiodiazoles, oxodiazoles
12p-10	Miscellaneous heterocyclic compounds with two and more ring nitrogen atoms, e.g. quinazolines, anthrapyrimidines, triazoles, tetrazoles, triazines
12p-6	Six-membered rings with two nitrogen atoms in 1,4-position without any other hetero atoms
12p-7/01	Pyrimidine derivatives and their corresponding nucleic acids, barbituric acids, thiobarbituric acids
12p-7/02	Double compounds and salts of barbituric acids or thiobarbituric acids, e.g. salts with heterocyclic bases
12p-7/10	Purines and their corresponding nucleic acids, synthesis, salts and double compounds
12p-7/11	Extraction of purines derivatives and their corresponding nucleic acids from natural substances
12p-8/01	Five-membered rings with two nitrogen atoms in 1,2-position without any other hetero atoms
12p-8/10	Pyrazolones with an amino group directly bound to the ring
12p-9	Other five-membered rings with two nitrogen atoms and optionally other hetero atoms, e.g. oxadiazoles, tiadiazoles
12p-10/01	Rings with two nitrogen atoms and optionally other hetero atoms, not provided for above
12p-10/05	Rings with more than two nitrogen atoms and optionally other hetero atoms, e.g. vitamin B12 (cyclic peptides 12q-6/01)
12p-10/10	Compounds with at least two nitrogen ring atoms distributed over several rings that are condensed to each other and where the nitrogen atoms can belong to to rings simultaneously, e.g. 1,4-diazabicyclo(2,2,2)octane, hexamethylene tetramine

Alkaloids, proteins and other nitrogen containing compounds of unknown constitution

12p-11/01	Alkaloids not provided for in the following groups (12p-14)
12p-11/10	Nicotine
12p-12	Cinchona alkaloids (chinuclidines 12p-5)
12p-13	Solanaceae alkaloids and the like, e.g. atropine, ecgonine, tropine, also cocaine, scopoline
12p-14	Opium alkaloids: morphine, codeine, thebaine and derivatives
12p-15	Nitrogen-containing organic compounds of unknown constitution, also hexamethylenetetramine and derivatives (12p-5; 12p-10; 12p-11, resinous nitrogen-containing products 39c-5 – 39c-15)
12p-16	Protein compounds (preparation of proteins 53i

12q Amines, phenols, naphtols, aminophenols, aminonaphtols, aminoanthracene compounds, antrol compounds; oxygen, sulphur and selenium rings

Note:
The following series of product substituents determines the boundary lines of classes 12o, 12p and 12q; compounds with nitrogen rings 12p-1 – 12p-10; heterocyclic compounds with oxygen, sulphur and selenium as ring members 12q-24 – 12q-28; aldehydes 12o-7 – 12o-9; hydrogenated cyclic compounds 12o-25; carboxylic-acid amides 12o-16; ureas 12o-17; compounds with unsaturated open chains 12o-19 – 12o-22; aminophenols , phenols and thiophenols 12q-14 – 12q-38; amines, aminocarboxylic and sulphonic acids 12q-1 – 12q-13, 12q-37; sulphur compounds 12o-23, 12o-24; carboxylic acids, also nitriles 12o-11 – 12o-15; miscellaneous other organic compounds 12o

Amines with the exception of those of the anthracene series and their derivatives

12q-1/00 Amines and quaternary ammonium compounds in general; Production of amines and quaternary ammonium compounds in general

12q-1/01 Aliphatic amines (12q-3 – 12q-5; 12q-9)

12q-1/02 Amines of the benzene series by substitution of the amino group for hydroxyl, sulpho, nitro groups or halogen atoms against the amino group (12q-3 – 12q-5; 12q-9; amino derivatives of hydrogenated cyclic compounds 12o-25, N-acyl derivatives, carboxylic acid amides 12o-16, 12o-17)

12q-2 Amines of the naphthalene series (12q-3 – 12q-5; 12q-9)

12q-3 Preparation of amines by reduction of nitro, nitroso, azo compounds, nitriles, etc.

12q-4 Separation of amine mixtures, primary, secondary, tertiary, and of isomers and homologs

12q-5 Alkylation and arylation of ammonia, and of the primary, secondary and tertiary amines

12q-6/01 Aliphatic aminoacids, also sulphur containing; peptides, their components and derivatives, also heterocyclic peptides (heterocyclic amino acids 12p)

12q-6/02 Aminobenzene carboxylic acids

12q-6/03 Aminobenzene sulphonic acids

12q-6/04 Aminobenzene sulphonic carboxylic acids and other amino acids of the benzene series, e.g. aminobenzene arsinic acids and aminobenzene antimonic acids

12q-7 Amino acids of the naphthalene series

12q-9 Non-resinous condensation products of amines and aldehydes (resinous condensation products 39c-12/01)

12q-10 Diazo compounds, especially those which are stable, other primary alkyl and aryl nitrosamines; isodiazohydrates and salts

12q-12 Azo, azoxy and hydrazo compounds (azo, azoxy and hydrazo dyestuffs 22a)

12q-13 Organic derivatives of hydrazine, hydroxylamine, and hydrazoic acid (12i-30)

Phenols, with the exception of those of the anthracene series, especially the naphthols and derivatives

12q-14/01 Extraction of phenols from tars, tar oils and waste liquors (tar-oil purification 12r-1; waste liquor purification 85c-1, 85c-2)

12q-14/02 Preparation of phenols by synthesis (phenols with aldehyde groups or oxyaldehydes 12o-9; phenols with unsaturated open chains 12o-20; phenols with hydrogenated nuclei 12o-25)

12q-14/03 Purification of phenols and separation of phenol mixtures

12q-14/04 Phenol ethers, aryloxy fatty acids, phenol salts, metallic complex compounds of phenols

12q-15/01 Phenols with halogen or nitro groups in the nucleus

12q-15/02	Phenols with mercury, cyanogen and other negative substituents in the nucleus, other aryloxy arsenic oxides, aryloxy arsinic acids, and the corresponding antimony compounds (sulphonic acids 12q-22; carboxylic acids 12q-29, 12q-31)
12q-16	Nucleus substitution of phenols with organic radicals
12q-17	Naphthols and their substitution products (sulphonic acids 12q-23; carboxylic acids 12q-30)
12q-18/01	Thiophenols, thionaphthols, setenophenols, selenonaphthols
12q-18/02	Thioderivatives of the phenols
12q-18/03	Arylthioglycolic acids
12q-19	Phenolphtaleins
12q-20/01	Nonresinous condensation products of phenols and aldehydes or ketones, e.g. diaryloxy methanes and hydroxy benzyl alcohols (resinous condensation products 39c-1, 39c-2)
12q-20/04	Water-soluble phenolaldehyde condensation products with sulphonic acid groups or other acid, water-soluble groups (artificial tanning mixtures 28a-6)
12q-21	Phenol esters
12q-22/01	Phenolsulphonic acids
12q-22/02	Salts and metal complex compounds of phenolsulphonic acids
12q-23	Naphthol sulphonic acids

Oxygen rings and sulphur rings

12q-24	Oxygen rings of the heterocyclic series with one atom of oxygen, such as furan, pyrone (coumalin), coumarin, benzofuran (coumarone), dibenzofuran, xanthene, xanthone, and their derivatives and substitution products (alkylene oxides 12o-5/05)
12q-25	Oxygen rings of the heterocyclic series with more than one atom of oxygen, such as dibenzo dioxin and dioxane, and their derivatives and substitution products
12q-26	Sulphur and selenium, such as thiophene, penthiophenes, thionaphthene, oxythionaphthenes, thioxanthenes, thioxanthones, selenofuran and their derivatives and substitution products
12q-27	Sulphur rings of the heterocyclic series with more than one atom of sulphur, such as diphenylene disulphide (thianthrene) and the like
12q-28	Heterocyclic compounds with oxygen and sulphur as ring members, such as phenothioxin and the like

Aromatic oxycarboxylic and oxysulphonic acids

12q-29/01	Phenol carboxylic acids
12q-29/02	Phenol sulphonic carboxylic acids
12q-29/03	Salts and metal complex compounds of phenol carboxylic acids and phenol sulphonic carboxylic acids
12q-30	Naphthol carboxylic acids, naphtol sulphonic carboxylic acids
12q-31/01	Aryloxy carboxylic acid esters with esterified hydroxyl groups
12q-31/02	Aryloxy carboxylic acid esters with esterified carboxyl groups
12q-31/03	Aryloxy carboxylic acid esters with esterified hydroxyl and carboxyl groups

Oxy-amino compounds, with the exception of those of the anthracene series

12q-32/01	Aliphatic oxy-amino compounds
12q-32/10	Aminophenols
12q-32/20	Aminoketones
12q-32/21	Aminoalcohols of the benzene series, e.g. adrenaline, ephedrine
12q-32/30	Aminoaryloxy compounds of arsenic, antimony, etc.
12q-33	Amiilonaphthols and derivatives, also sulphonic acids
12q-34	Aminoaryloxy sulphonic and carboxylic acids, excluding those mentioned in 12q-33

Anthracene derivatives

12q-37 Anthramine compounds and derivatives: aminooxy, also nitroxy, nitramino and nitramino-oxy anthracene compounds, aminoanthracene, anthraquinone carboxylic acids (anthracene dyestuffs 22b-2, 22b-3)

12q-38 Oxy and thioanthracene compounds: anthrols, oxyanthraquinones, anthracene and anthraquinone mercaptans, halogen- oxyanthracenes and anthraquinones, oxyanthracene, anthraquinone carboxylic acids (anthraquinone 12o-10; nitroxy anthracene 12q-37; anthracene dyestuffs 22b-2, 22b-3)

12r **Processing of tars and tar fractions from solid fuels, e.g. from crude benzene and pitch; wood vinegar, extraction from coal, peat, and the like; extraction and refining of montan wax** (tar production 10a-21 – 10a-30; 24e-3/01 - 24e-4; 26a-16; extraction of phenols from tars and tar oils, and purification 12q-14; regeneration of washing oils 26d-10/50; tar-and pitch-containing mixtures 22h-7/01; artificial asphalts 80b-25; 19c-3; 19c-5/12; 19c-7/18)

12r-1/01 Processing of tar and tar fractions in general, such as dehydration, polymerisation and oxidation (tar-and pitch-containing mixtures and their processing 22h-7; 39b-24; 80b-25; hydro-genation of tars under pressure 12o-1/05)

12r-1/02 Distillation of tars and tar fractions (distillation of mineral oils 23b-1/03)

12r-1/03 Cracking of tars and tar fractions (cracking of mineral oils 23b-1/04)

12r-1/04 Chemical refining of tars and tar fractions, extraction of coumarone resin from crude benzene (refining of crude hydrocarbons into separate pure hydrocarbons 12o-1/04, refining of petroleum and mineral oil hydrocarbons, general 23b-1/05)

12r-1/05 Treatment of tars and tar fractions with selective solvents, deparaffining of tars and tar fractions (treatment of mineral oils with solvents, general, including deparaffining 23b-2/01)

12r-2 Wood vinegar extraction and the like (acetic acid 12o-12; vinegar preparation 6e)

12r-3/01 Extraction from coat, peat, wood, and the like, at ordinary or elevated pressure, and extraction of montan wax (sulphur process 10a-23 – 10a-39; coal hydrogenation 12o-1/05; lixiviation of wood 38h-1/01)

12r-3/02 Processing and purification of coal extracts and extracts from peat, wood, and the like, in accordance with 12r-3/01, and of montan wax

12s **Preparation of dispersions, emulsions and suspensions, i. e. distribution of any chemical substance, in any medium, or utilisation of chemical substances or mixtures thereof as dispersing agents or stabilisers in general, chemical part** (mechanical part 12e-4/01, 22e-4/50; colloid mills 50c-18; production of colloidal, preponderantly inorganic solid substances and their solutions 12g-5/01; fat and oil dispersions 23c-2; dispersions for lubrication purposes, boring and cutting oil 23c-1; for therapeutic purposes 30h-2, 30h-9/04; for cosmetic purposes 30h-13; for the textile industry 8i, 8k, 8m, 8o, 29b-4 – 29b-6; for the leather industry 28a; for the paper industry 55c-2, 55f-11; for the food industry 53c-5, 53e-5, 53e-6/01, 53h-1/01 – 53h-1/03, 53i, 53k; rubber dispersions 39b-1; fuel oil dispersions 23b-4/02; for the flotation dressing of ores 1c; for painting purposes, inks, stamping inks, artists' oil colours, shoe polish, floor waxes, bleaching and cleaning agents 22g; bitumen for road building 80b-25/06, 19c-3; for photographic purposes 57b-6/01, 57b-8, 57b-9)

12s (No subdivision)