28.42 - Other salts of inorganic acids or peroxoacids (including aluminosilicates whether or not chemically defined), other than azides.

2842.10 - Double or complex silicates, including aluminosilicates whether or not chemically defined

2842.90 - Other

Subject to the **exclusions** mentioned in the introduction to this sub-Chapter, this heading includes :

(I) SALTS OF NON-METAL INORGANIC ACIDS OR PEROXOACIDS NOT SPECIFIED ELSEWHERE

Examples of these salts include :

(A) **Fulminates, cyanates, isocyanates and thiocyanates**, metal salts of the non-isolated cyanic acid (HO-C≡N) or of isocyanic acid (HN=C=O) or of fulminic acid ($H-C\equiv N^{+}-O^{-}$) another isomer of cyanic acid, or of thiocyanic acid (HS-C≡N).

(1) **Fulminates.** Fulminates are compounds of more or less unknown composition, very unstable, exploding at a slight shock or under the action of heat (for example, a spark). They constitute priming explosives and are used in the manufacture of fulminating caps or detonators.

(2) **Cyanates.** Ammonium, sodium or potassium cyanates are used for manufacturing various organic compounds. There are also cyanates of alkaline-earths.

(3) **Thiocyanates.** Thiocyanates (sulphocyanides) are the metal salts of the non-isolated thiocyanic acid (HS-C≡N). The most important are :

(a) **Ammonium thiocyanate** (NH_4SCN). Colourless crystals, deliquescent, very soluble in water, turning red under the action of air and light, and decomposed by heat. Used in electroplating; in photography; in dyeing or printing (in particular to prevent the deterioration of sized silk fabrics); for preparing refrigerating mixtures, cyanides or hexacyanoferrates (II), thiourea, guanidine, plastics, adhesives, weed-killers, etc.

(b) **Sodium thiocyanate** (NaSCN). Same appearance as ammonium thiocyanate or as a powder. Poisonous. Used in photography; in dyeing and printing (mordant); in medicine; as a laboratory reagent; in electroplating; for preparing artificial mustard oil; in the rubber industry, etc.

(c) **Potassium thiocyanate** (KSCN). Having the same characteristics as sodium thiocyanate. Used in the textile industry; in photography; in organic synthesis (e.g., thiourea, artificial mustard oil and dyestuffs), in the preparation of thiocyanates, refrigerating mixtures, parasiticides, etc.

(d) **Calcium thiocyanate** ($Ca(SCN)_2.3H_2O$). Colourless crystals, deliquescent and soluble in water. Used as a mordant in dyeing or printing, and as a solvent for cellulose; for mercerising cotton; in medicine instead of potassium iodide (against arteriosclerosis); for preparing hexacyanoferrates (II) or other thiocyanates; in the manufacture of parchment.

(e) **Copper thiocyanates**.

Cuprous thiocyanate (CuSCN), whitish, greyish or yellowish powder or paste, insoluble in water. Used as a mordant in textile printing, in the manufacture of marine paints and in organic synthesis.

Cupric thiocyanate ($Cu(SCN)_2$), black powder, insoluble in water, readily turning into cuprous thiocyanate. Used in the manufacture of detonating caps and of matches.

Mercury fulminate and mercuric thiocyanate **are excluded (heading 28.52)**.

(B) **Arsenites and arsenates**.

These are the metal salts of acids of arsenic; arsenites are the salts of arsenious acids, and arsenates are the salts of arsenic acids (heading 28.11). They are violently poisonous. Examples are :

(1) **Sodium arsenite** ($NaAsO_2$). Prepared by the fusion of sodium carbonate with arsenious oxide. White or greyish slabs or powder, soluble in water. Used in viticulture (insecticide); for preserving hides; in medicine; in the manufacture of soap and antiseptics, etc.

(2) **Calcium arsenite** ($CaHAsO_3$). White powder, insoluble in water. Used as an insecticide.

(3) **Copper arsenite** ($CuAsO_3$). Obtained from sodium arsenite and copper sulphate. Green powder, insoluble in water. Used as an insecticide, as a colouring matter known as Scheele's green and for preparing certain green pigments (see Explanatory Note to heading 32.06).

(4) **Zinc arsenite** ($Zn(AsO_2)_2$). Similarappearance and uses to calcium arsenite.

(5) **Lead arsenite** ($Pb(AsO_2)_2$). White powder, only sparingly soluble in water. Used in viticulture (insecticide).

(6) **Sodium arsenates** (ortho-, meta- and pyroarsenates). The most important are disodium hydrogen orthoarsenate (Na_2HAsO_4) (with 7 or 12 H_2O, according to the temperature of crystallisation) and trisodium orthoarsenate (anhydrous or with 12 H_2O). Prepared from arsenious oxide and sodium nitrate. Colourless crystals or greenish powder. Used in the preparation of medicaments (Pearson's solution), of antiseptics, insecticides, and of other arsenates; also used in textile printing.

(7) **Potassium arsenates**. Mono- and dibasic potassium orthoarsenates, prepared by the same method as sodium arsenates. Colourless crystals, soluble in water. Used as antiseptics or insecticides; for tanning; for printing textiles, etc.

(8) **Calcium arsenates**. Tricalcium diorthoarsenate ($Ca_3(AsO_4)_2$), often containing other calcium arsenates as impurities. Obtained by the interaction of calcium chloride and sodium arsenate. White powder, insoluble in water. Used in agriculture as an insecticide.

(9) **Copper arsenates**. Cupric orthoarsenate ($Cu_3(AsO_4)_2$). Obtained from sodium orthoarsenate and copper sulphate (or chloride). Green powder, insoluble in water. Used as a parasiticide in viticulture and for preparing anti-fouling paints.

(10) **Lead arsenates**. Trilead diorthoarsenate ($Pb_3(AsO_4)_2$), and the acid orthoarsenate. Only sparingly soluble in water. White powders, pastes or emulsions. Used in the preparation of insecticides.

(11) **Other arsenates**. These include arsenates of aluminium (insecticide) or of cobalt (pink powder, used in ceramics).

The heading **does not cover** :

(a) Natural nickel arsenates (e.g., annabergite, etc.) (**heading 25.30**).

(b) Arsenides (**heading 28.53**).

(c) Acetoarsenites (**Chapter 29**).

(C) **The salts of selenium acids** : selenides, selenites, selenates. These include :

(1) **Cadmium selenide**. Used in the manufacture of anti-glare glass and of pigments.

(2) **Sodium selenite**. Used for giving glass a red tint, or for masking its greenish hue.

(3) **Ammonium and sodium selenates**. Used as insecticides; the sodium salt is also used in medicine.

(4) **Potassium selenate**. Used in photography.

Zorgite, a natural copper lead selenide, is **excluded** (**heading 25.30**).

(D) **The salts of tellurium acids** : tellurides, tellurites, tellurates. These include :

(1) **Bismuth telluride**. A semi-conductor for thermopiles.

(2) **Sodium or potassium tellurates**. Used in medicine.

(II) DOUBLE OR COMPLEX SALTS

This group covers double or complex salts **other than** those specifically included elsewhere.

The principal double or complex salts classified in this heading include :

(A) **Double or complex chlorides (chlorosalts)**.

(1) **Chloride of ammonium with** :

(a) **Magnesium**. Deliquescent crystals; used in soldering.

(b) **Iron (ammonium ferrous chloride and ammonium ferric chloride)**. In masses or hygroscopic crystals; used in plating and in medicine.

(c) **Nickel**. Yellow powder or, hydrated, green crystals. Used as a mordant and in galvanising.

(d) **Copper (ammonium copper chloride)**. Blue or greenish crystals, soluble in water. Used as a colouring agent and in pyrotechnics.

(e) **Zinc (ammonium zinc chloride)**. White crystalline powder, soluble in water. Used in soldering (" **soldering salts** "), in dry batteries, and in galvanising (electrolytic zinc-plating).

(f) **Tin**. In particular **ammonium chlorostannate**; white or pink crystals or in aqueous solution. Sometimes called " **pink salt** "; used in dyeing and as a size for silk.

(2) **Chloride of sodium with aluminium**. White crystalline powder, hygroscopic. Used in tanning.

(3) **Chloride of calcium with magnesium**. White deliquescent crystals. Used in the paper, textile, potato-starch or paint industries.

(4) **Chlorosalts, e.g., chlorobromides, chloroiodides, chloroiodates, chlorophosphates, chlorochromates** and **chlorovanadates**.

These include **potassium chlorochromate** (**Peligot's salt**). Red crystals, decomposing in water. It is an oxidising agent used in organic synthesis.

Pyromorphite (phosphate and chloride of lead) and vanadinite (vanadate and chloride of lead) are **excluded** since they are natural metallic ores of **headings 26.07** and **26.15**, respectively.

(B) **Double or complex iodides (iodosalts)**.

(1) **Bismuth sodium iodide.** Red crystals, decomposed by water. Used in medicine.

(2) **Cadmium potassium iodide**. A white deliquescent powder which turns yellow on exposure to air. Also used in medicine.

(C) **Double or complex salts containing sulphur (thiosalts)**.

(1) **Sulphate of ammonium** with :

(a) **Iron (ammonium ferrous sulphate, Mohr's salt)** ($FeSO_4.(NH_4)_2SO_4.6H_2O$). Light green crystals, soluble in water. Used in metallurgy and in medicine.

(b) **Cobalt** ($CoSO_4.(NH_4)_2SO_4.6H_2O$). Red crystals, soluble in water. Used in cobalt-plating and in ceramics.

(c) **Nickel** ($NiSO_4.(NH_4)_2SO_4.6H_2O$). Green crystals, decomposed by heat; very soluble in water. Used mainly for electrolytic nickel-plating.

(d) **Copper**. Blue crystalline powder soluble in water, efflorescing in air. Used as a parasiticide, in textile printing and processing, in the preparation of copper arsenite, etc.

(2) **Sodium zirconium sulphate**. White solid. Used in zinc metallurgy.

(3) **" Thiosalts " and other double or complex salts containing sulphur, e.g. : selenosulphides and selenosulphates, thiotellurates, thioarsenates, thioarsenites and arsenosulphides, thiocarbonates, germanosulphides, thioantimonates, thiomolybdates, thiostannates, reineckates**.

This group includes :

(a) **Potassium trithiocarbonate**. Yellow crystals, soluble in water. Used in agriculture (against phylloxera) and in chemical analysis.

(b) **Alkali thiomolybdates**. Used as accelerating agents in metal phosphatising (parkerising) baths.

(c) **Ammonium tetrathiocyanatodiamminochromate (ammonium diammine-tetrakisthiocyanatochromate, ammonium reineckate or reinecke salt)** ($NH_4[Cr(NH_3)_2(SCN_4)].H_2O$). Crystalline powder or dark red crystals. Used as a reagent.

(d) **Ferrous potassium thiocyanate and ferric potassium thiocyanate**.

Cobaltite (sulphide and arsenide of cobalt) and germanite (copper germano-sulphide) are **excluded** from this heading since they are natural ores of **headings 26.05** and **26.17**, respectively.

(D) **Double or complex salts of selenium (selenocarbonates, selenocyanates, etc.)**.

(E) **Double or complex salts of tellurium (tellurocarbonates, tellurocyanates, etc.)**.

(F) **Cobaltinitrites (nitrocobaltates)**.

Potassium cobaltinitrite (cobalt potassium nitrite, Fischer's yellow) ($K_3Co(NO_2)_6$). Microcrystalline powder, fairly soluble in water. A pigment which, alone or mixed, is known as **cobalt yellow**.

(G) **Double or complex nitrates** (tetra- and hexa-amminonickel nitrates).

Ammoniacal nickel nitrates. Blue or green water soluble crystals. Used as oxidants and for the preparation of the pure nickel catalyst.

(H) **Double or complex phosphates (phosphosalts)**.

(1) **Ammonium sodium orthophosphate** $NaNH4HPO_4.H_2O$) (microcosmic salt). Colourlessefflorescent crystals, soluble in water. Used as a flux for dissolving metal oxides.

(2) **Ammonium magnesium orthophosphate**. White powder, only very slightly soluble in water. Used for fire-proofing textiles and in medicine.

(3) **Complex salts containing phosphorus**, e.g., **molybdophosphates, silicophosphates, tungstophosphates, stannophosphates**.

This group includes :

(a) **Molybdophosphates**. Used in microscopic research.

(b) **Silicophosphates and stannophosphates**. Used for sizing silk.

(IJ) **Tungstoborates (borotungstates)**.

Cadmium borotungstate. Yellow crystals or in aqueous solution. Used for separating minerals by density.

(K) **Double or complex cyanates**.

(L) **Double or complex silicates**.

This group includes **aluminosilicates**, whether or not they are separate chemically defined compounds. Aluminosilicates are used in the glass industry and as insulators, ion-exchangers, catalysts, molecular sieves, etc.

Included in this category are synthetic zeolites with the generic formula $M_{2/n}O.Al_2O_3.ySiO_2.wH_2O$, where M is a cation of valency n (usually sodium, potassium, magnesium or calcium), y is two or more and w is the number of water molecules.

Aluminosilicates containing binders (e.g., zeolites containing silica-based clay) are, however, **excluded** (**heading 38.24**). Particle size can usualy be used to identify zeolites containing binders (usually above 5 microns).

(M) **Double or complex salts of metal oxides**.

These are salts such as **calcium potassium chromate**.

This heading **excludes** :

(a) Complex fluorine salts (**heading 28.26**).

(b) Alums (**heading 28.33**).

(c) Complex cyanides (**heading 28.37**).

(d) Salts of hydrazoic acid (azides) (**heading 28.50**).

(e) Chloride of ammonium with mercury (ammonium mercuric chloride or ammonium chloromercurate) and copper mercury iodide **(heading 28.52)**.

(f) Magnesium potassium sulphate, whether or not pure (**Chapter 31**).