29.23 - Quaternary ammonium salts and hydroxides; lecithins and other phosphoaminolipids, whether or not chemically defined.

2923.10 - Choline and its salts

2923.20 - Lecithins and other phosphoaminolipids

2923.90 - Other

Quaternary organic ammonium salts contain one tetravalent nitrogen cation $R^1R^2R^3R^4N^+$ where R^1, R^2, R^3 and R^4 may be the same or different alkyl or aryl radicals (methyl, ethyl, tolyl etc.).

This cation may be associated with the hydroxide ion (OH^-) to give a **quaternary ammonium hydroxide** of general formula $R_4N^+OH^-$ corresponding to its inorganic parent ammonium hydroxide NH_4OH.

The residuary valence may, however, be filled by other anions (chloride, bromide, iodide, etc.) to give **quaternary ammonium salts**.

The most important salts and substitution derivatives of quaternary ammonium bases are :

(1) **Choline**, its salts and derivatives. A hydroxyethyltrimethylammonium hydroxide found in the bile, in the brain, in egg-yolk, and in all fresh seeds. A compound from which other very important biological substances are derived (e.g., acetylcholine, methylcholine).

(2) **Lecithins and other phosphoaminolipids**. These are esters (phosphatides) resulting from the combination of oleic, palmitic and other fatty acids with glycerophosphoric acid and an organic nitrogen base such as choline. They are usually yellowish-brown, waxy masses, soluble in ethanol. Lecithins are contained in egg-yolk (ovolecithin) and in animal and vegetable tissue.

Commercial lecithin, which is also included in this heading, is predominantly soya-bean lecithin and consists of a mixture of acetone-insoluble phosphatides (generally 60 to 70 % by weight), soya-bean oil, fatty acids and carbohydrates. Commercial soya-bean lecithin comes in brownish to light-coloured, more or less viscous form or, if the soya-bean oil has been extracted with acetone, in yellowish granules.

Ovolecithin is used in medicine. Commercial soya-bean lecithin is used as an emulsifying, dispersing, etc. agent in the food and animal feed industries, in paints, in the petroleum industry, etc.

(3) **Tetramethylammonium iodide** ($(CH_3)_4NI$).

(4) **Tetramethylammonium hydroxide** ($(CH_3)_4NOH$).

(5) **Tetramethylammonium formate** ($HCOON(CH_3)_4$), used in medicine .

(6) **Betaine**, a quaternary intramolecular salt, and **betaine hydrochloride**, used, e.g., in medicine, cosmetics and animal feeding.