

CHAP. VI.—SILVER.

NITRAS ARGENTI. *Ed.**Nitrate of Silver.*

Take of

Purest silver, flatted into plates, and cut in pieces, four ounces;

Diluted nitrous acid, eight ounces;

Distilled water, four ounces.

Dissolve the silver in a matrass with a gentle heat, and evaporate the solution to dryness. Then put the mass into a large crucible, and place it on the fire, which should at first be gentle, and afterwards increased by degrees till the mass flows like oil; then pour it into iron pipes, previously heated and anointed with tallow. Lastly, keep it in a glass vessel very well corked.

Dub.

Take of

Silver, flatted into plates, and cut in pieces,

Nitrous acid, of each one ounce by weight;

Distilled water, two ounces, by measure.

Put the silver in a glass phial, placed in a sand-bath, and pour on the acid, previously diluted with the water; then, gradually increasing the heat, dissolve the metal, and evaporate the liquor to dryness. Liquefy the mass which remains, in a crucible over a slow fire. Pour it into proper moulds, and keep it in a glass vessel well corked.

Lond.

Take of

Silver, one ounce;

Nitric acid, one fluidounce.

Distilled water, two fluidounces.

Mix the nitric acid with the water, and dissolve the silver in the mixture in a sand-bath. Then gradually increase the heat, to dry the nitrate of silver. Melt this in a crucible with a gentle fire, until the water being expelled it cease to boil; then immediately pour it out into proper moulds.

THE acid employed must be very pure. If it contain, as the acid of commerce always does, sulphuric or muriatic acid, these re-act upon the nitrate as soon as it is formed, and a

white precipitate, consisting of sulphate and muriate of silver, falls to the bottom.

The method which the refiners employ for examining the purity of their aquafortis (the name they give to dilute nitrous acid), and purifying it, if necessary, is to let fall into it a few drops of a solution of nitrate of silver already made; if the liquor remain clear, it is fit for use: otherwise, they add a small quantity more of the solution, which immediately turns the whole of a milky white colour; the mixture being then suffered to rest for some time, deposits a white sediment, from which it is cautiously decanted, examined again, and, if necessary, farther purified by a fresh addition of this solution.

Mr Phillips objected to the London process 1809, that there was an unnecessary waste of nitric acid, as one fluidounce and a half was sufficient to dissolve about 1023 grains, instead of 480. It has accordingly been reduced to an ounce.

It is necessary to employ very pure water in this process, for the muriates and earthy salts which common water generally contain, precipitate part of the silver in the state of a muriate or oxide. If distilled water be not used, the water should be added to the acid before it be tried, and purified by the nitrate of silver.

The solution will go on the more speedily, if the silver, flatted into thin plates, be rolled loosely up, so that the several surfaces do not touch each other. By this management, a greater extent of the surface is exposed to the action of the menstruum, than when the plates are cut in pieces and laid above each other. If the silver be alloyed with copper, the solution will have a permanent greenish-blue colour, and acquire a bright blue on the addition of ammonia. If it contain gold, the gold is not dissolved, but is found at the bottom of the solution, in the form of a black or deep purple powder.

The crucible ought to be of porcelain; as, with the common crucibles, the loss arising from the nitrate of silver sinking into their substance is too great. It ought also to be large enough to hold five or six times the quantity of the dry matter; for it bubbles and swells up greatly, so as to be apt to run over. During the evaporation also, little drops are now and then spirted up, whose causticity is increased by their heat, against which the operator ought therefore to be on his guard. The fire must be kept moderate till this ebullition ceases, and till the matter becomes consistent in the heat that made it boil before: the fire is then to be quickly increased, till the matter flows thin at the bottom like oil, on

which it is to be immediately poured into the mould; for if the heat be continued after this, the nitrate of silver begins to be decomposed, and the silver is reduced.

The mould should be of iron, or one may be formed in a mass of tempered tobacco pipe clay, not too moist, by making, with a smooth stick, previously greased, a sufficient number of holes. Each piece is to be wiped clean from the grease, and wrapt up in soft dry paper, not only to keep the air from acting upon them, but likewise to prevent their corroding or discolouring the fingers in handling.

Nitrate of silver is crystallizable. Its crystals are brilliant plates, having a variable number of sides. Their taste is austere, and intensely bitter. They are very soluble in water, but permanent in the air and not deliquescent. They are decomposed by heat, light, phosphorus, charcoal, many metals, all the alkalies and earths, sulphuric, muriatic, phosphoric, and fluoric acids, and by the salts they form. When deprived of water, and melted according to the directions of the colleges, nitrate of silver forms a black or dark grey coloured mass, hard, sonorous, and consisting of radii, diverging from the centre. It is not deliquescent when free from copper, which is seldom the case. It may, however, be prepared perfectly pure, even from a solution containing copper, by evaporating and crystallizing it as long as it furnishes firm tabular crystals. These are then to be washed with a little distilled water, and melted with a gentle heat. The nitrate of copper remains in the mother water, from which the silver it contains may be precipitated by muriatic acid.

Medical use.—A strong solution of nitrate of silver corrodes and decomposes animal substances: in a more diluted state, it stains them of an indelible black; and, for this purpose, it is now used as an indelible marking ink. The fused nitrate of silver is the strongest and most manageable caustic we possess, and is employed to remove fungous excrescences, callous edges, warts, strictures in the urethra, and the like. It is also used to destroy the venereal poison in chancres, before it has acted on the system. A weak solution of it may be applied, as a stimulus, to indolent ulcers, or injected into fistulous sores.

Notwithstanding its causticity, it has been given internally. Boërhaave, Boyle, and others, commend it highly in hydroptic cases. The former assures us, that, made into pills with crumb of bread and a little sugar, and taken on an empty stomach (some warm water, sweetened with honey, being drank immediately after), it purges gently, without griping,

and brings away a large quantity of water, almost without the patient's perceiving it: that it kills worms, and cures inveterate ulcerous disorders. He, nevertheless, cautions against using it too frequently, or in too large a dose; and observes, that it always proves corrosive and weakening to the stomach.

It has been more recently employed, and with success, in epilepsy and angina pectoris. On account of its very great activity, each pill should not contain above one-eighth or one-fourth of a grain.

CHAP. VII.—ARSENIC.

ARSENICI OXYDUM SUBLIMATUM. *Lond.*

Sublimed Oxyde of Arsenic.

Reduce oxyde of arsenic to powder; then put it into a crucible; expose it to the fire, and sublime it into another crucible inverted over the first.

THE white oxide of arsenic of commerce is obtained as an insignificant product in roasting cobalt ores, and is therefore often impure. By sublimation, however, it is easily separated from foreign matters, but the operator must be very careful to avoid the fumes which arise during the process.

LIQUOR ARSENICALIS. *Lond.*

Arsenical Solution.

Take of

Sublimed oxyde of arsenic, in very fine powder;
Subcarbonate of potass from tartar, of each sixty-four grains,

Distilled water, a pint.

Boil together in a glass vessel, until the arsenic be entirely dissolved. Add to the solution, when cold,

Compound spirit of lavender, four fluidrachms.

Lastly, add as much distilled water as will make the whole amount exactly to a pint.

ARSENIAS KALI. *Dub.*

Arseniate of Kali.

Take of

White oxyde of arsenic,