XX. *On some Salts of Cadmium.* By Henry Croft, *Esq.*

Read May 17, 1842.

CHLORIDE of cadmium is exceedingly soluble in water and cannot be obtained in good crystals. If it be treated with a solution of ammonia, it is not at first dissolved; but on heating, the white powder which is at first formed, disappears, and on cooling a granular crystalline powder falls out of the solution. It is a compound of the chloride with ammonia. By heating, it loses 16·63 per cent of ammonia; according to the formula $Cd\,Cl + H^3\,N$ it would lose 15·12; the excess obtained is owing to a portion of the chloride being decomposed when sal-ammonia is evolved. The proof of this is that the heated salt is not perfectly soluble in water.

If dry ammonia be passed over pulverised anhydrous chloride of cadmium, the powder increases greatly in bulk under evolution of heat. At first there is but little action, and the stream of ammonia must be passed over the salt for some time before violent absorption takes place. 1·276 gr. absorbed 0·6835 gr. of ammonia, or 100 parts absorbed 53·56; according to the formula $Cd\,Cl + 3\,N\,H^3$ it would be 56·47: the difference probably arises from the great increase in bulk which the salt undergoes, and which may prevent the ammonia reaching every particle.

This compound loses ammonia when exposed to the air; when it has ceased to smell of ammonia, it is converted into the first-mentioned compound, viz. that containing one atom of ammonia.

Bromide of cadmium crystallizes in long prisms somewhat similar to nitre; it loses its water of crystallization when exposed to a dry atmosphere: 2·422 grs. lost, when heated to

100°, 0·5075 gr. of water; that is, 20·95 per cent.; according to the formula Cd Br + 4 aq it should be 21·17: it fuses easily and crystallizes on cooling. Bromide of cadmium dissolves in hot caustic ammonia, and gives on cooling a granular crystalline powder; by slow cooling the salt is deposited in the form of regular octohedrons. It contains 11·69 per cent. of ammonia, or 1 atom, and is therefore analogous to the chloride.

The anhydrous bromide absorbs a large quantity of ammonia, like the chloride, but the quantity varies between two and three atoms*.

All these compounds are decomposed by water, and oxide of cadmium is separated.

The chloride, bromide and iodide of cadmium form very beautiful double salts with the alkaline chlorides, bromides and iodides.

They may be prepared by dissolving the respective salts in atomic proportions.

Cadmio-chloride of potassium.—From the concentrated solution the salts crystallize in silky needles which contain water. If these crystals be allowed to stand in the solution they gradually disappear, and large crystals are formed in their stead; they have the form of regular rhombohedrons; they contain no water. Their formula is Cd Cl + KCl; the acicular salt contains one atom of water. 100 parts of water at 60° F. dissolve 33·45.

Cadmio-bromide of potassium is precisely similar to the double chloride: it is, however, much more soluble in water. Formula Cd Br + KBr. The acicular salt contains water.

Cadmio-iodide, &c., does not crystallize like the bromide and chloride; the anhydrous salt is Cd I + K I. It is very soluble in water.

Cadmio-chloride of sodium does not crystallize in a regular form, but in verrucose crystals. The formula is Cd Cl + Na Cl + 3 aq. 100 parts of water at 60 dissolve — 71·32.

Cadmio-chloride of ammonium crystallizes like the potassium salt in two forms; the large crystals are anhydrous.

All these salts are somewhat soluble in alcohol and wood-spirit, but not so much so as the simple chloride, iodide and bromide.

The analyses of these, as well as some other salts of cadmium, will be published in a second paper.

* In the last number of the Reports of the Academy of Berlin, I find that Rammelsberg has prepared and analysed the crystallized bromide and its compounds with ammonia. That prepared in the dry way contains, as he says, two atoms of ammonia.