ART. LIV.—*On Argento-antimonious Tartrate (Silver Emetic)*; by JOSIAH P. COOKE. (Contributions from the Chemical Laboratory of Harvard College).

AS stated by us in our paper on the atomic weight of antimony,* this compound was originally obtained by Wallquist by precipitating nitrate of silver with tartar emetic, and was analyzed both by him and by Dumas and Piria. These chemists obtained respectively 27·31 and 28·05 per cent of oxide of silver. They appear however to have prepared the substance only in an amorphous form. As stated in the paper just cited, we first noticed the formation of crystals of the compound in a concentrated solution of antimonious chloride and tartaric acid, to which had been added an excess of argentic nitrate, and from the circumstances of their formation we were led to form a somewhat erroneous inference in regard to their relation to water. We find that the substance is far more soluble in this solvent than at first appeared. We have found from further investigation that one part of silver emetic dissolves completely in one hundred parts of boiling and in somewhat less than five hundred parts of water at 15° C. In one determination made by evaporation, a saturated solution, which had stood a long time at a temperature of 15°, we found that 1000 parts of water had dissolved 2·76 parts and in another 2·68 parts of the salt. There is obviously therefore no danger of the formation of this product in the precipitation of chlorine, bromine or iodine from solutions of the antimony compounds of these elements in tartaric acid, unless the excess of silver nitrate is larger and the solutions concentrated; and although we have most carefully looked for it in the precipitate we have never discovered it, except under the peculiar conditions described in our former paper, and our fear that it might be occluded by these precipitates was wholly unfounded.

It is evident from the above experiments that the solubility

* This Journal, p. 382.

of silver emetic in water like that of cream of tartar and other salts of tartaric acid is very greatly increased by heat, and we were easily able to obtain good crystals of the compound in large quantities by dissolving the precipitate, obtained as Wallquist describes, in boiling water, and allowing the solution to cool. The crystals are colorless and have a very brilliant, almost an adamantine, luster.

From the reaction by which silver emetic is formed we should infer that the composition of the salt would be expressed by the symbol

This compound would theoretically contain 26.34 p. c. of silver, and, as a mean of three analyses, we obtained for the amount of silver in the crystals 26.30 per cent, as previously stated.

The crystals of silver emetic rapidly blacken in the light and are very easily decomposed by heat. This decomposition takes place at about 200° C. with a slight explosion. A very fine carbon dust is blown out of the crucible and a residue is left behind, which under the microscope is

seen to consist of spangles of metallic silver mixed with an amorphous powder. Almost the whole of the powder dissolved easily in a solution of tartaric acid, and it evidently consisted of Sb_2O_3 . In one experiment we weighed the silver emetic and the product, and found that 0.8460 gram. of the salt left 0.5304 gram. of residue. If the residue consisted solely of silver and Sb_2O_3 , theory would require 0.5200 grams, and it can be seen from this how perfect the decomposition was. It

is obvious therefore that were this compound occluded as we at first feared, it would have made itself evident on drying the precipitates.

Mr. W. H. Melville, assistant in this laboratory, has made the following crystallographic measurements of the crystals whose formation and reactions we have described.

Angles between normals.

$$(111) \wedge (100) \quad 70^\circ \quad 19\frac{1}{2}'$$

$$(111) \wedge (\bar{1}\bar{1}\bar{1}) \quad 70^\circ \quad 17'$$

$$a : b : c = 1 : 1.386 : 0.571$$

		I.	Measured.
100	110	54° 12'	54° 19'
111	$\wedge$ 110	54° 51'	54° 54'

The pinacoid planes were irregular and the angles can only be regarded as approximate.

System Trimetric with hemihedral habit.

Observed planes $\pm \kappa \mid 111 \mid \mid 100 \mid \mid 110 \mid \mid 011 \mid ?$

In the following table the crystallographic ratios are compared with those of the acid tartrates of rubidium, caesium and potassium, formerly measured by us, and which have the same general form and hemihedral habit.

	Vertical.	Macro.	Brachy.
Acid tartrate of caesium	0·661	1	0·694
Acid tartrate of rubidium	0·695	1	0·726
Acid tartrate of potassium	0·737	1	0·711
Silver emetic	0·412	1	0·721