

More of the double salt was prepared by using ammonium oxalate solution saturated at 25°. The precipitate deposited at 50° gave 3.85 per cent. of ammonia and was, therefore, the same compound as the first, but when this solution cooled to room temperature, it yielded two kinds of crystals which, under the microscope, were identified as the double salt and ammonium oxalate, and it would appear that the salt described by Souchay and Lensson was a similar mixture.

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DOUBLE HALIDES OF TELLURIUM WITH THE ALKALOIDS.

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It has been previously shown¹ that the chloride and bromide of tellurium unite with the salts of the amines to form a series of double salts in which the types of H_2TeCl_6 and H_2TeBr_6 are consistently followed. The hydrogen of these acids may be considered as having been directly replaced by the complex ammonium group, or the tellurium halide may be looked at as uniting with the molecules of the hydrochloride or hydrobromide of the amine.

Following the same line of work with the alkaloids, there appear types which differ considerably from the first or most simple type.

In some cases 1 molecule of the alkaloid unites with 1 molecule of H_2TeCl_6 or H_2TeBr_6 while in others 2 molecules of the alkaloids unite with 1 molecule of the tellurium halogen acids. As a rule, the salts appear to follow the type of compounds that H_2PtCl_6 forms with the alkaloids, for example, with quinine there appear the salts $C_{20}H_{24}N_2O_2H_2PtCl_6 + H_2O$ and $C_{20}H_{24}N_2O_2H_2TeCl_6$, while with morphine $(C_{17}H_{19}NO_3)_2H_2TeCl_6$ is analogous to $(C_{17}H_{19}NO_3)_2H_2PtCl_6 + 6H_2O$.

However, the chloroplatinate usually crystallizes with water of crystallization while these new compounds are anhydrous.

The method of procedure for the formation of these compounds consists in adding a strong solution of tellurium dioxide in hydrochloric or hydrobromic acid to a concentrated solution of the alkaloid in the corresponding acid.

¹ This Journal, 22, 136.

In most cases a thick, curdy precipitate immediately forms. This precipitate is best purified by recrystallization from hot, dilute acid solution. Inasmuch as the alkaloid chloride or bromide frequently separates out in the cold, the recrystallization must be done hot. Obtained under these conditions, the salts crystallized very well. As in the case with the halogen salts of the amines with tellurium, the alkaloids form yellow chlorides with tellurium chloride and red bromides with the bromide.

All of the salts obtained are permanent at the ordinary temperature, but are easily decomposed by heat. Water decomposes them all with precipitation of tellurous acid, while dilute acids readily dissolve them.

Analysis.—In order to determine the composition of the salts, the amount of halogen and tellurium in each was determined and in one salt a combustion for carbon and hydrogen was made. The halogen was determined as the silver salt and the tellurium was determined as element.

CHLORIDES.

Quinine Chlorotellurate, $C_{20}H_{24}N_2O_2 \cdot 2HCl \cdot TeCl_4$.—When a strong solution of tellurium tetrachloride is added to a strong solution of quinine in hydrochloric acid, a light, curdy precipitate forms. This salt can be readily recrystallized from hot dilute hydrochloric acid. It contains no water of crystallization; at 150° it begins to decompose. Water decomposes the substance at the ordinary temperature.

Analysis.—Calculated: Cl, 31.91; Te, 19.12; C, 36.01; H, 3.93. Found: Cl, 31.86, 31.91; Te, 18.55, 18.79; C, 35.77, 35.53, 36.26; H, 3.91, 3.74, 3.72.

Cinchonine Chlorotellurate, $(C_{19}H_{22}N_2O \cdot 2HCl \cdot TeCl_4)$.—This salt forms light yellow crystals.

Analysis.—Calculated: Cl, 33.44. Found: Cl, 33.69, 33.64.

Strychnine Chlorotellurate, $(C_{21}H_{22}N_2O_2 \cdot HCl)_2 \cdot TeCl_4$, appears on recrystallization as large, bright yellow needles.

Analysis.—Calculated: Cl, 21.05; Te, 12.61. Found: Cl, 21.32, 21.03, 21.20, 21.14; Te, 13.13.

Morphine Chlorotellurate, $(C_{17}H_{19}NO_3 \cdot HCl)_2 \cdot TeCl_4$.—This substance appears as dark yellow crystals, and is the most stable of the series toward heat.

Analysis.—Calculated: Cl, 23.30; Te, 13.97. Found: Cl, 23.13, 23.67; Te, 14.21.

Thcobromine Chlorotellurate, $(C_7H_8N_4O_2HCl)_2TeCl_4$.—On bringing together the acid solution of the alkaloid and tellurium tetrachloride, no precipitate appears as with the other substances, but, on standing, the light yellow salt separates.

Analysis.—Calculated: Cl, 30.44; Te, 18.25. Found: Cl, 30.59, 30.55; Te, 18.59.

Brucine Chlorotellurate, $(C_{23}H_{26}N_2O_4HCl)_2TeCl_4$.—This salt appears as light yellow crystals.

Analysis.—Calculated: Cl, 18.81. Found: Cl, 18.36, 18.90.

With aconitine and atropine, non-crystalline bodies were first formed but quickly decomposed.

BROMIDES.

Quinine Bromotellurate, $(C_{20}H_{24}N_2O_2HBr)_2TeBr_4$.—This salt forms bright red crystals and is easily decomposed by heat.

Analysis.—Calculated: Br, 51.32; Te, 13.67. Found: Br, 51.27, 51.60; Te, 14.09.

Cocaine Bromotellurate, $(C_{17}H_{21}NO_4HBr)_2TeBr_4$.—The salt crystallizes readily in large carmine-red needles. It is quite readily decomposed by heat.

Analysis.—Calculated: Br, 39.47; Te, 10.48. Found: Br, 39.59, 39.14; Te, 11.18.

Brucine Bromotellurate, $(C_{23}H_{26}N_2O_4HBr)_2TeBr_4$.—This salt appears as brick-red crystals.

Analysis.—Calculated: Br, 34.26; Te, 9.12. Found: Br, 34.21, 33.80; Te, 8.50.

Morphine Bromotellurate, $(C_{17}H_{19}NO_3HBr)_2TeBr_4$.—This salt appears as dark red crystals.

Analysis.—Calculated: Br, 40.70; Te, 10.81. Found: Br, 40.42; Te, 10.70.

ON CERTAIN FACTORS INFLUENCING THE PRECIPITATION OF CALCIUM AND MAGNESIUM BY SODIUM CARBONATE.

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THE data contained in the following communication were obtained in an investigation undertaken primarily to determine some of the conditions which modify the results of the usual processes