XXXVIII.—*Platinum Tetrachloride.*

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THIS compound was first obtained by Norton (*J. pr. Chem.*, 1870, **2**, 469) in a hydrated form from the compound of silver chloride with platinum tetrachloride, discovered by Cammeille, and minutely studied by Jörgensen (*J. pr. Chem.*, 1877, **16**, 345). Norton tried to prepare the tetrachloride in an anhydrous state by heating the

hydrated chloride in air. At 100°, he says, it loses 4 mols. H₂O, but the remaining molecule cannot be removed without decomposing the compound. He further attempted to obtain it by heating chloroplatinic acid, but without success. On this account he supposed that the elements of water were chemically combined with the platinum chloride, so as to form a compound $\text{PtCl}_2 < \begin{smallmatrix} \text{Cl}_2\text{H} \\ \text{OH} \end{smallmatrix}$, standing intermediate between chloroplatinic acid, $\text{PtCl}_2 < \begin{smallmatrix} \text{Cl}_2\text{H} \\ \text{Cl}_2\text{H} \end{smallmatrix}$, and platinum oxychloride, $\text{PtCl}_2 < \begin{smallmatrix} \text{OH} \\ \text{OH} \end{smallmatrix}$, a compound formed by the action of ammonia on the hydrated tetrachloride.

By adopting a new method, I have lately succeeded not only in obtaining the tetrachloride from chloroplatinic acid, but also in getting it anhydrous. The method is a simple one, suggested to me by Professor Lothar Meyer, of Tübingen. It consists in passing a stream of dry hydrogen chloride over heated, dry chloroplatinic acid. The latter was placed in a weighed porcelain boat, and this in a glass tube, which was heated in an air-bath. At the end of the experiment the boat was quickly transferred to a weighed tube, and was allowed to cool in a desiccator. The tube and its contents were then weighed. The platinum chloride was washed out of the boat and the solution evaporated to dryness in a platinum crucible. The platinum and chlorine were estimated in the residue by the usual methods.

In the first three experiments, the temperature ranged between 170° and 200°. In each case a small amount of dichloride was produced as shown by a slight darkening in colour of the chloride and by a small residue of dichloride remaining undissolved after the addition of water.

The analysis gave the following results:—

	Expt.	1.	2.	3.	Mean.
Percentage of platinum ..		57·36	57·52	57·98	57·62
„ chlorine ..		41·32	41·24	40·65	41·07
					<hr/> 98·69

The percentages as calculated are:—

	PtCl_4 .	$\text{PtCl}_4 \cdot \text{H}_2\text{O}$.
Platinum	57·86	(2) 54·92
Chlorine	42·14	39·99
	<hr/> 100·00	Water.. 5·09
		<hr/> 100·00

A fourth experiment was made at 165°, the temperature of the bath being kept constant by a Harcourt's regulator. The heating

was continued for 15 hours, as an appreciable amount of water was evolved after ten hours. The product obtained in this experiment was free from dichloride. The percentage of platinum found was 57.82, which agrees well with the theoretical value for PtCl_4 .

As thus obtained, platinum tetrachloride is a very soluble, but not deliquescent substance. Its solution in water is strongly acid to litmus paper, and decomposes sodium carbonate rapidly with evolution of carbon dioxide.

These experiments show that platinum tetrachloride, PtCl_4 , can be obtained by heating chloroplatinic acid at a temperature of 165° in a stream of dry hydrogen chloride.

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