III.—*The Sulphate and the Phosphate of the Dimercurammonium Series.*

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THE preparation of dimercurammonium nitrite, NHg_2NO_2 , having already been described (Trans., 1902, **81**, 644), it occurred to me that by treating this compound with an acid, the NO_2 group would be destroyed and the corresponding salt of the reacting acid would be formed. It was, however, found that a halogen acid completely breaks up the molecular structure, giving rise to double salts of the type $2\text{NHg}_2\text{X}, \text{NH}_4\text{X}$, where X represents a halogen atom; but on substituting nitric acid for the halogen acid, the nitrate of the series was readily obtained (*Zeit. anorg. Chem.*, 1902, **33**, 209). It therefore seemed probable that an oxy-acid would behave differently from a halogen acid.

Acting on this hint, I have lately treated dimercurammonium nitrite with sulphuric and phosphoric acids respectively, and have succeeded in preparing the corresponding salts.

The Sulphate.—Dimercurammonium nitrite is gently heated to boiling for some time with dilute sulphuric acid, when nitrous fumes are liberated. As both the parent substance and its derivatives are insoluble, prolonged digestion is necessary before the NO_2 group is completely removed. A white, bulky, crystalline powder is obtained, which is washed free from the adhering mother liquor and dried in the steam-oven. The sulphate thus prepared is soluble in hydrochloric acid and conforms to the formula $(\text{NHg}_2)_2\text{SO}_4 \cdot \text{H}_2\text{O}$.

	Calculated.	Found.	
		I.	II.
Hg	84.92	84.00	—
N	2.97	3.26	—
SO ₄	10.19	10.96	10.21
H ₂ O	1.92	—	—

The foregoing analyses were made with different preparations. The salt gives off moisture when heated in a bulb tube.

The Phosphate.—This salt is prepared in much the same way as the sulphate; it is only necessary to lay stress on the fact that as phosphoric acid attacks the NO₂ group much more slowly than sulphuric acid, continued digestion at 50—60° for 2 to 3 days has been found to be necessary.

The salt is obtained as a white, crystalline powder, which is washed and dried just as in the case of the sulphate; it has the formula NHg₂H₂PO₄. The analyses given below were made with three distinct preparations.

	Calculated.	Found.		
		I.	II.	III.
Hg	78.30	78.54	77.4	78.07
N.	2.74	2.00	—	—
P.	6.07	6.44	6.33	—

It has all along been pointed out that when mercury is directly attached to the nitrogen atom, a more stable compound is formed than when it is linked to nitrogen through the intermediary of an oxygen atom, and this is strikingly shown in the behaviour of sodium sulphate towards mercuric nitrite and nitrate respectively (Trans., 1897, 71, 1103). It is also well known that a haloid of mercury is attacked by sulphuric acid with considerable difficulty. The "nitronic" or haloid constitution of the salts in both cases goes to account for this resistance of the SO₄ ion. In the dimercurammonium complex, NHg₂, also, owing to the nitrogen atom being directly related to the mercury atoms, the molecular structure remains unaffected when the salt is subjected to the action of an oxy-acid, but at once succumbs to the attack of a halogen acid.

It is also of interest to note that whilst both the hydrogen atoms of sulphuric acid are replaced by the group NHg₂, only one atom of the tribasic phosphoric acid is similarly affected. This is what might have been expected, considering that in ordinary circumstances even a strong base like caustic soda can only yield the disodium phosphate.

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