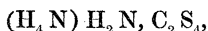
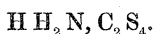


chemistry we are acquainted with a compound closely allied in composition and formation to the new compound. Bisulphide of carbon, when treated with an alcoholic solution of ammonia, furnishes, together with other products, a salt crystallized in long lemon-yellow needles, which is known by the name of sulphocarbamate of ammonium.

This compound,



when treated with diluted acids, is converted into an oily acid of but little stability, sulphocarbamic acid :



If we replace in this compound the hydrogen by ethyl, the nitrogen by phosphorus, in other words, if we replace the ammonia by triethylphosphine, we arrive at the composition of the body which forms the subject of this note.

I have convinced myself experimentally that trimethylphosphine exhibits with bisulphide of carbon a perfectly similar deportment. The compound formed is likewise of a crimson colour, but of a somewhat lighter tint ; it is more volatile and more readily soluble in alcohol than the corresponding ethyl-compound : it is also somewhat soluble in water.

Triethylarsin is not altered by the addition of bisulphide of carbon ; after some time, however, long needles are formed in the mixture of the two bodies. These needles are probably an analogous arsenic-compound : I have not however examined them. A mixture of triethylstibin and bisulphide of carbon was preserved for several months, without undergoing any change.

VIII. "Contributions towards the History of the Monamines." By A. W. HOFMANN, Ph.D., F.R.S. &c. Received May 28, 1858.

The progress of my experiments on the poly-ammonias and on the phosphorus-bases, now and then involves the study of reactions which are scarcely comprised between the boundary lines of the principal inquiries. For the sake of perspicuity, I beg leave to submit the results of these studies separately to the Society.

1. *Action of Bibromide of Ethylene on Trimethylamine.*

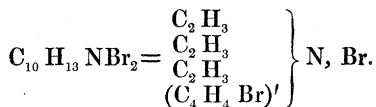
The unexpected result obtained in the action of bibromide of ethyl-

ene on triethylphosphine, induced me to examine the deportment of the tertiary amine-bases under the influence of the same agent. As a characteristic representative of this class I have selected trimethylamine, which may be readily procured in tolerable quantity and in a state of purity.

On submitting trimethylamine to the action of bibromide of ethylene, phenomena are observed which are perfectly similar to those which occur in the analogous experiment with triethylphosphine. On account of the volatility of the trimethylamine, I have never worked with the anhydrous base, but invariably either with aqueous or alcoholic solutions. At the common temperature bibromide of ethylene is only gradually acted on by an aqueous solution of trimethylamine. Frequent agitation and contact for several days are necessary to complete the reaction; addition of alcohol accelerates the process; which may be still very considerably shortened by exposure of the mixture in sealed vessels to a temperature of from 40° to 50° . To exclude complication, it is desirable to avoid a higher temperature and to keep always the bromide in considerable excess.

By adopting these precautions, the mixture of the two bodies is soon found to deposit a white crystalline salt, the formation of which continues until the liquid has assumed an acid reaction. A considerable quantity of this salt is dissolved in the water; it is therefore most convenient to distil off the excess of bibromide of ethylene and to evaporate the residuary liquid to dryness. The dry saline mass, separated from a slightly yellowish deliquescent substance by washing with absolute alcohol and once or twice recrystallized from the same solvent, furnishes magnificent white needles, extremely soluble in water, readily soluble in boiling alcohol, much less so in cold alcohol, and insoluble in ether. This salt can be boiled with the fixed alkalis without disengaging a trace of an alkaline vapour. This deportment renders it easy to recognize the absence of impurities.

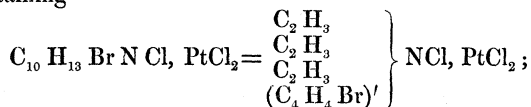
The composition of this substance, established by many determinations, is represented by the formula



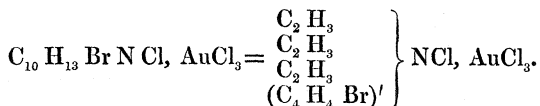
This substance, which presents itself as bromide of trimethyl-bromethylene-ammonium, is formed by the simple union of 1 equivalent

of bibromide of ethylene with 1 equivalent of the tertiary mon-amine. A glance at the formula exhibits the perfect analogy of the composition of this compound with that of the bromide formed by the action of bibromide of ethylene on triethylphosphine. The deportment of the two salts with nitrate and with oxide of silver is also similar in every respect.

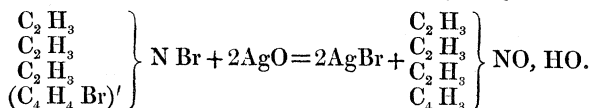
By treatment with nitrate of silver, the bromine not belonging to the ammonium may be removed without affecting the bromine of the radical. The nitrate thus obtained, after separation of the excess of silver, furnishes with bichloride of platinum a difficultly soluble octahedral salt, crystallizable from a large quantity of boiling water, and containing



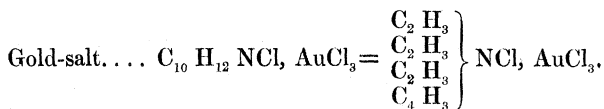
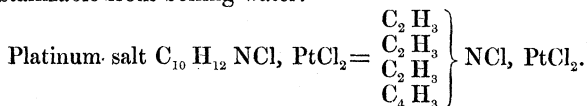
and with terchloride of gold an analogous compound crystallizing from boiling water in splendid golden-yellow needles,



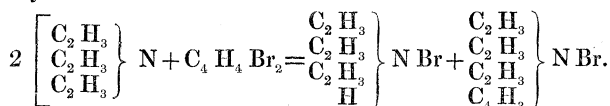
Treatment with oxide of silver converts the bromide of trimethyl-bromethylene-ammonium into the oxide of trimethyl-vinyl-ammonium:



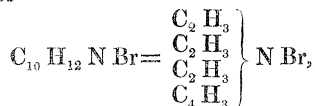
The solution of this substance is a powerfully alkaline liquid, which, on saturation with hydrobromic acid, furnishes a deliquescent bromide of extreme solubility, entirely differing from the original bromide. The corresponding chloride forms with bichloride of platinum an octahedral salt, likewise extremely soluble in water, but insoluble in alcohol; with terchloride of gold, beautiful yellow needles recrystallizable from boiling water.



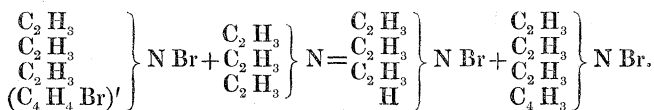
As might have been expected from the experience gathered in the phosphorus-series, the formation of the brominetted bromide is invariably accompanied by the simultaneous production of the vinyl-compound, and of a corresponding quantity of hydrobromate of trimethylamine.



Indeed it would appear that at a high temperature and with an excess of trimethylamine, the equation just given represents the principal phase of the reaction. In an experiment made under the stated conditions, the liquid in the digester had assumed a deep yellowish colour; and on evaporation and appropriate treatment a crystalline salt was obtained, which on analysis was found to consist exclusively of



the mother-liquor containing a large quantity of hydrobromate of trimethylamine. It is possible that even in this reaction the vinyl-compound was only a secondary product, formed by the decomposition of the brominetted bromide under the influence of an excess of trimethylamine.



Exactly as in the phosphorus-series, together with the compounds described, some other substances are formed, particularly when the process is supported by the action of heat. As yet I do not sufficiently understand these additional reactions.

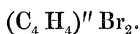
I have established experimentally that triethylamine and triamylamine, when treated with bibromide of ethylene, give rise to similar reactions. I have not, however, minutely examined the substances which are formed. They are sufficiently characterized by theory.

The unexpected department of bibromide of ethylene with the tertiary monamines and monophosphines, furnishes a new proof of the fact, that all our rational formulæ are, after all, the expressions of

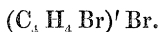
special reactions. With the alkalis, the brominetted Dutch liquid behaves as a double salt of two monatomic compounds,



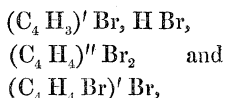
With silver-salts, with aniline, &c., it exhibits the deportment of a true biatomic compound,



With the tertiary amines and phosphines, lastly, we find that the elements of the same body, in accordance with the requirement of the case, arrange themselves into one monatomic compound, the constitution of which, if we simply consider the function which it performs under these special circumstances, might be represented by the formula



It is obvious that the three formulæ,



represent the constitution of this body with reference to certain special conditions; the absolute arrangement of the molecules we ignore altogether, and it is doubtful whether it will ever be accessible to experiment.

IX. "Researches on the Action of Ammonia on Glyoxal."

By Dr. H. DEBUS. Communicated by Dr. TYNDALL.

Received May 21, 1858.

(Abstract.)

If alcohol be slowly oxidized by nitric acid at ordinary temperatures, besides other substances, glyoxal, $\text{C}_2 \text{H}_2 \text{O}_2$, and glyoxylic acid, $\text{C}_2 \text{H}_4 \text{O}_4^*$, are formed.

I have continued the investigation of these substances, and beg to lay before the Royal Society some of the more interesting results.

Glyoxal, of the consistency of ordinary syrup, is mixed with about three times its bulk of strong ammonia, and the mixture kept for twenty minutes at a temperature from 60° to 80°C . The liquid

* $\text{C} = 12$, $\text{H} = 1$, $\text{O} = 16$.—Phil. Mag. Nov. 1856, and Jan. 1857.