XXXIX. *On Theine and its Preparation.*

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Read May 2, 1843.

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Complete Analysis of the Theine prepared by Sublimation.

0·285 gr. of the substance gave 0·5125 carbonic acid and 0·132 water. When burnt with oxide of copper, eight tubes gave carbonic acid and nitrogen in the proportion of four to one.

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	Found.	At.	Calculated numbers.
Carbon	49.72	16 Carbon	=49.798
Hydrogen	5.14	10 Hydrogen	= 5.082
Nitrogen	28.78	2 Nitrogen	=28.832
Oxygen	16.36	4 Oxygen	=16.288
	100.00		100.000

Theine from Paraguay Tea.

Through the kindness of my friend Professor Gardner, I have procured an additional quantity of Paraguay tea, which has enabled me to complete the analysis of the theine it contains, and also to determine its quantity. The easiest and most economical way of obtaining theine from Paraguay tea is by sublimation. The filtered infusion of the tea, after being treated with acetate of lead and the precipitate removed, should be boiled with an excess of litharge, the clear liquid evaporated to dryness and sublimed with the usual precautions. One quantity of two pounds yielded 12.5 grs. of anhydrous theine, and a second quantity of equal amount, which was more successfully treated, gave 14.5 grs.=0.13 per cent. This is about half the quantity which most kinds of coffee yield, which I have found to vary from 12 to 18 grs. for a pound, and about ten times less than Chinese tea, a pound of which yields from 70 to 90 grs.

Analysis of Theine from Paraguay Tea.

I. 0.2095 gr. of the substance dried at 212° gave 0.525 carbonic acid and 0.134 water.

II. 0.3192 gr. gave 0.572 carbonic acid and 0.1487 water.

When burnt with oxide of copper, nine tubes gave carbonic acid and nitrogen in the proportion of four to one.

	Found.		At.	Calculated numbers.
	I.	II.		
Carbon	49.960	49.54	16 Carbon	=49.798
Hydrogen	5.145	5.17	10 Hydrogen	= 5.082
Nitrogen	28.927	28.68	2 Nitrogen	=28.832
Oxygen	15.968	16.61	4 Oxygen	=16.288
	100.000	100.00		100.000

The following is a more complete analysis of the double salt of muriate of theine and chloride of platinum:—

I. 0.4637 salt gave 0.412 carbonic acid and 0.1155 water.

II. 0.4347 gave 0.386 carbonic acid and 0.1184 water.

I. 0.461 salt gave 0.112 plat.=24.29 per cent.

II. 0.529 salt gave 0.130 plat.=24.57.

III. 0.5828 salt gave 0.143 plat.=24.53.

IV. 0.458 salt gave 0.112 plat.=24.45.

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I.	II.	At. Calculated numbers	per cent.
C 24·56	24·55	16 C = 1222·9	24·32
H 2·76	3·02	11 H = 137·2	2·72
		4 N = 708·1	14·08
		4 O = 400·0	7·96
		3 Cl = 1327·9	26·41
Pt 24·46	24·46	Pt 1233·2	24·51
		5029·3	100·00

The rational formula for the salt is $C_{16} H_{11} N_4 O_4 Cl H + Pt\ 2\ Cl$. The formula for Theine,—

16 Carbon	= 1222·96
11 Hydrogen	= 124·79
4 Nitrogen	= 708·16
4 Oxygen	= 400·00
Atomic weight	= 2455·91

Nitro-theine.

I have given the provisional name of nitro-theine to the substance crystallizing in large shining plates, produced by the long-continued action of an excess of boiling nitric acid upon theine. It is not necessary to employ fuming nitric acid to obtain this substance, acid of the ordinary strength answers equally well. Nitro-theine when crystallized out of water forms large shining plates resembling cetine, but having more of a pearly lustre. When sublimed, its crystals resemble those of naphthaline, and when formed by spontaneous evaporation from æther they are deposited in large, very regular rhombohedrons. I formerly stated that alkalies do not evolve ammonia from nitro-theine; I find that in this I was mistaken, for when boiled with solution of potash it gives off abundance of ammonia.

When subjected to analysis,—

I. 0·2628 gr. of the substance dried at 212° gave 0·398 carbonic acid and 0·1005 of the water.

II. 0·2529 gr. gave 0·3855 carbonic acid and 0·0975 water.

When burnt with oxide of copper, ten tubes gave carbonic acid and nitrogen in the proportion of five to one.

	I.	II.
Carbon	41·87	42·15
Hydrogen	4·24	4·28
Nitrogen	19·39	19·56
Oxygen	34·50	34·01
	100·00	100·00

Nitro-theine appears to be a neutral body, and as I have not been able to determine its atomic weight, I have not

thought it worth while to attempt to deduce any formula from these analyses. Theine does not yield more of this substance than from 5 to 6 per cent.