observations and trials which we were not authorized in making; and, besides, the fish-tail and the argand seem to us to embrace the two limiting modes of burning between which the maximum effect must be found.

In this aspect the last result, which covers to all probable variations of management or mismanagement in the ordinary use of gas, appears to us worthy of undoubted acceptance.

J. H. ALEXANDER,
JOHN F. FRAZER.

REPORT ON THE ANALYTICAL INVESTIGATION OF THE ILLUMINATING GASES
OF NEW YORK AND PHILADELPHIA.

The New York gas was taken from the office of Messrs. Spies, Christ & Co., corner of Broad and Beaver streets, in glass tubes drawn out to fine points, in which it was sealed by the blow-pipe flame, after a sufficient amount of the gas had passed through to insure the total expulsion of atmospheric air. The Philadelphia gas was taken at the Laboratory in College Avenue, Tenth street, between Market and Chesnut streets. The results prove them both to have been free of atmospheric air.

The course of analysis pursued was that of Prof. Bunsen, a description of which will be found in the *Journal of the Franklin Institute* for 1849. The results are given in volumes as the determinations were made, the reductions being in every case to the usual standards of England and the United States, viz: to 32° Fahr. and 30" Barom. The thermometer was an accurate one of German manufacture. The barometer was a French aneroid, which had been previously compared with an ordinary mercurial barometer, and which would indicate the .01 inch.

The following are the results of the analysis of 100 volumes of the two gases:

		New York Gas.	Philadelphia Gas.
Olefiant Gas	CH ₄	8.32	6.38
Marsh Gas	CH ₄	32.92	54.84
Hydrogen	H ₂	24.04	26.27
Carbonic Oxide	CO	11.60	4.42
Carbonic Acid	CO ₂	2.10	0.97
Oxygen	O	0.19	0.04
Nitrogen	N	20.83	7.08
		100.00	100.00

JAMES C. BOOTH,
Prof. App. Chem. Univ. Pa.

WILLIAM L. FABER,
Pract. Chem. & Metallurgist.

Philad., Dec. 30, 1851.

ANALYSIS OF ILLUMINATING GAS, FURNISHED FOR CONSUMPTION IN NEW
YORK AND IN PHILADELPHIA, AND COMPARISON OF ITS PROBABLE CHE-
MICAL CONSTITUTION IN THE TWO CITIES RESPECTIVELY.

The sample of New York gas was collected at the New York Hotel in the forenoon of 2d January, 1852, by J. H. Alexander, and understood to be furnished there by the Manhattan Gas Company; the sample of Philadelphia gas is believed to have been gathered in the forenoon of 1st January, 1852, by Professor Booth, from a burner in his Laboratory.

Direct measurements, corrected for a uniform barometer-stand of 30 in. and constant temperature of 32° F., gave the following results:

		Manhattan Gas.	Philadelphia Gas.
Carbonic Acid	CO ² ,	0.0222	0.0087
Hydro-Carbons,	CH ² ,	0.0928	0.0996
Olefiant Gas	C ² H ² ,	0.0344	0.0204
Lt. Carburetted Hydrogen	CH ² ,	0.7089	0.3227
Hydrogen	H,		0.4049
Nitrogen	N,	0.1231	0.1461
		<hr/> 0.9814	<hr/> 1.0024

Assuming a constitution in accordance with the formulæ given above, these results may be reduced for comparison as follows:

	Manhattan.		Philadelphia.	
	Volume.	Weight.	Volume.	Weight.
CO ² ,	0.0227	= 0.0777	0.0087	= 0.0306
CH,	0.0945	= 0.1044	0.0993	= 0.1129
C ² H ² ,	0.0350	= 0.0774	0.0204	= 0.0464
CH ² ,	0.3204	= 0.4035	0.3220	= 0.4172
H,	0.4020	= 0.0623	0.4039	= 0.0645
N,	0.1254	= 0.2747	0.1457	= 0.3284
	<hr/> 1.	<hr/> 1.	<hr/> 1.	<hr/> 1.

Corresponding spec. grav., 0.444

0.432

The quantities inscribed as hydro-carbons were among the volumes absorbed by chlorine water in the dark; and no doubt appear slightly in excess from the vapor of naphtha accompanying the potassium used as one of the re-agents. The sample on hand was not sufficient to allow a repetition of the experiment by which this source of error might have been eliminated; but as both samples were purposely treated alike, it is fair to consider its influence as proportionate in the two cases, and as therefore not affecting the comparison here.

The smallness of the sample of Manhattan gas also gave no opportunity for separating the proportions of light carburetted hydrogen and pure hydrogen in that instance, as was done in the case of the Philadelphia gas. In the comparison, therefore, they are distinguished in the same ratio for the former as was found experimentally for the latter.

And the same obstacle prevented the experimental determination of specific gravities. The values given for this term above, are therefore only theoretical, and have been presented merely in illustration; though they may be presumed not to deviate materially from the fact.

Finally, if abstraction be made of the nitrogen and the carbonic acid, the former of which certainly and the latter probably contribute nothing to the illuminating power in combustion, the economical efficiency of the two samples may be compared in the ratio of their aggregated combustible elements, as under:

	Carbon.	Hydrogen.
Manhattan gas,	0.45845 = 1.	0.18915 = 1.
Philadelphia gas,	0.44944 = 0.98	0.19156 = 1.01

This last comparison shows the Manhattan gas to be richer in carbon by 2 per cent. and poorer in hydrogen by 1 per cent., under equal weights, than the Philadelphia gas; and implies besides, that under low pressures at the burner, the Manhattan gas should have the advantage in illuminating power, while under high pressures this advantage would be exhibited by the Philadelphia gas; and, finally, that within this range there is a point of pressure at which the illuminating power of the two gases, with the same burner, would be found exactly the same.

DAVID STEWART,
J. H. ALEXANDER.

Baltimore, February 16th, 1852.

NOTE.—A later analysis of the Philadelphia gas, made by Dr. CHARLES M. WETHERILL in the month of February, gives the following result:

Olefiant gas and	}		8.936
Hydro-carbon vapors,			
Oxygen,	.	.	0.136
Hydrogen,	.	.	44.168
Light Carburetted Hydrogen,	.	.	41.620
Carbonic Oxide,	.	.	5.081
Carbonic Acid,	.	.	0.000
Nitrogen,	.	.	0.059
			<hr/>
			100.000
			<hr/>

*Potash Salts in Soot from Blast Iron Furnaces.**

At the Glasgow Philosophical Society, on Wednesday, Dr. Penny communicated his discovery of the presence of a considerable quantity of potash salts in the soot from blast iron furnaces. The soot experimented upon was obtained from the Coltness Iron Works, where it collects in the flues that lead the heated gases, and other products of combustion, from the top of the furnaces to the air heaters and steam boilers. Dr. Penny gave the particulars of a careful analysis of the soot, and exhibited specimens of the potash salt, which had been extracted in large quantities by Dr. Quinlan, of Hurlet. The salt has been pronounced by competent judges to be a good marketable article, consisting chiefly of carbonate and sulphate of potash, with a small admixture of soda salts. According to the results of experiments described by Dr. Penny, it appears that the soot will yield about 50 per cent. of this marketable salt, containing 43 per cent. of pure potash. It has been found that the amount of potash in soot procured from other iron works is subject to variation, arising, no doubt, from the use of different coals in the blast furnace. From the well known value of potash salts, there is every reason to expect that this discovery will prove of considerable importance to those who are interested in these commercial products, and also to ironmasters, who will be enabled to turn to account a substance which has not hitherto been applied to any practical use.

*From the London Mining Journal, No. 847.