

LXVII.—*The Use of Aniline as an Absorbent of Cyanogen in Gas Analysis.*

By MORRIS LOEB.

In a paper published in the *Comptes Rendus*, **100**, 1005, some time ago, Jaquemin proposed the use of aniline as an absorbent for cyanogen in quantitative gas analysis, without however giving details of any experiments as to the trustworthiness of the method. The proposal is a surprising one, considering that hydrogen cyanide is always formed in the preparation of cyananiline; this fact is distinctly stated by Hofmann (*Annalen*, **66**, 129), who accounted for its production by certain secondary reactions which he studied. It is also to be noted that Jaquemin, in the same paper, describes a very satisfactory method of preparing cyanogen gas in the wet way, and that he probably employed the moist cyanogen in his experiments with aniline. As the presence of water seems to favour most of the reactions of cyanogen, there did not seem to be any conclusive evidence that dry cyanogen would be totally absorbed by aniline. At all events, it seemed worth while to make the experiment with cyanogen prepared in the old way, and at the same time to ascertain to what extent the development of hydrocyanic acid would interfere with Jaquemin's proposed method for gas analysis. For this purpose, cyanogen prepared from dry mercuric cyanide was brought into contact with recently distilled aniline. The gas was, indeed, absorbed rapidly and completely, nor did a bubble of gas appear after 24 hours' standing. But as soon as carbon dioxide was passed in, the presence

of hydrocyanic acid became apparent. It was expelled from the aniline by the carbon dioxide, and could now be recognised both by its odour and by the prussian blue reaction. At the same time a considerable quantity of carbon dioxide is absorbed by the aniline and must be held in solution, as chemical union is impossible under the circumstances. As the same is said to be the case with carbon monoxide, and these two gases are those which generally accompany cyanogen, I fail to see how aniline can be generally useful in determining the amount of cyanogen in a mixture, apart from the fact that hydrogen cyanide is produced in the reaction, and is itself very loosely attracted by aniline.

The experiments by which I satisfied myself of this were made last April, in the laboratory of the Physical Association of Frankfort-on-Main, to the director of which, Dr. B. Lepsius, I am very much indebted. The details of a few of the most important tests are given below.

I. 32·88 c.c. of cyanogen gas (under standard conditions) were absorbed immediately by 12·5 c.c. aniline; after 25 hours no trace of gas had been evolved.

II. A mixture of cyanogen and dry air was introduced into a U-shaped eudiometer, provided with stopcocks and filled with mercury. Aniline was first added and allowed to absorb the cyanogen, and dry carbon dioxide was then passed in; when no further change took place, the unabsorbed gas was transferred to a test-tube over mercury, and brought in contact with a few drops of sodic hydrate; the alkaline solution gave an appreciable test for hydrocyanic acid with ferrous and ferric salts. In the following table the measurements and the results are given:—

	<i>t.</i>	B.	c.c.	Corrected.	
Volume of cyanogen and air	19·0°	752·1	60	55·34	—
Volume 22 hours after introducing aniline	19·5	752·1	7·7	7·09	—
Volume of cyanogen absorbed. . . .	—	—	—	—	48·25
After addition of carbon dioxide. .	19·5	752·1	36·75	33·84	—
Volume carbon dioxide.	—	—	—	—	26·75
After 23·5 hours	19·5	752·0	21·00	19·33	—
Volume carbon dioxide absorbed. .	—	—	—	—	14·51

III. A similar experiment, performed in a somewhat different order, and with the use of a straight eudiometer, gave an analogous result. H = the height of the column of mercury, h = the height of the column of aniline reduced to mercury.

814 NILSON AND PETTERSSON: NEW CHLORIDES OF INDIUM,

	<i>t.</i>	B.	H.	<i>h.</i>	c.c.	Corrected.
Volume of carbon dioxide	19·5°	752·1	—	—	56·5	52·03
Volume of carbon dioxide and cyanogen	19·5	752·1	—	—	108·5	99·91
Volume of cyanogen	—	—	—	—	—	47·88
Vol. 22 hours after introduction of aniline	19·5	752·0	227	5·3	43·0	27·32
Volume of gas absorbed	—	—	—	—	—	72·59

47·88 c.c. cyanogen gas and 24·71 c.c. carbon dioxide have, therefore been absorbed. In this case, too, the residual gas had a decided odour of prussic acid.
