

small amount in his mouth and in about an hour a feeling of numbness spread over him to such a degree that pinching the flesh produced little sensation. Mr. Jordan was frightened by his condition but in an hour and a half he returned to a nearly normal state. The physiological action of this and other diphenamine compounds of chloral will be studied with care, some preliminary experiments on rabbits by Dr. MacNider, of this University, having confirmed the observation of such an action.

CHAPEL HILL, N. C.,
October 16, 1907.

NOTES.

The boiling point of isobutane, which is given in the literature, is based on a determination by Butlerow.¹ He found that the gas begins to condense to a liquid at -17° .

Some years ago Mabery² isolated from petroleum a hydrocarbon which boiled at 0° and which he considered to be isobutane on the basis of the chloride obtained from it, which boiled at $68-69^{\circ}$ and which he considered to be isobutyl chloride. Since 2-chlor-2-methyl-propane boils at $67.3-67.8^{\circ}$ ³ and has a specific gravity closely approaching that of Mabery's product, it seems probable that the chloride which he obtained was in reality a derivative of normal butane, and not of isobutane. This view is further supported by the work of Pelouze and Cahours,⁴ who found that a chloride boiling at $65-70^{\circ}$ is obtained by the action of chlorine on normal butane.

It seemed of interest to prepare isobutane again, and make a new determination of the boiling-point. This was done by Mr. E. F. Phillips under my direction in the laboratory of the Rose Polytechnic Institute several years ago, and the results were reported to Professor Mabery, thinking that he would, at some time, publish something further upon the subject. As he has not done this and informs me that he does not expect to take up the subject again, it seems proper to give the results of our experiments.

The isobutane was prepared by the reduction of isobutyl iodide with zinc and dilute alcohol. The gas was purified and dried by passing it through bulbs containing alcohol and also bulbs containing concentrated sulphuric acid. It was condensed to a liquid by a freezing mixture and the temperature at which the vapor of this liquid exerted a pressure of 760 mm. was determined. This temperature was found to be -11.5° . A considerable part of the liquid was allowed to evaporate and the deter-

¹ Ann., 144, 13.

² Am. Chem. J., 19, 247.

³ Norris and Green, *Ibid.*, 26, 308.

⁴ Jsb., 1863, 524.

mination repeated, proving that the liquid was practically homogeneous. A determination of the density of the gas also gave results agreeing satisfactorily with the theory.

There seems, therefore, to be little question that the butane obtained by Professor Mabery was in reality normal butane, and that the boiling-point of isobutane is -11.5° . W. A. NOYES.

The following note has been received from Prof. Mabery to whom this note was submitted in manuscript:

"I have no reason to doubt the accuracy of Professor Noyes' observation on the boiling-point of isobutane. It is not incompatible with our results on the butane in petroleum. I have intended to refer to this subject more fully in a later paper, a resumé of the composition of American petroleum." C. F. MABERY.

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The Stereochemistry of Indigo.—The last paragraph of this paper (This Journal, December number, 1907, p. 1743,) in which the structures of the two diacetyl indigo whites are discussed on the spatial hypothesis, assumes that both compounds possess the ketone structure. If both rearrange to the tautomeric enol forms, it should be pointed out that there would still be two stereoisomers (*cis* and *trans*) which it would not be possible to resolve into optically active isomers. K. GEORGE FALK AND J. M. NELSON.

REVIEW.

RESEARCHES ON THE DENSITY OF GASES

CARRIED ON DURING 1904, 1905 AND 1906 IN THE PHYSICAL CHEMISTRY LABORATORY OF THE UNIVERSITY OF GENEVA.¹

BY PHILIPPE A. GUYE.

Received October 1, 1907.

The present article contains a résumé of the results obtained during the course of three years' work on the exact density of gases. The work has been carried on in collaboration with Messrs. Jaquerod, Pintza, Davila, Gazarian and Baume, and until now has been the subject of only isolated publication (Jaquerod and Pintza, *Compt. rend.*, **139**, 129 (1904), (SO₂ and O₂); Guye and Pintza, *Ibid.*, **139**, 679 (1904); **141**, 51 (1905), (N₂O, CO₂ and NH₃); Guye and Davila, *Ibid.*, **141**, 826 (1905), (NO); Guye and Gazarian, *Ibid.*, **143**, 1233 (1906), (HCl); Baume, unpublished (1907), (SO₂)). These have contributed to the problem of the physicochemical determination of exact molecular weights, with a view to checking up the

¹ From *Archives des Sciences Physiques et Naturelles*, **24**, 32-62. Translated by Helen Isham.