of the Canal Zone erroneously referred to *L. chaperi* by Cushman, and it is different from *L. undosa* Cushman from the Antiguan Oligocene, a species which I had supposed might be synonymous with it. *L. chaperi* is as yet certainly known only from its upper Eocene type locality.

Cushman, J. A. 1. American species of *Operculina* and *Heterostegina* and their faunal relations: *U. S. Geol. Survey Prof. Paper*, **128**, pp. 125–137, pl. 3, 18–21, 1921.

2. Orbitoid foraminifera of the genus *Orthophragmina* from Georgia and Florida: *U. S. Geol. Survey Prof. Paper*, **108**, pp. 115–124, pls. 40–44, 1917.

3. American species of *Orthophragmina* and *Lepidocyclina: U. S. Geol. Survey Prof. Paper*, **125**, pp. 39–105, pls. 7–35, 1920.

4. The larger fossil foraminifera of the Panama Canal Zone: *U. S. Nat. Mus. Bull.*, **103**, pp. 89–102, pls. 34–45, 1918.

Douvillé, H. 1. Les couches à Orbitoides de l' isthme de Panama: *Soc. géol. France Compte rendu somm.*, Déc. 20, 1915, pp. 129–131, 1915.

2. Revision des Lépidocyclines: *Soc. géol. France* (n. s.), *mém.*, no. **2**, pp. 49, 2 pls., 47 figs. in text, 1924.

Lemoine, R., and Douvillé, R. Sus le genre *Lepidocyclina* Gümbel: *Soc. géol. France mém.*, no. **32**, pp. 41, 3 pls., 4 figs. in text, 1904.

Vaughan, T. W. 1. American and European Tertiary larger foraminifera: *Geol. Soc. Amer. Bull.*, **35**, pp. 785, 822, pls. 30–36, 6 figs. in text, 1924.

2. The biologic character and geologic correlation of the sedimentary formations of Panama: *U. S. Nat. Mus. Bull.*, **103**, pp. 547–612, 1919.

3. Criteria and status of correlation and classification of Tertiary deposits: *Geol. Soc. Amer. Bull.*, **35**, pp. 677–742, 1924.

THE ELECTRICAL CONDUCTIVITY OF LIQUID CYANOGEN BROMIDE

BY GEORGE GLOCKLER*

GATES CHEMICAL LABORATORY, CALIFORNIA INSTITUTE OF TECHNOLOGY

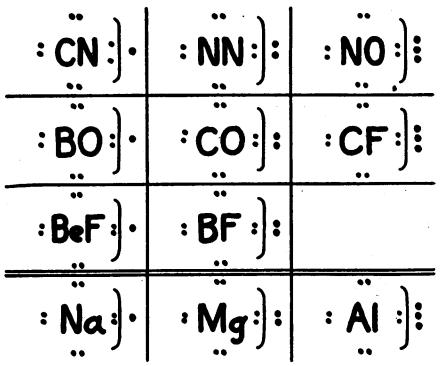
Communicated June 22, 1926

In this note I wish to record the fact that liquid cyanogen bromide at a temperature of 55°C. conducts electricity. The specific conductance of the liquid is approximately 0.02 mhos per centimeter cube.

It may be of interest to give the reasoning that led me to expect that cyanogen bromide would conduct. In a very interesting paper H. Grimm[1] has pictured a type of molecule which he calls a "pseudo atom." Methane, for instance, is a pseudo atom of neon, since the carbon nucleus and the four protons have a total positive charge of ten as has the single neon nucleus. The outer electronic structure of methane and neon are quite similar on this theory and the interesting feature concerning a pseudo atom is the complex nuclear center.

This same idea has lately come into the foreground in the theory of band

spectra.[2] The accompanying table contains a schematic representation of the possible pseudo atoms formed by the elements lithium to fluorine. It should be noted that Langmuir as early as 1916 proposed a structure for nitrogen and carbon monoxide, which resembles the above very closely.



It is interesting to study this table from a chemical point of view. For the present purpose I wish to point out that cyanogen radical is on this theory like sodium atom and therefore its fused salts should conduct electrically.

This reasoning led me to study the electrical conductivity of cyanogen bromide. A small conductivity cell having platinum electrodes 1 square centimeter in area and 1 cm. apart showed a resistance of only 200 ohms. The cyanogen bromide used was obtained from the Research Laboratories of the Eastman Kodak Co. It was not further purified. The whole material melted at 52°C. The conductivity of the molten substance was determined at 55°. I also studied the electrolysis of molten cyanogen bromide. The following observations were made in a U-shaped cell having platinum electrodes: (1) At the negative pole a colorless gas is given off which does not attack the electrode. (2) At the positive pole at first no gas is given off, but after a while the platinum assumes a reddish color and finally some gas bubbles appear. (3) The color of molten cyanogen bromide is yellowish brown. During electrolysis this color becomes lighter in shade around the negative pole and deeper in shade around the positive pole. (4) Some crystals of solid cyanogen bromide which were located above the liquid in the positive pole compartment assume a distinctly reddish color.

These experiments are only to be regarded as preliminary. The products of the electrolysis must be analyzed. This I hope to do in the near future.

I believe that a further careful study of the conductivity of cyanogen bromide will yield interesting results regarding its structure. And furthermore that a detailed analysis from a chemical point of view of table 1 should give us an idea as to whether or not the pseudo atom will prove a fruitful concept in chemistry.

* NATIONAL RESEARCH FELLOW IN CHEMISTRY.

[1] *Zs. Electrochem.*, **31**, 474 (1925).

[2] R. S. Mullikan, *Physic. Rev.*, **26**, 561 (1925); R. T. Birge, *Nature*, Feb. 13 and 27, 1926.