$$\begin{array}{l} R \quad\quad\quad R \\ R{:}RaD{:}D \longrightarrow R{:}RaE{:} + R; \\ R \quad\quad\quad R \end{array}$$

$$\begin{array}{l} \quad\quad\quad\quad\quad\quad R \quad\quad R \\ \quad\quad\quad\quad\quad\quad R{:}RaE{:} \longrightarrow {:}RaF{:} + R \\ \quad\quad\quad\quad\quad\quad R \quad\quad R \end{array}$$

or

$$RaD(CH_3)_4 \longrightarrow RaE(CH_3)_4^+ + (-) \longrightarrow RaE(CH_3)_3 + CH_3, \text{ etc.}$$

This behavior is in marked contrast to the effects of heat and light on the metal alkyls, both of which produce a decomposition into metal and hydrocarbons. While increased vibrational or electronic energy (heat or light) results in the disruption of all of the metal–alkyl bonds, the expulsion of an electron from the nucleus apparently causes the rupture of one bond only.

STANFORD UNIVERSITY, CALIF. RECEIVED JULY 20, 1934

x-Ray Patterns of Crystalline Urease and Pepsin

BY ISADOR FANKUCHEN

Pepsin and urease were studied by means of x-rays, using material prepared by Professor J. B. Sumner. Inasmuch as both materials were obtainable only in the form of microscopic crystals, the powder method alone could be employed. The radiation was from copper and iron targets. The following spacings in Ångström units were observed: for urease, 11.2, 4.57, 4.22, 4.15, 3.75, 2.34, 2.13; for pepsin, 49.2, 29.2, 21.0, 15.8, 12.8, 10.7, 9.65, 8.40, 7.16, 4.20, 2.14. With neither pepsin nor urease was there found a strong reflection corresponding to the length of the amino acid residue. It is probable, therefore, that neither substance contains straight chains of amino acid residues. The 4.20 spacing in pepsin was very intense and may correspond to a repetition of a folded amino acid residue chain. In neither case was it possible to make a unit cell size determination. For both pepsin and urease, the same pattern was obtained both from fresh material and from specimens that had lost water and set into a gel. It is probable therefore that the results given here are characteristic only for altered material. The results obtained with pepsin do not agree closely with those of Astbury and Lomax,[1] who state that the chief spacings are 11.5 and 4.6 Å.

(1) Astbury and Lomax, *Nature*, **133**, 795 (1934).

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RECEIVED AUGUST 8, 1934

[CONTRIBUTION FROM THE RESEARCH LABORATORIES OF THE UNIVERSAL OIL PRODUCTS COMPANY]

Catalysis in the Hydrogen Bromide–Olefins Addition

BY V. N. IPATIEFF, H. PINES AND R. C. WACKHER

It has been shown[1] that the butenes are absorbed by an acetic acid solution of hydrogen bromide while propene under the same experimental conditions is not absorbed. It was thought an analytical method might be developed on this basis for the quantitative determination of propene in a mixture of gases containing butenes.

However, it was found that when a mixture of propene and butenes was passed through hydrogen bromide in glacial acetic acid solution, some of the propene reacted with the hydrogen bromide; the butyl bromide formed promoted the reaction between hydrogen bromide and propene. This led to the study of the effect of other organic compounds upon the speed of addition of hydrogen bromide to propene.

(1) Ipatieff and Dekhanov, *J. Russ. Phys.-Chem. Soc.*, **36**, 659 (1904).

Apparatus and Procedure

The gas from an 8-liter glass gasometer was passed through a U drying tube filled with magnesium perchlorate and then through a gas absorber. The absorber was the ordinary gas wash bottle one-third filled with glass beads. It contained the glacial acetic acid solution of hydrogen bromide. Approximately the same quantity of solution was used in each experiment. The gas absorber was surrounded with an ice-bath so as to keep the temperature of the acid solution at 5°. From the gas absorber the gas was passed through a U-tube containing soda lime for absorption of the hydrogen bromide carried over from the reaction flask. The unreacted gas was collected in another 8-liter gasometer. The gas was passed with a speed of 2 liters per hour; readings of the volume of charged gas and exit gas were taken every fifteen minutes. The volumes of gas were computed to standard conditions of temperature and pressure. The alkyl bromides formed were submitted to a fractional distillation.

The apparatus for the experiment with propene and hydrogen bromide gas was smaller but similar to that employed in the other experiments; the pure hydrogen bro-