THE REACTIONS OF CALCIUM CARBIDE WITH THE VAPORS OF CERTAIN ORGANIC COMPOUNDS, A DISSERTATION

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The reactions of calcium carbide with the vapors of certain organic compounds, a dissertation by A. J. McGrail

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Trieste

The Reactions of Calcium Carbide with the Vapors of Certain Organic Compounds

A DISSERTATION
Submitted to the Faculty of Sciences of the Catholic University of America in partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy.

By
A. J. McGRAIL.

Washington, D. C.
1916.

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SOME REACTIONS OF CALCIUM CARBIDE.

Although the reaction of Calcium Carbide with water has been known for several years, it seems strange that a search of the literature upon the subject reveals the fact that only a few attempts have been made to study the effect of this powerful reagent upon other compounds.

Calcium carbide was used by Hugo Haehn as a condensing agent for organic acids. His method of experimentation was to pass vapors of the various acids over heated carbide. He observed the formation of acetylene and the corresponding ketone. Formic acid was converted into water and carbon monoxide, acetic acid gave acetone and a small amount of methyl alcohol, propionic acid formed diethyl ketone, butyric acid formed dipropyl ketone, isovaleric acid produced valeric aldehyde and valerone, while benzoic acid was converted into benzophenone.[1]

Bodroux and Taboury studied the reaction of calcium carbide on various ketones. Acetone, butanone, and acetophenone condensed to higher boiling compounds, with the elimination of water. Pentanone-3, however, would not react, and the authors concluded that the acetyl group CH_3CO- was essential for the condensation.[2] P. Lefebvre studied this condensation with several substances at 500°. Amyl chloride gave both gaseous and liquid products. The gases consisted of acetylene, ethylene, several other hydrocarbons, and hydrogen. The liquid was a mixture of the amylenes, including methyl-2 butene-1, and methyl-2 butene-2, and the amyl chlorides. The solid products were calcium oxide and calcium chloride.[3]

$$CaC_2 + 2C_5H_{11}Cl = CaCl_2 + C_2H_2 + 2C_5H_{10}.$$

Lefebvre then extended his researches to the alcohols. Amyl alcohol produced acetylene, ethylene, carbon monoxide,

[1] Haehn, Ber., 39, 1703, (1906).
[2] Bodroux and Taboury, Bull., (4), 3, 831, (1908).
[3] Lefebvre, Compt. Rend., 130, 1036, (1900).