



There were also isomeric C_6 materials, presumably radical coupling products, but *no* acetylene was formed. This is unlike the reactions of 2-methylpropane and cyclopropane with carbon atoms produced by nuclear processes where acetylene is formed to the extent of 21.2 and 42.7%, respectively, in oxygen-scavenged systems.⁵

Using the time-delay technique as previously described,³ it was determined that all products were resulting from reactions of the 1S state of carbon. In studies where 1D and 3P species only were present no products were formed. This conclusion is also supported by the low absolute yields obtained in these reactions, being $\sim 35\%$ of the yields in the reactions with olefins. It was previously determined² that $\sim 40\%$ of the carbon species generated with these arc conditions were in the 1S state.

The insertion of singlet carbon atoms into C-H bonds of paraffin hydrocarbons produces monoalkyl-

(5) A. P. Wolf, *Advan. Phys. Org. Chem.*, **2**, 202 (1964).

carbenes as intermediates. These carbenes are generated in a dilute paraffin hydrocarbon matrix and are thus subject to minimum solvation and efficient relaxation of vibrational excitation. It will be interesting to compare the behavior of these "free carbenes" with the "carbenes" produced by other procedures, photolyses of diazo compounds, α -eliminations of HX by bases, etc., where solvation of the vacant orbital sites by good Lewis bases may be important. Cyclopropyl- and *t*-butylcarbenes have been generated,^{6,7} and the product compositions differ significantly from those obtained in carbon atom insertions. Because the comparisons are made with data from widely different temperatures, caution should be used in their interpretation. Further work may cast light on this problem.

Conservation of spin during 1S insertions implicates singlet-state alkylcarbene intermediates, probably with higher energies than those obtained from photolyses of diazo compounds.

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(6) L. Friedman, H. Shechter, J. Smith, and J. Bayless, *J. Am. Chem. Soc.*, **87**, 659 (1965).

(7) W. Kirmse and B. von Wedel, *Ann.*, **666**, 1 (1963).

(8) National Science Foundation Cooperative Graduate Fellow, 1963-1966.

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Book Reviews

Silicate Science. Volume 1. Silicate Structures. By WILHELM EITEL, Institute for Silicate Research, University of Toledo, Toledo, Ohio. Academic Press Inc., 111 Fifth Ave., New York, N. Y. 1964. xii + 666 pp. 17.5 × 25 cm. \$21.00, subscription; \$24.00, regular.

Professor Eitel has compiled a comprehensive set of correlated abstracts of the literature related to silicates from 1954 to 1964. The subject matter is meticulously classified and is keyed to his "The Physical Chemistry of Silicates" of 1954 by selected references to older work.

About one-third of the work is devoted to silicate crystal structures, a separate section treats clay minerals, and about half is devoted to colloidal aspects of silicate dispersoids. Something near 2000 references are cited, and more than 2000 authors appear in the author index. About 400 illustrations are excerpted from the original sources.

The crystal structure references are arranged according to the Bragg and the Belov schemes. Frequent cross references and multiple citations provide continuity, and the reader is frequently aided by critical annotations. Less frequently, somewhat un-

orthodox contributions are merely abstracted without comment. The separated sectioning for clay minerals reflects the lesser degree of authenticity inherent in interpretations often necessarily based on inadequate or incomplete data.

The achievement of continuity in the more highly diversified catalog of the colloid chemical literature has obviously been the greater problem. It seems true in many instances that the information cited only calls attention to the nature of the work cited, and the conclusion. It will be required that the reader refer to the original work for full understanding of the formulas and the selected illustrations of data presented.

The greatest value of the book will be that it collects under one cover keys to ten prolific years of literature which could otherwise be surveyed by interested research personnel only by prohibitively intensive library searches. Volume 1 will be followed by four more volumes covering glasses, enamels, and slags; phase-rule phenomena; hydrothermal silicate systems; and ceramics and Portland cements.

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