reader is left with very little doubt that organosilicon chemistry can indeed be organized around this point, and that Dr. Eaborn has established a secure niche for himself by doing so. What needs to be pointed out here, however, is that mechanisms are not thrown about irresponsibly; one would expect the young author to overreach himself in his zeal, but he does not. Instead, he holds to a sensible view: "I have tried to set down the experimental facts in such a way that they will be apparent even where my speculations and assertions about them are confounded by the advances of the next few years" (quoted from the preface). And so we come to the enormous service which Dr. Eaborn has rendered to chemists but has not advertised: he has taken a long, thorough look at *all* of organosilicon chemistry, as published through 1958, and has distilled it into a clear,[1] logical account. It is the only comprehensive review that carries up this far,[2] and it would have carried further (or appeared earlier) if it had not been caught up in a printer's strike for several months.

Several books about the technical and industrial aspects of silicones have appeared recently, all of which (for good reasons) have given scant attention to the basic chemistry of organosilicon compounds. Dr. Eaborn's book properly avoids all but "an elementary outline" of industrial silicones, and concentrates 480 pages on fundamental chemistry. In your reviewer's opinion, it will be indispensable to those working in the field, and to chemists in general it will be worth its price several times over.

(1) American readers may be slowed by English spelling and phraseology, but never by loose grammar or unnecessary words.

(2) THIS JOURNAL, **82**, 2405 (1960).

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Crystal Growth. Discussions of the Faraday Society. No. 5, 1949. By the Faraday Society. Butterworth and Co. (Canada), Ltd., 1367 Danforth Avenue, Toronto 6, Ontario, Canada. 1959. 366 pp. 16 × 25 cm. Price $12.00.

"This General Discussion of the Faraday Society was first published in 1949. It has long been out of print, and since its publication many of the papers it contains have become classic. It is reprinted and published in response to the very many requests received by the Faraday Society" (from the paper wrapper).

The reviewer can add little to this, except to concur in the desirability of rendering this discussion of the theoretical, experimental and industrial aspects of Crystal Growth permanently available. Many of the problems so ably presented and discussed at the 1949 meeting are still being followed up, and where some final answer seems to emerge it is often a development of views proposed at the conference. The mass of ideas and observations brought together at this meeting of the most experienced crystal growers remains fascinating.

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Gas Chromatography. Second Edition. By A. I. M. KEULEMANS, Research Chemist, Koninklijke/Shell-Laboratorium, Amsterdam, Holland. Edited by C. G. VERVER. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1959. xxi + 234 pp. 16 × 23.5 cm. Price, $7.50.

During the period 1952 to date the field of gas chromatography has progressed from a laboratory curiosity to a full pledged scientific tool. The appearance of the first edition of this book was hailed by many for providing the first definitive coverage of the available theoretical and experimental knowledge. Since the author, A. Keulemans, was a leader in developing certain of the areas of gas chromatography, his writing stemmed from a first-hand knowledge of the field.

Since 1957, the field has moved ahead at what seems to be an unabated speed. Thus, the second edition of this book is as welcome now as the first edition in 1957. The changes are largely in the practical and implementation areas with little change in the theoretical discussions. The principal changes include a discussion of many of the latest and more advanced applications, the use of gas–solid chromatography for characterizing catalyst surfaces, isotope separation and as a highly sensitive detection device and the extension of previous concepts to the case of columns with a very large number of theoretical plates. In addition all of the material of the first edition has been brought up to date.

As in the first edition the writing is extremely clear and concise and the ideas are well developed. This second edition should prove as valuable to workers in the field of gas chromatography as did the previous edition.

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Fuel Cells. A Symposium held by the Gas and Fuel Division of the American Chemical Society at the 136th National Meeting in Atlantic City. Edited by G. J. YOUNG, Alfred University, Alfred, New York. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. v + 154 pp. 16 × 23.5 cm. Price, $5.75.

This excellent book should be considered as required reading for all those concerned about fuel cells.

The introduction by H. A. Liebhafsky and D. L. Douglas and the articles entitled "The Hydrogen–Oxygen Fuel Cell With Carbon Electrodes" by K. Kordesch, "High-Temperature Fuel Cells" by G. H. J. Broers and J. A. A. Ketelaar and "Carbonaceous Fuel Cells" by H. H. Chambers and A. D. S. Tantram are especially fine and lead quickly to a fundamental understanding of the subject.

The other articles are: "Catalysis of Fuel-Cell Electrode Reactions" by G. J. Young and R. B. Rozelle, "Electrode Kinetics of Low-Temperature Hydrogen–Oxygen Fuel Cells" by L. G. Austin, "The High-Pressure Hydrogen–Oxygen Fuel Cell" by F. T. Bacon, "Nature of the Electrode Processes in Fuel Gas Cells" by E. Gorin and H. L. Recht and "Molten Alkali Carbonate Cells With Gas-Diffusion Electrodes" by D. L. Douglas.

All the authors agree that hydrogen is the ideal fuel and that methane is not well suited for use in fuel cells. However, the use of catalytic converters to produce H_2 and CO from hydrocarbons looks promising.

Since oxygen in air is the most readily available oxidant on earth and does not function well in acid, all the articles pertain mostly to fuel cells with alkaline electrolytes. When halogens are used as oxidants in acid, higher voltages and current densities can be obtained, but the energy output per unit weight of combined fuel is less because of the lower equivalent weight of oxygen.

Fuel cells appear well suited to special applications where large amounts of electrical energy are required over longer periods than can be supplied by conventional batteries. However, fuel cells do not look promising for use in central power stations, although there may be an occasional large scale installation for which cost is secondary.

It is emphasized that fuel cell efficiencies can be misleading since over-all efficiencies of 90% or more usually pertain to operating conditions where current densities are so low as to be impractical for many purposes. Low capital investment, long life and low upkeep are particularly uncertain today for large fuel cells.

Significant improvement in fuel cells appears to await much additional basic research regarding (1) the mechanisms of electrode reactions, (2) the role of catalysts in electrode reactions and (3) energy and charge transfer processes in liquid and solid systems and across membranes. Some applicable basic research may have been done in connection with the development of conventional alkaline batteries.

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