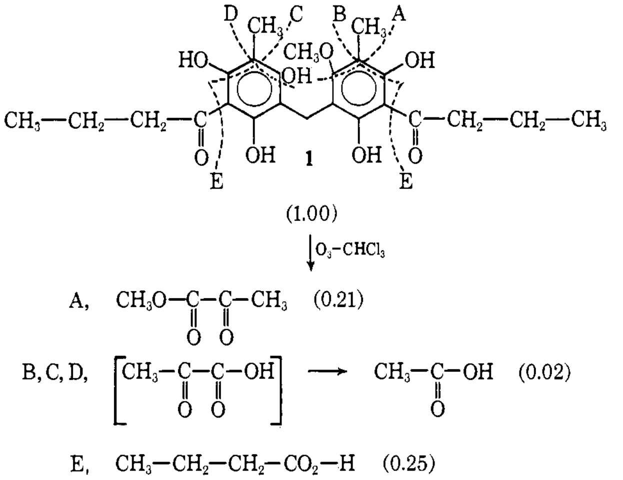
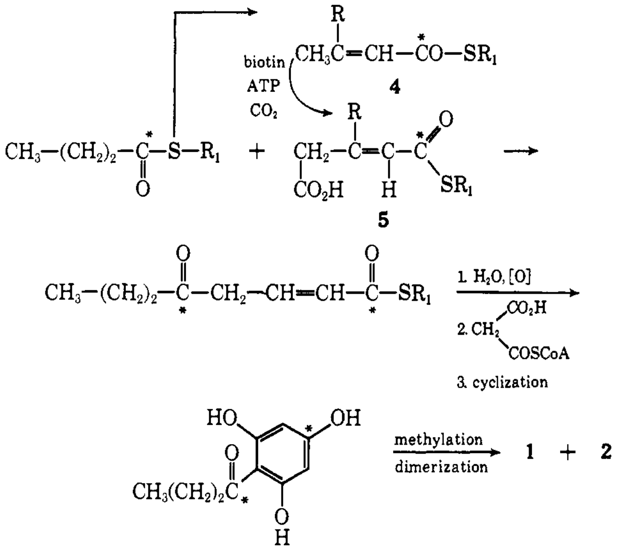
When a second feeding experiment produced identical results, the location of activity within the ring was determined by carefully controlled ozonolysis of **1**. Methyl pyruvate, acetic acid, and butyric acid were isolated and quantitated by gas chromatography.[5]

Essentially all of the activity on the ring[6] was found in the methyl pyruvate, derived by the indicated cleavage (A). The acetic acid (cleavages B, C, and D) contained 2% of the original activity, proving, along with the previous butyric acid degradations, that conversion of butyrate to acetate plays a minor role in this system.



We must conclude that *two discrete four-carbon units* have joined *head to tail* prior to combination with a single two-carbon unit. Although chain initiation by butyrate is well documented,[7] we know of no precedent for the subsequent coupling reaction. $\beta$-Methylcrotonyl-CoA (**4**, R = $CH_3$) is a substituted vinylog of acetyl-CoA and has been shown to undergo biotin-dependent carboxylation in leucine metabolism to give **5** (R = $CH_3$).[8] A similar reaction with crotonyl-CoA (**4**, R = H, derived from butyrate)[3] would provide the necessary activation for its condensation with butyryl-CoA.[9]



The generality of the reaction and the nature of the intermediate are under current investigation.

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[5] Reoplex 400, 20% on Gas-Chrom P (HMDS treated), 100–120 mesh (Applied Science Laboratories, Inc.), 6 ft × $^1/_8$ in. column, 130°, flash heater 178°, gas flow 35 cc/min. Retention times: methyl pyruvate 8.1 min; acetic acid 15.3 min; butyric acid 34.6 min. Similar conditions were employed for the preparative glpc except that the column was 7 ft × $^1/_4$ in at 125°.

[6] Average of two determinations.

[7] S. J. Wakil and J. Ganguly, *J. Amer. Chem. Soc.*, **81**, 2597 (1959); M. G. Horning, D. B. Martin, A. Karmen, and P. R. Vagelos, *Biochem. Biophys. Res. Commun.*, **3**, 101, (1960); R. W. Long and J. W. Porter, *J. Biol. Chem.*, **234**, 1406 (1959).

[8] A. Del Campillo-Campbell, E. E. Dekker, and M. J. Coon, *Biochim. Biophys. Acta*, **31**, 290 (1959).

[9] Dr. R. O. Brady (National Institutes of Health) has pointed out that tetrolyl-CoA ($CH_3C{\equiv}CCOSCoA$) could also function as a plausible intermediate in the reaction. The intermediacy of acetoacetate is a third possibility but the methylene carbon atom is already activated and coupling at this point would lead to a different labeling pattern.

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# *Book Reviews*

**Gas-Phase Reaction Rate Theory.** By Harold S. Johnston, University of California, Berkeley, Calif. The Ronald Press Co., 15 East 26th St., New York, N. Y. 1966. ix + 362 pp. 16 × 23.5 cm. $10.00.

This book is intended as a text for an introductory course in gas kinetics. It begins, as texts of this kind must, by drawing together the necessary array of widely diversified background information. The first seven chapters contain a well-balanced survey of experimental techniques, a discussion of tunneling, qualitative features of potential surfaces and particle dynamics, a quick introduction to normal coordinates, and elementary material drawn from statistical thermodynamics and the kinetic theory of gases. The stage is thus set for the beginning of the book proper at page 117.

The main focus is on the kinetics of elementary bimolecular reactions. Chapters 8 and 9 present a careful derivation of the transition-state theory under conditions of chemical equilibrium—the assumptions inherent in its use under other conditions are clearly identified—and a corresponding treatment from the collisional point of view, along with comparisons of the two. Chapter 10, the longest and best in the book, covers the bimolecular exchange reaction of three hydrogen atoms in a thorough and up-to-date way. The next three chapters extend the discussion to other reactions. Appropriately, Professor Johnston's own research results appear frequently in these.

Other classes of reaction are discussed in less detail. Recombination reactions, at the level of iodine atoms and unsophisticated theory, are allotted 10 pages. The selection of material carries a mild implication that this field has been stagnant since 1960, with which some experimentalists will surely disagree. Unimolecular reactions occupy more space (35 pages) but are treated in a less even way; quantum-statistical effects are well covered and the Slater theory is mentioned, but the main Marcus extension of the R. R. K. theory is deemphasized and diffusely presented. This may prove to be the book's most serious flaw. There is a penultimate chapter in which the relationship between elementary reactions and mechanisms is clarified, followed by a brief summary, a set of five appendices, and a conscientiously prepared subject index.

Professor Johnston's writing style is everywhere clear and informal, and he has provided many well-made figures and tables. A few end-of-chapter exercises are sprinkled through the text.

Whether this book will suffice by itself for a modern introductory course in gas kinetics will depend on the instructor's taste and the amount of time available. The writer of textbooks in such a rapidly expanding field faces a hard choice. If he does not confine himself to traditional material, he riskes enshrining between hard covers research material that will soon be revised into some other shape by its authors—something of which there are several recent instances in gas kinetics. In comparison with other authors, all of whose books differ rather strongly from one another, Professor Johnston has steered a course somewhat on the conservative side of the average. He has done this by confining his attention to reactions that occur in homogeneous gases mostly under steady-state conditions, rather than in such places as molecular beams, non-Boltzmann systems, and so on. The instructor who wishes to introduce these matters will have to furnish them as a supplement.

Aside from its instructional uses, the book is a likely candidate for inclusion in the personal libraries of practicing kineticists. I have been asked to review it at a time when I have already had a copy on my shelf for a year and a half, during which I have found it a pleasure to own and to use.

**Don L. Bunker**

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**Reagents for Organic Synthesis.** By Louis F. Fieser, Sheldon Emery Professor of Organic Chemistry, Harvard University, and Mary Fieser, Research Fellow in Chemistry, Harvard University. John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1967. ix + 1457 pp. 16.5 × 24 cm. $27.50.

In my opinion this book will prove to be of greater value to organic chemists than any other single volume that has been available in the last ten years. It is crammed from front to back with information that will be of great value not only to those who are interested in applying their knowledge to the pursuit of useful objectives but also to the more theoretically minded chemists who may be seeking to apply their intelligence to the understanding of problems removed from certain areas which are becoming overworked.

In all cases where reagents or reactions are described, specific examples are given, leading references are appended, and special apparatus is often illustrated. Furthermore, directions are frequently given which tell how to prepare the reagent in question. In addition to four excellent and complete indexes (Apparatus, Author, Subject, and Type) which make the book very easy to use, there is a list of Suppliers for the special reagents involved.

No space is spent in postulating mechanisms by which the reactions described may occur. Hence this book is an admirable source for problems to assign to students, a use which was probably not in the minds of the authors when the book was being written.

All in all, if one of my advanced graduate students or postdoctoral fellows asked me which book should be bought if only one purchase in the coming year were to be made, this book would be my recommendation.

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