Book Reviews

The Reactive Intermediates of Organic Chemistry. John E. Leffler. Interscience, New York, 1956. 275 pp. Illus. $6.

During the last year or two, a number of books dealing with reaction mechanisms and physical organic chemistry have appeared. A few have been good, but more have been unsatisfactory for one reason or another. John Leffler has pulled off a major feat by writing not only a fine book but also one that differs notably in approach from all previous ones, and one that is written in such an engaging style that most chemists who are at all interested in these fields will wish to read it.

As the title, *The Reactive Intermediates of Organic Chemistry,* implies, radicals, carbonium ions, and carbanions are used as a framework for discussing reaction mechanisms and a variety of other topics in organic chemistry. The sections on each of these intermediates are introduced by a discussion of the physical and other evidence for the existence of these species. A brief discussion of the effect of structural variations on rates and equilibriums of formation is followed by well-thought-out sections on reactions which go through these intermediates. Although the classical experiments are adequately described, Leffler has managed to find less familiar examples to demonstrate many of his points, so that even someone who is familiar with the field is not left with the feeling of having heard it all before. Although the approach is not at all a kinetic one, qualitative discussions of such topics as solvent effects on rates, ion pairs, and neighboring group rate enhancements are included. But the absence of a discussion of the displacement reaction is to be regretted.

Undoubtedly, the most valuable parts of the book are the chapters that are devoted to free radicals—their production and reactions. Usually, free radical reactions are relegated to a small section buried somewhere near the back of chemistry textbooks. Finding the first four chapters of this book devoted to this topic is likely to be a wholesome shock and is perhaps a landmark along the road to respectability for radical chemistry. In these chapters, as elsewhere, Leffler resists the temptation to oversimplify. However, his qualifications and asides are usually unobtrusive enough not to confuse the novice, yet strong enough to give pause to more advanced readers. Advanced students, especially, will profit from a careful reading of the text, since Leffler presents the material in a very scholarly manner, with full awareness of the many pitfalls for the unwary and with no personal theories to push. On the other hand, the small size of the book makes long discussions impossible, and there are few wasted sentences. Persons who meet this field for the first time in the pages of this book may well find the going difficult. The returns, in terms of a mature understanding of the subject matter, should be correspondingly great.

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Elasticity, Fracture and Flow. J. C. Jaeger. Methuen, London; Wiley, New York, 1956. 152 pp. Illus.

Elasticity, Fracture and Flow, a beautifully written little volume, provides a concise perspective of the theories of deformation and failure of materials under the influence of external loading. It is especially characterized by the care with which assumptions and definitions are stated and by the emphasis that is placed on the limitations inherent in each argument presented. There has been a tendency in a great deal of the literature on this subject to rush into formal manipulation without a critical examination of the physical applicability of the hypotheses that underlie the formal approach. J. C. Jaeger's exposition is the antithesis of this.

In a sense, the method of attack is similar to that in comparative physiology or comparative anatomy, where a deeper understanding of the functions and structure of organs is acquired by comparing them in different species. Instead of pursuing the theory of perfectly plastic materials or that of viscous fluids or that of brittle substances as separate disciplines, Jaeger makes an attempt here to show how the properties of substances differ from one another on the basis of the various theories. Thus, this book goes far toward supplying a much needed "connective tissue" for the topic.

The text is divided into three chapters and subdivided into 41 sections. The first chapter provides a thorough and facile introduction to the specification of stress and strain in deformation. Of particular interest are the sections on finite strain.

The second chapter, on the behavior of actual materials, includes discussion of the stress-strain relationships for elastic isotropic solids, anisotropic substances, natural strain, the Griffith theory of brittle strength, Mohr's theory of fracture, the maximum shear stress theory (Tresca), and the maximum distortional strain energy theory (Maxwell-Huber-Hencky-von Mises). There is also a short section on rheological models, including Hookean, Newtonian, Kelvin-Voigt, Maxwell, general linear, and Bingham substances.

The last chapter opens with a discussion of some simple problems that illustrate the differences between the various substances mentioned in the preceding paragraph. The elastodynamic stress equations are derived, and properties of dilatational (P), shear (S), and Rayleigh waves are presented. Some problems of elastostatics are also given. These include a brief description of the stress function (Airy) and of plane stress and plane strain. Finally, some special problems in viscosity and plasticity are treated.

In my opinion, in view of the range of topics covered, the book is outstanding. Very little a priori knowledge of the subject on the part of the reader is assumed by the author. Extreme clarity, unusual consideration for the reader in pointing out limitations, and a combination of comprehensiveness and conciseness all contribute to make this book a desirable acquisition for materials specialists, engineering students, and interested scientists in other fields.

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Human Generation, Conclusions of Burdach, Döllinger and von Baer. Arthur W. Meyer. Stanford University Press, Stanford, Calif.; Geoffrey Cumberlege, Oxford University Press, London, 1956. 143 pp. Illus. $3.50.

In this little book, which will be of real interest to all those who concern themselves with the history of embryology, A. W. Meyer has translated, from the Latin, some of the less accessible monographs of the great early 19th-century figures in this field and has