Chemical Technology

Infra-Red Spectroscopy and Molecular Structure. An outline of the principles. Mansel Davies, Ed. Elsevier, New York, 1963. xiv + 468 pp. Illus. $13.50.

In this compilation Mansel Davies, the editor, has attempted to provide an introduction to infrared spectroscopy and to present recent developments in the field. In many respects, he has achieved this difficult goal. Theoretical aspects are lucidly presented in a well-written introductory survey. The chapters on instrumentation and general experimental methods, the infrared spectra of simple molecules, force constant calculations for small molecules, and raman spectroscopy will serve as valuable references for those who are beginning their infrared studies. The detailed examples of force constant calculations have a similar utility. The other chapters, which are concerned with recent advances in several areas, present outstanding and detailed interpretations of the topics considered and, in effect, are complete monographs in themselves. The topics so considered are low-frequency infrared spectroscopy, characteristic features in the spectra of organic molecules, infrared spectra of solids (dichroism and polymers), inorganic applications of infrared spectroscopy, quantitative intensity studies and dipole moment derivatives, the methods and results of dispersion studies, hydrogen bonding, and solvent effects.

The volume suffers from the plight prevalent in many multiauthored books—a great deal of redundancy, an inconsistent format (for example, in some chapters the equations are not numbered), too few cross references, and the use of different assumptions by the authors (for example, the validity of Lorentzian line shapes).

Despite these editorial deficiencies, the contents make this book a valuable text for one engaged in infrared spectroscopy. Particularly noteworthy chapters are those by Krimm on the infrared spectra of solids and dichroism and polymers, and by Fahrenfort on the methods and results of dispersion studies. These two chapters, which present the first comprehensive discussion of these subjects in book form, will be received with enthusiasm by the scientific community.

The only major disappointment is the inferior chapter (18 pages) on infrared emission spectra. The abundant recent developments in the field of solid and gas infrared emission are not presented, and discussion of measurement techniques and methodology is totally ignored. Among the papers cited, the only recent ones were published in 1961 (two papers), and Coblenz's pioneering work (1909) is not discussed at all. These deficiencies severely limit the usefulness of this chapter.

In spite of the shortcomings described here, the net appraisal is that this volume is a valuable source of information for those interested in most areas of infrared spectroscopy.

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Botany

Flora of Missouri. Julian A. Steyermark. Iowa State University Press, Ames, 1963. lxxxiii + 1725 pp. Illus. $18.50.

To date, Julian A. Steyermark's *Flora of Missouri* is certainly the most voluminous of the state floras. In this work, of 1725 double-column pages, Steyermark considers more than 2400 species of vascular plants that grow wild in Missouri. The author has devoted more than 30 years to the exploration and classification of the vegetation of Missouri, and this presentation of the results of his study will be of incalculable value to those interested in the plants of Missouri.

The introductory section contains an historical sketch, general remarks concerned with the use of the book, and a 10-page treatment entitled "Flora and vegetation." This is followed by a 50-page key to the families.

The main body of the work provides keys to the subdivisions within the families. After the genus is reached, additional keys lead to species, varieties, and forms found in Missouri. Maps show geographical distribution, and more than 2300 excellent line drawings supplement the keys and aid in identification. The illustrations are interspersed throughout the text but usually appear within one or two pages of the descriptions of given species. A very exhaustive treatment of the literature is presented and subjected to an analysis which reflects the author's opinions, basic philosophy, and wealth of knowledge of the subject.

Synonyms as well as the accepted scientific name are given, and common English names are supplied where these exist. Dates of flowering are provided, and so are data of an ecological nature. For many species, the value of the plants to wild life is indicated, and frequently uses of the plants by man are also noted. The total known ranges of native plants are given.

No general descriptions of the species are given. In most cases the information presented by the keys and by the illustrations is so complete that nothing more is needed. But there are instances where it would be helpful to know such facts as the height of the plant, although scales are given to indicate the size of certain features, for example, flowers and leaves.

This work alone constitutes virtually a library on the plant life of Missouri, and it would be difficult, without resorting to the vagaries of personal opinion, to suggest ways in which it might be improved.

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Vacuum Equipment

Vacuum Technology. Andrew Guthrie. Wiley, New York, 1963. xii + 532 pp. Illus. $12.50.

Andrew Guthrie's extensive, well-organized volume for beginners in vacuum technology, a book that abounds in tables as well as in text and numerical examples, begins with a chapter entitled "The nature of vacuum" and most appropriately ends with one entitled "Finding and repairing leaks" (chapter 15). Guthrie covers various types of components—vacuum pumps, valves, gauges, and the like—and discusses the merits and the applications of these items to the vacuum system. The real value of this text is that it can be used by an intelligent reader who has little or no background in the field but needs a working knowledge of vacuum equipment and apparatus.

Like most good books, *Vacuum Technology* suffers from some weaknesses. In general, the presentation of fundamental physical derivations is neglected in favor of a practical applied basis. I wish the author had presented