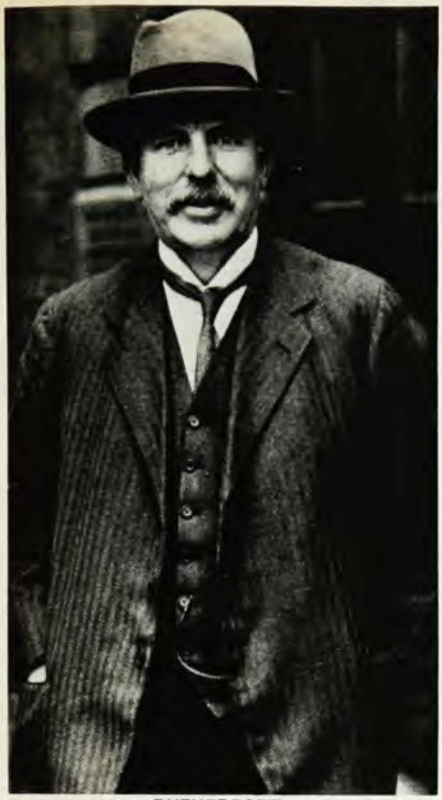

RUTHERFORD

most literarily graceful and historically perceptive book, although it is too thin to do justice to its subject. Andrade's biography, moreover, sparkles when describing the pre-World-War-I Manchester with which he was familiar, while no similar feelings of turn-of-the-century Montreal, or Cambridge-of-the-1930's are evoked by Eve or Feather, respectively.

Feather's book, now reissued, stands on other merits. It is a straight-forward, clear, fairly short and readable account of the main lines of Rutherford's research. The several works for which he is famous—the disintegration theory of radioactivity (with Frederick Soddy) of 1902–1903, the nuclear atom of 1911, and artificial disintegration of elements, 1919—are naturally emphasized. Other topics are also discussed, though rarely in depth, and the book's chronological arrangement effectively precludes thematic continuity. This is probably satisfactory for the book's presumed audience, the intelligent layperson, and even desirable for one who would collect the entire original series (which includes lives of Sir Edward Elgar, Jellicoe, Lord Kelvin, Marshal Foch, and Lord Kitchener).

To the extent that the biography devotes space to Rutherford's laboratory accomplishments, Feather has indeed written a scientific life. Yet, aside from a first chapter on "The Outlook of the Scientist," which is part philosophical and part background material, these accomplishments are rarely seen against any description of contemporary science. Rutherford's New Zealand youth and many subsequent events in his career are presented, giving a reasonable overview of his life, but one is left feeling that this life has not been related to its scientific times.

With the hindsight of more than three decades since the book's original publication, it is interesting to see that Feather, a distinguished alumnus of Rutherford's Ca endish Laboratory, at the time felt no need to discuss the details and importance of such topics as C. E. Wynn-Williams' advances in electronic counting of particles, Rutherford's early work in nuclear fusion or the influence of theory upon the laboratory's experimental progress. Nor is Rutherford's role as a power in the "establishment" of science analyzed. Presumably, these subjects were not then considered significant enough. Since the book is a virtually unaltered reprint, these points are offered as insights to a 1940 viewpoint, not as criticism. What may be regarded with some slight unhappiness, however, is the missed opportunity to add a few words to this 1973 edition regarding the laboratory's altered direction, under Rutherford's successor, W. L. Bragg, away from nuclear physics, into pioneering research in molecular biology and radioastronomy.

LAWRENCE BADASH
University of California
Santa Barbara

IR—Theory and Practice of Infrared Spectroscopy

N. L. Alpert, W. E. Keiser, H. A. Szymanski
380 pp. Plenum, New York 1973. $7.95

Infrared spectrometers and spectrophotometers are standard equipment in many laboratories. A variety of commercial models is available ranging from relatively inexpensive apparatus with limited versatility to complex instruments offering the choice of many operating modes. They can all be used for qualitative and quantitative analysis and the spectra produced can aid in the structural analysis of molecular compounds. However, the usefulness of the data and of their interpretation depend on the skill and experience of the operator.

This paperback, which is derived from the second edition (1970) of a book first published in 1964, is a helpful introduction to the chemical applications of infrared spectroscopy. The authors discuss the operation and characteristics of typical spectrophotometers and the relationships between the spectra and the structures of absorbing molecules.

Nelson Alpert and William Keiser, both of whom have associations with

the Perkin-Elmer Corporation, are responsible for chapters on instrumentation and experimental techniques. The individual components of a spectrophotometer and their influence on the observed spectra are described together with sample-handling techniques and some of the accessories available for particular applications. They include many practical suggestions for minimizing errors and obtaining reliable, reproducible data. By digesting this material and beginning spectroscopist can save much time and effort and an experienced practitioner will be reminded of the most suitable operational methods. There is, unfortunately, no discussion of some of the newer instruments, such as interferometers, which are now commercially available and which offer some advantages over the more conventional prism or grating instruments.

Approximately two-thirds of the book is concerned with infrared theory and the use of characteristic group frequencies in structural analysis. This material was prepared by the principal author, Herman Szymanski, who has firsthand experience of the problems and difficulties encountered by spectroscopists through the well known Infrared Spectroscopy Institutes held at Canisius College. There is an excellent, non-mathematical introduction to the origins of the fine structures of vibration-rotation bands of molecules and to some of the perturbations that may affect band positions and contours. The symmetry properties of molecules and group theory are used to relate the observed bands to molecular structures. Examples of the methods for identifying the structural groups present in a compound are given, together with brief accounts and listings of the characteristic frequencies associated with the principal structural groups found in organic molecules.

An interesting feature is the set of 20 loose spectra in a folder at the end of the book. These allow the reader to examine in detail some of the spectral features described. Besides a representative list of references at the end of each chapter there are also compilations of books on infrared spectroscopy, abstracting services and sources of reference spectrograms and spectral retrieval systems. A listing of the principal suppliers of instruments and accessories would have been useful.

Overall, the book is well written and attractively produced. There are some minor criticisms: there are no ordinates to the energy level diagrams and some sketches of spectra do not have an abscissa label. This may cause confusion, because other examples of spectra which are given may have either frequency (cm^{-1}) or wavelength increasing to the right. There are occasional ambiguities in the text that should not cause difficulty to most readers, and some portions of the theory section are catalogs of unsupported statements of the relations between observed spectra and molecular structure.

The book merits a place in any chemical laboratory with an infrared spectrometer. It may not be suitable as the sole text for a course in chemical spectroscopy unless the instructor limits the number of topics covered and is prepared to expand on them and unless some laboratory experience is also available.

John H. Shaw
The Ohio State University
Columbus

Color Centres and Imperfections in Insulators and Semiconductors

P. D. Townsend, J. C. Kelly
229 pp. Crane, Russak, New York, 1973. $16.50

In the majority of applications of solids, it is impurities and defects that determine or at least limit the properties of the solids. Examples such as doping of semiconductors with donors or acceptors, the importance of trace "activators" and "sensitizers" in phosphors and the role of dislocations and other defects in determining mechanical properties are all widely appreciated. Less well known are the application of defects in determining mechanical properties are all widely appreciated. Less well known are the application of defects in photochromic memory systems or the use of thermoluminescent traps to date archeological samples or to estimate the formation temperature of stony meteorites.

In traditional introductory solid-state physics courses the importance of defects and impurities is considered briefly if at all. Thus most students are surprised to find how large a role defects play in applications and they are usually appalled at the apparent witchcraft used to prepare desired defect distributions in practice.

It is this shortcoming in traditional course work that Peter Townsend and John Kelly have set out to correct in writing this book about imperfections in insulators and semiconductors. The book is based on lectures prepared for both final-year undergraduates and for required graduate curricula at the Universities of Sussex and New South Wales. The authors' aim was to prepare a book that begins at a level comprehensible to final-year undergraduates, but which provides a summary of recent discoveries for more advanced workers. Both authors have had