choice of topics in the more experimental adventures, or about the very pronounced emphasis placed on ruby devices. I am also sure many professionals will feel that more or less emphasis should have been placed on their work or on the efforts of others. However, I am far more impressed with the positive features of Lengyel's accomplishment than I am distressed by the inevitable deficiencies of a rapidly prepared book about an almost violently active topic. Lengyel has attempted to be useful to the reader, and he has achieved his purpose with considerable consistency throughout the exposition.

The main topic headings will give some idea of the scope of this monograph: Background Material on Radiation, General Description of Lasers, Solid State Lasers, Fluid State Lasers, Applications and Development. Many readers will benefit from the skill with which Lengyel has enfleshed this skeleton.

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Structural Information

Infrared Absorption Spectroscopy, Practical. Koji Nakanishi. Nankodo, Tokyo, Japan; Holden-Day, San Francisco, Calif., 1962. xii + 223 pp. Illus. $8.

This English-language edition of a text originally written and published for the Japanese market was published at the instigation of Carl Djerassi, who has provided an explanatory foreword. The book's title could be a bit misleading, since experimental aspects of infrared spectroscopy are rather briefly treated. Actually the book is intended for use as a guide in interpreting infrared spectra of complex organic molecules—that is, the problem of deducing structural information from the spectrum of an unknown substance. Its publication may cause some surprise, for two excellent and widely used sources of data are already available on the American market.

It is reasonable to inquire whether this is merely an updated and abbreviated Bellamy. The answer is unequivocally no. This is an excellent work in its own right. Nakanishi's systematic organization of the material is excellent and it brings an amazing wealth of information in easily accessible form to the user's fingertips. The references that follow each of the tables of data on a given functional group are up to date (1961) and well chosen.

A welcome innovation is the reproduction of the spectra of commonly employed solvents, and I was pleased to note that Young, DuVall, and Wright's overtone patterns for various aromatic substitution types are also reproduced. No other source provides such a display of accurate information in a format that is suitable for quick reference use. The average organic chemist will find a great deal of use for this part of the text.

There are novel features in Nakanishi's text that will greatly enhance its value to students of modern organic qualitative analysis courses and to graduate students beginning research work. A series of 85 problems that range over all uses of infrared spectral data in organic chemistry are presented. A major portion of the book (pages 71 to 223) is devoted to these problems and the detailed answers to them. Certainly this is the best way for a beginner to gain experience in interpreting infrared spectra. Each problem contains one or more spectral reproductions, an invaluable aid in learning about the shapes and intensities of the various bands. However, students must pay careful attention to the text interspersed among the tables, for only there (and in an exceedingly terse form) will they learn which bands are the more reliable sources of information. Perhaps only experience can teach that the appearance of bands in the spectrum at some given frequency is not always a guarantee of the listed function. Thus, the unwary will continue to interpret the bands at 910 and 990 cm^{-1} in 2-butanol as a vinyl group.

Credit must be given to the proofreader, since this book is quite free of misprints. I noted only one: a misprint in the table on page 20, which changed the C—H stretching vibration from 2925 to 1925 cm^{-1}. The spectra are well reproduced. The binding is of such poor quality that it is not likely to survive the handling this useful book will receive.

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Nuclear Chemistry

Basic Concepts of Nuclear Chemistry. Ralph T. Overman. Chapman and Hall, London; Reinhold, New York, 1963. xii + 116 pp. Illus. Paper, $1.95.

The author aims this monograph at the level of college undergraduates who have some scientific background; he also hopes to attract workers in other fields who lack training in nuclear chemistry and high school students who wish to add to their regular course material.

The mathematical complexity of the material is minimal, and the book may well be useful to high school students, for Overman's coverage of the field is more complete and systematic than that of other works directed toward high school students. For example, good discussions of interactions of radiation with matter, detection devices, and the often neglected errors and statistics are given. However, the book is written in conventional scientific style and will not excite the reader's imagination as successfully as those written in the Gamow style.

The author misses his other objectives. Bright freshmen can handle (and crave) more challenging material. Overman uses lengthy and confusing discussions to avoid simple mathematical expressions. For example, in treating statistical fluctuations, he shows a Gaussian distribution but omits the mathematical expression for it. There is not sufficient detail given to prepare workers in other fields for experiments involving radionuclides. (Overman's earlier books, written with H. W. Clark, excellently fulfils this aim.)

Space is often wasted when Overman introduces topics and then concludes that they are too lengthy or complicated to discuss. In the space required to write the simple Compton scattering relationship, we instead learn that "there are certain limiting values for the energies, especially when the scattering is at 90° and 180°." Overman gives a clever analogy between decay laws and water flowing from tanks, which is quite effective for parent-daughter relationships including secular equilibrium. But he fails to note the example of constant reactor production of a short-lived species. Then, in the discussion of activation analysis, $(1\text{-}e^{-\lambda t})$ is pulled from a hat.

The few errors in the book are serious—for example, the statement that "energy is given off when elements of high atomic number are broken down into their nucleons." In the example of a two-component decay curve, the short-lived species is incorrectly resolved. The discovery of element 102 is confused with that of mendelevium, and the diagrams of energy level in which positron emission goes "uphill" are annoying.

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Metallurgy

Electronic Structure and Alloy Chemistry of the Transition Elements. Paul A. Beck, Ed. Interscience (Wiley), New York, 1963, 261 pp. Illus. $12.

This book, which is based on papers presented at a symposium sponsored by the Metallurgical Society and the American Institute of Mining, Metallurgical, and Petroleum Engineers, contains eight chapters, each written by a specialist in the field.

Harvey Brooks discusses theoretical models for transition metals and their alloys and gives a very complete summary, from the theoretical viewpoint, of our present knowledge of bonding in transition metals. He provides an extensive list of references. The most important developments leading to future progress in the field are, according to Brooks, the study of localized magnetic states in dilute alloys, studies of the hyperfine field at the nucleus in ferromagnetic materials, and the influences of many-body effects on properties of, and at, the Fermi surface. F. E. Hoare reviews what specific heat measurements can contribute to the study of the electronic band structure of transition elements and their alloys. For the second and third transition series, the results can be reasonably well explained on a simple rigid-band model. For elements of the first transition series, additional knowledge is needed of the magnetic behavior of some of these alloys, particularly at low temperature. J. Crangle discusses the ferromagnetic properties of alloys of the first transition series as well as those of dilute solutions of ferromagnetic elements in palladium and platinum.

C. G. Shull presents a short but complete summary of the magnetic electron configuration in iron, which can be deduced from magnetic scattering amplitudes when the polarized neutron technique is used. Shull also discusses the magnetic electron configuration in Fe_3Al. In his usual informal style W. Hume-Rothery discusses the problem of the transition metals. The occurrence of specific phases is proposed as a basis for an alloy chemistry analysis based on group numbers or electron concentrations. After expressing the opinion that "mathematicians" will not be of much help to the metallurgists in the near future (although he agrees that "Mathematical work must, of course, continue") Hume-Rothery reviews some of the most promising experimental techniques, including soft x-ray spectroscopy, which, perhaps unfortunately, has not received much attention during the last 20 years.

The last three chapters are concerned with alloy chemisty. M. V. Nevitt provides a most complete description and classification of alloy phases of transition metals (including the rare earths) in terms of their composition and crystal structure. Hans Nowotny places special emphasis on alloys of the transition metals with boron, carbon, nitrogen, aluminum, and silicon. These two chapters, with their extensive lists of references, constitute a very complete and up-to-date summary of the crystal structure of alloys that involve transition elements. In the last chapter Leo Brewer states that "Although in principle all the properties of metals should be deducible from the solution of the Schrödinger equation, in practice there is no hope in the foreseeable future that one will be able to deduce properties of a wide variety of metallic systems from first principles alone. Because of the impractibility of the exact quantum treatment of metals one must resort to various simplified models to aid in the correlation of the properties of metals." Brewer then develops his ideas about the application of Pauling's valence bond theory to metals. Brewer stresses N. Engel's contributions to this field and reminds us that Engel's original work was published in Danish (in 1949) because the three most important metallurgical journals published in America—*Transactions of the American Institute of Mining and Metallurgical Engineers, Transactions of the American Society for Metals*, and *Acta Metallurgica*—considered his manuscripts too original and novel and for that reason rejected them.

This book will constitute a very valuable addition to the libraries of students and advanced research workers in the field of alloys.

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Atmospheric Processes

Exploring the Atmosphere. G. M. B. Dobson. Oxford University Press, New York, 1963. 200 pp. Illus. $3.40.

This little book presents a fascinating account of atmospheric properties and processes as they are seen by a scientist whose investigations over four decades have contributed greatly to our understanding of the upper atmosphere. Dobson's objective is quite limited, and it is on this basis that his work should be evaluated. The book consists of a nontechnical account of ten more or less independent atmospheric problems. The topics chosen are, of course, those of particular interest to the author; and this leads to the neglect of large areas of great interest and importance. The book is, nevertheless, self-contained and coherent to a remarkable degree. The organization revealed by the table of contents suggests a hodge-podge, but the author makes a generally successful effort to weave a logical fabric. Dobson has illustrated the fact that what is important in a book or a lecture aimed at a wide audience is the communication of the author's way of thinking about his subject. In this case, the thinking is sound, the emphasis appropriate, the expression lucid, and the link between author and reader strong. An effort to compile a similar book from papers by a number of authors probably would have been a disaster.

The topics discussed are a general picture of the atmosphere; temperature and humidity of the troposphere and stratosphere; temperature and density at great heights; clouds, hail, and rain; thunderstorms; ozone; the sun, sunspots, and solar activity; the ionosphere; the aurora, airglow, and Van Allen Belts; and the geomagnetic field. These complex problems are presented with refreshing clarity and simplicity. It is inevitable in a nonmathematical account that much has been omitted, but con-