The first three chapters on elementary radiation chemistry are somewhat pedestrian but will serve as a useful introduction to the uninitiated. From this point a comprehensive review of radiation research in polymeric systems is skillfully presented. Chapters IV to VII or approximately one-third of the book deal with radiation induced polymerization of monomers in the homogeneous liquid and heterogeneous phases as well as in the presence of added substances which markedly alter the polymerization process. Chapters VIII–XI describe aspects of radiation effects in polymers in the solid and solution states with detailed delineation between polymers of the cross linking and degrading types. The last chapter is concerned with the more practical subject of graft copolymers prepared with ionizing radiation and, while not a comprehensive review, details the salient features of these complex reaction mechanisms. The book is recommended to the skilled research worker or graduate student desiring a convenient reference source and, more important, as an authoritative text that presents the unifying concepts as they are understood today in a field complicated by a multitude of conflicting and uninterpreted publications.

GENERAL PACKAGING RESEARCH AND DEVELOPMENT DIVISION ROBERT B. MESROBIAN
CONTINENTAL CAN COMPANY, INC.
CHICAGO 20, ILLINOIS

Introduction to Chemical Instrumentation. Electronic Signals and Operations. By EDWARD J. BAIR, Associate Professor of Chemistry, Indiana University. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1962. viii + 349 pp. 16 × 23.5 cm. Price, $10.75.

The author's preface describes this book as "a representative collection of topics which when covered by independent study or as a one-semester course will give the student beginning . . . experimental research a reasonable insight into new advances in instrumentation . . . as well as some insight into the practical art of designing instruments to solve particular problems."

Almost the first third of the book is filled by a frenetic survey of topics from chemical physics and electrochemistry with occasional incidental reference to a pertinent instrument or instrumental method. This material is collected under the chapter title, "Chemical Signal Sources"; it ranges from atomic energy levels through n.m.r. spectroscopy to X-ray diffraction, electrolysis and polarography. Theoretical remarks are often garbled and facts egregiously misstated. The writing is careless. The following quotations illustrate typically these pervasive shortcomings. Page 14: "A photon originating at a point in space radiates from that point in a spherical wave characterized by electric field vectors which have periodic maxima perpendicular to the direction of propagation." Page 16: "When there is interaction between the oscillating electric field of a photon and the oscillating field of an atom or molecule, the energy of the photon may, under some specific circumstances, be absorbed . . . ." Page 20: "Angular dispersion $d\lambda/d\vartheta$ is the angle between rays of different wavelength . . . ." Page 22: "The major contributions to the energy correspond to the size of the orbit of the valence electron . . . . The *resultant orbital angular momentum* or resultant eccentricity of electronic orbits having the same principal quantum number accounts for somewhat smaller energy differences which are classified as different series." Page 46: "Radiation that is reemitted to the ground state is *resonance fluorescence*." On pp. 77–78, the L X-ray level is represented as double, the notation is archaic, and the origins of the $L\alpha$ and $L\beta$ lines are misstated. Page 81: "From the discussion of Rayleigh scattering of optical radiation it is clear that scattering and diffraction are relatively important at X-ray wavelengths." On page 107, the saturated Weston cell is said to be almost universally used as the secondary standard against which voltages are measured, and the temperature coefficient of the voltage is said to be small; the unsaturated cell is not mentioned.

The author, who refers to electronics as "the most systematic method of instrumentation," presents in the remaining two-thirds of his book a collection of notes on electronics. The proportion of elementary detail suggests that the discussion is aimed at the beginner, but the disorderliness and haphazard involution attending the introduction of basic concepts, as for example impedance, and the needlessly obscure and grossly careless exposition in such critical sections as the first pages on triodes, vacuum-tube voltages, and plate characteristics would induce in many a beginner a lifelong frustration in the face of any problem involving electronics. Three of the later chapters, entitled "Nonlinear Operations and Signals," "Analysis of Small-signal Electronic Circuits" and "Noise, Bandpass, and Information," rise above the preceding criticisms. The contrast in quality creates an impression that most of the book has been composed hastily and without editing to give bulk to a tested laboratory handbook.

Instrumentation is an interdisciplinary subject. To train appropriately talented students for the resourceful, creative and critical application of instrumental methods, a chemistry faculty needs to develop and retain the interested coöperation of other faculties. It has been accepted that the physics faculty should supply the basic training in mechanics, electricity, magnetism and optics, because it should do this more expertly and authoritatively than the faculty of another discipline; and the chemistry faculty has developed the applications which are within its special competence and needs. Lately, within a generation, electronics has developed as a field of applied science and engineering that has revolutionized instrumentation in every area of experiment; yet chemistry faculties have been slow to recognize that they must now send students also to the professional electronics faculties for a fundamental training in electronics, and that the chemistry curriculum can afford no time for sciolistic bungling. Once equipped with a professionally laid foundation, a student can be expected to utilize the resources of electronics self-reliantly and securely to the limit of his talent, interest and opportunities.

GATES AND CRELLIN LABORATORIES OF CHEMISTRY
CALIFORNIA INSTITUTE OF TECHNOLOGY J. H. STURDIVANT
PASADENA, CALIFORNIA

Ion Production by Electron Impact. By R. I. REED, Chemistry Department, The University, Glasgow. Academic Press, Inc., (London) Ltd., Wing I, 7th Floor, Berkeley Square House, Berkeley Square, London, W. I., England. 1962. xii + 242 pp. 16 × 24 cm. Price, $7.00.

This monograph by Professor Reed is nominally an introduction to the determination of molecular structure constants by mass spectrometric measurements of the ions produced by single electron impact in dilute gases or vapors. The first half of the volume (*ca.* 117 pages) is largely concerned with the determination of the energetics of molecules and ions from electron impact measurements, while the second half (*ca.* 90 pages) is concerned with the ions that are observed in mass spectra and the various fashions their occurrence may be interpreted in terms of the structure of molecules.

The reviewer found the volume quite unsatisfactory. Virtually none of the subjects is treated in either a systematic or a critical manner. The various chapters are composed of only loosely connected sections and only too frequently the sections are composed of unrelated paragraphs. No attempt will be made to present here a detailed criticism of this book, since a really adequate critique would require a volume of the size of the original. In the following paragraphs there will be simply given a few typical examples of the sources of the reviewer's dissatisfaction.

Chapter I consists of a brief description of mass spectrometers and their mode of operation, followed by a section entitled, "The Experimental Evaluation of Ionization Potential." The subject of this section is not defined either within the section or in the section called "Ionization Potentials" that starts Chapter III, "Theoretical Considerations." The major portion of this section on the evaluation of ionization potentials consists of a 12-page table of values (Table 1) to which there is no reference in the text, nor does the table itself contain any indication of the significance of its various columns or indications of what the reader might learn from the comparison of the numbers in the columns it contains.

The second paragraph of Chapter III reads in its entirety as follows: "Particular interest attaches to the case of carbon disulfide which is a triatomic molecule. Although precision studies upon molecular ionization potentials have not been carried out widely, there is a considerable amount of careful work which has been carried out by other techniques, particularly ultraviolet spectroscopy. Conventionally the reason for this discrepancy is considered to originate in the distinctive methods by which the ionization potential is obtained." Neither the preceding nor succeeding paragraphs throw any light on the author's interest in the fact that carbon disulfide is a triatomic molecule nor the nature of the discrepancy that originates in the methods. Some four pages later one finds the only other reference to carbon disulfide, "Collin (1960) has determined the ionization potential to be $I\,(CS_2, {}^2\Pi\text{-}{}^1\Sigma_g{}^+) = 10.15 \pm 0.05$ e.V. which is in good agreement with the value determined by optical spectroscopy of 10.08 e.V."!

As a final example, we quote definitions of the term "base peak" that are to be found in the footnotes to Tables 33 and 35, on pages 193 and 194, respectively. Under Table 33, "The 'base peak' represents the most abundant ion in the spectrum," while under Table 35, "The 'base peak' is the abundance of the most intense ion in the spectrum and is given a value of 100."

The only readers to whom this book can be recommended are potential authors as a collection of examples of how not to write.

SHELL DEVELOPMENT COMPANY
EMERYVILLE, CALIFORNIA D. P. STEVENSON