base equilibria, buffers; amphoteric substances. A brief introduction to laboratory techniques follows the theoretical section.

The qualitative scheme covers only a limited selection of common metallic ions and anions. The group separations for the metallic elements are familiar ones, essentially along lines of the Noyes and Bray scheme. The anion scheme utilizes group tests, for example, for oxidizing or reducing properties, and for precipitation by barium, silver, or calcium ions, to narrow the field of specific tests for the limited selection of anions that is provided for in the scheme.

The appendix includes lists of apparatus and reagents, density-molarity tables for the common acids and ammonia, preparation of test solutions, and mathematical operations and problems thereon. Further tables are for ionization constants of weak acids and bases, solubility products, dissociation constants of complexes, and a very extensive table (32 pages) of properties of substances that may be formed by combinations of the various anions and cations that are provided for in the qualitative schemes.

The subject index is rather brief, but probably adequate. Tables of four-place logarmithms and a set of answers to problems follow the index. A table of 1953 atomic weights is inside the front cover, and a periodic chart, including transuranic elements, is inside the back cover. The typography and the figures are excellent.

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The Properties of Glass. George W. Morey. ACS Monograph Series No. 124. William A. Hamor, Ed. Reinhold, New York, ed. 2, 1954. 591 pp. Illus. $16.50.

Morey's definitive book on glass properties follows closely the format and organization of the 1938 edition and it remains the best available book on the subject. During the past 15 years this book has achieved first rank in providing reliable information to glass technologists and scientists interested in glass. The emphasis on reliability of property data in relation to chemical composition, especially Morey's own pioneering and continuing work on phase equilibriums, has contributed greatly to the development of systematic research in glass. While some of its shortcomings may be minor, they nevertheless deserve to be considered here.

The first three chapters cover the chronological development and characteristics of glass, crystallization studies of glass systems and rates of crystal growth, and the requirements of commercial glasses and the development of new compositions. The presentation would have been improved if glass history and statistics had been brought up to date and a more complete coverage of devitrification rate studies had been included.

Chapter 4 covers the chemical resistance characteristics important in glass usage. It is believed that the four new references do not adequately cover the chemical durability studies made since 1938.

The next 16 chapters are devoted to specific glass properties important in glass fabrication and end usage. Some 225 references are made to new material in these chapters, and many new data have been added. Discussions on new material appear to have been added in a manner that least disturbs the original format. This has resulted in overcondensation and, in a few instances, near exclusion of some accounts of new property measurements.

The last chapter discusses the constitution and structure of glass, principally on the basis of x-ray diffraction studies. Many investigators will not agree with the author's implication that x-ray diffraction studies, notably the excellent work of Warren and his coworkers, give a satisfactory picture of glass structure. In fact, in the author's reference No. 57 to this work, Warren states (p. 258):

> . . . the X-ray diffraction study of a glass gives information only on average quantities; it tells nothing about the fine details of the structure. . . . The X-ray studies of glass might be said to establish the first order approximation to a picture of the structure, and the fine details must be filled in with other kinds of measurements.

Although future research may show that this average picture is the best that can be achieved, I would point out that it is too indefinite to be of much use except in the most simple problems of glass technology. A complete account should have included the continuing efforts of many investigators to apply Raman and infrared spectra, heat capacity, neutron and electron diffraction, electron microscope, and other types of data toward a more definite and usable picture of glass structure.

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The Steel Skeleton. vol. I. *Elastic Behaviour and Design.* J. F. Baker. Cambridge Univ. Press, New York, 1954. xi + 206 pp. Illus. + plates. $8.50.

In 1929 the British steel industry and the Department of Scientific and Industrial Research helped form the Steel Structures Research Committee and embarked upon an intensive investigation of various design procedures applicable to steel building frames. It was believed by many engineers that the ductile properties of steel were not fully exploited for structural purposes and that existing building codes were irrational and too restrictive. It was hoped that certain advantages would exist in a design procedure based on the theory of continuous frames and on the ductile properties of steel.

Volume I of *The Steel Skeleton,* by J. F. Baker of Cambridge University, is a review of the analytic and experimental investigations that were conducted by the Steel Structures Research Committee on the elastic behavior of steel building frames. Volume II

is to be called *Plastic Behaviour and Design* and is to describe the investigations pertaining to the inelastic ranges of loading.

The first two chapters of volume I present a summary of the specifications and practices that existed in various countries at the time the Steel Structures Research Committee was formed. Differences were observed in the specified live loads, wind loads, working stresses, and column formulas. The procedure indicated for checking the proportions of beams and columns was common to most building codes. For gravity loads, the beams were to be checked as simply supported beams and the columns were to be checked as pin-ended columns with or without eccentric loads. Provisons for continuity of columns were usually in the form of "effective lengths."

The next five chapters deal with the experimental phases of the investigation and present the results of tests on an experimental frame and three actual building frames. Various stiffnesses of beam-to-column connections were considered. These ranged from light beam connections, as in the experimental frame, to exceptionally stiff connections, as in a hotel building. Strains were measured for the various stages of construction ranging from the bare frames to the frames with floors laid and columns encased. It was observed that the behavior of an actual building was radically different from that assumed in the design methods in common use. The behavior was closer to that of a rigidly jointed frame than to that of a structure with hinged-ended beams. The columns had appreciable bending, and even comparatively light beam connections transmitted much heavier bending moments than had been anticipated.

The results of tests concerning the moment-angle change relationships for various types of beam-to-column connections are presented. These results are used in interpreting the behavior of the actual building frames, in developing several analytic procedures for frames with semirigid connections, and in developing a design method for such frames. Various conditions of loading and different types of frames were considered in arriving at a set of recommendations for the design of beams and columns in building frames. In the recommendations for the design of beams, allowance is made for the restraining moments at the ends of the beams. Adjusted standard curves are presented for different connections to maintain constant load factors, even though the design is based on working loads and working stresses. In studying the critical loading conditions causing single curvature or double curvature of columns, the yield stress of the material is used as a criterion of failure. As might be expected, the moments in the columns are large and extremely sensitive to the loading conditions considered. The book includes a summary of the recommendations made by the Steel Structures Research Committee in regard to the design of steel building frames.

In conclusion, the author discusses the reception of the recommendations given by structural designers and organizations involved in codifying practice. In general, a reluctance has been shown in modifying existing codes and rules of practice. This reluctance is principally due to the complications that are involved in the recommended design procedure without such complications being offset by a reduction in the amount of steel required in a building frame. Provided that no adjustments are made in load factors, the recommended design procedure, although rational, leads to lighter beams but heavier columns than ordinarily called for. The author indicates that volume II is to deal with a simpler method of design based on the plastic behavior of structures.

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Biographical Memoirs. vol. XXVIII. National Academy of Sciences, Washington, D.C., 1954 (Order from Columbia Univ. Press, New York). 311 pp. Plates. Paper, $4.

This volume includes notices of Francis G. Blake by John Rodman Paul, of Gano Dunn by Vannevar Bush, of Merritt L. Fernald by Elmer D. Merrill, of Frederick P. Gay by A. R. Dochez, of E. B. Hart by Conrad A. Elvehjem, of Ludvig Hektoen by Paul R. Cannon, of Raymond A. Kelser by Richard E. Shope, of Elmer A. Sperry by J. C. Hunsaker, of George L. Streeter by George W. Corner, and of Frank C. Whitmore by C. S. Marvel. The biographies are as various as their diverse subjects and authors. Perhaps the single quality they share in common is their ability to move the reader to unbounded admiration for the energy, industry, imagination, and humanity of the men they portray. These men were all born, roughly, within the last third of the 19th century, and they have all contributed greatly to the vigor of present American thought. The facts of their lives constitute the raw material of contemporary intellectual history, and for this reason, as well as for the sake of commemorating these individuals from a personal point of view, the volume is fascinating to read.

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Coronary Heart Disease in Young Adults. A multidisciplinary study. Menard M. Gertler and Paul D. White. Harvard Univ. Press, Cambridge, 1954 (For the Commonwealth Fund). xviii + 218 pp. Illus. + plates. $5.

This monograph represents the result of a concerted effort of nine well-known researchers and cardiologists trying to explain why some young persons are singled out and die following an acute coronary episode. Even a few of the conclusions give impressive evidence of the results of this study:

1) Coronary heart disease is more likely to occur if parents or siblings have experienced the disease.