***Copper.*** The science and technology of the metal, its alloys and compounds. Allison Butts, Ed. ACS Monograph Series, No. 122, William A. Hamor, Ed. Reinhold, New York, 1954. xii + 936 pp. Illus. $20.

This volume is one of the monograph series of the American Chemical Society. It contains 46 chapters, each written by one or more of the leading international authorities, on all the various phases of the technology of copper. The volume is encyclopedian in its scope.

The stated purpose of this composite monograph is "to provide a reference work on all the important phases of the subject of copper both as a chemical element and as an industrial metal." This objective has been carried out admirably, and the resulting volume, containing nearly 1000 pages, should occupy a space on the reference shelf of every engineer, metallurgist, chemist, and technical or scientific worker whose operations bring him in contact with the element copper in any of its forms and applications.

The metallurgical phases of copper are, in general, particularly well covered and, in most cases, with adequate detail, but some aspects might have been more expanded. For instance, the chapter on "Electrolytic refining" occupies 57 pages with 23 references. The subject is exploited in the fullest detail and with perhaps more detail than its relative importance would seem to demand. On the other hand, "Secondary copper and copper alloys" (Chapter 16) is covered in only 8 pages with no references. Considering the very great importance of this subject in our present-day economy, more space should have been assigned to it. The methods of refining secondary material are described only in such general terms that the inclusion of this chapter, as written, seems scarcely worthwhile.

In Chapter 7, the thermodynamics of copper smelting occupies 16 pages with 18 references. The introductory material of this chapter, especially in regard to free-energy changes, could have been treated in more detail. Unless the reader has a good, up-to-date, and working knowledge of modern physical chemistry, he is not likely to be able to apply the equations appearing on pages 152 and 153, even though it is stated:

> If the activity values are known, the free-energy changes accompanying reaction with reactants and products at any other than standard states can readily be obtained by combining the $\Delta$ °F values from the graphs with equation (2).

The reader is told that "A" equals the activity of a constituent. When he turns to his physics textbook he finds that "activity" is defined as the ratio of the fugacity of the substance in the state in which it happens to be to the fugacity in the standard state. When he seeks a concise definition of "fugacity," he jumps into really deep water.

Again, in the treatment of "Analytical chemistry of copper" (Chapter 46), slightly more detail could have been given. Even though it is stated that "the analytical chemistry of copper is reviewed rather briefly" and that "Due to space limitations no attempt is made to give the details of the laboratory procedures," nevertheless, the commonly used and accurate electrolytic method receives a thorough treatment (3½ pages and about 50 references). Although the gravimetric, iodiometric, and other methods, including the colorimetric method, are discussed and amply referenced, it might have been advantageous to include some details of one of each of these methods. This chapter contains 106 references.

Most of the chapters cover their subjects in an adequate and excellent manner, and the book covers the whole subject of copper in practically all its ramifications in a most commendable fashion, including 1289 references to the literature from about 1933 to as late as 1952. Unfortunately, however, six chapters have no references at all. This fact, together with the poor reproduction of at least two diagrams (pages 105 and 157) in which some of the numerals are completely blocked up and undecipherable, is about the only valid criticism that can be made. Only one typographical error was found (page 536), and this was a minor one.

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***Optical Workshop Principles.*** Translation of *Le Travail des Verres d'Optique de Précision.* Charles Dévé. Trans. by Thomas L. Tippell. Hilger & Watts, London, and Jarrell-Ash, Newtonville, Mass., Engl. ed. 2, 1954. xxiv + 436 pp. Illus. + plates. 42s.

The first English edition of this work was prepared by Hilger to provide a manual for the training of the many optical workers needed in World War II. The present edition was translated from the third French edition, most of which was written in 1945 and published in 1949. The apparent age of the French original does not detract from the value of the book as a guide to the rationale of optical shop practice.

The author pointed out that the manual was written for apprentices, teachers, shop managers, and others who already know something of the practice of optical surfacing. Some elementary subjects, such as the design and mechanics of grinding machinery, are not discussed. Thus the book is in the nature of a monograph on selected topics of optical work, but the treatment of these is so thorough and practical that it is useful to workers in any stage of training.

The first part of the book, "Elementary," is devoted to glasses, their faults and aberrations; choice of materials; abrasives, glues, cements, tools, polishers; surfacing; and spectacle lenses. The second part, "For the use of works managers and senior workmen," takes up the mechanical theory of working optical surfaces; optical tests in the workshop; polarization of light; crystal working; the construction of several types of polarizing prisms; centering, edging and cementing lenses; reticules, micrometers, graticules; the metallization of mirrors. There are three appendixes; the most significant is on the surfacing of aspherical lenses. There are author and subject indexes. Only a