temperature hydrogen-oxygen cells, and carbonaceous fuels. These topic headings indicate considerable overlap in the material, and some consolidation might have been made in order to save space. However, the division of subjects is logical in terms of the experiences of the authors, and it is easy to skip over the repetitious parts (but one hopes this repetition did not very seriously affect the price of the book).

Each of these chapters includes a discussion of the special features and advantages of a type of fuel cell, a brief treatment of thermodynamic and possibly kinetic considerations, details of one or more cell designs, and performance data in terms of current-cell (or electrode) potential curves. Electrode materials and designs are treated extensively from the point of view of development. Only occasional attention is given to studies of electrode reaction mechanisms and catalysis. The bibliographies are complete, but not extensive, up to 1961, with only a very few references to 1962 publications.

The three remaining chapters are concerned with relatively general consideration of fuel cells: thermodynamics, kinetics, and catalytic aspects as well as research techniques. After the first reading, the usefulness of these chapters is variable and depends upon the individual reader. My opinion is that they will not replace the standard reference works and texts, many of which are cited. This is particularly true with respect to the chapter on kinetics and catalysis, which appears to be pedagogically unsound; the major fault is that many statements are unnecessarily specific and are given in the guise of generalities. In addition, the definitions of terms are not rigorous and often are misleading. Readers should carefully consider any statement within its context before attempting any generalizations. Even then, some parallel reading would be helpful.

Although the glamour of fuel cells has faded as a result of slower than expected development and application, the rate of advance of technology in this area is indeed significant. General interest is widespread and is occasionally stimulated by reports from the popular press. This timely and comprehensive review of the current status of the different types of fuel cells should find a wide reception.

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Care of Museum Objects

Recent Advances in Conservation. A conference held at Rome in 1961. G. Thomson, Ed. Butterworth, Washington, D.C., 1963. xvi + 224 pp. Illus. $21.

The need to conserve natural resources is widely recognized. It is far less frequently realized that it is also necessary to conserve the materials stored in museums. Yet, ill-considered methods of handling, display, storage, and repair can often ruin museum objects. At the very least, lack of proper attention gradually erodes away their number and quality. In honor of its tenth birthday, the International Institute for the Conservation of Historic and Artistic Works held a conference in Rome in 1961 to consider these matters. Although this professional society has less than 1000 members, it publishes a technical quarterly and a biannual set of abstracts. The field is young and rapidly growing, however, and there are few books that describe, even in a general way, the technical methods of examining and treating museum objects. Hence, this publication of the conference papers is a valuable contribution, for it provides a review of the present state of the art by 46 prominent specialists.

The 47 papers, eight of which are in French, are varied in character. There are reviews of the literature, statements of policy and philosophy, descriptions of methods and techniques, and disclosures concerned with new findings in research. The subjects considered include museum climate, physical and chemical methods of analysis, fungicides and insecticides, new varnishes and problems encountered in removing varnishes, the examination and treatment of metal objects, transferring frescos, the consolidation of fragile objects, the examination and conservation of glass, reinforcing and transferring wood-panel paintings, the treatment and repair of textiles, and the training of conservators and restorers. Understandably, there is little discussion of archeological problems *per se* and practically nothing about the restoration of architectural monuments. Notably missing are contributions from Belgium and India. The extensive halftone illustrations are not of the highest quality, and they detract from the overall attractiveness of the volume.

This is not a how-to-do-it handbook of specific treatment and analysis. Rather, it is a survey and statement of fundamental problems. Although the volume is addressed primarily to professional colleagues, the language is simple and direct. It will be a valuable reference, for it introduces the nonspecialist to the people, the literature, and the basic problems concerned with the care and examination of museum materials.

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Chemical Engineering

The Thermodynamics of Gasification and Gas-Synthesis Reactions. N. V. Lavrov, V. V. Korovov, and V. I. Filippova. Translated from the Russian edition (Moscow, 1960) by G. H. Kinner. Pergamon, London; Macmillan, New York, 1963. viii + 116 pp. Illus. $6.50.

Essentially this monograph is composed of two distinct parts; the first is a quite adequate review of the calculation of thermodynamic data by statistical methods and of chemical equilibrium constants from thermodynamic functions. This section also includes tabulations of thermodynamic functions, which are based on data derived in large measure from Western sources. My spot checks show that the data in these tabulations generally agree with American tabulations which use the same sources. However, several of the enthalpies of formation, ΔH_0°, do not agree with those tabulated by Pitzer and Brewer in their revision of Lewis and Randall's *Thermodynamics* (for example, ΔH_0° for SO_3, SO_2, H_2S, $COCl_2$, CH_2O_2 and HF). As a result, one should check the original sources before using the tabulations of thermodynamic properties given by Lavrok and his co-authors for precise calculations. In general the literature citations are adequate, but occasional references are insufficient (see reference 75 on p. 72).

The second half of the monograph should be useful to process engineers in the organic chemical industry. In this half, equilibrium constants, equilibrium concentrations, and percentage conversions for several chemical synthesis processes are recorded. Unfortunately, in this respect the Russians have