tion to the literature and is sufficient reason for persons interested in the field of mass spectrometry to acquire this book. The appendix contains an exhaustive survey of critical potential data covering the literature from 1930–1955 inclusive. The associated bibliography of 534 references indicates the magnitude of the effort involved in this work.

The main text of the book contains chapters on Apparatus and Methods, Theory, Energetic Considerations, Mass Spectral Considerations and Implications for Chemical Reactions. The first chapter is specifically designated to the discussion of appearance potential determinations and related techniques and serves this purpose. The chapter on Theory misses an excellent opportunity to indicate the limitations of usefulness of the quasi-equilibrium theory which arise from difficulties in getting precise and reliable appearance potential data. In the reviewer's opinion one of the most important applications of critical potential data is found in studies of the quasi-equilibrium theory of mass spectra.

The chapter on Energetic Considerations shows the limitations of appearance potential data. This topic is difficult to treat clearly and objectively and the authors often yield to the natural temptation to emphasize their own results.

On the point of clarity of exposition, if future editions of this book appear revision of passages of the following type would be helpful. "In discussing various ionic organic reactions, obviously the proton affinity of a molecule is the energy evolved when a proton is added to a molecule to form an ion. Since a proton is an entity of very high energy, proton affinities are usually comparatively high and, of course, so are strengths of the bonds involving the proton."

In spite of the objections noted above on clarity and the manner in which some data are presented, the reviewer recommends this book as a useful reference work.

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International Committee of Electrochemical Thermodynamics and Kinetics. Proceedings of the Seventh Meeting. Lindau, 1955. G. VALENSI, Poitiers (Editor-in-Chief), T. P. HOAR, Cambridge, F. JOLAS, Paris, and J. O'M. BOCKRIS, Johannesburg. Butterworths Scientific. Publications, 88 Kingsway, London, W. C. 2, England. 1957. xi + 409 pp. 16.5 × 25.5 cm. Price, 84 s., by post 1s. 6d extra.

The papers, the discussions, and the business of the seventh meeting of CITCE at Landau, Germany, in July, 1955, are contained in this volume. At the outset it must be noted that the value of the proceedings must have been diminished by the 27 months which elapsed before they appeared in print. This is not only a disservice to the authors of the papers making up most of the book but also to the readers who did not have access to some of the fine work contained in these papers. Delay in publication of proceedings of meetings and symposia seems to be widespread (see for instance *Science*, 126, 704 (1956), for a review by Hodge), and some effort is needed to overcome this problem. It may be that the excessive delay stems from the inclusion of the discussions. If so it would be well worthwhile considering eliminating the discussion from the volume and printing it as a separate pamphlet to be distributed at a later time. In this volume the discussion was surprisingly meager, especially in the sections on experimental methods and on semi-conductor electrochemistry.

There are six sections of major interest in the book. These are: Experimental Methods in Electrochemistry; Fundamentals, Electrochemical Definitions; Potential–*p*H Diagrams; Corrosion and Protection against Corrosion; Batteries and Accumulators; and Electrochemistry of Semi-conductors. Of the 33 paper titles listed, eight are essentially notes and three are simply abstracts. Approximately a quarter of the book is given over to the business of the meeting, to introductory summaries of the papers in each section, and to reports of the several Commissions of the organization. Among the last is an interesting introductory report by Pourbaix on electrochemical kinetics. This report and the resulting discussion led to the formation of a Commission on Electrochemical Kinetics which was charged first with assembling presently available information in that field of interest.

In spite of what may sound like a discouraging report up to this point this volume does contain good papers, some largely review, but all of generally high caliber. A group of six titles is devoted to up-to-date reports and reviews on the electrochemistry of systems with solid state conductors. Following a survey by Madelung on the nature of the semiconduction single phase, using both band theory and the atomic picture used for ionic crystals, there are two papers concerned with the complications introduced in multiphase systems of this sort. Schultz and Harten concern themselves with semi-conductors in contact with a gas phase and with a metal, while Seiler and Geist treat the case of semi-conductors in contact with other semiconductors. The former have a particularly interesting section on surface properties of semi-conductors but the entire group, while largely review, is good. Wagner provides an outstanding paper on galvanic cells using solid electrolytes. It is largely theoretical, drawing heavily on data and experimental information already in the literature. Milička in an abstract gives a tantalizing look at a possible procedure for measuring the phase potential of semi-conductors (and insulators) in powder form. If truly applicable, this opens some interesting possibilities such as its use in potentiometric measurement of adsorption onto powders, as suggested by the author. The section is closed by a paper by Gölr in which he draws the parallel between potentials in electrochemistry and in semi-conductor work. This is done in a clear and concise fashion.

The largest single section of the book consists of 15 titles devoted to experimental methods in electrochemistry. This is one section which would have served a much better purpose had it appeared earlier. Much of it is in the nature of review but a considerable portion describes new and useful procedures. Disregarding the question of new material *versus* review and survey, the papers by Gierst on constant current density electrolysis, especially using interrupted and periodic inputs, by Seipt on galvanostatic and potentiostatic methods, and by Ibl on investigative methods for the diffusion layer are first rate and likely to be very useful to many workers in electrochemistry. The paper by Epelboin, Brouillet and Froment on measuring large anode potentials in concentrated electrolyte solutions should be of particular interest to those working on anodization, on electropolishing, and to some extent to those concerned with the passivity of metals. Grüss's paper on the use of brightness measurements to study metal surfaces is a short review of limited usefulness. Rius, Llopis and Sanchez-Robles describe a mercury jet cathode as another in the arsenal of polarographic techniques. They point out the disadvantages of the method and state that it provides an interesting system in which a particular advantage is its use for preparative purposes, thereby permitting one to study the kinetics of electrochemical reductions by normal analytical means. There are two other original papers of somewhat more restricted interest. De Greef, Decroly and Boute studied the effects of additions to the solution on deposition potentials of alloys, specifically Cu-Zn; Nagel describes an investigation of the mechanism of "haze" formation in the electrolytic production of silver halide electrodes. A theoretical treatment of some interest concerning the elimination of diffusion potentials was contributed by Maroumey and Valensi, and Lange made some succinct comments concerning Volta potential drops and the advantage of using the condenser method for measurement of these potentials. A paper on electrolytic oxidation and reduction by Lewartowicz is concerned generally with the influence of various experimental parameters on the interpretation of kinetic results. The remaining four titles are brief notes or abstracts.

The question of electrochemical definitions and signs of electrode potentials is dealt with in a short section containing five notes. Much of this material has been seen before but it is of interest in two respects. A note on The Sign of Half-Reaction Potentials by Latimer (probably his last) shows that he was willing to use the so-called European sign convention in order to destroy what is certainly an undesirable, and probably unnecessary, roadblock. Gerischer's brief paper on notations of current–potential curves is certainly timely.

Potential–*p*H behavior for the systems Ni–H_2O and Sn–H_2O is detailed thoroughly by Pourbaix, Zoubov and Deltombe in two papers. Aside from the equilibrium infor-

mation, the corrosion and electrochemistry (electrodeposition, galvanic cells) of each system is discussed. The last two authors also contributed a short paper on the standard free enthalpy of $SnH_4(g)$. A paper by Brown, plus the discussion which follows, gives a very full background on the chemistry of the I_2–H_2O system and should be most useful to anyone interested in iodine and its compounds in aqueous systems. The section is completed by a good paper by Maronny and Valensi on the calorimetric determination of various thermodynamic functions for the polysulfide ion $S^2{}_5^-$.

The reports of Study Groups one and two on corrosion and on batteries and accumulators, respectively, were brief and not particularly informative. Associated with each, however, was an original paper of some interest which should have appeared earlier than they did. Darsulin and Markovic studied the mechanism of corrosion of lead in water–dioxane systems containing air, and concluded that the water molecule is split giving an oxide and a hydrogen-sorbed lead surface. The rate of lead corrosion is said to be controlled then by competition between the formation of the adsorption "surface compound" and the rate of access of oxygen to the surface. Brenet, Grund and Jolas studied the effect of heating on MnO_2 structure and on the Mn–O ratio. The work is incomplete in that the changes found have not yet been related to the important electrochemical effects in the dry cell.

This volume covers such a wide range of topics that a critical review of each contribution was not feasible. However, the quality throughout is generally satisfactory or better. Thus for various reasons, various people should find this a useful book to have handy.

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Synthesis of Heterocyclic Compounds. Issue I. A. L. MNDJOIAN, Editor. Publishing House of the Academy of Sciences of the Armenian SSR, Ulitsa Abovyana, No. 124, Erevan, Armenian SSR, USSR. 1956. 84 pp. 15 × 22.5 cm. Price, 5 rubles (with binding).

This little booklet is patterned after the well-known "Organic Syntheses" in style of writing and composition of the individual items.

As stated by the editor, until the publication of this book, which is stated to be the first of a series, there has been a lack of small and inexpensive books giving practical directions for the synthesis of heterocyclic compounds. Such preparations are scattered through the literature although some do appear in "Organic Syntheses." The original publications, however, are often not given in sufficient detail to be reliable or workable, and a series of small books describing practical syntheses of heterocyclics should be very useful.

This reviewer fully supports the author in this purpose. There are many compendia on heterocyclic compounds, but for the most part these are of a descriptive or theoretical nature rather than manuals of practical directions.

The present booklet covers a number of readily carried out syntheses of furan derivatives. They are to a large extent taken from Mndjoian's own publications in the Journals of the Armenian Academy in 1953. Many are simple adaptations of earlier descriptions in Western publications.

Mndjoian has been active in the general area of organic pharmaceuticals for a number of years, and has reported a large number of preparations of esters and amides useful in the general area of anesthetics and antihistaminics in the Armenian journals. The furan series is only one of the lines of work. The present booklet largely collects these data in one place. The original descriptions in the Armenian journals were mere lists of the compounds made with descriptions of physical constants but as a rule no details of the methods of synthesis were given owing to lack of space.

In the introduction the author states that the Institute of Fine Organic Chemistry of the Armenian SSR is undertaking a periodic publication of such volumes in heterocyclic syntheses. Along with material taken from the work of this Institute (in which Mndjoian is a leading chemist), he states that methods developed by others will also be published. The preparations are checked and verified in the "Organic Syntheses" tradition. Apparently several additional volumes will also be devoted to furan derivatives.

This reviewer's personal reaction to this little volume is good. It is well put together in a style familiar to all practicing chemists, references are well annotated and proper credit is given to previous work. A reading of the book did not disclose any apparently unworkable stages in the syntheses. Very sensibly the irritant properties of halomethylfurans are mentioned as warnings in the text. This is also common "Organic Syntheses" practice.

If the series is continued and is diversified to other heterocyclic systems, it will make a very useful and inexpensive addition to a chemist's personal library (provided he reads Russian). Current books in this country on heterocyclics are becoming too expensive for most bench chemists.

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Chemisorption. Proceedings of a Symposium held at the University College of North Staffordshire, Keele, Staffordshire, by The Chemical Society, 16–19 July, 1956. Edited by Professor W. E. GARNER, C.B.E., D.Sc., F.R.S. Academic Press Inc., Publishers, 111 Fifth Avenue, New York 3, N. Y. 1957. xii + 277 pp. 14.5 × 22 cm. Price, $9.00.

The subject of chemisorption, particularly in relation to the chemistry of the solid state and the kinetics of surface reactions, is undergoing extremely rapid development. Over the past few years our knowledge of the nature of chemisorption has advanced from a vague notion of the saturation of residual valence bonds at surfaces to much more precise ideas in which Brillouin zones, Fermi levels, conduction bands, impurity levels and d electrons play a prominent and well-defined role. There is still much room for advancement, however, since a number of important points remain unsettled and a few contradictions still exist. For this reason the publication of the proceedings of a symposium in which the participants are all distinguished workers in the field is particularly timely, and those interested and fairly familiar with the subject will find much of value in the present volume.

Space does not permit even a reference to each individual paper, and the reviewer will content himself with commenting on a few of the contributions that seemed to him to be of special interest. The group of papers dealing with chemisorption on metals is a particularly strong one; most of the important phases of the subject are covered. Conductivity changes on adsorption on metal films are described by Suhrmann, while Mignolet extends his previous work on charge transfer during chemisorption. Bond and Addy deal with chemisorption and catalysis on metals of group VIII, while Eley and Rossington, and Gundry and Tompkins, deal more particularly with kinetic aspects of chemisorption. A very interesting paper by Leck describes experiments on chemisorption resulting from the bombardment of metal surfaces by positive ions with energies up to 5000 e.v.

The group of papers on semiconductors also contains several significant contributions. The introductory paper by Stone is a particularly lucid and useful one. Winter reviews his results on the exchange of ^{18}O between O_2 gas and oxide surfaces, while papers by Rudham and Stone, McConnell and Roberts, and R. J. Davis, deal with processes at the surfaces of various other oxides. A group of papers dealing with adsorption on insulators includes interesting contributions by Kipling and Peakall and by Gregg on the adsorption of water and other vapors on oxides, and by Kloosterziel on hydrogen-containing aluminum oxides.

A somewhat disappointing group of papers comprises those dealing with the theory of chemisorption; one could, indeed, glean more of the theory by reading the other papers than the four in this group. Dowden's introductory paper is written in such a condensed manner as to be largely unintelligible to anyone not already entirely familiar with the field. Grimley gives an interesting formal treatment of the quantum mechanics of the chemisorption of hydrogen on a metal surface, and in this section one might have hoped for parallel treatments of other kinds of systems. A paper by de Boer gives an authoritative discussion of the possible factors leading to a decrease of the heat of chemisorption with coverage. A paper by Schuit, de Boer and co-workers,