the use of electrolytic polishing in studying the mechanism of electrolysis and the valence of ions by I. Epelboin, and an article by M. Haïssinsky on applications of radioactive methods to the study of surface states and surface reactions.

A section devoted to potential–*p*H diagrams contains a progress report of Commission 1 by M. Pourbaix, and eight papers containing potential–*p*H diagrams for the following metals, or systems, at 25°: Fe, Cd, Co, and the systems $Fe–CO_2–H_2O$ and $CN–H_2O$ by E. Deltombe and M. Pourbaix, the systems $Ti–H_2O$ by J. Schmets and M. Pourbaix and $Mn–H_2O$ by A. M. Moussard, J. Brenet, F. Jolas, M. Pourbaix and J. Van Muylder, and the electrode Pt, S/S_5^{--} at 20 and 25° by G. Maronny and G. Valensi. These are followed by ten articles under the heading polarization curves and electrochemical kinetics. One of these on the temperature dependence of the activation energy of electrochemical reactions, by F. Gutmann and L. M. Simons, is theoretical. The remaining nine contain original experimental data, or curves. B. E. Conway, J. O'M. Bockris and B. Lovreček report the effects of alkaloids on the rate of evolution of H_2 at cathodes of Hg and other metals. H. J. Reiser and H. Fischer present polarization–current curves for the simultaneous deposition of H_2 and Ni, and conclude that the rate-determining stage in H_2-deposition is the recombination of H to H_2, catalyzed by Ni. H. Fisher, M. Seipt and G. Morlock make an oscillographic study of the polarization of the deposition of Ni by measuring the variation in overpotential during short rectangular current pulses. G. B. Adams, M. Maraghini and P. Van Rysselberghe describe methods for measuring the thickness of very thin growing films of ZrO_2. These methods should be serviceable in studying the effects of numerous variables upon the ionic current responsible for oxide film growth. Activation polarization in the electrodeposition of Cu is studied by E. Mattsson and R. Lindström, and they explain why the rate-determining step in the deposition depends upon current density. L. Gierst and L. Bourgeois present experimental curves and survey the kinetics of the passivation of Hg, and A. Ruis, J. Llopis and F. Colom do this for the effects of alternating current on the overpotential of O_2 and some anodic oxidation processes. This section is concluded with short papers concerning the electrolysis of NaCl with a mercury cathode. M. Dodero and M. Behroun discuss the copious evolution of H_2, and M. Dodero, C. Deportes and R. Mayoud present the potential–*p*H diagram and polarization curves for the electrolysis.

The last half of the book is concerned with practical applications of electrochemical thermodynamics and kinetics, and with polarography. Nine papers deal with corrosion. This subject is introduced with a statement of the aims of the study group on corrosion, and with a discussion of definitions, classifications and nomenclature used in the description of corrosion-inhibition and inhibitors. The careful experimental work of A. Ruis, J. Llopsis and F. Colom on superimposed alternating currents is extended to the anodic corrosion of Pt. R. Olivier contributes a long and important paper on the passivity of Fe–Cr alloys, including 18/8 stainless steel. J. Van Muylder and M. Pourbaix present two papers on the electrochemical behavior of lead and its corrosion and cathodic corrosion protection, and A. M. Abd El Wahed and M. Pourbaix explain the use of polarization curves in studying the corrosion and protection of Fe in the presence of chlorides. M. Serra and S. Feliu present data on the anodic passivation of Fe in sulfate solutions, and discuss several processes which can explain its origin. M. Billy and G. Valensi report an interesting and careful kinetic study of the formation of β-silver sulfide, and discuss its bearing upon the phenomenon of electrochemical corrosion. The electrochemistry of Mn is emphasized in papers under the supervision of Study Group 2 concerned with batteries and accumulators. K. H. Maxwell and H. R. Thirsk contribute an exhaustive study of the relation between preparation and structure of MnO_2 and the e.m.f. of cells containing the MnO_2 electrode. An interesting controversy results from the juxtaposition of a paper on the thermodynamics of the MnO_2 electrode by J. Brenet and a paper by the same author and A. M. Moussard on the variability of the potential of this electrode in practice.

The applications of polarography to analytical chemistry are outlined by P. Souchay, and a renewed Hg cathode is shown by H. Coriou, J. Dirian and J. Hure to permit a practical separation of traces of Mn from relatively large amounts of electrolytes. M. A. El Guebely shows that this electrode can also be used in the determination of Ru in extremely dilute solutions, because the concentration of Ru is proportional to the velocity of H^+ ion discharge which it catalyzes. New developments in polarography and voltammetry are reviewed by P. Delahay. The volume is concluded with a collection of important but somewhat unrelated papers. The conditions for electrolytic reduction of salicylic acid are investigated by H. V. K. Udupa and B. B. Dey, and the conditions and mechanism of the electrolytic preparation of cyclobutanol are discussed by R. Le Corff and F. J. Taboury. Two papers are concerned with the mechanism of reduction at the Hg cathodes. The reduction of CO_2 is considered by T. E. Teeter and P. Van Rysselberghe, and H_2O_2 is studied by G. A. Murdock and P. Van Rysselberghe. The mechanism of electrolytic polishing is discussed by S. Feliu and M. Serra. A cryoscopic study is reported by Y. Doucet, who investigated the thermodynamic behavior of mixtures of fused salts.

Although a part of the volume is necessarily devoted to reports and the plans of committees and study groups which may not be of interest to the general reader, some 500 pages contain a wealth and variety of original contributions, and many of these are largely experimental. The International Committee for Electrochemical Thermodynamics and Kinetics is to be congratulated for making the results of such work available in this convenient and well-organized collection.

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Electrochemical Affinity. Studies in Electrochemical Thermodynamics and Kinetics. By PIERRE VAN RYSSELBERGHE, Professor at the University of Oregon, Eugene, Oregon. Hermann and Cie, Editeurs, 6 Rue de la Sorbonne, Paris 6, France. 1955. 109 pp. 16 × 24 cm. Price, 1250 French francs.

The theme of this booklet is "that a rational treatment of electrochemistry requires the use of the thermodynamics of irreversible processes and that this discipline, although not new by any means, is still unfamiliar to the majority of physical chemists and electrochemists." For this majority it can be stated briefly that the thermodynamics of irreversible processes comprises a generalized description in which reversible processes and equilibria are limiting cases. To the majority this may not appear novel or profound. Nevertheless, the thermodynamics of irreversible processes is a profound subject with much of its modern development based on Onsager's reciprocal relations together with the use of concepts such as the degree of advancement of a reaction and the power of irreversibility introduced by De Donder and extended by Van Rysselberghe.

The topics discussed are limited to the theory of galvanic and electrolytic cells, electrode processes, polarization, overpotential, electrochemical kinetics and thermo-electrochemistry. In essentially the same form a portion of this material has been presented by Van Rysselberghe in the *J. Phys. Chem.* **57**, 275 (1953). This article on electrode phenomena and the thermodynamics of irreversible processes exhibits the same scholarship and style so precisely that it can serve as an illustrative review and partial replica of the material in this brief but interesting book.

NATIONAL BUREAU OF STANDARDS
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Blood Group Substances. Their Chemistry and Immunochemistry. By ELVIN A. KABAT, Departments of Microbiology and Neurology, College of Physicians and Surgeons, Columbia University; and Neurological Institute, Presbyterian Hospital, New York. Academic Press, Inc., Publisher, 125 East 23rd Street, New York 10, N. Y. 1956. ix + 330 pp. 16 × 23.5 cm. Price, $8.00.

The author of this very worthwhile book brings to his task a profound knowledge of immunochemistry and also a long experience in the field in which the A,B,O blood group system forms a useful model. Much of present day knowledge in immunology and chemistry of antigens and antibodies has been obtained by study of this system.

The book is devoted to the ABO system and in this it gives more than its title promises. It deals with all known aspects of the chemistry and immunochemistry of the A, B and O substances and thus fills a long standing gap in immunological and biochemical literature. The serological, general biological and even genetical significance of blood groups is given consideration to the extent necessary to make it comprehensible to the more chemically trained reader. The sources and methods of analysis are described and critically evaluated without being lost in detail. In spite of the wide scope, the whole is kept under the unifying concept of the immunochemical significance of these substances.

Other blood group systems, of which none is yet chemically defined, are viewed in their relation to the ABO system. In recent years, there has been some clarification on the relationship between the specificity and structure of the ABO substances to which the author made notable contributions.

With a few exceptions, this book is written clearly and concisely and can also be comprehended by people not working directly in the blood group field.

The essential references are cited extensively which make this treatise a storehouse of information. The author carefully avoids giving this book the appearance of a review and he does not hesitate to take part in controversial issues such as the question as to the origin and nature of the isoantibodies in the ABO system. His criticism and arguments, however, are perfectly logical and fair, a feature which characterizes the whole volume.

The great importance of the quantitative immunoprecipitation technique of Heidelberger and his school in determining purity of antigens has been rightly stressed by the author who successfully adapted this technique to the studies of the A and B substances. There are a few minor criticisms, *e.g.*, Chapter 7, table 1: it would be desirable to know the amount of minimum hemagglutinating doses throughout this extensive tabulation without having to resort to the original papers. In table 8, of Chapter 8, it would have been advantageous to assign a prefix to the sugars galactose, fucose and probably also N-acetylglucosamine since every reader may not be aware of the frequent absolute specificity of serological reactions toward enantiomorphous isomers. The formulas on p. 245–246 tend to point out the necessity of two hydroxyls in *cis* position in the periodate reaction (see also reaction (e) p. 246), although it was intended to stress *vicinal* rather than *cis* hydroxyl groups. In table 3 of Chapter 1, the last column heading omits the reference point."

The author makes it evident that we stand only at the beginning of our understanding of the structure, specificity and biological significance of the blood group substances.

The index and the physical aspects of the book, including formulas, type, paper and binding are good. There are occasional printing errors, including references, which should be eliminated in forthcoming issues of this excellent volume.

This book is highly recommended to chemists and all biologists interested in immunological science beyond the descriptive level.

IMMUNOCHEMISTRY SECTION
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Annual Review of Nuclear Science. Volume 5. BY JAMES G. BECKERLEY, Editor, Schlumberger Well Surveying Corporation, MARTIN D. KAMEN, Associate Editor, Washington University Medical School, and LEONARD I. SCHIFF, Associate Editor, Stanford University. Annual Reviews, Inc., Stanford, California. 1955. ix + 448 pp. 16 × 23 cm. Price, $7.00.

Volume 5 of the Annual Review of Nuclear Science carries on the tradition of its predecessors in presenting to workers in the field critical review articles on timely topics more or less related to the nucleus. Of the fourteen articles, there are three on fundamental properties of the nucleus, two on techniques for obtaining fundamental data on the nucleus, two on the application of nuclear information or techniques to reactor design and shielding, two on the use of the mass spectrometer in the study of non-nuclear problems, one on radiation chemistry, and four on radiobiological studies.

The three articles on the nucleus give the theoretical background, and comparison of predictions from theory with experiment, on the charge distribution in the nucleus, the de-excitation of excited nuclei by emission of electromagnetic radiation, and reactions of nuclei with projectiles in the 10 Mev. energy range The two articles on techniques used for obtaining fundamental data discuss particle detection by cloud chambers and bubble chambers, a relatively new method for particle detection based on the soda-pop principle, and radiochemical separation methods for isolation of radionuclides, a technique which has contributed handsomely to the discovery and characterization of new radionuclides as well as to the preparation of radionuclide sources for other studies. The two articles on reactors and shielding are especially timely in view of the expansion in pile construction in industrial and university sites.

The only other article this reviewer feels competent to comment upon is the one on the fundamentals of radioautography, in which, although the biological application is stressed, a simple discussion on the interaction of radiations with emulsion is given.

This volume will be appreciated by workers in the diverse disciplines of physics, chemistry, biology and nuclear technology as a contribution to their understanding of the many fields encompassed by "nuclear science."

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Simposio Internazionale di Chimica Macromolecolare Organizers of the Symposium—ANTONIO NASINI, Professor, Istituto Chimico Universita, Torino, Italy, GIULIO NATTA, Professor, Istituto di Chimica Industriale del Politecnico e Montecatini, S.p.a., Milano, Italy, and MARIO MILONE, Segretario generale, Istituto Chimico Universita, Torino, Italy. (International Union of Pure and Applied Chemistry. International Symposium on Macromolecular Chemistry.) Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1955. xix + 954 pp. 18 × 24.5 cm. Price $19.20.

This book contains 92 papers delivered in four languages at the 1954 International Symposium on Macromolecular Chemistry in Milan and Turin, reinforced by submitted comments, questions and authors' replies in the manner of the Faraday Society Discussions. The wide range of subjects treated is seen in the following list of sub-titles (actually, titles of sessions at the symposium), the parenthetical figures giving the number of papers under each: Building Reactions of Macromolecules (19), Transformation Reactions of Macromolecules (5), Preparation and Properties of Block and Graft Copolymers (7), Cellulose and Derivatives (8), Molecular Weight Distribution (11), Methods of Molecular Weight Determination (3), Branched Polymers (4), Fiber-forming Polymers (8), Crystallization and Transitions (8), Proteins (6), General Properties of Polymers (13). One may as well say that almost all aspects of polymer science are represented.

Recalling that the somewhat smaller output of the 1953 conference at Uppsala appeared as Volume 12 of the *J. Polymer Sci.*, one is impelled to compare the present work to a typical volume of a scientific journal. The content is not superior, the problem of synchronizing scientific discovery with the calendar being yet unsolved. The presentation appears less economical, as could be expected from the complete sacrifice of the referee system. The price is comparable, although for frequent use a sturdier binding would have been desirable. A safe conclusion is that the book will have to be in every library carrying the important polymer literature, but that at the present price few individuals will strive to own a copy.

On the positive side, there remains the international flavor which is after all the chief attraction of such meetings. There are five papers by the Russian scientists whose sudden and unexpected appearance was the conversation piece of the symposium. Heralding later events at Geneva, these papers by Andrianov, Bresler, Medvedev and Tsvetkov indicated more clearly than mere abstracts that polymer science in Russia is well advanced and similar to that in the West.

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