94, 6874 (1972)]. By LEO A. PAQUETTE* and MICHAEL J. KUKLA, Department of Chemistry, The Ohio State University, Columbus, Ohio 43210.

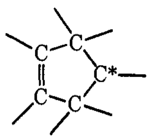
The correct name of the title compound is tricyclo-[5.3.0^{4,8}]deca-2,5,9-triene.

Dimerization of Nortropane-*N*-oxyl [*J. Amer. Chem. Soc.*, **94,** 7166 (1972)]. By G. D. MENDENHALL* and K. U. INGOLD, National Research Council of Canada, Ottawa, Canada K1A OR9.

The epr splitting parameters for **1** are a_N 17 G, a_H (2 H) 4 G and for **3** a_N 19.3 G, a_H (1 H) 7 G. The bridgehead protons cause the secondary splitting in each case.

7-Norbornenyl Anions. Evidence for a Bishomoantiaromatic System [*J. Amer. Chem. Soc.*, **94,** 8489 (1972)]. By J. K. STILLE* and K. N. SANNES, Department of Chemistry, University of Iowa, Iowa City, Iowa 52240

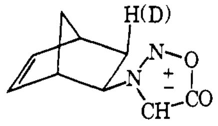
Structure **1** should be



1

Allylcarbinyl–Cyclopropylcarbinyl Norbornenyl–Nortricyclyl Anion Rearrangement. Evidence for a Symmetrical Intermediate [*J. Amer. Chem. Soc.*, **94,** 8494 (1972)]. By J. K. STILLE* and K. N. SANNES, Department of Chemistry, University of Iowa, Iowa City, Iowa 52240.

Strucure **14 (15)** should be



14 (15)

Book Reviews*

Inorganic Chemistry. By G. C. DEMITRAS (La Salle College), C. R. RUSS (University of Maine), J. F. SALMON (Loyola College), J. H. WEBER (University of New Hampshire), and G. S. WEISS (Millersville State College). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1972. x + 556 pp. $15.95.

This textbook is designed for an upperclass undergraduate course. In organization, it has some points of merit; there is unusually complete coverage of the solid state and of electrochemistry, and there are selected topics in "descriptive chemistry" (hydrides, oxides, halides, and organometallics) to go with the more theoretical material. However, much of the material (atomic structure, covalent bonding, stereochemistry, and kinetics) is presented at a level in between the usual general and physical chemistry course treatments and is probably of little value in an upperclass inorganic course.

The student would find in this text a number of models now considered outmoded by most inorganic chemists, such as the calculation of the per cent ionic character of the hydrogen halides from their dipole moments (neglecting lone pairs) and Pauling's old valence bond magnetic criteria of bonding and structure in transition metal complexes. The text's presentation of more modern topics, especially ligand field theory and the spectra, paramagnetism, and structure of complexes, seems weak. Also, this book will have little value to the student as a future reference volume, in contrast to Cotton and Wilkinson, for example.

A major problem with this book is that there are repeated errors of fact throughout. For example, serious mistakes occur in the discussions of magnetism, nonaqueous solvent systems, the use of coordination chemistry nomenclature, structures, and synthesis.

Although the instructor of an upperclass inorganic course needs to have a greater choice than is now available in the selection of textbooks, this one cannot be recommended.

John T. Yoke, *Oregon State University*

Detergency: Theory and Test Methods. Part I. (Volume 5. Surfactant Science Series). Edited by W. G. CUTLER and R. C. DAVIS (Whirlpool Corp.). Marcel Dekker, Inc., New York, N. Y. 1972. ix + 451 pp. $28.50.

Appropriate to its title, the book under review offers an excellent state-of-the-art report on the theory of detergency along with a compilation of test methods commonly in use today to evaluate detergency.

The book appears at a time when need for such a volume is being well felt and when, more than ever before, both industrial and academic researchers are deeply involved in studies for finding efficient nonphosphate detergent systems. As is well known, detergency is a very complex process and any approach in the design and evaluation of novel detergent systems has got to be benefited by a clear understanding of such basic aspects of detergency as nature of laundry soils, the mechanism of adherence of particulate/oily soil to and their removal from fibrous substrate, soil redeposition, role of mechanical action in soil removal, etc. Chapters 3–8 of this book have given an excellent theoretical discussion on these topics. In spite of the easy-to-understand style of the presentations, some of these chapters have been dealt with in surprising depth. The subsequent chapters have dealt with the various test procedures for evaluating detergency.

The major deficiency of the book lies in the definition of terms in Chapter 2, and in the choice of exemplary illustrations therein. In more than one instance, the definitions have been inaccurate or the examples to illustrate them have been poorly chosen. However, in spite of these deficiencies, the book as a whole will be useful to the majority of readers.

This part does not have an index; the complete index of this part and that of Part II will appear at the end of Part II.

In general, this book can be highly recommended.

P. M. Chakrabarti, *GAF Corporation*

Group Theory and the Coulomb Problem. By M. J. ENGLEFIELD (Monash University, Australia). John Wiley and Sons, Inc., New York, N. Y. 1972. viii + 120 pp. $11.95.

The remarkable degeneracies of different angular momentum states in the nonrelativistic hydrogen atom (*e.g.*, 2s, 2p) are not accidental but a consequence of higher symmetry in the Coulombic Hamiltonian. (This was discovered by V. Fock in 1935.) Englefields's monograph presents a systematic account of some applications of Lie algebras and groups to fundamental problems in quantum mechanics. Also dealt with, in addition to the Coulomb problem, are the one-, two-, and three-dimensional harmonic oscillators and the theory of angular momentum. The compressed style of presentation requires some fair degree of mathematical sophistication on the part of the reader. This is perhaps in contradiction to the author's stated intention of reaching "more general readers." But for those with the requisite background and inclination, this is a very interesting little book.

S. M. Blinder, *University of Michigan*

Many-Electron Theory. By STANLEY RAIMES (Department of Mathematics, Imperial College, London). American Elsevier Publishing Co., Inc., New York, N. Y. 1972. xi + 272 pp. $21.50.

This book represents an attempt to partially bridge the gap between conventional training in quantum mechanics and the sophisticated techniques of current research in many-particle theory. The Hartree–Fock method, second quantization, diagram techniques in perturbation theory (Feynman graphs), and Green functions are developed from first principles. The free-electron gas—a simple model for the conduction electrons in a metal—serves as the prototype many-particle system. (The author has an earlier volume entitled "The Wave Mechanics of Electrons in Metals.") A recurring motif is the problem of calculating the correlation energy of a free-electron gas. Second-order perturbation theory based on Hartree–Fock functions gives a divergent result. Two alternative approaches are outlined. Following Bohm and Pines, it is shown that the long-range parts of the Coulomb correlation correspond to collective excitations (plasma oscillations) which remain unexcited at absolute zero. The residual short-range correlation is then adequately described by perturbation theory. By the method of Gell-Mann and Brueckner, valid in the limit of high electron density, the divergences in each individual order of perturbation theory cancel one another when summed to lead to a finite correlation energy.

The writing is lucid and well organized for the most part. Most readers will find the presentation self-contained and easy to follow with the exception of the chapter on plasma oscillations (which requires reference to the earlier book). By keeping arguments elementary, some proofs inevitably become lengthy and tedious affairs—but tolerable to the extent encountered. All in all, the book does fulfil its stated purpose of preparing the reader for more advanced or specialized study in many-particle theory.

S. M. Blinder, *University of Michigan*

Chemical Methods of Silicate Analysis—A Handbook. By H. BENNETT and R. A. REED (British Ceramic Research Association). Academic Press, New York, N. Y. 1971. xiv + 272 pp. $12.

This book is an updating of "Methods of Silicate Analysis," by H. Bennett and W. G. Hawley (the first edition appeared in 1958, the second in 1965). The present volume continues the trend from "classical" methods as developed in the second edition. The methods discussed are confined to a delineation of analytical procedures applicable to materials commonly encountered in a ceramics analytical laboratory. Methods are developed along the lines of specific types of materials by chapter: high silica, aluminosilicates, aluminous; magnesites and dolomites; chrome-bearing materials; zircon and zircon-bearing refractories; bone ash; and frits and glazes. F, phosphate, and sulfate are treated separately. The material has been organized for "ease of use" on the bench, a purpose in which the authors have succeeded admirably.

New methods are: a coagulation method for SiO_2, obviating the need for dehydration by evaporation to dryness; residual SiO_2 escaping precipitation is recovered colorimetrically on an aliquot of the SiO_2 filtrate. Fe_2O_3 and TiO_2 are determined colorimetrically, and Al_2O_3, CaO, and MgO are determined by complexiometric titration, also on aliquots of the same filtrate. Alkalis are determined separately by flame photometry. If ZrO_2 is to be determined, a cupferron precipitation including Fe_2O_3 and TiO_2 is made; the latter are subsequently determined on the ignited and weighed precipitate. The procedures for Al_2O_3 have considerable merit in that they are direct. Fe_2O_3, TiO_2, ZrO_2, SnO_2, and V_2O_5 are removed by chloroform extraction of their cupferrates, and Al_2O_3 is titrated with EDTA or DCTA. These basic methods are modified to fit the sample material at hand. Where not applicable, standard or classical methods are applied.

The experienced silicate analyst will no doubt find much here with which he is familiar; some procedures he would modify in the light of his experiences and preferences. However, the book is well organized in the presentation of methods for specific materials. It offers something for the experienced analyst and a most useful guide for the less experienced. It is recommended for inclusion in the library of the ceramic laboratory, not so much as a reference text, but as a working guide for the bench analyst or laboratory technician.

Paul Close, *Owens-Illinois, Inc.*

Essays in Chemistry. Volume 3. Edited by J. N. BRADLEY (University of Essex), R. D. GILLARD, and R. F. HUDSON (University of Kent at Canterbury). Academic Press, London and New York. 1972. x + 156 pp. $5.50.

For those not familiar with this series, each volume contains five or six essays on topics taken from all fields of chemistry. These essays differ greatly from review articles on these topics. First of all, they are directed at the nonspecialist in the areas described. Consequently the presentations presuppose little background and provide more detailed explanations. Secondly, the reviews are not encyclopedic and give only a few references to the more general treatments of the various topics.

The following areas are covered in Volume 3: branching-chain reactions, the hydrogen–oxygen reaction, basic principles of lanthanide and actinide chemistry, symmetry, chemiluminescence, and intramolecular catalysis. Each article is clearly written and should provide advanced undergraduate and graduate students with an introductory knowledge of developments in new or other areas and hopefully stimulate them to do more reading in these areas.

Donald J. Reuland, *Indiana State University*

Principles of Surface Chemistry. By G. A. SOMORJAI (University of California, Berkeley). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1972. xviii + 283 pp. $10.95.

This book, written as one member of the series "Fundamental Topics in Physical Chemistry" (Editor: Harold S. Johnson, University of California, Berkeley), was designed primarily as a textbook for students who have had a basic course in physical chemistry and who are now ready for a more intensive treatment of surface phenomena. However, others will find in it not only an excellent up-dating review but a stimulating introduction to some of the modern techniques for exploring solid surfaces. The teacher will welcome the excellent illustrations which could serve as models for projection slides and also the problems at the end of each chapter which were selected to not only challenge the student but to send him to the original literature for aid in their solutions. There are 321 literature citations, often with comments and suggestions by the author. The book has a very complete and detailed index and a four-page "List of Symbols." The book is arranged under five major headings, *viz.*, Structure of Solid Surfaces, Thermodynamics of Surfaces, Dynamics of Surface Atoms, Electrical Properties of Surfaces, and Interactions of Gases with Surface. Each major grouping is further divided and subdivided by numerals and decimals for easy reference. Equations are also numbered consecutively in each section. A sound basis in calculus is assumed by the author to be a prerequisite for any course using the text, but a good balance between word and equation is maintained. In fact, the problems are quite practical in scope and the student will readily see the merit in their solution. Furthermore, the author has made the text smooth flowing and quite readable so that a person weak in math can still read and understand the descriptive material and the basic concepts. A useful summary is given at the end of each chapter. The editor of the series mentioned above stated in the Foreword, "Each author has been urged to make his goal student insight into one basic area of physical chemistry." This reviewer feels that author Somorjai has fulfilled that assignment well and any student who masters this text and who works through the problems will have a good base in surface chemistry for future studies.

James A. Robertson, *FMC Corporation*