then it has become a standard source and perhaps the best single introduction to the field. In the United States it has remained virtually unknown. This is a pity, because ever since Van't Hoff moved from Amsterdam to Berlin in 1896 Germany has been the center of evaporite research, and Braitsch is the ideal guide to this body of work. It is good to have the translation by Burek and Nairn now, even though much has happened during the last decade. The translators, adhering strictly to the original, have produced a readable, if not elegant, version. To acknowledge the passage of time, A. G. Herrmann has added a sprinkling of references up to 1968, none of which are included in the reference list or index.

Otto Braitsch's death in an automobile accident in 1966 was a loss for all of us. During his trip through the United States in the preceding year he made many friends. His grasp of the subject was obvious, and he was delightfully flexible and free of dogma. Many of us were counting on active and fruitful collaboration. Now we are grateful that he summarized his views so convincingly.

The translation arrived in the nick of time. I believe that the next few years will bring radical changes. Like no other branch of the earth sciences, evaporite research has been dominated by chemists, foremost among them Van't Hoff. It looks as if it is now the sedimentologists' turn. A detailed analysis of the depositional environments and sedimentary structures of evaporites promises to yield more insight than further phase diagrams—for a geochemist, quite an admission.

HANS P. EUGSTER
Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Maryland

Surface Chemistry

Catalysis of Gas Reactions by Metals. A. J. B. ROBERTSON. Springer-Verlag, New York, and Logos, London, 1970. xii, 182 pp., illus. $9.80.

Recent years have seen the appearance of many novel experimental techniques that give definitive information about surfaces without interference by bulk atoms. Low energy electron diffraction, which reveals the structure of surfaces and adsorbed gases, and Auger electron spectroscopy, which makes possible nondestructive qualitative and quantitative chemical analyses of surfaces, are only two of these techniques. The study of heterogeneous catalysis, which is one of the most important applications of surface chemistry, will be one of the major beneficiaries of the recent advances in surface science. This book, a well-written review of many of the modern ideas and techniques of catalytic surface chemistry, will aid in the dissemination of the new information as applied to heterogeneous catalysis.

The important advances in the understanding of heterogeneous catalysis in recent years were made by establishing the correlation between the atomic structure of metal surfaces and chemisorbed gases and the reactivity of catalytic systems. Such studies utilize crystal surfaces that are prepared in ultra-high vacuum by a variety of newly developed surface cleaning techniques. The author reviews these techniques and incorporates them in his discussion of the physical-chemical properties of various types of metal catalysts. He presents a well-rounded discussion that takes into account recent advances in surface research in areas outside what has traditionally been considered the domain of heterogeneous catalysis (that is, the surface chemistry of supported metal catalysts). The historical introduction in chapter 1 is very informative and permits a better appreciation of the subject matter treated in subsequent chapters. Chapter 2 is devoted to the development of the concepts of heterogeneous catalysis that are used at present by workers in the field. The next three chapters are devoted to ultra-high vacuum studies of clean, well-defined metal surfaces. After a brief discussion of the preparation of supported metal catalysts the author turns his attention to the properties of adsorbed layers. First he discusses the modern physical methods used in studies of adsorbed gases (chapter 7). Then in the five remaining chapters, he discusses selected catalytic reactions as they are studied by measurements of macroscopic parameters (rate constants, adsorption isotherms, product yields, and so on).

This book indicates the trend that is noted by only too few workers in the field: the conversion of heterogeneous catalysis from art to a branch of applied surface science.

G. A. SOMORJAI
Department of Chemistry, University of California, Berkeley

Chemical Technique

Spectroscopy in Inorganic Chemistry. C. N. R. RAO and JOHN R. FERRARO, Eds. Vol. 1, xiv, 410 pp., illus., $19.50. Vol. 2, xvi, 312 pp., illus., $18. Academic Press, New York, 1970–71.

This is an excellent survey of selected aspects of the applications of spectroscopy to inorganic chemistry. There is a total of 16 articles (average length, 40 pages) by 22 authors, and the number of references runs from 31 to 298, the average being over 110. There are also author and subject indexes.

Now, what are these volumes about? Perhaps that can be best explained by listing the titles of three representative articles: "High-resolution nuclear magnetic resonance," "Electronic Raman transitions of rare earth ions and crystal field effects," and "Spectroscopy of donor-acceptor systems." The first surveys in traditional fashion a well-known field by introducing such phenomena as spin-spin splitting and the chemical shift and progressing to a review of such recent applications of NMR as to fluxional organometallic molecules, diastereoisomeric complexes, and double resonance. I chose the second title above to illustrate the very specialized nature of some of the articles; this particular article, which freely uses such concepts as scattering tensors and 3*J* symbols, would be of interest primarily to the specialist, although the section on experimental results should allow the general reader to get an idea of what the subject is about. The last-mentioned chapter is primarily a survey of a wide area of chemistry where spectroscopy (infrared, NMR, electronic, and so on) has been one of the useful probes. I found several of the articles in this class particularly illuminating, perhaps because inorganic chemists are generally problem-oriented and less interested in "spectroscopy" as a unifying theme.

There is no attempt at completeness; rather, most of the articles lean toward techniques of recent importance instead of a broad coverage of the electromagnetic spectrum. As an illustration of this point, the lone article concerning vibrational spectroscopy concerns only measurements at high pressures. While there is a chapter devoted to the principles of transition ion crystal spectra, there appears elsewhere no mention of recent work concerning such topics as magnons and magnetocircular dichroism. There are two articles on electron spin resonance, a field well reviewed

elsewhere, but no article on photoelectron spectroscopy.

This monograph then looks something like the "Advances" and "Progress" series that we have seen so much of lately (though it appears that these volumes are not planned as such a continuing series), with the primary restriction of spectroscopic application. Most of the articles will also be of interest to people outside of inorganic chemistry.

RICHARD L. CARLIN
Department of Chemistry, University of Illinois at Chicago Circle, Chicago

Selective Attention and Learning

Mechanisms of Animal Discrimination Learning. N. S. SUTHERLAND and N. J. MACKINTOSH. Academic Press, New York, 1971. xiv, 560 pp., illus. $18.50.

This is a thoughtful book that is abreast of current experimental and theoretical activity. Probably not since Hull wrote *Principles of Behavior* (1943) has a book in the field of animal learning appeared with the breadth and depth of analysis that this one has. Although the authors introduce special terms when conceptualizing their particular theory of selective attention as it applies to discrimination learning, the bulk of their theoretical interpretation is relatively independent of this bias. And even when the interpretation is directly related to their theory, this does not necessarily get in the way of a more traditional stimulus-response analysis; for a great number of interrelated facts have been pulled together in a thorough fashion. Thus the book constitutes an important contribution to the field regardless of the reader's orientation.

But, of course, one can also be critical. For example, one can question the value of the authors' special terminology, which, though used by them for several years, represents a definite departure from the mainstream of the conceptualization of discrimination learning. Such terms as "analyzers," "strengthening and extinguishing analyzers," and "switching in and out" of analyzers are prime examples, and no clear independent or operational definition of these concepts is presented in the book. From the authors' discussion, it appears impossible to differentiate the concept of analyzer from the concept of perceptual response ("analyzer" represents an animal's "paying attention" to some particular aspect or dimension of the stimulus situation). In the reviewer's opinion a careful look at the Sutherland-Mackintosh theory indicates that traditional terms much in use, namely, "relevant and irrelevant cues" and "salience of cues," nicely substitute for their various uses of "analyzer." In fact the authors, who are quite at home in the use of current S-R terminology, frequently slip into the terminology of salience and relevance of cues, bypassing their own terminology. To put it bluntly, how many different ways do we need to say the same thing?

None of the above is intended to challenge the authors' basic point about selective attention. All cues present in a discrimination learning situation are *not* equally effective: the cues differ in salience innately and as a result of learning, and this point must be fully considered in a discussion of discrimination learning. But is it useful to introduce terms that reify the concept of attention?

The coverage of topics is primarily in the tradition of non-Skinnerian approaches to discrimination learning, as exemplified in two-choice learning situations and the "go—no-go" procedure of the straight runway. The topics include formal models, the continuity-noncontinuity controversy, blocking and overshadowing, additivity of cues, transfer along a continuum, stimulus generalization, reversal learning and the overlearning reversal effect, reversal and nonreversal shifts, partial reinforcement and extinction, and probability learning—all topped off by a comparative-psychology approach in which species differences are exploited. Several rather successful attempts show that performance differences and similarities are consonant with the authors' two-stage model of discrimination learning when appropriate parameters are selected for the species involved.

With reference to partial reinforcement effects in extinction, the authors make the needed admonition that very probably several different variables and thus several different explanations apply (the phenomenon, as they put it, is "overdetermined"). It might be argued that the large amount of space devoted to the many aspects and subtleties of reversal learning is slightly disproportionate to their theoretical importance; and the authors' interpretation of the overlearning reversal effect is not quite as convincing as they seem to claim. Also, the broad coverage skimps in one main respect—the role of nonreinforcement in discrimination learning is treated inadequately.

A number of experimental psychologists reading this book may have some uneasy moments as they repeatedly encounter the word "prove" instead of "demonstrate" when reference is being made to induction from experimental evidence rather than to logical deduction. The same is true for the authors' strong statements for or against a proposition when the data are really not that clear.

The writing is clear except in a few isolated instances, and the book is remarkably free of errors. The book is primarily for courses at the graduate level and for research workers in the field, but many could benefit from reading it. Such a good book should adorn the bookshelf of every psychology graduate student and most psychologists.

M. RAY DENNY
Department of Psychology, Michigan State University, East Lansing

Books Received

The Adaptive Geometry of Trees. Henry S. Horn. Princeton University Press, Princeton, N.J., 1971. xii, 144 pp., illus. Cloth, $7.95; paper, $3.95. Monographs in Population Biology, No. 3.

Adsorption of Organic Compounds on Electrodes. Boris B. Damaskin, Oleg A. Petrii, and Valerii V. Batrakov. Translated from the Russian edition (Moscow, 1968) by E. Boris Uvarov. Roger Parsons, Transl. Ed. Plenum, New York, 1971. xvi, 500 pp., illus. $35.

Advanced Wastewater Treatment. Russell L. Culp and Gordon L. Culp. Van Nostrand Reinhold, New York, 1971. x, 310 pp., illus. $14.50.

Advances in Computers. Franz L. Alt and Morris Rubinoff, Eds. Vol. 11. Marshall C. Yovits, Ed. Academic Press, New York, 1971. xii, 410 pp., illus. $18.50.

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