other oxidation reactions by Criegee, Waters, and others has spurred an increased activity in this field in recent years. A few reviews that deal with a single aspect of the field have appeared, but until this year no comprehensive coverage of most common oxidation reactions had been published.

Ross Stewart is well qualified to write a monograph on oxidation reactions, because he has worked in this field for a number of years and has published a number of important papers dealing with permanganate and chromic acid oxidation. On reading his book, one is impressed with the insight that he has brought to the many unresolved problems and by his clear discussion of the present state of each reaction treated.

Stewart begins with a general discussion of the mechanisms by which oxidation may occur and the methods by which the reactions may be studied and then considers the versatile oxidants, chromic acid and permanganate, in considerable detail. The second half of the book is concerned with other transition metal oxidants, glycol cleaving reagents, nonmetal oxides and acids, and peroxy compounds. A final chapter is devoted to mechanisms of some biologically important oxidation reactions.

The material treated should prove valuable to most organic chemists regardless of whether their primary interest is in synthesis or in mechanisms of reaction. Although the volume is largely devoted to the mechanisms of reactions, a large body of information that should be useful in devising synthetic schemes is included. This small, inexpensive, and very useful book will be a valuable addition to any chemist's library.

KENNETH B. WIBERG
Department of Chemistry,
Yale University

Classification of Aurora

International Auroral Atlas. Published for the International Union of Geodesy and Geophysics by Edinburgh University Press, 1963 (order from Aldine, Chicago, Ill.). 18 pp. Plates. $8.75.

Description of a phenomenon as transient and as variable as the aurora is much easier if it can be done with the help of an accepted scheme of classification. Responsibility for providing such a scheme has been accepted by the International Association of Geomagnetism and Aeronomy, part of the International Union of Geodesy and Geophysics. The first atlas and classification were produced by a committee under Carl Störmer about 30 years ago and have been in use since that time. The atlas has been out of print for many years, and the association decided that, instead of reprinting the atlas, the question of a revision should be considered. The present atlas is the result of the deliberations of a committee chaired by James Paton.

It is clear that the revision of an accepted classification system should be undertaken with caution, because, when a few years have elapsed, the understanding of a large body of literature may be hampered. In this case, if the two systems are simply compared, there is no doubt that the new is superior; confusion due to the changeover will certainly exist but should not be serious, for the most important terms of the old system have been taken over with nearly the same meanings. These can be qualified by the addition of as many as five symbols, some of them with subscripts. In my opinion, this full panoply of qualifiers will practically never be used by most observers, but they do no harm and are always available if needed. Here is an example from the text: a rayed band is called RB in both the old and the new systems. For a more detailed description, the symbol RB3c would be used, giving the intensity and the color. The intensity scale is essentially the same as the old International Brightness Coefficients, increasing by one unit for each factor of ten in the physical intensity. The complete symbol would be a_3fR_3B3c, in which a_3 specifies a certain kind of activity, with rays moving rapidly along the form, and f tells us that the form is fragmentary. The subscript on R_3 refers to a very long ray, at least several hundred kilometers high.

A useful innovation is the form called *veil* (V), a rather extensive, uniform luminosity which frequently covers a large fraction of the sky. Unwary observers have often reported that no aurora was present when in actual fact a bright veil was covering the whole sky. *Patch* (P) replaces the old diffuse surface; this may lead to some confusion, because in the old system P meant "pulsating," now replaced by the qualifier *pulsing* (p_1–p_4).

The main body of the atlas is a collection of excellent photographs that illustrate the classification. There are 32 in black and white and 4 in color; the latter are outstanding in that they show truer colors than any others I have seen. Because all-sky photographs may distort some forms and make classification difficult, a collection of these is given also. To give an idea of the rapid motions in an auroral display, a sequence of 1-minute exposures covering 24 minutes is included. Study of all these pictures will give one as good an impression of an auroral display as can be had without being on the spot.

DONALD M. HUNTEN
Kitt Peak National Observatory,
Tucson, Arizona

Chemical Kinetics

Catalysis and Inhibition of Chemical Reactions. P. G. Ashmore. Butterworth, Washington, D.C., 1963. xii + 375 pp. Illus. $14.95.

Almost everyone who works in chemistry comes into regular contact with problems relating to the mechanisms of processes influenced by catalysts and inhibitors. For this reason it is particularly valuable to have an up-to-date review of the status of this subject. The field of catalysis and inhibition is a very wide one which embraces surface reactions, gas reactions, and enzyme-catalyzed processes. Despite this there are many general principles that relate to all of these topics, and a unified treatment of these principles, with applications to the various branches of kinetics, is therefore very welcome.

Ashmore, an original and careful research worker in chemical kinetics, is admirably qualified for the difficult task he has undertaken. The result of his labors is an authoritative, scholarly, and lucid review of the field of catalysis and inhibition. He places the subject sharply in perspective as an important branch of kinetics and brings out the fundamental principles very clearly. The subject is developed in a logical fashion, with an introductory chapter in which catalysis is carefully defined and the general mechanisms of catalytic action discussed. The next three chapters are on homogeneous catalysis; the first and largest deals with acid and base catalyzed reactions, and

the second, which includes both gas and solution reactions, with catalysis by group or electron transfer. The third chapter deals with reactions catalyzed by enzymes; this subject has become a rather complicated one, but Ashmore brings out the general principles very clearly and applies them to a few typical examples.

The subject of heterogeneous catalysis is dealt with in four comprehensive chapters which describe the modern theories of chemisorption and their application to the problem of the mechanisms of surface-catalyzed reactions. Three chapters treat the catalysis and inhibition of chain reactions and, among other topics, deal with pyrolyses, polymerizations, and oxidations.

Ashmore treats the subject at a fairly advanced level, and his book will be of great value to research workers. At the same time, the book is written in a lucid and sufficiently explicit style so that it will undoubtedly be much consulted by many students of chemistry and chemical engineering who are embarking on a study of chemical kinetics.

K. J. LAIDLER
Department of Chemistry, University of Ottawa, Ottawa, Canada

Theory and Applications

Aerodynamics. John E. Allen. Harper and Row, New York, 1963. 128 pp. Illus. $2.95.

Allen has packed into ten dozen pages a quite astonishing amount of information on aerodynamics and its applications to a wide range of subjects. Aerodynamics is presented in a much broader sense than the conventional one that implies the science underlying aeronautical engineering: Allen discusses airflow over mountains, wind effects on buildings and towers, galloping power lines and oscillating bridges, boomerangs, re-entry, and magnetohydrodynamics, to name only a few of his concisely treated topics. That he succeeds in saying something useful about each one of so many topics in so small a book is the result of a tight style and well-selected illustrative numerical data.

The book is not a text, but neither is it merely a chatty commentary on its subject. It is an effective and readable introduction to the theory and applications of aerodynamics. For the benefit of graduate students in numerous fields who should read Allen's book, I hope it will soon be published as a paperback and thus become available at an even more modest price. This is a very good little book.

JAMES E. MCDONALD
Institute of Atmospheric Physics, University of Arizona

Physical Inorganic Chemistry

The Inorganic Chemistry of Nitrogen. William L. Jolly. Benjamin, New York, 1964. xii + 124 pp. Illus. $5.75.

This is a volume in the Physical Inorganic Chemistry Series, a series designed to illustrate the applications of concepts from physics and physical chemistry to inorganic problems. The editors of the series state that the volumes are suitable for use as supplementary textbooks for an advanced inorganic chemistry course, as reference treatises on inorganic chemistry, and as introductions, for specialists, to specific research fields in which attention is directed to unsolved problems. In his preface, the author, William L. Jolly, comments on the wide variety of molecular structures and properties among nitrogen compounds, on the practical importance of many of them, on the fact that the chemical reactions of nitrogen compounds are seldom thermodynamically controlled, and on the efforts of kineticists to unravel and systematize the mechanisms of these reactions.

The book contains 11 chapters that cover the unique features of nitrogen; elementary nitrogen; the compounds of nitrogen with hydrogen, the halogens, oxygen, sulfur, phosphorus, carbon, and boron; hydroxyl amine; the oxy acids; and the thermodynamics of nitrogen compounds. Each chapter is followed by a short list of references (2 to 11 references, with an average of 5.3). The presentation is lucid and well illustrated. Naturally, in a book of this size, the coverage represents only a sampling of a large field of investigation. Although the author successfully arouses a desire to learn more, the references are too few and too general to aid the reader directly in his pursuit of more information. Modern concepts of physics and physical chemistry are frequently utilized, but the reader will not appreciate their full significance unless he consults other works. The book would be much more useful had it included a series of problems or exercises based on the material covered. This is particularly true of the last chapter in which the thermodynamics of nitrogen compounds are treated.

The quality of the typesetting, the paper, and the binding are excellent. Errors are very few indeed.

W. CONARD FERNELIUS
Koppers Company, Inc., Monroeville, Pennsylvania

Notes

Metallic Solid Solutions. J. Friedel and A. Guinier, Eds. Benjamin, New York, 1963. Unpaged. Illus. $19.75. This volume contains the 1962 Orsay Lectures, 52 papers given at an international symposium supported by the French Centre National de la Recherche Scientifique and held in July 1962. The editors write in the preface that the "meeting dealt with the structure of metallic solid solutions . . . and that the main object was to induce physicists dealing with both crystallographic and electronic aspects of that field to come together to describe and discuss their latest results and ideas. The papers vary in length from a one-page abstract to a 38-page essay, but the majority are short.

Progress in Reaction Kinetics. vol. 2. G. Porter, Ed. Pergamon, London; Macmillan, New York, 1964. viii + 391 pp. Illus. $15. Eight papers: "The rate constants of halogen atom reactions," by G. C. Fettis and J. H. Knox; "Mercury photosensitized reactions," by R. J. Cvetanović; "The reactions of methylene and some simple carbenes," by H. M. Frey; "The kinetics of *cis-trans* isomerizations," by R. B. Cundell; "The kinetics of propagation of anionic polymerization and copolymerization," by M. Szwarc and J. Smid; "Rate constants of protolytic reactions in aqueous solution," by M. Eigen, W. Kruse, G, Maass, and L. De Maeyer; "The rates of reaction of some haem compounds," by Q. H. Gibson; and "Kinetic treatment of consecutive processes," by R. M. Noyes. The reaction index (pp. 363–375) tabulates 1000 reactions for which rate data are given in volumes 1 and 2 of this series.