

Chemical Kinetics

Fast Reactions and Primary Processes in Chemical Kinetics. Proceedings of the 5th Nobel Symposium, Stockholm, Aug.-Sept. 1967. STIG CLAESSON, Ed. Interscience (Wiley), New York; Almqvist and Wiksells, Stockholm, 1967. 487 pp., illus. \$27.50.

The Nobel Symposium on fast reactions and primary processes in chemical kinetics is a testimonial to the impact of the work of R. G. W. Norrish, G. Porter, and M. Eigen on the advancement of this field in the last two decades.

What the techniques of these distinguished kineticists have in common is the rapid input of energy, via light, heat, or electric field, followed by an appropriate method for the fast recording of the subsequent events. The flash-photolysis research of Norrish and Porter enables the initiation of reactions in systems far from equilibrium and the study of the chemistry of excited states.

The temperature-jump and high-field techniques of Eigen make possible the rapid displacement of systems from equilibrium followed by measurement of the relaxation rate. These techniques, with the addition of the more recently available laser light sources, enable measurement of reaction rates covering many orders of magnitude in time, from picoseconds to minutes. Rate processes covering this range are discussed in this volume.

The participants in the symposium, in addition to the Nobel laureates, included a group of outstanding scientists interested in chemical kinetics per se, or in using it as a means for study of rates and mechanisms of reactions of chemical and biological importance. The contributions include papers ranging in subject matter from reactions involving species such as atoms and diatomic molecules to reactions in complex biological systems. In spite of this great variation in system complexity, most of the chapters, with the exception of the review of flash initiation of gas-phase reactions by Norrish, treat dynamics involving simple species—electrons and protons, vibrational and electronic excited states, and monoenergetic hydrogen atoms.

In addition to the techniques advanced by the Nobel laureates, other recent experimental and theoretical advances in fast-reaction kinetics are included. Two papers by Prigogine sum-

marize recent contributions of his group on the statistical mechanics of rate processes. Especially challenging is his conclusion that in dissipative processes, for example, in a system in which diffusion and chemical reactions are coupled, chemical instabilities can arise. Although the existence of such an instability was suggested by Chance with respect to his experiments on a specific enzyme reaction, the need for experimental confirmation remains.

Nine of the 24 papers discuss the application of flash photolysis in chemical and biological systems. Three papers, two of them by Eigen, discuss the application of the jump methods to proton transfer in solutions and to reactions in biological systems. Among other topics treated are the chemistry of the electron in aqueous and gas phase and the use of the stopped-flow technique to study rates of biochemical processes, and there are papers summarizing the mechanisms of proton transfer and of nerve action. In addition to these contributions, some of the discussions of specific papers and summarizing statements by Porter and Eigen are included. The latter are especially noteworthy for the challenge they present to future chemical kineticists by discussing needed techniques and problems to be solved. One of the more interesting discussions is that between B. Chance and H. T. Witt on the interpretation of the latter's research on photosynthesis.

In spite of the high caliber of the contributors and contributions, the book cannot be considered to be a complete summary of the current status of chemical kinetics. It will be of greatest interest to those desiring a summary of the influence of the Nobel laureates on the science of chemical kinetics, to scientists interested in energy-exchange processes, and, especially, to those desiring information on the application of kinetics to the understanding of biological phenomena. It has less to offer on the theory and measurements of the kinetics of gas-phase reactions than does *Molecular Dynamics of the Chemical Reactions of Gases*, volume 44 of the Discussions of the Faraday Society.

The clarity of print and figures, especially the reproduction of spectra, is excellent. However, the reviewer found the frequency of misspelled words high for a book of this overall quality.

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Coordination Complexes

Reactions of Transition-Metal Complexes. J. P. CANDLIN, K. A. TAYLOR, and D. T. THOMPSON. Elsevier, New York, 1968. xvi + 483 pp., illus. \$30.

This book represents a significant attempt to bring to the attention of the synthetic organic chemist an area which is likely in the future to have a major impact on investigations of organic synthesis. However, interest in this volume will by no means be confined to synthetic organic chemists. Transition-metal complexes are taken in their largest definition to include organometallic compounds (containing metal carbon bonds) as well as more classical coordination complexes. This review of reactions of transition-metal complexes consists of three parts. The first is a discourse and review of the types of reactions which these complexes undergo. This section is quite extensive (210 pages) and covers substitution reactions, combination reactions, and redox reactions as the main types. Mechanistic aspects are stressed, and extensive examples and literature references are given. The second section (206 pages) deals with the reactivity of classes of reagents with transition-metal compounds. The six chapters in this section are headed: "Hydrocarbon reactions"; "Reactions of organic halogen compounds"; "Reactions of carbon monoxide and isonitriles"; "Reactions of OR-, OH-, and CN-"; "Reactivity of H-, H₂ and H⁺"; and "Reactions of inorganic compounds." Each chapter is extensive, consisting of several sections each with its own list of literature references. For instance, the chapter on reactions of inorganic compounds has sections dealing with the following classes of reagent: group IV elements; nitrogen compounds; nitric oxide; phosphines, arsines, and stibenes; group VI elements; halogens; and mercury compounds. The third and final part of the book, entitled Preparation of New Organic Systems, is extremely brief (19 pages) and may be disappointing to some readers. Instead of outlining the preparation of new organic compounds via transition-metal-containing intermediates, it discusses some classes of novel organometallic compounds: metallocenes, π -bonded heterocycles, and cyclobutadiene derivatives, among others. The heading of the chapter that constitutes this section, "Stabilized organic systems," seems to describe the contents more accurately.

An extremely useful feature of this book is the "Reaction index" in the back, where reactions are listed by compound under the individual metals involved. This serves as a useful cross reference to part 2, which is organized according to class of reagent. The regular index is somewhat brief, but the table of contents is detailed and extremely useful. Extensive literature references are given, with many as late as 1967, although the literature review does not pretend to be exhaustive. The text is well written and appears to be relatively free of errors. At times, however, it degenerates into a succession of one-sentence reviews which are generally uncritical in nature. A great many structural formulas are included which make for ready assimilation of the material by chemists not particularly familiar with transition-metal complexes. This book will serve as a valuable introduction to the substance of current research in the reactions of transition-metal compounds and as a useful source of references to specific reactions.

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Confronting Suicide

Essays in Self-Destruction. EDWIN S. SHNEIDMAN, Ed. Science House, New York, 1967. xx + 554 pp. \$12.50.

It is estimated that at least one in every 100 Americans now living has tried to kill himself at one time or another. Suicide is a major public health problem in our country, ranking tenth among the causes of death of adults. It is condemned by the three great traditions of Roman law, English law, and Church law. Since a bent toward suicide exists in many of us, it may well be that the proscription mirrors an unconscious need to minimize its infectious aspects. Certainly it is one of those afflictions of man around which there has hung a curtain of fearful silence.

Essays in Self-Destruction is part of an encouraging trend in recent years to push aside that curtain. Its editor, one of the leading authorities on suicide, has assembled a worthy group of contributors, including not only psychologists, psychiatrists, and other clinicians but also philosophers, sociologists, and students of literature. The word "essays" in the title fairly characterizes

the mode of contribution, which is primarily contemplative, expository, and discursive rather than empirical or experimental. The book does not pretend to offer a comprehensive or detailed sweep of the subject, but the essays are wide-ranging and encompass not only suicidal behavior per se but the broad realm of the self-destroying and self-negating facets of human conduct.

The book is organized in four major sections. Part 1, Literary and Philosophic Essays, contains, for example, papers on the suicidal equivalents in Melville, suicides in Shakespeare, the Buddhist view of suicide, and death as a motive of philosophic thought. Part 2 consists of Sociological and Ethnographic Essays, among them papers on patterns of orientation toward death in American culture, on the problems of certification of suicidal death, and on suicide in Japanese adolescents. Part 3, Psychological and Psychiatric Essays, comprises most of the praxis of the book. It includes a paper dealing with the clinical experiences that led Freud to his various theoretical conclusions concerning suicide, a clinical and epidemiological study of a group of self-poisoned persons, papers on the theory and therapy of suicide and on the relation between destructive urges and sexual deviation, and an early study of suicides among New York City policemen. Part 4, Taxonomic and Forensic Essays, is devoted mainly to the problems of classification and theory building and includes, *inter alia*, a paper exploring the possibility of inhuman suicide and one calling attention to sleep as a possible avenue toward an understanding of suicidal behavior.

It is clear from these diverse contributions that we need to advance beyond the usual three-part taxonomy of threatened, attempted, and accomplished suicide. The fourfold categorization of death as natural, homicidal, accidental, and suicidal is also oversimplified. Why is shooting oneself to death "suicide," drinking oneself to death "natural," and provoking and accomplishing death by recklessness with an automobile "accidental"? Obviously to understand the dynamics of suicide requires a grasp of the individual's motivations and conceived role. In this regard the field is indebted to the editor and his colleagues Norman Farberow, Robert Litman, and Norman Tabachnick of the Los Angeles Suicide Prevention Center for developing the procedure of "psychological autopsy" to elucidate the

intention of the dead person in relation to his own death.

Suicide represents a failure in social as well as individual growth. Society—family, school, church, industry—needs to examine its contributing role in self-chosen death. The *vis a tergo* for suicide cannot be completely explained within the framework of mental illness or intrapsychic loss of nerve. The prevention of self-annihilative tendencies will have to reckon not only with the individual's particular conflicts but also with the values of the culture in which he lives. We shall have to marshal social and philosophical resources along with those of medicine and psychology.

A major strength of the book is that in it suicide is perceived as part of the general realm of personality. This perspective provides us not only with increased insights for circumventing suicide but also with helpful clues to transforming "hollow men" into productive participants in society. The next steps forward in subjugating suicide will come when the stimulating questions and hypotheses emanating from these essays, clinical observations, and empirical beginnings are subjected to more systematic investigation. The Veterans Administration and the National Institute of Mental Health are to be commended for supporting many of the efforts reflected in the book.

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Success and Advantage

The Huxleys. RONALD W. CLARK. McGraw-Hill, New York, 1968. xvi + 398 pp., illus. \$8.95.

The eminence of the Huxleys is widely appreciated, but probably few people are aware of how many competent members this family now has on the scene. Backed by a family tree in the appendix the author shows that the Huxley *élan* extends far beyond T. H., Julian, and Aldous (who dominate the book), including as it does one Nobel laureate and several promising beginners at the writing game, in which the Huxleys have so excelled.

It is not easy to create a sense of unity when retelling a family history that extends over a century and a half. Ronald Clark brings it off by what, for