

chlorobenzoyl)-5-methoxy-2-methyl-3-indolylacetate, m.p. 103–104°. (*Anal.* Calcd. for $C_{23}H_{24}NO_4Cl$: C, 66.74; H, 5.84. Found: C, 67.04; H, 5.93.) Since the N-benzoyl group was rather labile toward acidic or alkaline cleavage, the acylated *t*-butyl ester was pyrolyzed at 210° to give indomethacin, m.p. 153–154°. (*Anal.* Calcd. for $C_{19}H_{16}NO_4Cl$: C, 63.78; H, 4.50; N, 3.91. Found: C, 63.14; H, 4.65; N, 4.10) $\lambda_{max}^{E:OH}$ 230 m μ (20,800), inf. 260 m μ (16,200), and 319 m μ (6,290).

The mechanism of the anti-inflammatory activity of these compounds is not yet understood. The activ-

ity observed with adrenalectomized animals would indicate that the pituitary-adrenal axis is probably not involved. Further studies are in progress.

MERCK SHARP & DOHME
RESEARCH LABORATORIES
RAHWAY, NEW JERSEY

T. Y. SHEN R. L. ELLIS
T. B. WINDHOLZ A. R. MATZUK
A. ROSEGAY S. LUCAS
B. E. WITZEL C. H. STAMMER
A. N. WILSON F. W. HOLLY
J. D. WILLET L. H. SARETT
W. J. HOLTZ

MERCK INSTITUTE FOR
THERAPEUTIC RESEARCH
WEST POINT, PENNSYLVANIA

E. A. RISLEY
G. W. NUSS
C. A. WINTER

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BOOK REVIEWS

Tables of Chemical Kinetics. Homogeneous Reactions. (Supplementary Tables.) National Bureau of Standards Monograph 34. C. H. STAUFFER, Project Director. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1961. 459 pp. 23 × 29 cm. Price, \$2.75.

This monograph contains tables of chemical kinetics supplementary to the previously published National Bureau of Standards Circular 510 and Supplements 1 and 2. The present supplement contains information pertaining to substitution, exchange and elimination reaction types.

The user of these tables would probably be wise to browse generally through the volume before seeking specific information, since the classification system will not be immediately obvious to all chemists. For example, nucleophilic displacements on carbon attached to the nitrogen of a quaternary ammonium ion are listed as eliminations from a Vth group element. Reactions involving the transfer of hydrogen, activated by electron-withdrawing substituents, from carbon to a base are also listed as elimination reactions. The reader will, however, experience very little difficulty in accommodating himself to the classification system used and should realize that no system would be equally acceptable to all chemists.

The present compilation is incomplete and more material in the groups covered is being prepared for future publication. As in previous volumes, only the chief American and British periodicals are covered completely, but articles cited as references in these primary sources are also included. All of the tables cover this literature through 1955 and some contain references as recent as 1959.

The tables contain appended comments which are concise, judicious and pertinent. This is a careful and critical compilation and a welcome addition to the previously published tables.

RESEARCH LABORATORIES
SPRAGUE ELECTRIC CO.
NORTH ADAMS, MASS.

SIDNEY D. ROSS

Absorption Spectra and Chemical Bonding in Complexes. By C. K. JØRGENSEN, Cyanamid European Research Institute, Cologne, Geneva, Switzerland. Addison-Wesley Publishing Company, Inc., Reading, Mass. 1962. xii + 352 pp. 15 × 22.5 cm. Price, \$10.00.

The inorganic chemist with a major interest in transition metals and their complexes, the "non-nuclear" physicist, and the spectroscopist will find Jørgensen's "Absorption Spectra and Chemical Bonding in Complexes" one of the most useful and instructive volumes published to date in transition metal chemistry. It is most fortunate for those in the United States with research interests in the above-defined areas to have a book written by a chemist of Jørgensen's stature in English.

Some of the expected differences (U. S. *vs.* Continental) in notation are worth mentioning, although the reviewer feels that certain of the notations used are more typical of the author than of general practice in Europe. The reader must acclimate himself to the Kayser (K or $ks.$ = 1 cm^{-1}) as an energy unit. The author has been consistent in converting all energy terms to the kilokayser. Another not completely familiar term is "nephelauxetic" to describe an electron expansion effect leading to cation and

anion series resembling the spectrochemical series. A full chapter is devoted to this effect. The symbol U is used for electrochemical potential with the signs reversed from the Latimer convention. In place of ΔF the symbol ΔG is used for free energy change. The Rydberg constant is referred to as "ry," a logical choice since no confusion is introduced with the gas law constant. The schematicism of a line for an electron pair in Lewis octet structure is referred to as "valency stroke," a term not familiar to this reviewer. Shell and subshell seem to be used interchangeably in elementary electron structure. There are some instances of unusual notation of complex species such as for the nickel(II) and cobalt(III) complexes written in the form of $Ni(CN)_2, NH_3, C_6H_6$ and $Co(NH_3)_6, SO_4^+$.

The author makes no apology for the mathematics included and used in developing bonding, structure and spectra, which in a manner sets this volume apart from another recent treatment on transition metals. The adherents of hybridization and valence bond theory will have strong feelings about Jørgensen's treatment since it points up the incompatibility of these concepts with absorption spectra interpretation; also that hybridization is only one very special case of molecular orbital theory. Incidentally, the author extends a plea for a wider adoption of visible and ultraviolet spectra in interpreting bonding in view of the relative simplicity of the instrumentation and use of aqueous solutions.

What can and what cannot be accomplished by M.O. treatment is clearly defined in some eleven "theses." The M.O. treatment of metal-metal bonds is not considered because of the "great complexities" arising. The reader is thus left with the feeling that interpreting spectra of complexes is free of these complexities.

The bibliography, though quite complete, is not always of high utility. The listing of all references is at the end of the volume by a number. On many occasions specific references are made by author with no number, making it difficult for the reader to decide which, if any, of several articles should be consulted. It is surprising in one instance that Bailar's work in the use of activated charcoal for complex cobalt systems is not mentioned, though Bjerrum's work on this subject is.

Although, in general, the clarity of presentation is beyond criticism, there is a disturbing number of instances where sentence structure is chopped by the too frequent use of phrases and ideas set off by parentheses. General effectiveness of presentation would be improved by devoting the full sentence to such thoughts.

There is an abundance of tremendously useful information incorporated into tables not found in any other single source. A useful interrelation is found of the various U (or E_0) values with the oxidation states of ions obtained in a 1 M non-complexing acid solution. To illustrate, for chromium the (II) state exists at $-0.5 v.$, the (III) state at $0.0 + 0.5$ and $+1.0 v.$, while the (VI) state is obtained at $+1.5 v.$ Such information is given for 97 elements. Tables with spectral summary data are available in a form of high utility for general interpretation. Spectra are tabulated (among other ways) according to the three transition arrangements $3d^q, 4d^q$ and $5d^q$, with increasing q -values for each group and also in accord with increasing oxidation number of the metal. References to the original literature are given in these tables in a rather unusual fashion. When the author agrees with the data a certain superscript notation is used, different from that used when there is a disagreement.