

Calcd. for  $C_{13}H_{16}N_3O_2$ : C, 63.66; H, 6.16; N, 17.13. Found: C, 63.90; H, 6.42; N, 17.15). Refluxing XII with 88% formic acid gave *inter alia* a basic material having the m.p. 196–197°,  $\lambda_{\text{max}}^{\text{EtOH}}$  275  $\mu$ ,  $\epsilon$  7,000, 293  $\mu$ ,  $\epsilon$  6500.<sup>6</sup> On the basis of spectral and degradative data this material has been tentatively assigned the structure XIII, 3-methyl-2-

(6) V. Rousseau and H. G. Lindwall, *J. Am. Chem. Soc.*, **72**, 3047 (1950), report  $\lambda_{\text{max}}^{\text{H}_2\text{O}}$  275  $\mu$ ,  $\epsilon$  5800, 293  $\mu$ ,  $\epsilon$  5900 for 2-methyl-indazole. Elemental analyses of XIII for nitrogen done in three independent laboratories fail to agree although carbon and hydrogen values are consistent.

(1,2,5,6-tetrahydro-2-oxo-3-pyridyl) - 2H - indazole.<sup>7</sup>

The preparation of these and other synthetic variants of acyltryptamines and related compounds will be described in detail in our forthcoming papers.

WARNER-LAMBERT RESEARCH INSTITUTE  
DEPARTMENT OF ORGANIC CHEMISTRY  
MORRIS PLAINS, NEW JERSEY

JOHN SHAVEL, JR.  
MAXIMILIAN VON STRANDTMANN  
MARVIN P. COHEN

RECEIVED DECEMBER 28, 1961

(7) The details of the structure elucidation of XIII and related compounds will be described in future publications.

## BOOK REVIEWS

**The Determination of Stability Constants and Other Equilibrium Constants in Solution.** By FRANCIS J. C. ROSSOTTI and HAZEL ROSSOTTI, Department of Chemistry, University of Edinburgh. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 36, N. Y. 1961. xiv + 425 pp. 16 × 23.5 cm. Price, \$12.50.

The last two decades have seen an enormous increase in the study of complexes and the measurement of complex stabilities. This volume summarizes the many methods that have been used to determine stability, describes in detail the often intricate calculations, and gives a remarkably thorough bibliography of work in this field. It concerns itself with ionic and molecular association in all their forms. Quite properly, the emphasis is on methods of determination rather than on the compilation of data. The authors believe that experiments to determine stability constants have heretofore often been ill-designed and that the experimental data are not always subjected to a sufficiently rigorous mathematical analysis. They have accordingly devoted considerable space to the many ingenious methods, many of them graphical, for deriving accurate stability constants from the experimental data. Much of the latter material derives from the British and Scandinavian schools of coordination chemistry, with both of which the authors have been closely identified.

In principle, any property which varies with the degree of complex formation can be used to determine the position of equilibrium. The most useful techniques for measuring these properties are outlined. The methods described in detail are potentiometry, polarography and amperometry, solubility, liquid-liquid partition, ion exchange, freezing point, boiling point, vapor pressure, optical and spectroscopic methods, and reaction kinetics. Fifteen of the 18 chapters are devoted to mononuclear complexes formed with only a single type of ligand. The remaining three chapters consider polynuclear systems and mixed complexes.

This new book provides a welcome degree of systematization to the field of coordination chemistry. The reactions considered are always those for the *formation* of the complex species; hence, the terms "instability constant," "dissociation constant," and "ionization constant" are unnecessary and are not used. Nevertheless, in the reviewer's opinion, it is rather artificial to classify weak acids with metal complexes. A great majority of common solvents are protogenic or protophilic in some degree; hence, the dissociation of acetic acid, for example, is generically quite a different process from that by which the ammine complex of copper is broken into its constituent parts. The suggestion that the electron may be regarded as a ligand in oxidation-reduction equilibria will be regarded by many as an instance of carrying systematization a step too far.

For practical reasons, many, if not most, stability constants are neither activity quotients nor thermodynamic constants, but rather are concentration constants determined in a constant ionic medium, usually of high ionic strength. The various types of stability constants and the basic principles upon which their determination is based are very

capably described. It is further evident that the authors are aware of the limitations of the "constant medium" procedure and of the unfortunate fact that stabilities determined in different constant ionic media cannot strictly be compared.

Nevertheless, it should not be implied (as on p. 29) that "in the presence of high concentrations of background salt . . . the activity coefficient of the solute may . . . be assumed to approach that of the bulk electrolyte," in other words, that through its mere preponderance, electrolyte B is able to impose its properties on electrolyte A. This is demonstrably untrue. In a mixture of 0.01 *M* hydrochloric acid and 2.99 *M* sodium chloride, the activity coefficient of sodium chloride is 0.714. According to this postulate, the activity coefficient of the hydrochloric acid should also be 0.714 in the mixture, but experiment shows it to be 1.062. Although the activity coefficients of different cations (whatever they may be) can possibly be rendered constant by this means, it seems certain that they cannot be made equal. Furthermore, a "swamping electrolyte" without a common ion (*e.g.*, sodium perchlorate) can likely do no better.

The large number of symbols employed (105, drawing heavily on the English, Greek and German alphabets, are listed and defined in the front of the book) assures the rigor of the treatment but detracts somewhat from the readability. The book is exceedingly well written, carefully edited, and attractively printed. The discussion is thorough and authoritative; very few errors of fact were noted and none of typography. This volume should be a part of the library of anyone concerned with the determination of stability constants.

SOLUTION CHEMISTRY SECTION  
NATIONAL BUREAU OF STANDARDS  
WASHINGTON 25, D. C.

ROGER G. BATES

**Probability and Experimental Errors in Science. An Elementary Survey.** By LYMAN G. PARRATT, Professor of Physics, Chairman of the Department of Physics, Cornell University, Ithaca, New York. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. xv + 255 pp. 15.5 × 23.5 cm. Price, \$7.25.

Nearly thirty-five years have passed since Sir Ronald A. Fisher wrote "Statistical Methods for Research Workers" to show experimenters how their traditional but inadequate machinery for summarizing measured data can be replaced with a rigorous statistical methodology based on logical relationships between small-sample statistics and population parameters.

Sir Ronald developed this methodology in collaboration with research workers in the biological sciences, and it has been adopted in many fields of applied science and technology since that time. Research workers in the physical sciences have been slow to replace the traditional treatment with small-sample statistical methods; and very