

I have used this explanation in my own lectures since that time. Essentially the same explanation is given by Willstätter in his lectures in Zürich. By introducing the idea of partial valence the mechanism is more readily conceived. The reaction is formulated thus:



The partial valences of the nitrogen and carbon atoms are represented by a number of very short lines, not dots, which should be reserved for ordinary valences. (The practise of writers in this matter is not uniform, but uniformity would be very desirable.) When the partial valences come into play in the presence of H.NH_2 , one of the double bonds between nitrogen and carbon is broken, as represented in lecture practise by a double stroke across the bond and the partial valences resolve themselves into ordinary valences.

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NEW BOOKS.

Spectroscopy. By E. C. BALY. Longmans, Green & Co., 1912, 2nd edition. 687 pp. Price, \$3.50 net.

The first part of this interesting and valuable book has undergone no revision. Chapter II is the same as previously published and at the end a short account of the work of the International Union of Solar Research in establishing standards of wave-lengths is added.

Chapter III which deals with slits, prisms and lenses, has additional data on the latest determinations of refractive indices. In the case of calcite, the table of old data has been replaced by the latest observations. Unfortunately Paschen's latest (1901) values of refractive indices of fluoite were overlooked. The reviewer finds that when these latest values are corrected for temperature coefficient they agree with the values of Langley and his assistants, thus clearing up a discrepancy which has been outstanding for some years. To be thoroughly up-to-date the old tables of infra-red refractive indices of quartz, fluorite, rock-salt and sylvite should have been replaced by the most recent determinations. The next chapter on the "complete prism spectroscope" contains additional examples of the latest attainments in the construction of spectroscopes and spectrographs while the following one (Chap. V.) on the prism spectroscope in practice gives additional information on interpolation formulas in measuring the wave-lengths of spectral lines.

Chapter VI on diffraction gratings contains an additional two pages on the latest experiments by Wood (echelette gratings) in attempting to determin the distribution of intensity among spectra, while the following chapter on gratings in practice contains a page of new material on replica gratings and auto-collimating devices.

The infra-red and ultraviolet regions of the spectrum are dealt with in Chapter VIII which contains a dozen pages of new material on the construction and intercomparison of radiometers (including radiomicrometers, thermopiles, and bolometers) and the focal isolation of heat waves which has enabled the observation of the longest heat waves (314μ) yet measured. For historical accuracy as to discovery and because of wider range, data obtained previous to those cited on p. 286 might have been quoted, showing that the position of the maximum of infra-red absorption and reflection bands in a related group of compounds, *e. g.*, carbonates, sulfates, is dependent upon the atomic weight of the metallic element in the salt.

It is refreshing to read the suggestion that the mineralogist must look to infra-red investigations of the effect of radiant energy upon matter in order to obtain a solution of his problems. The chapter concludes with an additional page of new matter on the extension of observations into the extreme ultraviolet.

The chapter (IX) on interference methods in spectroscopy contains over two pages of new matter including a table of standard iron lines, while the following chapter, on the resolving power of spectroscopes, is reduced to one-third of its former length. Chapter XI has been thoroughly revised. It has additional material on sensitizing plates, and on photographing the infra-red. The previously published chapter on the production of spectra is replaced by chapters on methods of illumination, on phosphorescence and fluorescence, and on absorption spectra. The chapter on the Zeeman effect has some ten pages of new matter and the chapter on spectral series lines has four additional pages and a bibliography, all of which is of interest to those following that line of work. The concluding chapter on the change of wave-length contains a short account of the work done on canal rays. The chapter on Rowlands' grating ruling engine is omitted. The complete volume contains over a hundred pages more material than the first edition.

Considered as a whole, the book is a complete and an up-to-date exposition of the subject of spectroscopy. It is confined in a small space and is obtainable at a price that enables students to possess it. The weighty tomes of Kayser must, of course, be consulted by the specialist desiring details in this subject.

WM. W. COBLENTZ.

Annual Tables of Constants and Numerical Data, Chemical, Physical and Technological

Published under the auspices of the International Association of Academies, and under the direction of an international commission appointed by the VII International Congress of Applied Chemistry. Volume I, for the year 1910. xxxix + 727 pp. Chicago: University of Chicago Press. 1912. Price, \$5.00.

The purpose and general scope of this work have already been described in the preliminary announcement by the American members of the inter-

national committee (*Proc. Am. Chem. Soc.*, p. 105, Aug. 1911). The appearance of the first volume of these annual tables marks the beginning of an undertaking destined to be of the greatest assistance to the prosecution of investigation in pure and applied science. The present volume contains the values of all physical quantities published during 1910 in all parts of the world, together with the name of the investigator, place of publication and experimental method employed. It will no longer be necessary for the individual investigator to search the literature for the latest value of any constant; for the searching process has been carried out by the large corps of abstractors of these tables, much more thoroughly than the individual could ever hope to.

The text of the tables is in French, but a table of contents with directions for employing the tables is given in English, German, French, and Italian. No index is given but one is promised to appear with volume II. A single page of errata is appended to the volume and the reviewer has noted a number of additional errors in the tables. In view of the conditions under which the first volume has been prepared freedom from errors is not to be expected, and the editors earnestly request all readers to call their attention to any errors and omissions which may come to their notice. For this purpose a set of three post cards is attached to page XX. A table of corrections thus obtained will be issued within the next few months. It is certainly to be hoped that every reader will take the trouble to accede to this request. Indeed, every investigator who has published numerical data of any kind during 1910 should at once take the trouble to verify the abstract which appears in this volume and to notify the editors of any corrections necessary. These tables are published without financial profit of any kind and the members of the commission serve without remuneration. The scientific world at large should render the commission every assistance in its power.

E. W. WASHBURN.

Laboratory Exercises in Physical Chemistry. By J. N. PRING, D.Sc. Longmans, Green & Co. 162 pages. Price, \$1.25 net.

The subjects treated in this book are: molecular weight and density determinations; calorimetry, including the determination of the calorific power of gases and of the heat of combustion of coal; electrolytic conductivity; electromotive force measurements; electro-analysis; electrolytic preparations; and optical and thermo-electric pyrometry. As mentioned by the author in the preface, certain important sides of physical chemistry, such as rate of reaction, mass action and heterogeneous equilibrium, are omitted. The book is adapted only for students who have had a thorough course in physics and electro-chemistry, as the theoretical discussion which accompanies the experiments would be otherwise inadequate.

M. S. SHERRILL.