relishes and presents his material but also from his skill in weaving the principles and concepts of science into a pattern which is both meaningful and strikingly his own.

Gamow has repeatedly proved to be readable, and his latest book is no exception; it is a gay and exciting excursion into the physical sciences. The approach is a refreshing one. The book is written in the form of a trilogy, dealing first with things of our own size, second with the microcosmic world, and finally with the macrocosm. This departure from the usual historical approach allows a more continuous presentation of physics, chemistry, astronomy, and geology and will be appreciated by the general reader. It is evident that considerable effort and thought have been given to the problems of conjoining the contents of each section into a whole (this is most successfully accomplished in the macrocosmic section) and of keying the more difficult concepts of modern science to the simple level of presentation used in the first section. As an aid to the assimilation of the material, the author has included many entertaining illustrations and photographs.

The volume appears to be written for the general reader, but the addition of questions and answers and the publisher's advertisement, as well, suggest that it may be intended as an introductory text for nonscience students. For this purpose the book is probably oversimplified, and the amusing style tends to obscure the drama of science. However, the general reader will be handsomely rewarded, for he will find the author to be an illuminating writer on scientific matters as well as a provocative prophet. Says Gamow, "To sum up, we can say that the state of physical sciences today can be compared with the state of geography a few centuries ago: there are no Americas to be discovered any more."

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The Measurement of Colour. W. D. Wright. Macmillan, New York, ed. 2, 1958. ix + 263 pp. Illus. $10.75.

Since 1931, when the Commission International de l'Eclairage (CIE) adopted the Standard Observer System for Colorimetry, color measurement and specification have grown tremendously. Wright's efforts in the development of this system eminently qualify him to write a book on the measurement of color. Although the book treats this specialized field from the psychophysicist's viewpoint, it is written in language that nonspecialists can fully comprehend.

Wright develops the story of tristimulus colorimetry in a logical and informative manner. The first two chapters treat the physical and physiological concepts of visible radiation. The next two chapters present the principles underlying photometry and colorimetry, culminating in the definition of the 1931 CIE standard observer. Chapters 6 and 7 describe the means by which color may be measured (colorimeters and spectrophotometers) and by which colors may be specified and represented (color spacings and color atlases). The final two chapters discuss such important applications of the system as color photography, color printing, and color television and give a behind-the-scenes view of the reasons forcing consideration of revision of the system, ending with the open-minded statement that only the future will show whether the data currently being gathered will "justify a revision of the standard observer data."

There are, regrettably, several prominent inadequacies: nonphysical use of the term *power* to describe "capability"; incomplete captioning of figures for the spectral distribution curves of sources, so that the tyro may draw erroneous conclusions regarding the energy in these sources; and reversal on plate 4 of the bottom and top colors printed to represent effects of decreasing saturation on the spectral reflectance curves of pigments. On the whole, however, Wright has prepared an excellent revision of his earlier work (1944). He does not presume to be an oracle who answers all color-measurement problems, but rather presents the reader a clear insight into the CIE Standard Observer System.

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Proceedings of the Second International Congress of Surface Activity. vol. I, *Gas/Liquid and Liquid/Liquid Interface,* 521 pp., $15; vol. II, *Solid/Gas Interface,* 348 pp., $12.60; vol. III, *Electron Phenomena and Solid/Liquid Interface,* 621 pp., $16.80; vol. IV, *Solid/Liquid Interface (Washings, Etc.) and Cell/Water Interface,* 352 pp., $12.60. J. H. Schulman, Ed. Academic Press, New York; Butterworths, London, 1957. $50 per set.

These four volumes contain the papers presented at the second International Congress of Surface Activity, held in London in the spring of 1957. The amount of material contained in the four volumes is very great and reflects the outstanding success with which the efforts of the organizers (Schulman and his school) have been so justly crowned. The speed with which the work has been published reflects credit on publisher and authors alike, for this is no small achievement.

Since the list of contributors and titles is so long, I feel that to select just a few names would be unjust, but the truly international character of the meeting may be briefly indicated by such names as Ekwall (Finland), Derjaguin and Trapeznikov (U.S.S.R.), de Boer and Overbeek (Holland), Nilsen (Sweden), Sata and Sasaki (Japan), and Alexander (Australia).

The topics of the four main activities of the meeting are conveniently grouped in individual volumes. Volume I deals with general adsorption problems at the gas-liquid and liquid-liquid interfaces, as well as with applications of these studies to typical systems of practical interest—for example, evaporation from water reservoirs, solubilization in detergent solutions, and emulsification. Volume II deals exclusively with adsorption on solid surfaces, one section comprising physical adsorption—particularly with reference to heat of adsorption—and the other section dealing with an interesting variety of problems in chemisorption. Volume III deals with electrical phenomena at the mercury-water and other interfaces, and with such aspects of the solid-liquid interface as flotation and adsorption, while volume IV is concerned with other aspects of the solid-liquid interface, such as problems in detergency, as well as with the surface chemistry of cell and tissue interfaces. The last two volumes illustrate very well the increase which has occurred in recent years in the state of knowledge relating to such apparently diverse phenomena as the flotation of minerals and biological surface chemistry.

These books represent more than simply a collection of (for the most part) admirably brief but well-documented papers dealing with specific items in surface chemistry. Following the excellent precedent set by the Faraday Society, the organizers of the congress allowed time for discussion of the papers, and the keen discussions are reproduced along with the papers. The discussions seem to me to be a valuable feature; they aid the reader in evaluating the occasionally rather strongly worded claims in certain of the papers, and they contribute towards bringing the material into a more coherent whole. Would that more meetings were run along these lines!

Although, to be sure, the many contributions deal with individual items, even the general reader can gain sight of a good cross section of current activity in surface chemistry from these four volumes, and it is heartening to see such breadth of study represented here. Specialists will be more concerned with individual volumes; thus, solution-chemists will find more in volume I than elsewhere, and workers in the field of cata-

lysis will be predominantly interested in volume II, whereas those concerned with mineral processing and flotation will find their subject covered in volume III. Although the subject of biological surface chemistry is recorded in only a limited number of papers in volume IV, biologists will find these profitable reading.

The standards of printing, format, and binding are high. Errors are few, and though the editor attributes the success of the publication to his many contributors, one cannot help thinking that this is overmodesty on his part. The price for all four volumes is high, but justified, and for those readers concerned with only one or two areas of study, the volumes are available singly.

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Physique électronique des gaz et des solides. Michel Bayet. Masson, Paris, 1958. 246 pp. Illus. F. 4900.

This book is based on material taught in a course by the author at the Faculté des Sciences de Toulouse for candidates for the "electronics certificate"; the course material is augmented by a number of theoretical developments, which are in part original. The purpose of the book is to give a unified account of transport phenomena associated with the motion of electrons in gases and solids; the greater part of the book (174 pages) deals with gases, the remainder being devoted to metals and semiconductors.

In the first chapter, the author briefly reminds the reader of the elements of Boltzmann, Fermi-Dirac, and Bose-Einstein statistics; the second part of this chapter discusses the classical theory of collisions between two particles. Chapter 2 deals with the kinetic theory of gases; the Boltzmann transport equation, diffusion, viscosity, thermal conductivity, and so on are discussed along standard lines.

In chapter 3 the author gives a detailed mathematical discussion of the transport properties of a nondegenerate Lorentz gas—that is, of a mixture of two gases, A and B, in which the A-A interaction is negligible compared with the A-B and B-B interactions. The results obtained in this chapter are carried over to the next one, in which the electromagnetic properties of a plasma are investigated. In chapter 5 one finds a rather standard treatment of the fundamental processes in ionized gases, such as ionization, excitation, and recombination. The various types of gas discharges are considered in chapter 6, which constitutes the last chapter dealing with gases. The last two chapters deal with the electron theory of metals and semiconductors. The appendix contains mathematical details of derivations and gives properties of certain mathematical functions used in the text.

The general level of this book corresponds to senior undergraduate or beginning graduate physics courses in this country. It is clearly written and should serve a useful purpose for those who are interested in electron physics—particularly, of gases. The publishers should be congratulated on the good general appearance of this book.

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The Origins of Modern Science, 1300–1800. H. Butterfield. Macmillan, New York, ed. 2, 1957. x + 242 pp. $3.

In the eight years since the first edition of Butterfield's worthy *Origins* appeared on the market, perhaps no single volume has been so widely used in introductory courses dealing with one or another aspect of the scientific revolution. This is surely proof positive of its basic correctness and balance as well as of its extreme readability, for which its author, master of Peterhouse in the University of Cambridge, has come to be justly praised. Perhaps no better indication can be found of the popularity of this relatively slight book as well as the esteem in which it is held than the fact that one repeatedly hears professional historians of science express two desires: (i) that comparable studies suitable for textbook purposes existed for other periods in the history of science, and (ii) that *they themselves* had written this particular book.

In view of such kudos, it is slight wonder that its author and publisher should wish to perfect it by correcting any noted errors or misprints, by adding relevant material to the existing chapters of the original structure, and by keeping it up to date through the addition and use of entries under "Suggestions for further reading." The result is a revised edition, some 55 pages longer than the first edition, as eminently sound as ever, and no doubt headed for even greater success.

While the general content and number of the original chapters remain unchanged, I note the following additions. Pages 34–36 add useful ideas concerning ancient, nonscientific elements in Renaissance thought—including the role of occultism and cabalistic speculation—which help to round out the chapter on "The conservatism of Copernicus." This brilliant chapter, supporting the view that Copernicus' work can more meaningfully be viewed as the end of the old astronomy and cosmology than as the beginning of the new, still, however, contains a possibly misleading concept. Of Copernicus we read, "To the old objection that if the earth rotated its parts would fly away and it would whirl itself into pieces, he gave an unsatisfactory answer. . . ." (page 32). Coupled with the allusion to Ptolemy on the following page, the reader could well get the erroneous impression that Ptolemy had faced "that whole question of centrifugal force." However, Ptolemy nowhere argues in such terms, or indeed says anything about what would happen if the earth were to rotate upon its axis. The truth of the matter is that Copernicus in *De revolutionibus* (book I, chapters 7–8) erroneously ascribed such an argument to Ptolemy and, unfortunately, most modern scholars writing about Copernicus have not bothered to check by reading Ptolemy.

Other material new to this book includes a section dealing with the work of Duhem and others on the theory of impetus (pages 14–16) and a section on the communications of scientists and early scientific societies in the 17th century (pages 71–76). Additional suggestions for further reading include such important work as T. S. Kuhn's paper on "Robert Boyle and structural chemistry in the seventeenth century" and E. Rosen's *Three Copernican Treatises.*

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Elements of Water Supply and Waste-Water Disposal. Gordon Maskew Fair and John Charles Geyer. Wiley, New York; Chapman & Hall, London, 1958. vii + 615 pp. Illus. + chart. $8.95.

Conventionally and traditionally the undergraduate student of civil engineering has been introduced first to the subject of municipal water supply and treatment, then later to a separate and largely unrelated course in sewerage and sewage disposal. Yet the basic disciplines and engineering sciences governing all aspects of water supply and waste-water disposal are similar, whether the water passes through municipal, industrial, or agricultural systems. Although chemical engineers have long recognized these mutualities by stressing "unit processes and unit operations" that are applicable to many industries, Fair and Geyer have pioneered in utilizing this approach for sanitary engineering. Sedimentation and flotation, for example, involve identical principles of fluid mechanics whether they are used for water treatment, sewage clarification, or the separation of solids and oils from industrial wastes. Fair and Geyer emphasize the similarities of the fundamental principles and then go