

I would not object to the elementary presentation if it were reasonably rigorous. Unfortunately, this is not the case. The language is loose, to say the least, and the discussion is often interspersed with information implying knowledge of a much higher level. For instance, on page 8, in the discussion of interference phenomena, the phrase "coherent light" appears, quite properly, but without any explanation of what coherence means. Many examples could be quoted to show how elementary and misleading is the presentation.

The emphasis of the book is, as the subtitle indicates, on the recognition of particles. Yet the criteria for recognition are strangely fuzzy. The authors use also the term "sensitivity." For the light microscope, the "sensitivity" limit is given as about five times the resolving power of the optical system. For the electron microscope, the "sensitivity" is given as 100 Å instead of somewhere around 10 Å.

There are also inconsistencies in the book. On page 44, contrast in an electron micrograph is ascribed to "absorbance," on page 83 to scattering. In table 29 the "sensitivity" of the light microscope is given as "1 pg, 10^{-12} g," yet in the next line the "sensitivity" of the electron microscope is given as "0.01 pg, 10^{-18} g." This brings us to the question of units. I was completely puzzled by the use of the unit E, short for "Emich." Long after this unit has been introduced, we are informed that $1 \text{ E} = 10^{-15} \text{ g}$. There are international agreements about names and prefixes to be used, and it does not help understanding if in one line the authors adhere to the adopted usage (pg for picogram) and then in another call a femtogram (fg) an Emich. Another example of the general tenor of the book is its treatment of the problem of illumination in the microscope. Three and a half pages are devoted to very detailed instruction for producing "critical, Köhler or diffuse illumination." The instructions are given in such a way as to be understandable to a low-grade technician, but do not indicate under what circumstances one type of illumination may be used more advantageously than another.

The authors attempt to create a "systematic taxonomy of particles." For this purpose they have developed a six-digit binary code based on the following classification characteristics: transparency, color (transmitted), color (reflected), birefringence, refractive index, and shape. To these six digits are

added one or two digits in the decimal system ranging from 0 to 48, which are listed in table 1 on pages 292–302. I searched for a definition or explanation of these added digits and conclude that if one exists it is well hidden. According to the code, most of the materials represented by the color micrographs are characterized by three to five different numbers. As an example: "Cigarette ashes 0:000000, 1:000001, 8:001000, 32:100000, 33:100001." Admittedly, cigarette ashes appear to be an odd mixture of materials in different stages of combustion, but if I were a microscopist attempting to identify this material I would like a simpler system for doing so.

I have shown a draft of this review, together with the book, to one of my friends, who is an expert light microscopist. In his opinion the collection of color micrographs can be of very little help to the practitioner because too many of the sample micrographs look

too much alike and there is not sufficient information about the conditions under which they were taken. None of the captions indicates the numerical aperture of the objective or the aperture of the condenser, and even the state of polarization is given in purely qualitative terms. Another irritating aspect of the book is its unashamed promotion of commercial products. Not all of them are products of McCrone Associates (the company owned by the senior author), but a fair number of McCrone products are listed. Some parts of the book read almost like a commercial catalog.

A book priced at \$125 has to be really good. I cannot say so much of this one. For that price I would have expected, among other things, the elimination of the considerable number of typographical errors.

L. MARTON

*National Bureau of Standards,
Gaithersburg, Maryland*

Strong Interactions

High Energy Collisions of Elementary Particles. R. J. EDEN. Cambridge University Press, New York, 1967. xii + 298 pp., illus. \$9.50.

This summary of the present theoretical state of the art in strong interactions is a welcome addition to the bookshelf of the practicing high energy physicist. In a relaxed style that lends itself to casual reading, the author surveys both rigorous theoretical results on scattering amplitudes and the phenomenological description of scattering data. For graduate students this book will serve as an introduction to the field, but it does not seem to be designed for use as the primary textbook for the customary graduate courses.

For the specialist the highlights of this book are the chapters on asymptotic bounds on cross-sections and real parts of forward scattering amplitudes. The author, a well-known expert on this subject, reviews the existing rigorous theoretical bounds and outlines essential details of their proofs. It is a great convenience to have a compact summary of recent literature on this complicated subject. An interesting discussion of dispersion relations, Pomeranchuk theorems, and the Phragmén-Lindelöf theorem concludes the section on asymptotic amplitudes.

Major emphasis is placed on Regge theory and phenomenology. In view of

the upsurge of interest in applications of Regge poles to scattering data this emphasis is well placed. A rather standard introduction to complex angular momentum in potential scattering and generalization to relativistic theory are included, followed by sections on factorization and fermion Regge poles. The developments on conspirator and daughter trajectories apparently occurred too late for inclusion in the book.

The author attempts to give his approach to the subject a phenomenological flavor by including a survey of experimental results in the initial chapter and by devoting a later chapter to specific applications of Regge pole models to data fitting. My own impression is that the principal weakness of the book lies in these chapters. The trends in the experimental data could have been more effectively presented by additional illustrating figures. The experimental study of Regge theory might have been described in greater detail for the limited number of reactions considered. A few errors occur in the phenomenology sections, but none of major consequence. Unfortunately, few references are given to the literature on comparison of theoretical models with the results of experiment. In most instances the author refers the reader to review articles that are not readily accessible.

Brief mention is made of the absorption-model and quark-model de-

scriptions of high energy scattering processes in a final chapter. Decay correlations are touched on, but density matrix methods are not discussed in detail.

Granted that any treatise of reasonable size on high energy scattering must have its limitations, the author has given an interesting overall picture of the field.

V. BARGER

*Department of Physics,
University of Wisconsin, Madison*

Coordination Chemistry

Mechanisms of Inorganic Reactions. A Study of Metal Complexes in Solution. FRED BASOLO and RALPH G. PEARSON. Wiley, New York, ed. 2, 1967. xiv + 701 pp., illus. \$17.95.

It has been nine years since the first edition of Basolo and Pearson's book. In the interval there has been an extremely rapid growth in studies of the mechanisms of coordination reactions. The area of investigation previously bounded largely by the substitution reactions of Co(III) and Pt(II) plus a few oxidation-reduction systems has expanded to take in a multitude of chemical systems including many previously considered immeasurably fast, many that no one previously bothered to examine, and many that were previously unknown. As the authors point out, the number of publications per month in kinetics and mechanisms of inorganic chemical systems has quadrupled since 1957. A remarkable number of recent Nobel Prize laureates, including Eigen, Porter, Norrish, Zeigler, Natta, Mulliken, and Calvin, have made contributions of direct or indirect importance to this area. The last decade has been perhaps the most exciting period in coordination chemistry since the time of Werner.

Clearly the authors had a tough job in preparing a new edition of this book. A minor revision would have been completely inadequate, and indeed the second edition is greatly expanded and has many new features. The material has been reorganized and extensively updated. Although the resulting book probably will not transmit an aura of excitement to a student new to the subject, it does bring the admiration of this reviewer, who has found it highly readable and packed full of vital, well-documented, and current information.

At the time of their first edition

Basolo and Pearson were deeply engaged in a not always pleasant scientific dispute with Ingold, Tobe, and others regarding the nature of Co(III) substitution reactions—in particular, the role of hydroxide ion was in question. Were the reactions S_N2 or S_N1CB ? As recent converts and enthusiastic proponents of crystal field theory, Basolo and Pearson put considerable emphasis on this topic. These interests were strongly reflected in their book, and on these and other topics of controversy the authors did not hesitate to express their views. Undoubtedly their forthright viewpoints helped to stimulate additional research. Many of their earlier points were well made, and, as they mention in their new preface, it has not been necessary to modify greatly the ideas that were presented in the first edition. If any fault can be found with the new edition it would be the very occasional tendency of the authors to try too hard to defend their own position in areas where they have made important contributions, contributions which now are widely accepted, but where every phenomenon does not fit. There are so many new areas in which to pick arguments that it would be best in the absence of some new data or new insight to admit to some possible exceptions and save more space for new material. Indeed, for the most part this is done, and the new book has better balance and better perspective than the old one. Even the new sections on hard and soft acids and bases are written with admirable restraint, considering the involvement of one of the authors in this subject.

The second edition has expanded 65 percent in number of pages and appears to contain about 80 percent more textual material than the first. The illustrations are new and the presentation of the tables and graphs is much improved. The authors have done an extensive and impressive job of literature documentation, which is invaluable for those using the book as a research reference. Many parts of the book are remarkably current for a rapidly moving research area.

New chapters are included on the reactions of transition metal organometallics and on photochemistry. A sizable section on metal ion catalysis is almost all new, and new material is included on the theory of bonding, stereochemistry, hard and soft acids and bases, fast reactions, chelate mechanisms, ligand stereospecificity, and photoracemization. The chapter on oxidation-reduction reactions is greatly expanded, reflecting the research activ-

ity in this field. As before, the chapters on substitution reactions of octahedral and of square planar complexes dominate the book. This material is well presented and is valuable both in its collection and in its interpretation of research accomplishments.

In summary, the new edition by Basolo and Pearson is not only of considerable value to those active in research but because it is well written it also is quite appropriate for someone new to this area of chemistry. It is highly recommended.

DALE W. MARGERUM

*Department of Chemistry,
Purdue University,
Lafayette, Indiana*

Books Received

Advances in Chemical Physics. Vol. 13. I. Prigogine, Ed. Interscience (Wiley), New York, 1967. x + 398 pp., illus. \$15.50.

Advances in Inorganic Chemistry and Radiochemistry. Vol. 10. H. J. Emeléus and A. G. Sharpe, Eds. Academic Press, New York, 1967. xiv + 466 pp., illus. \$18.

American Building. Materials and Techniques from the First Colonial Settlements to the Present. Carl W. Condit. University of Chicago Press, Chicago, 1968. xiv + 329 pp., illus. \$10.

Anelastic and Dielectric Effects in Polymeric Solids. N. G. McCrum, B. E. Read, and G. Williams. Wiley, New York, 1967. xiv + 617 pp., illus. \$25.

Animal Agents and Vectors of Human Disease. Ernest Carroll Faust, Paul Chester Beaver, and Rodney Clifton Jung. Lea and Febiger, Philadelphia, ed. 3, 1968. x + 461 pp., illus. \$11.50.

Animal Orientation and Navigation. Proceedings of the 27th Annual Biology Colloquium, Corvallis, Ore., May 1966. Robert M. Storm, Ed. Oregon State University Press, Corvallis, 1967. x + 134 pp., illus. \$5.

Arbeitsmethoden und aktuelle Ergebnisse der technischen Mikrobiologie. Proceedings of a symposium, Berlin, April 1966. S. Windisch. Fischer, Stuttgart, 1967 (distributed in the United States by Abel, Portland, Ore.). viii + 236 pp., illus. Paper, \$15.50. Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, 1. Abteilung, supplementheft 2.

Arctic Biology. Papers presented at the 1957 and 1965 Annual Biology Colloquiums, Corvallis, Ore. Henry P. Hansen, Ed. Oregon State University Press, Corvallis, ed. 2, 1967. 318 pp., illus. \$6.50.

Asian Drama. An Inquiry into the Poverty of Nations. Gunnar Myrdal. Pantheon (Random House), New York, 1968. Three volumes. lxii + 2284 pp., illus. Paper, \$8.50. Twentieth Century Fund Study.

Australian Inland Waters and Their

(Continued on page 924)