problems are appended to each chapter. Elementary valence theory and metal deformation constitute the subject matter of two appendixes of three and two pages, respectively.

The fundamental approach adopted by the author is as sound as it is timely; the underlying theory encompasses a vast area of physico-chemical knowledge, and our understanding of the subject as a unified whole has lagged behind its enormous and ever-growing practical ramifications. However, it is precisely for this reason that the author of a book, as modest in size as this one, faces a formidable challenge in terms of knowledge, organizational ability, conciseness, clarity and, above all, perspective and judgement as to "what to omit".

In my opinion, the author has been only partially successful. On the positive side, he has produced an eminently readable volume, written with more style and grace than one is accustomed to in books of this sort. He has presented some of the basic theory in a concise, personal, and refreshing, if somewhat unorthodox, manner; I refer here especially to the thermodynamic material in the first chapter. He adheres rigidly to his unified viewpoint, and he succeeds in incorporating practical aspects into the framework of the basic discussions. The weakness of the book derives from the fact that the author has attempted too much for the space he has allowed himself. Some of the more intricate theory is treated with such conciseness that the result tends to be more than unorthodox, i.e. superficial and even misleading. This applies especially to the question of metal complexes, which is brought up in a number of places, and even more to the breathtakingly brief appendixes. Again, so much material is presented that the main line of the discussion is frequently interrupted and the perspective lost.

In the author's words, "The book is aimed largely at second and final-year students in English universities and colleges of advanced technology". I feel that this volume will be appreciated mainly by persons of substantial physico-chemical maturity, who will derive benefit and even pleasure from its undeniable virtues. However, the book largely confirms my opinion that a complex subject of this sort demands exhaustive, specialized treatment—and thus, inevitably, a more voluminous (and I am afraid less gracefully written!) book.

The book is well-produced, and I have not been able to detect major typographical errors except in line 2, page 12 which, I presume, should read "0.1 *M* $AgNO_3$".

Clemens Auerbach has been a member of the Analytical Chemistry Group in the Nuclear Engineering Department of Brookhaven National Laboratory since 1956. He received his BS degree in 1943 at Robert College, Istanbul, Turkey and did graduate work under the direction of Professor J. J. Lingane at Harvard University, where he received his PhD degree in chemistry in 1951. After three years of postdoctoral work at the University of Minnesota, with Professor I. M. Kolthoff, he held a faculty position at the University of Buffalo from 1953 to 1956. His specialty is electroanalytical chemistry with emphasis on polarography and coulometry.

A BIRD'S-EYE VIEW

Title Chemical Processing in the Atomic Energy Industry

Author A. R. Cooper

Publisher Iliffe Books, Ltd., 1964

Pages ix + 160, including 44 figures, 10 tables

Price 38 shillings 6 pence in the United Kingdom

Reviewer Walter O. Haas, Jr.

This small volume is one of a series designed for a general postgraduate course in nuclear engineering, in particular as an introductory part of the Harwell Reactor School Standard Course. The author, and authors of other books in the series, teach their specialities at the colleges of Advanced Technology at Birmingham, Bradford, and Salford.

The Harwell school course is attended by chemists, physicists, metallurgists, engineers, and senior executives, who are concerned with the development and construction of nuclear reactors. The students are expected to be well grounded in the fundamentals of science and engineering, and introductory lectures are given in mathematics and atomic and nuclear physics before proceeding to more specialized subjects. Chemical processing, metallurgy, heat transfer, and radiation protection are among the disciplines covered in the course, but the emphasis remains on nuclear and reactor physics. The intent of introducing the associated disciplines is to create an awareness of the extent to which these affect reactor design, operation, and economics, rather than to train personnel for work in these fields.

Considered in this context the book does provide an overall, if somewhat sketchy, summary of the part chemical processing plays in the atomic energy industry. The short introduction discusses the material requirements of a nuclear reactor, the behavior and compatibility of these materials under reactor operating conditions, and the need of chemical processing to obtain the materials of required purity. A second chapter touches on the various processing techniques in use and mentions the problem of criticality encountered in processing plutonium and enriched uranium. Each of the next seven chapters is devoted to individual elements: uranium, plutonium, thorium, zirconium, beryllium, niobium, and graphite; outlined are their important physical and chemical properties, the processes considered and used in their isolation, their fabrication into reactor components, and, when pertinent, the mode of reduction from ore. The last two chapters cover the reprocessing of fuel and isotope separation.

It would be surprising if a book of this size were to be completely successful in achieving its purpose. The difficulty of summarizing a complex industry for a mixed audience is probably best illustrated by the fact that the author felt it desirable to define such terms as "ion" and

"cation" in a glossary of less than two pages, while mentioning such considerations as the "avoidance of exothermic ortho-para hydrogen transformation" in the body of the text without explanation.

The book would be most useful to a person having some chemical or chemical engineering background and an elementary knowledge of nuclear and reactor theory. It would give him a bird's-eye view of chemical processing in the atomic energy industry and a general idea of the technical and economic considerations involved in the use of reactor materials. Since the majority of journal references are to summary-type articles, neither the book nor the references are likely to provide answers to specific technical problems. Other references are to standard texts, handbooks, and progress reviews which would serve a more extensive interest in a particular subject.

A drawback for American readers is the fact that all but one of the journal references are to British publications, 60% of these to NUCLEAR ENGINEERING and 25% to NUCLEAR POWER. However, the articles in these journals are not exclusively devoted to British experience.

Although the book shows a few signs of hasty preparation, it does serve its stated purpose reasonably well and can be recommended within that framework.

Walter O. Haas, Jr., is Supervising Chemist for Isotopic Analysis at the Knolls Atomic Power Laboratory, General Electric Co., Schenectady, N. Y. From 1947 to 1957 he was a member of the KAPL Separations Chemistry Group, serving as Chairman of the Planning Committee for the separations pilot plant in 1952-1953. At that time he was chiefly concerned with solvent-extraction flowsheet design and contributed a chapter on principles of solvent extraction to Chemical Processing of Reactor Fuels *(J. F. Flagg, Ed., Academic Press, 1961). He received his AB degree from Kalamazoo College in 1937 and his PhD degree in Inorganic Chemistry from the University of Chicago in 1941. From 1941 to 1947 he was at the Hawthorne Plant of the Western Electric Co., associated with the development of insulation, dielectrics, and synthetic piezo-electric crystals.*

AGED SOW'S EAR STILL NO SILK PURSE

Title Handbook of Radiochemical Exercises

Authors An. N. Nesmeyanov, V. I. Baranov, K. B. Zaborenko, N. P. Rudenko, and Yu. A. Priselkov

Publishers Pergamon Press and MacMillan Co., 1965

Translator E. Kloczko (translation edited by R. W. Clarke)

Pages xii + 448

Price $12.00

Reviewer John W. Irvine, Jr.

This is a translation of a Russian book which, from internal evidence, must have been published in late 1955 or in 1956. As a consequence, it is necessary to examine the question of the quality of the Russian publication and the justification for this belated translation.

According to the preface, the book "has been designed for students of advanced courses in chemical departments and for scientific workers beginning investigations involving radioactive isotopes". It is divided into an introduction and five chapters. The last four chapters are subdivided into expository material and laboratory exercises. The chapter contents can be briefly summarized as: I. Laboratories, equipment, and procedure, II. Properties and measurement of radiation, III. Growth and decay, IV. Production and chemical properties, and V. Tracers.

Chapter I is a queer mixture of the reasonable, the unreasonable, and the irrelevant. Approximately one half of the material covered in this chapter falls into this last category, since it is devoted to equipment for relatively high level operation and to micromanipulation. Neither topic is treated significantly in the rest of the book.

In Chapter II the properties of nuclear radiation and its interaction with matter are treated fairly thoroughly and reasonably well. Instrumentation, however, is completely unsatisfactory. Approximately 25 pages are devoted to electroscopes and electrometers of the types used in the '20's and early '30's. I doubt if there are a dozen radiochemists in this country who have ever used a string or a Hoffman electrometer, and I am sure there are even fewer who are interested in four methods of finding the electrical capacity of such instruments. The same amount of space, one-half page, is devoted to the scintillation counter as to the spinthariscope (I wonder how many readers know what that instrument is?). The experiments on absoulte activity measurements are inadequate. No mention is made of 4π counting or coincidence techniques. One whole page is devoted to the order of switch throwing and knob twiddling on an alpha counter, but the stoichiometry of the ignited and weighed uranium oxide which is used as a standard for the instrument is not indicated.

Chapter III briefly treats elementary growth and decay equations and then plunges into (but does not name) the Bateman equations. Matrix methods of solving these equations are introduced. In this chapter and the previous one, nearly all of the 31 exercises are based on natural radioactive species.

Chapter IV covers the production, the isolation, and the decay properties of selected radioactive species. Great emphasis is placed on (n,γ) production with a Ra-Be neutron source. Szilard-Chalmers reactions are utilized frequently but never referred to by name. Lack of familiarity with cyclotron production is indicated by the statement "(d,p) reactions are most frequently used in the production of radioactive isotopes with the cyclotron". If this book is a true indicator of the state-of-the-art in Russia in the mid '50's, one must conclude that the radioisotope production and distribution in that country had not progressed to the point that it benefited the general research and student population. Moreover,