are to be found in this material, and it is interesting to compare the views expressed when the awards were made with current views about nuclear technology and policies."

The typical format of the awards ceremonies involved a presentation of the accomplishments of the recipient presented by an outstanding colleague also of worldwide renown. This was followed by the reading of the citation and a response from the recipient, and the ceremony closed with remarks by one or two distinguished speakers, who, typically, spoke on matters of national policy and human need.

I shall not attempt to list the contents of this remarkable volume; the flavor can be gained from the ceremony at which the first Atoms for Peace Award was conferred on Niels Henrik David Bohr. Here the presentation of the recipient's accomplishments was made by John Archibald Wheeler, and the remarks following the award were made by President Eisenhower and Arhur Hawley Compton. Wheeler's remarks were entitled, "No Fugitive and Cloistered Virtue," and Compton's, "Nuclear Energy and the Growth of Man." The last award, in 1969, was given to President Eisenhower, and his tribute presented by Killian.

It would be difficult to quarrel with any of the selections made by the Board of Trustees. The recipients' contributions speak for themselves, and their gracious responses to the Award speak directly to the breadth of interest, the deep sense of responsibility that characterizes these 22 outstanding men.

This volume, edited by James R. Killian and published by the MIT Press, is indeed a fitting tribute to Henry and Edsel Ford, as well as to the 22 recipients. It is a volume that will be read with great enjoyment and profit by anyone involved in nuclear science or nuclear engineering. Killian and the MIT Press are to be congratulated for making this remarkable cross section of the beginning of the era of the peaceful atom available to a wide public.

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Energy Conversion Engineering

Author	Richard C. Bailie
Publisher	Addison-Wesley Publishing Company (1978)
Pages	537
Price	$19.50
Reviewer	Alfred Schneider

The intensive preoccupation with energy problems during the past decade has spawned many new courses in energy conversion engineering at most institutions of higher learning. Unfortunately, there has been a dearth of suitable textbooks, notwithstanding the continuing proliferation of books, studies, and reports devoted to many aspects of energy conversion. This book is intended as a textbook for senior level students in engineering or the physical sciences. As stated by the author, the emphasis on coal is due to his familiarity with this energy source as well as to the widely held belief that coal will be the major fuel for the next century. The chemical engineer's point of view of energy matters prevails throughout the book.

A concise historical review and an introduction of simple energy conversion calculations are followed by a brief presentation of the energy demand and supply situation. The treatment of thermodynamics, chemical equilibrium, and chemical reaction kinetics is quite thorough. Most engineering seniors will have covered the laws of thermodynamics in earlier courses, for which several excellent texts are available, and the two other topics will be of limited interest to nonchemical or petroleum engineering students.

By contrast, the chapter on the combustion of fossil fuels is quite cursory; only a few pages are devoted to the conversion of heat to power and magnetohydrodynamics (MHD) generators and fuel cells are only briefly described. An excellent survey is given of coal gasification and liquefaction systems, including descriptions of equipment, operation practices, and a review of their current status. The chapter on nuclear energy provides a good introduction to the subject with a proper balance of theory, engineering, and operational and safety aspects. The author avoids any partisanship in the "nuclear controversy" by presenting those facts that can be quantified as well as identifying the issues that are a matter of debate.

The principles of solar energy are briefly introduced and several collector types (flat plate, focusing, and satellite) are analyzed. Only superficial treatment is given to energy storage, photovoltaic, and biomass conversions. The chapter devoted to environmental considerations, though limited to fossil fuel combustion, is probably the most useful in this text. Pollution sources, dispersion mechanisms, abatement equipment, and cost-benefit tradeoffs are thoroughly treated and numerous calculational examples are provided.

Only three pages are devoted to economics, politics, and social implications. The author believes that a discussion of economics should be avoided because of rapid changes and that only a "simplistic approach" would thus be provided, in contrast with "the laws of conservation of mass and thermodynamics, which will remain invariant, whatever future policies may be." The text contains many calculational examples, with the solutions presented in tabular form. Each chapter also provides many generally good problems for student assignments. The text is largely devoid of bibliographic references. Omitted from the text are important modes of energy conversion, such as hydroelectric power, internal combustion engines, electric storage batteries, thermoelectric generators, etc.

The book is a photoreproduction of a typed copy, the figures are simple line drawings, both British and SI units are used, and the style is frequently succinct. Thermodynamic data, a primer on material balances, and conversion factors are provided in the Appendix.

Energy Conversion Engineering is one of the better texts to have appeared in recent years. As a textbook it will be useful to chemical engineers, but coverage of several important topics may require supplemental texts.

Alfred Schneider is a professor in the School of Nuclear Engineering at the Georgia Institute of Technology. A chemical engineer by education, he has been active for 25 years in research, technical management, and education, primarily in the nuclear fuel cycle and energy conversion areas. He is currently a consultant to the New York State Energy Research and Development Authority and the U.S. Department of Energy.

Photochemistry of Small Molecules

Author Hideo Okabe

Publisher John Wiley and Sons, Inc.

Pages 431

Price $34.50

Reviewer G. K. Vemulapalli

Photochemistry is a subject with wide-ranging applications. Because of this, many books have been written that undertake to give comprehensive coverage of the subject. Most of these books concentrate on the photochemistry of relatively large molecules, about which a great deal of information is available to us. However, there are at least two good reasons for the investigation of the photochemistry of small molecules. In the first place, the connection between spectroscopy—absorption of light by molecules—and subsequent energy transfer, nonradioactive degradation, and reactivity is perhaps best studied in small molecules, since their quantum states are better characterized than those of the big molecules. Second, understanding of the photochemical processes in the small molecules may lead to technologically fruitful applications, e.g., isotope separation.

Okabe's book, *Photochemistry of Small Molecules*, is therefore a welcome addition to the photochemical literature. The book is well written with a balanced presentation of the necessary theory and a wide collection of applications. The author follows an overall organization similar to that found in Herzberg's classic monographs: description of the basic theory followed by detailed discussion of individual cases. This organization suits the subject very well and like Herzberg's books, this too should be a valuable resource for photochemists and spectroscopists.

The first chapter gives a concise description of spectroscopy; the second chapter describes the mechanisms of photodissociation and experimental techniques are covered in the third. Chapters 4 through 7 discuss the photochemistry of atoms, and diatomic, triatomic, and polyatomic molecules, while the last chapter briefly describes three topics related to photochemistry—isotope separation, photochemistry of planetary atmospheres, and air pollution.

The jacket states: "It is a particularly relevant text for graduate students, since no other book provides a comprehensive summary of the latest developments of photodissociation, dynamics, guiding principles of photodissociation, the relationship of photochemistry with spectroscopy and various recent topics related to photochemistry."

This is true to a large part. With supplementary material and problems, the book should serve as a textbook for graduate courses.

G. K. Vemulapalli (BS, Andhra University, Waltair, India; PhD, Pennsylvania State University) is an associate professor in the Department of Chemistry, University of Arizona. He did his post-doctoral research at the Institute of Molecular Biophysics, Florida State University, and taught for a year in Michigan State University's Department of Biophysics. He joined the faculty of the University of Arizona in 1967. His interests are in electronic spectroscopy of molecules and photochemistry with emphasis on spin-forbidden transitions, nonradiative processes, energy transfer mechanisms, and excited-state reactivity.

Engineering for Nuclear Fuel Reprocessing

Author Justin T. Long

Publisher The American Nuclear Society (1978)

Pages 1025

Price $68.00

Reviewer J. A. Buckham

This is the second printing of the edition originally published in 1967. At that time it was the most comprehensive text ever written on the subject. Much of the information is of course timeless, such as the basic theory of solvent extraction and other diffusional and mass transfer operations. Unfortunately, in the past 13 years many technological advances have been made that are not covered. Even more unfortunate, nothing appears about a whole new area, licensing, which came about because of the change in political climate and public sentiment and which has a profound input on the entire nuclear industry. On this basis *Engineering for Nuclear Fuel Reprocessing* would still be useful in a beginning course in nuclear engineering, but would be of little value to an engineer involved in the design of an updated plant.

In the area of solvent extraction there are new and improved computer codes for approximating contactor operation, improved diluents, and new uranium-plutonium partitioning agents. Tributyl phosphate remains as the standard extractant, but the old kerosene-type diluents have been replaced by the saturated, straight-chain hydrocarbon, primarily a C_{12}-C_{14} cut. These diluents are subject to less radiation damage and nitration than the early diluents. Hydroxylamine nitrate has been studied as a partitioning agent for uranium and plutonium. Hydroxylamine has the advantage of eliminating the iron and sulfuric acid that would enter the high-level waste from the use of ferrous sulfamate. Electrolytic partitioning of uranium and plutonium has been developed in both Germany and the U.S. as a process improvement.

The sections on headend processing also need updating, particularly dissolution of spent fuel. Practically all the current light water reactor fuel is Zircaloy-clad UO_2, whereas the book discusses the older fuels, integral dissolution, etc. There is a long discussion of the Darex process,