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.

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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,