BOOKS

Advances in Photochemistry (Volume 1), W. Albert Noyes, Jr., George S. Hammond, and J. N. Pitts, Jr., editors, Interscience, New York (1963). 443 pages. $16.50.

The volume begins with a welcome discussion of the vocabulary of photochemistry, with the worthy aim of amalgamating terms used in photochemistry and spectroscopy. The definitions and a summary of symmetry and state notations add considerable clarity to this confused subject. It is hoped that authors of subsequent articles in the series will pay close attention to the suggestions made here.

The vocabulary section is followed by eight authoritative review articles on various topics in photochemistry: the photochemistry of aromatic hydrocarbon solutions, photochemical gas phase reactions in the hydrogen-oxygen system, photochemistry of the cyclic ketones, addition of atoms to olefins in the gas phase, a new approach to mechanistic organic photochemistry, isotopic effects and the mechanism of energy transfer in mercury photosensitization, photochromism, photochemical rearrangements of organic molecules. Each article includes an up-to-date bibliography, roughly covering the years since 1940, when photochemistry began to receive much attention. Earlier references are included in some cases.

Subsequent books in the series on advances in photochemistry will consist of a second volume to be published soon and about one volume a year thereafter. The high standards of writing, editing, and printing set by this first volume indicate that the series will make positive and much-needed contributions to the subject.

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Introductory Nuclear Reactor Theory, H. S. Isbin, Reinhold, New York (1963). $22.50.

It is a great privilege to review and report on a new work which so clearly meets its goals. Professor Isbin's text is a remarkably superior effort of a scholar-engineer, and it will be surprising if it is not widely adopted for instructional purposes in this field.

The organization and layout of the book, which runs somewhat over 600 pages, are excellent. The use of nonglare paper, exceptionally clear type, well-balanced line drawings and graphs, and the relative freedom from typographical errors, should contribute heavily to its success. Of greatest importance, however, are the author's clear exposition and his wise selection and use of the large body of literature of ideas and data which has accumulated over nearly two decades of prog-

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$$\left[\left(\frac{p-k}{p}\right)\cdot \bar{f}_s\ (p-k)\right] = c_s/p \qquad (24)$$

Clearly (23) and (24) are now entirely analogous to Equations (17) and (18). One may therefore write

$$\bar{c}_{A2}(p) = \left(\frac{p-k}{p}\right)\cdot \bar{f}_s\ (p-k) = \left(1-\frac{k}{p}\right)\bar{f}_s\ (p-k) \qquad (25)$$

Next recognize that

$$\bar{f}(p-k) = \bar{F}(p) \qquad (26)$$

where

$$F = f\,e^{kt} \qquad (27)$$

and that

$$\frac{1}{p}\bar{F} = \bar{I} \qquad (28)$$

where

$$I = \int_o^t F\,dt \qquad (29)$$

One may then take advantage of Equations (26) and (28) in inverting Equation (25) to obtain

$$c_{A2} = f\,e^{kt} - k\int_o^t f\,(\mathbf{r},\tau)e^{k\tau}\,d\tau \qquad (30)$$

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ress in the nuclear-reactor field. Of importance, particularly to those giving instruction in reactor theory, are the many fresh new problems given at the end of nearly every chapter. A high percentage of these draw from real experience as reported in the literature and also draw the student to the literature in a critical and rewarding way.

In sixteen chapters the author sets the context, develops the simpler methods of analysis, gradually works his way to the more sophisticated techniques, and concludes with firm-design orientation. Throughout, one finds adequate emphasis on relating theory and experiment. This reviewer found particularly commendable the author's treatment of neutron diffusion in nonmultiplying media where graphical comparisons give an excellent feel for the applicability of infinite media solutions to certain finite media problems.

Inevitably, perhaps, a few errors or misstatements have not been caught. Some of the more important ones, which may create false impressions in inexperienced minds include: an early statement that "natural uranium is used as the fuel material for most thermal reactors," whereas in fact virtually all but the large plutonium production reactors in this country are heavily committed to the use of uranium enriched in the U-235 isotope; an equation (9-24) improperly suggesting itself, without qualification, as a general solution for the time-dependent neutron density problem with time-varying reactivity; and, finally, a tabular value of the multiplication factor for an infinite homogeneous "optimum" mixture of natural uranium and light water in excess of 1.0. In addition to these specifics, this reviewer suggests that the first of the two chapters on reactor dynamics might have imparted a little more of the feel of the subject than it did. It is also somewhat disappointing to see nothing in the final chapter on reactor dynamics on the subject of xenon instability. These comments should not dissuade the reader, however, from the overall impression of excellence.

Professor Isbin reveals his chemical engineering background in a few places which meaningfully tie the material to other areas of more traditional chemical-engineering activity. For the most part, however, the book is directed to the serious student of applied physics and should be readily comprehensible, indeed invaluable, to him.

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