

neering Department and Director of the Reactor Facility at the University of Virginia. He was in the Aircraft Nuclear Propulsion program at Oak Ridge in the 1950's which led to his interest in nuclear space applications. He attended the Advanced Institute on Nuclear Rockets in Gainesville, Florida in the summer of 1962, and was a Visiting Staff Member at the Nuclear Rocket Development Station in Nevada in the summer of 1965. He teaches a graduate course in nuclear rockets at the University of Virginia and has served as a consultant with NASA, Lockheed, Westinghouse, and the Air Force.

RE RADAPPERTIZATION, RADICIDATION, AND RADURIZATION

Title Microbiological Problems in Food Preservation by Irradiation

Publishers International Atomic Energy Agency, 1967

Pages 148

Price \$3.00

Reviewer Durwood B. Rowley

The papers incorporated in this volume are of high scientific quality and of great interest to readers concerned with radappertization, radication, and radurization. Good judgment was used in selecting papers concerned with a variety of microorganisms of public health concern. I was especially impressed with the recommendations as to further research areas of importance. Such emphasis will help direct interested scientists toward the pertinent problem areas and thus lead to concentrated research effort and more hope of success.

One major criticism of the book was that it included a few papers that consisted largely of data previously published in other scientific journals. It would have been preferable to have the authors publish a summary of such work with reference to the original data.

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Natick Laboratories, Natick, Massachusetts. His research encompasses mechanisms of cellular resistance and effect of radiation and significant food chemicals on the germination, outgrowth, and toxinogenesis potential of spores of Clostridium botulinum. His PhD (microbiology, 1962) is from Syracuse University.

TOO MANY COMPROMISES

Title Introduction to Nuclear Theory

Author I. E. McCarthy

Publishers John Wiley & Sons, Inc., 1968

Pages xv + 555

Price \$13.95

Reviewer Leonard S. Kisslinger

It is very difficult to write a textbook on nuclear theory at the present time, since the subject itself is complex and is changing rapidly as are graduate courses in nuclear theory. Therefore, one can try either to write monographs which treat fairly completely important new aspects of the field, such as A. Lane's book on *Nuclear Theory*, or else devote an extraordinary amount of time and talent to try to cover most of the material out of which all possible courses in nuclear theory can be taught, such as the forthcoming volumes by A. Bohr and B. Motelson.

As is stated in the Preface, the book by I. E. McCarthy is a compromise, in fact a collection of compromises such as a professor might make in preparing notes for a course to be taught during one particular year. In order of increasing thoroughness, the main topics treated are nuclear structure, nuclear matter and the two-nucleon interaction, and nuclear reactions.

The treatment of nuclear structure is so incomplete that one can question the value of including in the book the three chapters (3, 5, and 7) in which this material is discussed. Most single-particle aspects of nuclear structure not contained in many other texts are repeated in Chap. 11 in the treatment of optical

potentials. The main chapter which deals with nuclear structure (7) leaves out essentially all of the topics which have made nuclear structure physics truly exciting during the past decade. I believe that it would have been better to have referred to other books which are now available to the students and to have omitted at least Chap. 7.

There are five chapters in which the two-body problem and two-nucleon interaction and nuclear matter are treated. There is a brief heuristic treatment of the two-nucleon force in which the range is related to the mass of the pion. Since a considerable effort is expended on the many-body methods (often known as Brueckner Theory) which were developed to get around the difficulty of the hard core in the nucleon-nucleon force, further treatment of the origin of two-body force in terms of meson exchanges would have been most appropriate.

The reader can find a discussion of some of the early work on nuclear matter that is not contained in other texts in nuclear theory. The author includes some work on Hartree-Fock calculations and the relation to the results obtained by Brueckner Theory. Unfortunately, since there is little discussion of symmetries in the book, and no treatment of the symmetries associated with the Hartree fields, the main purpose of the recent Hartree-Fock calculations in nuclear physics could not be treated very well. For example, the connection of the results of a Hartree-Fock value of the quadrupole moment to what might be interpreted as an intrinsic quadrupole moment of the nucleus is, at best, oversimplified in the text.

The last seven chapters of the book treat nuclear reactions. Chapters 8 and 9 review various theories and discuss their applications. This could be especially useful for experimentalists who wish to learn something about the treatment of their data. The author gives a fairly thorough description of the optical model and the properties of the wave functions which result from the optical model.

There is a useful chapter collecting the results of $(p, 2p)$ reactions. The pickup and stripping reactions are discussed in some detail; however, the application of these reactions for studies of nuclear structure

cannot be completely discussed, since current theories of nuclear structure are entirely omitted, as mentioned above. For the same reason, the section on inelastic scattering cannot be considered to be adequate. Moreover, for a text which has as its main point of view the "use of nuclear reactions in order to understand nuclear structure," it is hard to see how reactions involving isobaric analog states can be omitted, since these have done more to accomplish this goal than perhaps any other reactions.

In summary, I believe that the book will not serve as a general textbook for a nuclear theory course, but can serve as a reference text for a course in nuclear reactions. The reader can find some topics in the treatment of nuclear matter and nuclear reactions which are not included in other texts. The survey of the application of nuclear reaction theories will be especially useful to experimentalists.

Professor Leonard S. Kisslinger has been at Case Western Reserve University since receiving his PhD (University of Indiana) in 1956, except for periods spent at the Bohr Institute in Copenhagen, at the Weizmann Institute, and at MIT. He has been a visiting physicist at Brookhaven, Oak Ridge, and Lawrence Radiation Laboratories, and a consultant to Los Alamos Scientific Laboratory. His fields of research include nuclear models and structure, particle physics, and the many-body problem.

SOURCE BOOK FOR PLASTICS TESTING

Title The Properties and Testing of Plastics Materials
Authors A. E. Lever and J. A. Rhys
Edition Third, 1969
Publisher John Wright & Sons, Bristol, England
Pages ix + 445
Price \$22.75
Reviewer Albert Lightbody

As stated in the Preface, this book is a source or reference for

those who test plastics. As such the book does not list the properties of plastics nor the details of the testing of plastics material. Instead, the new materials now on the market are listed with descriptions that give clues for possible utility.

The extensive use of the second edition and the changes that have occurred since it appeared in 1962 fully justify this third edition. The practical rather than theoretical features of plastics testing are emphasized. The point is consistently made that the performance of a plastic molding depends as much on the design and the molding conditions as on the materials used.

The >4000 references cited draw heavily from testing methods widely accepted in the United Kingdom and the United States. There are references from practically all standards agencies although the list is heavily weighted, as one might expect, by the American Society for Testing Materials Specifications, US Government Reports, and British Standards. A list of the standards organizations throughout the world is given.

The quality of the definition and description of each subject discussed in the text is excellent. These subjects are clearly and succinctly defined with the limitation of the tests clearly stated, and the text is well written.

Some space might have been devoted to the determination of the glass transition temperature of polymers and the importance of this property to the physical behavior of plastics. This subject is covered in many of the references cited but is not mentioned in the text. The authors may have considered this of more interest to the academician than to the engineer.

The comparative results of many of the properties of the materials are tabulated.

The high quality of this work should make this book valuable to all who are interested in the properties and uses of the many types of plastics materials. Its scope is broad enough to be of interest to all engineers, and especially those responsible for evaluating materials.

Albert Lightbody, Chief of the Chemistry Research Department of the US Naval Ordnance Laboratory (NOL), White Oak, Silver Spring, Md.,

has been interested in plastics research and engineering since 1943. A past director of the Society of Plastics Engineers and now the Secretary of the Plastics Institute of America, he was instrumental in developing a specimen, known throughout the industry as the NOL ring, for testing of filament-wound composites. His PhD (physical chemistry) was earned from the University of Nebraska in 1933.

ELIMINATING AN ASTERISK

Title Project Icarus
Editor Louis A. Kleiman
Publisher The MIT Press, 1969
Pages xiv + 115
Price \$6.95
Reviewer Francis J. Jankowski

For several years MIT has been teaching Systems Engineering to graduate interdisciplinary classes. The success of this approach is evident in the enthusiasm of the students and faculty, in the adopting of this approach at other universities, and in the several successful solutions to large-scale problems attained by these classes.

Part of the pedagogical process has been the requiring of each class to prepare a final report and present it orally to a group of faculty, industry, and government people. This book is the final report of one class.

The problem presented to this class was a hypothetical one. Icarus is an asteroid having an elliptic orbit that intersects that of the earth. In June, 1968, it came within 4 000 000 miles of the earth—a near miss on the astronomical scale. This project postulated that Icarus and the earth, in the spring of 1967, were on collision courses, with but 70 weeks in which to design and effect a remedy. This book reports this design effort.

In this rapidly evolving field of Systems Engineering, such a text would be potentially valuable to engineering faculty, systems and project engineers, and engineers in a specialty related to the project reported.