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Chapter Review Radioactivity And Nuclear Reactions Key

Radioactivity: Introduction and History
provides an introduction to

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radioactivity from natural and artificial sources on earth and radiation of cosmic origins. This book answers many questions for the student, teacher, and practitioner as to the origins, properties, detection and measurement, and applications of radioactivity. Written at a level that

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most students and teachers can appreciate, it includes many calculations that students and teachers may use in class work.

Radioactivity: Introduction and History also serves as a refresher for experienced practitioners who use radioactive sources in his or her field

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of work. Also included are historical accounts of the lives and major achievements of many famous pioneers and Nobel Laureates who have contributed to our knowledge of the science of radioactivity. * Provides entry-level overview of every form of radioactivity including natural and

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artificial sources, and radiation of cosmic origin. * Includes many solved problems to practical questions concerning nuclear radiation and its interaction with matter * Historical accounts of the major achievements of pioneers and Nobel Laureates, who have contributed to our current

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knowledge of radioactivity

Drawing on the authors' extensive experience in the processing and disposal of waste, *An Introduction to Nuclear Waste Immobilisation, Second Edition* examines the gamut of nuclear waste issues from the natural level of radionuclides in the environment to

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geological disposal of waste-forms and their long-term behavior. It covers all-important aspects of processing and immobilization, including nuclear decay, regulations, new technologies and methods. Significant focus is given to the analysis of the various matrices used, especially cement and

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glass, with further discussion of other matrices such as bitumen. The final chapter concentrates on the performance assessment of immobilizing materials and safety of disposal, providing a full range of the resources needed to understand and correctly immobilize nuclear waste.

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The fully revised second edition focuses on core technologies and has an integrated approach to immobilization and hazards. Each chapter focuses on a different matrix used in nuclear waste immobilization: cement, bitumen, glass and new materials. Keeps the most important

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issues surrounding nuclear waste - such as treatment schemes and technologies and disposal - at the forefront

A concise and current treatment of the subject of nuclear power safety, this work addresses itself to such issues of public concern as: radioactivity in

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routine effluents and its effect on human health and the environment, serious reactor accidents and their consequences, transportation accidents involving radioactive waste, the disposal of radioactive waste, particularly high-level wastes, and the possible theft of special nuclear

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materials and their fabrication into a weapon by terrorists. The implementation of the defense-in-depth concept of nuclear power safety is also discussed. Of interest to all undergraduate and graduate students of nuclear engineering, this work assumes a basic understanding of

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scientific and engineering principles
and some familiarity with nuclear
power reactors

This completely updated and revised
new edition of Radiation Therapy
Physics contains comprehensive,
balanced coverage of the fundamental
radiation physics principles and its

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clinical applications. Since publication of the ground-breaking first edition in the 1970s, high-energy x-ray and electron beams have increasingly become the preferred approach to the radiation treatment of many cancers. Obviously, too, the use of computers has become pervasive in radiation

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therapy. Imaging techniques and computers are now used routinely in treatment planning, and sophisticated methods are available for overlaying anatomical images with computer generated multidimensional treatment plans. Treatment procedures such as conformal and intensity-modulated

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radiation therapy, high dose-rate brachytherapy, and image-guided and image-guided and adaptive radiation therapy have become standard operating procedures in radiation therapy clinics around the world. Calibration protocols have been extensively revised, and quality

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assurance in radiation therapy has become a subject in itself. These procedures, and others that represent state-of-the-art radiation therapy including quality engineering, are discussed at length in this new edition. The 4th edition has an increased number of chapters (20 compared to

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16) and includes new topics of interest to the practicing radiation oncologist and medical physicist:- The chapter on diagnostic imaging has been expanded to include molecular imaging.- A new chapter has been added on proton radiotherapy.- A new chapter has been added on radiation

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oncology informatics.- A new chapter has been added on quality and safety engineering. - A new chapter on dynamic delivery techniques, explaining the standard (e.g., IMRT) and new treatment techniques (e.g., VMAT). - The treatment planning and brachytherapy chapters omit a detailed

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explanation of historical techniques that no one uses clinically any longer, in favor of including a new focus on modern computer-based techniques in wide-spread clinical use. - The Problem sections in each chapter have been expanded to include designated ?easy? question designed to give a

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broad understanding of a topic, and
?hard? questions that would be
designed to help the student
understand the details of a topic.

Phase 1

A History of Images

Alpha-, Beta- and Gamma-Ray

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Spectroscopy

Physical Science

Cracking the SAT Physics Subject
Test

This best seller, now in its eighth
edition, makes chemistry exciting
by showing why important

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concepts are relevant to the lives and future careers of readers.

The new design, digital images, photos, Career Focus features, and macro-to-micro art enhance the new edition while it retains the many features that have

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made this book so successful.

The writing, as always, is exceptionally friendly. Each section contains sample problems that develop readers' critical-thinking skills. This edition also contains more conceptual

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problems than ever before and has been redesigned to accomodate new styles of learning and teaching with a wide variety of pedagogical tools. Health and Environmental Notes throughout the book highlight

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topics that are relevant to readers' lives and are ideal for classroom discussion. Explore Your World activities in each chapter make chemistry exciting, relevant, and non-threatening. This book is ideally suited for the

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allied health student, or anyone interested in general, organic, or biological chemistry.

This vital reference is the only one-stop resource on how to assess, prevent, and manage severe nuclear accidents in the

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light water reactors (LWRs) that pose the most risk to the public. LWRs are the predominant nuclear reactor in use around the world today, and they will continue to be the most frequently utilized in the near

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future. Therefore, accurate determination of the safety issues associated with such reactors is central to a consideration of the risks and benefits of nuclear power. This book emphasizes the prevention

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and management of severe accidents, in order to teach nuclear professionals how to mitigate potential risks to the public to the maximum extent possible. Engineers, researchers, students and the

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personnel of vendors, safety authorities and nuclear power generation organizations require the knowledge offered by this volume's globally renowned experts to ensure they obtain a core competency in nuclear

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safety. Organizes and presents all the latest thought on LWR nuclear safety in one consolidated volume, provided by the top experts in the field, ensuring high-quality, credible and easily accessible information

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Explains how developments in the field of LWR severe accidents have provided more accurate determinations of risk, thereby shedding new light on the debates surrounding nuclear power safety, particularly in light

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of the recent tragedy in Japan
Concentrates on prevention and
management of accidents,
developing methodologies to
estimate the consequences and
associated risks
Governments and journalists tell

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us that though Chernobyl was "the worst nuclear disaster in history," a reassuringly small number of people died (44), and nature recovered. Yet, drawing on a decade of fine-grained archival research and interviews

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in Ukraine, Russia, and Belarus, Kate Brown uncovers a much more disturbing story, one in which radioactive isotopes caused hundreds of thousands of casualties. Scores of Soviet scientists, bureaucrats, and

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civilians documented stunning increases in cases of birth defects, child mortality, cancers, and a multitude of prosaic diseases, which they linked to Chernobyl. Worried that this evidence would blow the lid on

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the effects of massive radiation release from weapons testing during the Cold War, international scientists and diplomats tried to bury or discredit it. A haunting revelation of how political exigencies shape

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responses to disaster, Manual for Survival makes clear the irreversible impact on every living thing not just from Chernobyl, but from eight decades of radiation from nuclear energy and weaponry.

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Nuclear Radioactive Materials in the Oil and Gas Industry comprehensively discusses the TENORMs generated from various types of oil and gas processes and their associated adverse human health effects,

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effective TENORM waste management strategies, and the quantitative risk analysis. The book thoroughly investigates current knowledge, addressing the three main gaps identified in available studies: 1) Exposure to

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radioactivity, 2) High volume waste as a source of radiation exposure, and 3) A lack of uniform, international safety regulations. This book offers researchers, scientists and graduate and undergraduate

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students a comprehensive and well-researched reference that covers fundamental concepts, problem identification and solutions development. It is an ideal, comprehensive guideline for professionals involved in the

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oil and gas and nuclear industries who are concerned about radiological issues. Demystifies NORM and TENORM concepts and redefines TENORM from technical and nuclear scientific

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perspectives Addresses
statistically representative data
of quantitative risk assessment
and dynamic accident modeling
Stresses the need for legislation
and consistency of safety
standards relating to radiological

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risks posed by TENORM on
health and the environment
Introduction to General, Organic
and Biochemistry
Physics and Technology for
Future Presidents
Volume 2: Radioanalytical

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Applications

Radiation Detection for Nuclear
Physics

Electricity & Magnetism;
Radioactivity & Nuclear Energy
Basic Physics of Nuclear
Medicine

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*Internal Conversion
Processes documents the
proceedings of the
International Conference
on the Internal Conversion
Process held at Vanderbilt
University, Nashville,*

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*Tennessee on May 10-13,
1965. This compilation
discusses the internal
conversion theory;
experimental methods for
the determination of
internal conversion*

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*coefficients; and
conversion electron-gamma
directional correlation.
Other topics include the
application of the
internal-external
conversion (IEC) method to*

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*the lens-type
spectrometer; anomalies of
E2 conversion coefficients
in the deformed-nucleus
region; and conversion
coefficients of mixed
E2-M1 rotational*

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*transitions. The anomalous
E1 conversion; internal
conversion electrons from
primary fission fragments;
particle parameters
measured in pure
transitions; and survey of*

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E1 transitions in the rare earth region are also discussed in this book. This publication is a good reference for nuclear physicists and researchers conducting work on the

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*various types of
measurements that involve
internal conversion
electrons.*

*Radiation detection is key
to experimental nuclear
physics as well as*

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underpinning a wide range of applications in nuclear decommissioning, homeland security and medical imaging. This book presents the state-of-the-art in radiation detection

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*of light and heavy ions,
beta particles, gamma rays
and neutrons. The
underpinning physics of
different detector
technologies is presented,
and their performance is*

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compared and contrasted.

*Detector technology likely
to be encountered in
contemporary international
laboratories is also
emphasized. There is a
strong focus on*

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*experimental design and
mapping detector
technology to the needs of
a particular measurement
problem. This book will be
invaluable to PhD students
in experimental nuclear*

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*physics and nuclear
technology, as well as
undergraduate students
encountering projects
based on radiation
detection for the first
time. Part of IOP Series*

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*in Nuclear Spectroscopy
and Nuclear Structure.
Handbook of Radioactivity
Analysis is written by
experts in the measurement
of radioactivity. The book
describes the broad scope*

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of analytical methods available and instructs the reader on how to select the proper technique. It is intended as a practical manual for research which requires

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the accurate measurement of radioactivity at all levels, from the low levels encountered in the environment to the high levels measured in radioisotope research.

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This book contains sample preparation procedures, recommendations on steps to follow, necessary calculations, computer controlled analysis, and high sample throughput

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techniques. Each chapter includes practical techniques for application to nuclear safety, nuclear safeguards, environmental analysis, weapons disarmament, and assays

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*required for research in
biomedicine and
agriculture. The
fundamentals of
radioactivity properties,
radionuclide decay, and
methods of detection are*

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included to provide the basis for a thorough understanding of the analytical procedures described in the book. Therefore, the Handbook can also be used as a

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teaching text. Key

*Features * Includes sample
preparation techniques for
matrices such as soil,
air, plant, water, animal
tissue, and surface swipes
* Provides procedures and*

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*guidelines for the
analysis of commonly
encountered na*

*This bestselling text
continues to lead the way
with a strong focus on
current issues,*

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applications, visually
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exceptionally strong and
varied end-of-chapter*

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problems. Revised and updated throughout, the tenth edition now includes new biochemistry content, new Chemical Connections essays, new and revised problems, and more. Most

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*end of chapter problems
are now available in the
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Medicine and Molecular*

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Imaging E-Book

Legacies and Risks:

Expanded Edition

Nuclear Fear

*A Critical Review of the
Literature : Summary and
Synthesis Chapter*

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This book takes a very practical approach to presenting a readable source of radiation protection material for anyone working in the areas of radiological and health sciences. It is a suitable text on the subject

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for students preparing for careers as radiologic and nuclear medicine technologists, for residents, and for medical health physicists. It is an good reference guide for anyone using radiation in the health field,

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including physicians. The first seven chapters consist of radiation protection principles which have general application. These include a discussion of instruments used in the field of radiation protection both for

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area and personnel monitoring which is rarely found elsewhere. Additionally, a description is given of SI units for radioactivity, exposure, absorbed dose, kerma and effective/equivalent dose as well

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as risk assessment and the current recommendations of the International Commission on Radiation Protection (ICRP) and the United States National Council on Radiation Protection and Measurements (NCRP). The

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basic radiation protection principles of time, distance and shielding are also discussed here. The next three chapters are concerned with the practical implementation in the workplace of the principles discussed

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earlier, including a chapter on specific recommendations for the safe use of common sources of radiation, the laws governing the use of these sources and the calculation of shielding required for these various sources of

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radiation. The last two chapters detail the methods of calculating absorbed dose from internally deposited radionuclides (including a very lucid discussion of the method proposed by the Medical

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Internal Radiation Dose (MIRD) Committee of the Society of Nuclear Medicine) and external radiation (including a discussion of the Bragg-Gray method). Each chapter has self-assessment review questions and problems

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as a useful aid to retaining important information. The four appendices discuss the current status of the units and their current and former usage as well as the concepts of logarithms. A complete glossary and set of

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references are also included.

Answers to the problems are
provided at the end of the book.

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Handbook of Radioactivity

Analysis: Radiation Physics and

Detectors, Volume One, and

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Radioanalytical Applications,
Volume Two, Fourth Edition,
constitute an authoritative
reference on the principles,
practical techniques and
procedures for the accurate
measurement of radioactivity -

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everything from the very low levels encountered in the environment, to higher levels measured in radioisotope research, clinical laboratories, biological sciences, radionuclide standardization, nuclear

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medicine, nuclear power, and fuel cycle facilities, and in the implementation of nuclear forensic analysis and nuclear safeguards. It includes sample preparation techniques for all types of matrices found in the

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environment, including soil, water, air, plant matter and animal tissue, and surface swipes. Users will find the latest advances in the applications of radioactivity analysis across various fields, including

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environmental monitoring,
radiochemical standardization,
high-resolution beta imaging,
automated radiochemical
separation, nuclear forensics,
and more. Spans two volumes,
Radiation Physics and Detectors

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and Radioanalytical Applications
Includes a new chapter on the
analysis of environmental
radionuclides Provides the latest
advances in the applications of
liquid and solid scintillation
analysis, alpha- and gamma

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spectrometry, mass
spectrometric analysis,
Cherenkov counting, flow-cell
radionuclide analysis,
radionuclide standardization,
aerosol analysis, high-resolution
beta imaging techniques,

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analytical techniques in nuclear forensics, and nuclear safeguards Describes the timesaving techniques of computer-controlled automatic separation and activity analysis of radionuclides Provides an

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extensive table of the radiation characteristics of most radionuclides of interest for the radioanalytical chemist
In the late 1980s, the National Cancer Institute initiated an investigation of cancer risks in

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populations near 52 commercial nuclear power plants and 10 Department of Energy nuclear facilities (including research and nuclear weapons production facilities and one reprocessing plant) in the United States. The

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results of the NCI investigation were used a primary resource for communicating with the public about the cancer risks near the nuclear facilities.

However, this study is now over 20 years old. The U.S. Nuclear

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Regulatory Commission
requested that the National
Academy of Sciences provide an
updated assessment of cancer
risks in populations near USNRC-
licensed nuclear facilities that
utilize or process uranium for

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the production of electricity.
Analysis of Cancer Risks in
Populations near Nuclear
Facilities: Phase 1 focuses on
identifying scientifically sound
approaches for carrying out an
assessment of cancer risks

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associated with living near a nuclear facility, judgments about the strengths and weaknesses of various statistical power, ability to assess potential confounding factors, possible biases, and required effort. The results from

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this Phase 1 study will be used to inform the design of cancer risk assessment, which will be carried out in Phase 2. This report is beneficial for the general public, communities near nuclear facilities,

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stakeholders, healthcare providers, policy makers, state and local officials, community leaders, and the media.

Physics of Nuclear Reactors presents a comprehensive analysis of nuclear reactor

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physics. Editors P.

Mohanakrishnan, Om Pal Singh,
and Kannan Umasankari and a
team of expert contributors
combine their knowledge to
guide the reader through a
toolkit of methods for solving

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transport equations,
understanding the physics of
reactor design principles, and
developing reactor safety
strategies. The inclusion of
experimental and operational
reactor physics makes this a

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unique reference for those working and researching nuclear power and the fuel cycle in existing power generation sites and experimental facilities. The book also includes radiation physics, shielding techniques

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and an analysis of shield design, neutron monitoring and core operations. Those involved in the development and operation of nuclear reactors and the fuel cycle will gain a thorough understanding of all elements of

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nuclear reactor physics, thus enabling them to apply the analysis and solution methods provided to their own work and research. This book looks to future reactors in development and analyzes their status and

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challenges before providing possible worked-through solutions. Cover image: Kaiga Atomic Power Station Units 1 – 4, Karnataka, India. In 2018, Unit 1 of the Kaiga Station surpassed the world record of

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continuous operation, at 962 days. Image courtesy of DAE, India. Includes methods for solving neutron transport problems, nuclear cross-section data and solutions of transport theory Dedicates a chapter to

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reactor safety that covers
mitigation, probabilistic safety
assessment and uncertainty
analysis Covers experimental
and operational physics with
details on noise analysis and
failed fuel detection

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Power

The Effects of Nuclear Weapons

Nuclear Safety

A Chernobyl Guide for the
Future

Hendee's Radiation Therapy

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Introduction and History, From
the Quantum to Quarks

Ocean affairs are deeply woven into
the history of the nuclear age. Ranging
from wastes to security, this study
frames the complex relationships

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between the oceans and the nuclear age and illuminates patterns of impact and response in ocean law.

This book is aimed at scientists and engineers wanting to use radioisotopes and the emitted ionising radiations competently but without seeking expertise. It describes decay

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and stability criteria, necessary precautions to ensure radiation protection and the detection of alpha, beta and gamma rays including spectrometry. There are comments on calorimetry, liquid scintillation counting, how to use secondary standard instruments, high resolution

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detectors and how to calculate counting results estimating uncertainties and allowing for the statistics of radionuclide decays. The book's principal purpose is to encourage radionuclide applications which can be done safely, reliably and accurately. It describes industrial and

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scientific applications of alpha, beta, and gamma rays, neutrons and high energy radiations. This book will be of particular interest to scientists and technologists, teachers and students, helping them to work with radioisotopes safely, efficiently and reliably.

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A recipient of the PROSE 2017 Honorable Mention in Chemistry & Physics, *Radioactivity: Introduction and History, From the Quantum to Quarks, Second Edition* provides a greatly expanded overview of radioactivity from natural and artificial sources on earth, radiation of cosmic

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origins, and an introduction to the atom and its nucleus. The book also includes historical accounts of the lives, works, and major achievements of many famous pioneers and Nobel Laureates from 1895 to the present. These leaders in the field have contributed to our knowledge of the

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science of the atom, its nucleus, nuclear decay, and subatomic particles that are part of our current knowledge of the structure of matter, including the role of quarks, leptons, and the bosons (force carriers). Users will find a completely revised and greatly expanded text that includes all

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new material that further describes the significant historical events on the topic dating from the 1950s to the present. Provides a detailed account of nuclear radiation – its origin and properties, the atom, its nucleus, and subatomic particles including quarks, leptons, and force carriers (bosons)

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Includes fascinating biographies of the pioneers in the field, including captivating anecdotes and insights
Presents meticulous accounts of experiments and calculations used by pioneers to confirm their findings
Assesses the impact of associations derived from historical and cultural

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sources on perceptions about nuclear energy

Radioactivity

Handbook of Radioactivity Analysis

An Introduction to Nuclear Waste

Immobilisation

Understanding Chemistry

Radioactivity and Radiation

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Radioactivity: Introduction and History

Nuclear Safety provides the methods and data needed to evaluate and manage the safety of nuclear facilities and related processes using

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risk-based safety analysis, and provides readers with the techniques to assess the consequences of radioactive releases. The book covers relevant

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international and regional safety criteria (US, IAEA, EUR, PUN, URD, INI). The contents deal with each of the critical components of a nuclear plant, and provide an analysis of the

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risks arising from a variety of sources, including earthquakes, tornadoes, external impact and human factors. It also deals with the safety of underground nuclear

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*testing and the handling
of radioactive waste.*

*Covers all plant
components and potential
sources of risk including
human, technical and
natural factors. Brings*

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*together information on
nuclear safety for which
the reader would
previously have to consult
many different and
expensive sources.
Provides international*

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*design and safety criteria
and an overview of
regulatory regimes.
This book lays the
foundations for you to
understand all that you
always wanted to know*

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about radioactivity. It begins by setting out essential information about the structure of matter, how radiation occurs and how it can be measured. It goes on to

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explore the substantial benefits of radioactivity through its many applications, and also the possible risks associated with its use. The field of radioactivity is explained

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in layman's terms, so that everybody who is interested can improve their understanding of issues such as nuclear power, radiation accidents, medical

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applications of radiation and radioactivity from the environment. Everything is radioactive. There is natural radioactivity in the homes that we live in, the food that we eat and

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*the air that we breath.
For over 100 years, people
have recognised the
potential for
radioactivity to help
solve problems and improve
our standard of living.*

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This has led to the creation of radioactivity levels in some places that are much higher than naturally-occurring background levels. Such high levels of radiation

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can be harmful to people and the environment, so there is a clear need to manage this potential harm and to make the risk worth the benefits mankind can achieve from radioactive

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Alpha-, Beta- and Gamma-Ray Spectroscopy Volume 1 offers a comprehensive account of radioactivity and related low-energy phenomena. It summarizes

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*progress in the field of
alpha-, beta- and gamma-
ray spectroscopy,
including the discovery of
the non-conservation of
parity, as well as new
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*emissions of gamma-
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