

Chapter 7 Ionic And Metallic Bonding Practice Problems Answers

The approach of this concise but comprehensive introduction, covering all major classes of materials, is right for not just materials science students and professionals, but also for those in engineering, physics and chemistry, or other related disciplines. The characteristics of all main classes of materials, metals, polymers and ceramics, are explained with reference to real-world examples. So each class of material is described, then its properties are explained, with illustrative examples from the leading edge of application. This edition contains new material on nanomaterials and nanostructures, and includes a study of degradation and corrosion, and a presentation of the main organic composite materials. Illustrative examples include carbon fibres, the silicon crystal, metallic glasses, and diamond films. Applications explored include ultra-light aircraft, contact lenses, dental materials, single crystal blades for gas turbines, use of lasers in the automotive industry, cables for cable cars, permanent magnets and molecular electronic devices. Covers latest materials including nanomaterials and nanostructures Real-world case studies bring the theory to life and illustrate the latest in good design All major classes of materials are covered in this concise yet comprehensive volume

The Spencer text is the only text that is built on independently researched pedagogy on the best way to teach General Chemistry. Chemistry: Structure and Dynamics, 5th Edition emphasises deep understanding rather than comprehensive coverage along with a focus on the development of inquiry and reasoning skills. While most mainstream General Chemistry texts offer a breadth of content coverage, the Spencer author team, in contrast, focuses on depth and student preparation for future studies. The fifth edition is revised in keeping with our commitment to the chemical education community and specifically the POGIL (Process Oriented Guided Inquiry Learning) Project. This text reflects two core principles, first that the concepts that are covered are fundamental building blocks for understanding chemistry and second, that the concepts should be perceived by the students as being directly applicable to their interests and careers. The authors further provide this "core" coverage using 1 of 3 models; data-driven, chemical theories and students understanding, which allows for a more concrete foundation on which students build conceptual understanding. Discover all of the fundamental topics of general chemistry in the latest edition of this brief, cost-effective, reader-oriented text. Masterton/Hurley's CHEMISTRY: PRINCIPLES AND REACTIONS, 6e, provides a clear, concise presentation based on the authors' more than 50 years of combined teaching experience. This edition takes you directly to the crux of concepts with simplicity and allows you to efficiently cover all topics found in the typical general chemistry book. New and proven concept-driven examples as well as examples that focus on molecular reasoning and understanding provide important practice. New Chemistry: Beyond the Classroom essays by guest authors demonstrate the relevance of the concepts you are learning and highlight some of the most up-to-date uses of chemistry. A strong, enhanced art program further assists you in visualizing chemical concepts. For the first time, this edition fully integrates OWL (Online Web-based Learning), the homework management system trusted by tens of thousands of students. Integrated end-of-chapter questions and Key Concepts correlate to OWL. An optional e-book of this edition is also available in OWL. To further assist in learning and depth of coverage, the book offers CengageNOW, a Web-based student self-tutorial program. In addition, Go Chemistry™ learning modules developed by award-winning chemists offer mini-lectures and learning tools available for video iPods, MP3 players, and iTunes or CengageNOW to accommodate students like you who are on the go. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

A practical introduction to ionic compounds for both mineralogists and chemists, this book bridges the two disciplines. It explains the fundamental principles of the structure and bonding in minerals, and emphasizes the relationship of structure at the atomic level to the symmetry and properties of crystals. This is a great reference for those interested in the chemical and crystallographic properties of minerals.

The complete guide to understanding and using lasers in material processing! Lasers are now an integral part of modern society, providing extraordinary opportunities for innovation in an ever-widening range of material processing and manufacturing applications. The study of laser material processing is a core element of many materials and manufacturing courses at undergraduate and postgraduate level. As a consequence, there is now a vast amount of research on the theory and application of lasers to be absorbed by students, industrial researchers, practising engineers and production managers. Written by an acknowledged expert in the field with over twenty years' experience in laser processing, John Ion distils cutting-edge information and research into a single key text. Essential for anyone studying or working with lasers, Laser Processing of Engineering Materials provides a clear explanation of the underlying principles, including physics, chemistry and materials science, along with a framework of available laser processes and their distinguishing features and variables. This book delivers the knowledge needed to understand and apply lasers to the processing of engineering materials, and is highly recommended as a valuable guide to this revolutionary manufacturing technology. The first single volume text that treats this core engineering subject in a systematic manner Covers the principles, practice and application of lasers in all contemporary industrial processes; packed with examples, materials data and analysis, and modelling techniques

Exceptions to the rule are always interesting, and the anomalies in the stress-strain curves of mild steel and in many other metals and alloys have excited the curiosity of engineers and scientists for well over a hundred years. Yet it is only during the last twenty years that significant theoretical advances have been made, and the aim of this book has been to examine these theories against the background of the considerable volume of experimental results published over the last few years, up to mid-1969. Hence this review volume has a two-fold aim; the first chapter attempts to review the general theories of yield point phenomena, using sufficient examples only to illustrate the theories. This chapter is intended to be complete in itself, and could be read by under graduates who wish to appraise rapidly the general

background to the problem. The remaining chapters deal, in turn, with the various alloys exhibiting yield point phenomena. Thus, chapter 2 on mild steel, is a more extensive study of quench and strain ageing, while Chapter 3 is on the refractory metals and discusses theories of the low-temperature strength. The next concerns hydrogen in meta-Is. Chapters 5 and 6 discuss the face-centred cubic alloys, particularly the cases of the unloading yield point and intermetallic compounds. Chapter 7 covers hexagonal and ionic structures. A brief final chapter considers the areas where further research may be fruitful.

The essential introduction to the understanding of the structure of inorganic solids and materials. This revised and updated 2nd Edition looks at new developments and research results within Structural Inorganic Chemistry in a number of ways, special attention is paid to crystalline solids, elucidation and description of the spatial order of atoms within a chemical compound. Structural principles of inorganic molecules and solids are described through traditional concepts, modern bond-theoretical theories, as well as taking symmetry as a leading principle.

X-ray absorption fine structure (XAFS) is a powerful technique in characterization of structures and electronic states of materials in many research fields including, e.g., catalysts, semiconductors, optical ingredients, magnetic materials, and surfaces. This characterization technique could be applied in a static or a dynamic state (in-situ condition). The XAFS can provide information that is not accessible by other techniques for characterization of materials, particularly catalysts and related surfaces. Furthermore, XAFS can provide a molecular-level approach to the study of reaction mechanisms for the understanding of catalysts and development of new catalysts. A number of synchrotron radiation facilities have been planned to be built in Asian countries in addition to the high-brilliant synchrotron radiation facilities under construction in the USA, Europe, and Japan. The applications of XAFS have now expanded to catalytic chemistry and engineering, surface science, organometallic chemistry, materials science, solid-state chemistry, geophysics, etc. This book caters to a wide range of researchers and students working in the domain or related topics.

The easy way to get a grip on inorganic chemistry Inorganic chemistry can be an intimidating subject, but it doesn't have to be! Whether you're currently enrolled in an inorganic chemistry class or you have a background in chemistry and want to expand your knowledge, Inorganic Chemistry For Dummies is the approachable, hands-on guide you can trust for fast, easy learning. Inorganic Chemistry For Dummies features a thorough introduction to the study of the synthesis and behavior of inorganic and organometallic compounds. In plain English, it explains the principles of inorganic chemistry and includes worked-out problems to enhance your understanding of the key theories and concepts of the field. Presents information in an effective and straightforward manner Covers topics you'll encounter in a typical inorganic chemistry course Provides plain-English explanations of complicated concepts If you're pursuing a career as a nurse, doctor, or engineer or a lifelong learner looking to make sense of this fascinating subject, Inorganic Chemistry For Dummies is the quick and painless way to master inorganic chemistry.

This introduction to mineralogy for undergraduate and graduate students in geology and materials science has been designed for a semester course. Covering all aspects of mineralogy in an integrated way, it links mineral properties with broader geological processes, and conveys their economic importance throughout the text. Handy reference tables and a glossary of terms make this study an indispensable guide for the next generation of mineralogy students.

House's Descriptive Inorganic Chemistry, Third Edition, provides thoroughly updated coverage of the synthesis, reactions, and properties of elements and inorganic compounds. Ideal for the one-semester (ACS-recommended) sophomore or junior level course in descriptive inorganic chemistry, this resource offers a readable and engaging survey of the broad spectrum of topics that deal with the preparation, properties, and use of inorganic materials. Using rich graphics to enhance content and maximize learning, the book covers the chemical behavior of the elements, acid-base chemistry, coordination chemistry, organometallic compounds, and numerous other topics to provide a coherent treatment of the field. The book pays special attention to key subjects such as chemical bonding and Buckminster Fullerenes, and includes new and expanded coverage of active areas of research, such as bioinorganic chemistry, green chemistry, redox chemistry, nanostructures, and more. Highlights the Earth's crust as the source of most inorganic compounds and explains the transformations of those compounds into useful products Provides a coherent treatment of the field, covering the chemical behavior of the elements, acid-base chemistry, coordination chemistry, and organometallic compounds Connects key topics to real world industrial applications, such as in the area of nanostructures Includes expanded coverage on bioinorganic chemistry, green chemistry, redox chemistry, superacids, catalysis, and other areas of recent development

Provides an introduction to the principles and procedures of chemistry, including atomic structure, the elements, compounds, the three states of matter, chemical reactions, and thermodynamics.

Thoroughly revised and updated, the third edition of this popular textbook continues to provide a comprehensive coverage of the main construction materials for undergraduate students of civil engineering and construction related courses. It creates an understanding of materials and how they perform through a knowledge of their chemical and physical

Filling a gap in the literature, Practical Engineering Failure Analysis vividly demonstrates the correct methodology to conduct successful failure analyses, as well as offering the background necessary for these investigations. This authoritative reference covers procedures to reduce the occurrence of component failures due to errors in material se

Edited and written by renowned experts in the field, this is the first book to reflect the state of the art of nanocatalysis in ionic liquids. Divided into two core areas, the first part of the book describes the different classes of metal nanoparticles as well as their synthesis in ionic liquids, while the second focuses on such emerging issues as the application of such systems to energy and biomass conversion.

Ceramic materials have proven increasingly important in industry and in the fields of electronics, communications, optics, transportation, medicine, energy conversion and pollution control, aerospace, construction, and recreation. Professionals in these fields often require an improved understanding of the specific ceramics materials they are using. Modern Ceramic Engineering, Third Edition helps provide this by introducing the interrelationships between the structure, properties, processing, design concepts, and applications of advanced ceramics. This student-friendly textbook effectively links fundamentals and fabrication requirements to a wide range of interesting engineering application examples. A follow-up to our best-selling second edition, the new edition now includes the latest and most important technological advances in the field. The author emphasizes how ceramics differ from metals and organics and encourages the application of this knowledge for optimal materials selection and design. New

topics discuss the definition of ceramics, the combinations of properties fulfilled by ceramics, the evolution of ceramics applications, and their importance in modern civilization. A new chapter provides a well-illustrated review of the latest applications using ceramics and discusses the design requirements that the ceramics must satisfy for each application. The book also updates its chapter on ceramic matrix composites and adds a new section on statistical process control to the chapter on quality assurance. Modern Ceramic Engineering, Third Edition offers a complete and authoritative introduction and reference to the definition, history, structure, processing, and design of ceramics for students and engineers using ceramics in a wide array of industries.

Publisher Description

Prentice Hall Chemistry PRENTICE HALL

Biomaterials: A Systems Approach to Engineering Concepts provides readers with a systems approach to biomaterials and materials engineering. By focusing on the mechanical needs of implants, disease states, and current clinical needs, readers are encouraged to design materials and systems targeted at specific conditions, and to identify the impact of their proposed solutions. This inventive text is a useful resource for researchers, students, and course providers of biomaterials and biomedical engineering. Provides a fully comprehensive treatment relating to the construction and use of materials in medicine Presents perspectives of disease states to encourage the design of materials and systems targeted at specific conditions Defines current issues experienced by clinics to enable optimized engineering solutions

Challenging the cherished notions of colloidal theory, Barry Ninham and Pierandrea Lo Nostro confront the scientific lore of molecular forces and colloidal science in an incisive and thought-provoking manner. The authors explain the development of these classical theories, discussing amongst other topics electrostatic forces in electrolytes, specific ion effects and hydrophobic interactions. Throughout the book they question assumptions, unearth flaws and present new results and ideas. From such analysis, a qualitative and predictive framework for the field emerges; the impact of this is discussed in the latter half of the book through force behaviour in self assembly. Here, numerous diverse phenomena are explained, from surfactants to biological applications, all richly illustrated with pertinent, intellectually stimulating examples. With mathematics kept to a minimum, and historic facts and anecdotes woven through the text, this is a highly engaging and readable treatment for students and researchers in science and engineering.

Metallic nanoparticles display fascinating properties that are quite different from those of individual atoms, surfaces or bulk materials. They are a focus of interest for fundamental science and, because of their huge potential in nanotechnology, they are the subject of intense research effort in a range of disciplines. Applications, or potential applications, are diverse and interdisciplinary. They include, for example, use in biochemistry, in catalysis and as chemical and biological sensors, as systems for nanoelectronics and nanostructured magnetism (e.g. data storage devices), where the drive for further miniaturization provides tremendous technological challenges and, in medicine, there is interest in their potential as agents for drug delivery. The book describes the structure of metallic nanoparticles, the experimental and theoretical techniques by which this is determined, and the models employed to facilitate understanding. The various methods for the production of nanoparticles are outlined. It surveys the properties of clusters and the methods of characterisation, such as photoionization, optical spectroscopy, chemical reactivity and magnetic behaviour, and discusses element-specific information that can be extracted by synchrotron-based techniques such as EXAFS, XMCD and XMLD. The properties of clusters can vary depending on whether they are free, deposited on a surface or embedded in a matrix of another material; these issues are explored. Clusters on a surface can be formed by the diffusion and aggregation of atoms; ways of modelling these processes are described. Finally we look at nanotechnology and examine the science behind the potential of metallic nanoparticles in chemical synthesis, catalysis, the magnetic separation of biomolecules, the detection of DNA, the controlled release of molecules and their relevance to data storage. The book addresses a wide audience. There was a huge development of the subject beginning in the mid-1980s where researchers began to study the properties of free nanoparticle and models were developed to describe the observations. The newcomer is introduced to the established models and techniques of the field without the need to refer to other sources to make the material accessible. It then takes the reader through to the latest research and provides a comprehensive list of references for those who wish to pursue particular aspects in more detail. It will also be an invaluable handbook for the expert in a particular aspect of nanoscale research who wishes to acquire knowledge of other areas. The authors are specialists in different aspects of the subject with expertise in physics and chemistry, experimental techniques and computational modelling, and in interdisciplinary research. They have collaborated in research. They have also collaborated in writing this book, with the aim from the outset of making it a coherent whole rather than a series of independent loosely connected articles. * Appeals to a wide audience * Provides an introduction to established models and techniques in the field * Comprehensive list of references

The new Pearson Chemistry program combines our proven content with cutting-edge digital support to help students connect chemistry to their daily lives. With a fresh approach to problem-solving, a variety of hands-on learning opportunities, and more math support than ever before, Pearson Chemistry will ensure success in your chemistry classroom. Our program provides features and resources unique to Pearson--including the Understanding by Design Framework and powerful online resources to engage and motivate your students, while offering support for all types of learners in your classroom.

Modern ESCA: The Principles and Practice of X-Ray Photoelectron Spectroscopy is a unique text/reference that focuses on the branch of electron spectroscopy generally labeled as either Electron Spectroscopy for Chemical Analysis (ESCA) or X-ray Photoelectron Spectroscopy (XPS). The book emphasizes the use of core level and valence band binding energies, their shifts, and line widths. It describes the background, present status, and possible future uses of a number of recently developed branches of ESCA, including:

Many geochemists focus on natural systems with less emphasis on the human impact on those systems. Environmental chemists frequently approach their subject with less consideration of the historical record than geoscientists. The field of environmental geochemistry combines these approaches to address questions about the natural environment and anthropogenic effects on it. Eby provides students with a solid foundation in basic aqueous geochemistry before discussing the important role carbon compounds, isotopes, and minerals play in environmental issues. He then guides students through how these concepts apply to problems facing our atmosphere, continental lands, and oceans. Rather than broadly discussing a variety of environmental problems, the author focuses on principles throughout the text, leading students to understand processes and how knowledge of those processes can be applied to environmental problem solving. A wide variety of case studies and quantitative problems

accompany each chapter, giving each instructor the flexibility to tailor the material to his/her course. Many problems have no single correct answer, illustrating the analytical nature of solving real-world environmental problems.

This proven book introduces the basics of coordination, solid-state, and descriptive main-group chemistry in a uniquely accessible manner, featuring a less is more approach. Consistent with the less is more philosophy, the book does not review topics covered in general chemistry, but rather moves directly into topics central to inorganic chemistry. Written in a conversational prose style that is enjoyable and easy to understand, this book presents not only the basic theories and methods of inorganic chemistry (in three self-standing sections), but also a great deal of the history and applications of the discipline. This edition features new art, more diversified applications, and a new icon system. And to better help readers understand how the seemingly disparate topics of the periodical table connect, the book offers revised coverage of the author's Network of Interconnected Ideas on new full color endpapers, as well as on a convenient tear-out card. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Environmental Materials and Waste: Resource Recovery and Pollution Prevention contains the latest information on environmental sustainability as a wide variety of natural resources are increasingly being exploited to meet the demands of a worldwide growing population and economy. These raw materials cannot, or can only partially, be substituted by renewable resources within the next few decades. As such, the efficient recovery and processing of mineral and energy resources, as well as recycling such resources, is now of significant importance. The book takes a multidisciplinary approach to fully realize the number of by-products which can be remanufactured, providing the foundation needed across disciplines to tackle this issue. As awareness and opportunities to recover valuable resources from process and bleed streams is gaining interest, sustainable recovery of environmental materials, including wastewater, offers tremendous opportunity to combine profitable and sustainable production. Presents a state-of-the-art guide to environmental sustainability Provides an overview of the field highlighting recent and emerging issues in environmental resource recovery that cover a wide array of by-products for remanufacture potential Details a multidisciplinary approach to fully realize the number of by-products which can be remanufactured, providing the foundation needed across disciplines to tackle these global issues

Test prep for the AP Chemistry exam, with 100% brand-new content that reflects recent exam changes Addressing the major overhaul that the College Board recently made to the AP Chemistry exam, this AP Chemistry test-prep guide includes completely brand-new content tailored to the exam, administered every May. Features of the guide include review sections of the six "big ideas" that the new exam focuses on: Fundamental building blocks Molecules and interactions Chemical reactions Reaction rates Thermodynamics Chemical equilibrium Every section includes review questions and answers. Also included in the guide are two full-length practice tests as well as a math review section and sixteen discrete laboratory exercises to prepare AP Chemistry students for the required laboratory experiments section on the exam.

Authored by Paul Hewitt, the pioneer of the enormously successful "concepts before computation" approach, Conceptual Physics boosts student success by first building a solid conceptual understanding of physics. The Three Step Learning Approach makes physics accessible to today's students. Exploration - Ignite interest with meaningful examples and hands-on activities. Concept Development - Expand understanding with engaging narrative and visuals, multimedia presentations, and a wide range of concept-development questions and exercises. Application - Reinforce and apply key concepts with hands-on laboratory work, critical thinking, and problem solving.

"A pedagogical gem.... Professor Readey replaces 'black-box' explanations with detailed, insightful derivations. A wealth of practical application examples and exercise problems complement the exhaustive coverage of kinetics for all material classes." –Prof. Rainer Hebert, University of Connecticut "Prof. Readey gives a grand tour of the kinetics of materials suitable for experimentalists and modellers.... In an easy-to-read and entertaining style, this book leads the reader to fundamental, model-based understanding of kinetic processes critical to development, fabrication and application of commercially-important soft (polymers, biomaterials), hard (ceramics, metals) and composite materials. It is a must-have for anyone who really wants to understand how to make materials and how they will behave in service."

--Prof. Bill Lee, Imperial College London, Fellow of the Royal Academy of Engineering "A much needed text filling the gap between an introductory course in materials science and advanced materials-specific kinetics courses. Ideal for the undergraduate interested in an in-depth study of kinetics in materials." –Prof. Mark E. Eberhart, Colorado School of Mines This book provides an in-depth introduction to the most important kinetic concepts in materials science, engineering, and processing. All types of materials are addressed, including metals, ceramics, polymers, electronic materials, biomaterials, and composites. The expert author with decades of teaching and practical experience gives a lively and accessible overview, explaining the principles that determine how long it takes to change material properties and make new and better materials. The chapters cover a broad range of topics extending from the heat treatment of steels, the processing of silicon integrated microchips, and the production of cement, to the movement of drugs through the human body. The author explicitly avoids "black box" equations, providing derivations with clear explanations.

Matches the specifications of the Awarding Bodies (AQA:NEAB / AEB, OCR and Edexcel). This accessible text includes frequent hints, questions and examination questions, providing support and facilitating study at home. It features photographs and comprehensive illustrations with 3D chemical structures.

Chemistry is a conceptual subject and, in order to explain many of the concepts, teachers use models to describe the microscopic world and relate it to the macroscopic properties of matter. This can lead to problems, as a student's everyday experiences of the world and use of language can contradict the ideas put forward in chemical science. These titles have been designed to help tackle this issue of misconceptions. Part 1 deals with the theory, by including information on some of the key alternative conceptions that have been uncovered by research; ideas about a variety of teaching approaches that may prevent students acquiring some common alternative conceptions; and general ideas for assisting students with the development of appropriate scientific conceptions. Part 2 provides strategies for dealing with some of the misconceptions that students have, by including ready to use classroom resources including copies of probes that can be used to identify ideas held by students; some specific exercises aimed at challenging some of the alternative

ideas; and classroom activities that will help students to construct the chemical concepts required by the curriculum. Used together, these two books will provide a good theoretical underpinning of the fundamentals of chemistry. Trialled in schools throughout the UK, they are suitable for teaching ages 11-18.

MATERIALS FOR BIOMEDICAL ENGINEERING A comprehensive yet accessible introductory textbook designed for one-semester courses in biomaterials. Biomaterials are used throughout the biomedical industry in a range of applications, from cardiovascular devices and medical and dental implants to regenerative medicine, tissue engineering, drug delivery, and cancer treatment. *Materials for Biomedical Engineering: Fundamentals and Applications* provides an up-to-date introduction to biomaterials, their interaction with cells and tissues, and their use in both conventional and emerging areas of biomedicine. Requiring no previous background in the subject, this student-friendly textbook covers the basic concepts and principles of materials science, the classes of materials used as biomaterials, the degradation of biomaterials in the biological environment, biocompatibility phenomena, and the major applications of biomaterials in medicine and dentistry. Throughout the text, easy-to-digest chapters address key topics such as the atomic structure, bonding, and properties of biomaterials, natural and synthetic polymers, immune responses to biomaterials, implant-associated infections, biomaterials in hard and soft tissue repair, tissue engineering and drug delivery, and more. Offers accessible chapters with clear explanatory text, tables and figures, and high-quality illustrations. Describes how the fundamentals of biomaterials are applied in a variety of biomedical applications. Features a thorough overview of the history, properties, and applications of biomaterials. Includes numerous homework, review, and examination problems, full references, and further reading suggestions. *Materials for Biomedical Engineering: Fundamentals and Applications* is an excellent textbook for advanced undergraduate and graduate students in biomedical materials science courses, and a valuable resource for medical and dental students as well as students with science and engineering backgrounds with interest in biomaterials.

This exhaustive work in three volumes with featuring cross-reference system provides a thorough overview of ultra-high temperature materials – from elements and chemical compounds to alloys and composites. Topics included are physical (crystallographic, thermodynamic, thermo-physical, electrical, optical, physico-mechanical, nuclear) and chemical (solid-state diffusion, interaction with chemical elements and compounds, interaction with gases, vapours and aqueous solutions) properties of the individual physico-chemical phases and multi-phase materials with melting (or sublimation) points over or about 2500 °C. The first volume focuses on carbon (graphite/graphene) and refractory metals (W, Re, Os, Ta, Mo, Nb, Ir). The second and third volumes are dedicated solely to refractory (ceramic) compounds (oxides, nitrides, carbides, borides, silicides) and to the complex materials – refractory alloys, carbon and ceramic composites, respectively. It will be of interest to researchers, engineers, postgraduate, graduate and undergraduate students in various disciplines alike. The reader is provided with the full qualitative and quantitative assessment for the materials, which could be applied in various engineering devices and environmental conditions at ultra-high temperatures, on the basis of the latest updates in the field of physics, chemistry, materials science, nanotechnology and engineering. For lower-division courses with an equal balance of description and theory.

[Copyright: dbbdfcdd3b578fe5204b1d474a049ab5](https://www.stuvia.com/doc/1234567/9781107051400)