

### Polymer Chemistry – Exercises

1. Based on thermal properties, how many type of polymers? Provide example for each polymer type.
2. What is the difference between thermoplastic and thermoset polymers? Provide the structure of elastic polymers.
3. What kind of monomers that can be polymerized? Provide example for step-growth polymerization.
4. What are main kinds of polymerization methods? Provide an equation for polymerization of polystyrene.
5. What are the initiators in a polymerization? Provide an example of non-initiator polymerization.
6. Describe the difference of bulk and solution polymerization technique.
7. Describe the mechanism of polymerization of ethylene using azobisisobutyronitrile (AIBN) as initiators under high pressure. Explain why only low density polyethylene (LDPE) is obtained?
8. Explain the features of semicrystalline and amorphous polymers. With a suitable diagram, explain  $T_g$ ,  $T_m$  and  $T_c$ . (2 points)
9. Describe the change of behaviors of polymers below and above  $T_g$ . (2 points)
10. Consider the following facts: Nylon 6 is crystalline, polybutadiene is amorphous and polyvinyl alcohol is crystalline. With the help of structures, explain the reasons for these facts. (2 points)
11. Describe the difference of monomer conversion – polymer chain length diagrams of chain polymerization and step-growth polymerization. Predict the diagram of controlled living polymerization.
12. What is the crystallinity of polymers? How do crystallinity affect to the properties of polymers? Describe the factors affected to the change of crystallinity of polymer.
13. Describe the difference of emulsion polymerization and mini-emulsion polymerization. Describe the mechanism of emulsion polymerization process.
14. How many pathways to prepare a graft copolymer? What are they? Give a brief description of them.
15. Why were different initiators used in the suspension and emulsion polymerization?
16. Provide 03 monomers to obtain the following polymer.



# Polymer Chemistry Exercises

**Charles E. Carraher Jr.**



## **Polymer Chemistry Exercises:**

Introduction to Polymer Chemistry Charles E. Carraher Jr., 2017-01-06 Introduction to Polymer Chemistry provides undergraduate students with a much needed well rounded presentation of the principles and applications of natural synthetic inorganic and organic polymers With an emphasis on the environment and green chemistry and materials this fourth edition continues to provide detailed coverage of natural and synthetic giant molecules inorganic and organic polymers elastomers adhesives coatings fibers plastics blends caulks composites and ceramics Building on undergraduate work in foundational courses the text fulfills the American Chemical Society Committee on Professional Training ACS CPT in depth course requirement

Introductory Polymer Chemistry Gauri Shankar Misra, 1993 Focuses on polymer chemistry This text is suitable for students who have studied in an Indian University for a BSc degree

**Carraher's Polymer Chemistry** Charles E. Carraher Jr., 2017-10-12 Carraher's Polymer Chemistry Tenth Edition integrates the core areas of polymer science Along with updating of each chapter newly added content reflects the growing applications in Biochemistry Biomaterials and Sustainable Industries Providing a user friendly approach to the world of polymeric materials the book allows students to integrate their chemical knowledge and establish a connection between fundamental and applied chemical information It contains all of the elements of an introductory text with synthesis property application and characterization Special sections in each chapter contain definitions learning objectives questions case studies and additional reading

**Seymour/Carraher's Polymer Chemistry** Charles E. Carraher Jr., 2003-04-30 This revolutionary and best selling resource contains more than 200 pages of additional information and expanded discussions on zeolites bitumen conducting polymers polymerization reactors dendrites self assembling nanomaterials atomic force microscopy and polymer processing This exceptional text offers extensive listings of laboratory exercises and demonstrations web resources and new applications for in depth analysis of synthetic natural organometallic and inorganic polymers Special sections discuss human genome and protonics recycling codes and solid waste optical fibers self assembly combinatorial chemistry and smart and conductive materials

Introduction to Polymer Chemistry Mr. Rohit Manglik, 2024-01-09 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

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**Carraher's Polymer Chemistry, Ninth Edition** Charles E. Carraher Jr., 2016-04-19 Most of the advancements in communication computers medicine and air and water purity are linked to macromolecules and a fundamental understanding of the principles that govern their behavior These fundamentals are explored in Carraher's Polymer Chemistry Ninth Edition Continuing the tradition of previous volumes the latest edition provides a well rounded presentation of the principles and applications of polymers With an emphasis on the environment and green chemistry and materials this edition offers detailed coverage of natural and synthetic giant molecules inorganic and organic polymers biomacromolecules elastomers adhesives coatings fibers plastics blends caulks composites and ceramics Using simple fundamentals this book demonstrates how the basic principles of one polymer group can be applied to all of the other groups It covers reactivities synthesis and polymerization reactions techniques for characterization and analysis energy absorption and thermal conductivity physical and optical properties and practical applications This edition includes updated techniques new sections on a number of copolymers expanded emphasis on nanotechnology and nanomaterials and increased coverage of topics including carbon nanotubes tapes and glues photochemistry and more With topics presented so students can understand polymer science even if certain parts of the text are skipped this book is suitable as an undergraduate as well as an introductory graduate level text The author begins most chapters with theory followed by application and generally addresses the most critical topics first He provides all of the elements of an introductory text covering synthesis properties applications and characterization This user friendly book also contains definitions learning objectives questions and additional reading in each chapter

**Advanced Polymer Chemistry** Manas Chanda, 2000 This volume employs a practical problem solving approach to understanding the detailed chemistry kinetics and mechanisms of polymer synthesis It provides a comprehensive analysis of the methods of synthesis and techniques of characterization unique to polymers

**Polymer Chemistry** Sebastian Koltzenburg, Michael Maskos, Oskar Nuyken, 2017-12-11 This comprehensive textbook describes the synthesis characterization and technical and engineering applications of polymers Offering a broad and balanced introduction to the basic concepts of macromolecular chemistry and to the synthesis and physical chemistry of polymers it is the ideal text for graduate students and advanced Masters students starting out in polymer science Building on the basic principles of organic chemistry and thermodynamics it

provides an easily understandable and highly accessible introduction to the topic Step by step readers will obtain a detailed and well founded understanding of this vibrant and increasingly important subject area at the intersection between chemistry physics engineering and the life sciences Following an approach different from many other textbooks in the field the authors with their varying backgrounds both from academia and industry offer a new perspective Starting with a clear and didactic introduction the book discusses basic terms and sizes and shapes of polymers and macromolecules There then follow chapters dedicated to polymers in solutions molar mass determination and polymers in the solid state incl partially crystalline or amorphous polymers as well as their application as engineering materials Based on this information the authors explain the most important polymerization methods and techniques Often neglected in other textbooks there are chapters on technical polymers functional polymers elastomers and liquid crystalline polymers as well as polymers and the environment An overview of current trends serves to generate further interest in present and future developments in the field This book is the English translation of the successful German textbook Polymere which was awarded the Chemical Industry in Germany s 2015 literature Prize Literaturpreis des Fonds der Chemischen Industrie for its innovative novel approach and its good accessibility and readability while at the same time providing comprehensive coverage of the field of polymer science

Introduction to Polymer Chemistry Judit E. Puskas, Ph.D,2013-11-18 Fundamental concepts and reactions explained through polymers from plants and animals Macromolecular structures introduced via biological polymers Includes a course syllabus study questions and exercises Extensive lab guidance and protocols for DNA isolation amplification using PCR Full color figures shown throughout the text This book connects modern synthetic polymer chemistry to its roots by exploring the chemistry of natural polymers and self assembled macromolecular structures Designed to introduce students to the basics of polymer science the text investigates intermolecular forces functional groups and key reactions by means of polymers found in and produced by living plants and animals including proteins rubber DNA fibers lignin carbohydrates and many others The author explains how varied natural polymeric systems illustrate a wide array of fundamental polymer concepts Key analogies are demonstrated between mechanisms in biological and synthetic polymerization and the text uses growth DNA replication self assembly and other biological processes to assist the student in mastering the terminology and molecular level mechanisms of polymer chemistry To guide both instructors and students the book includes the outline of a one semester course syllabus end of chapter questions as well as detailed instructions for setting up multiple labs dealing with gene isolation and amplification using polymerase chain reaction techniques PCR Each chapter also offers exercises based on real world examples

**Inorganic and Organometallic Polymers** Ronald D. Archer,2004-03-24 A balanced and concise coverage of inorganic polymers Inorganic polymers contain elements other than carbon as part of their principal backbone structure and are known to exhibit a wide range of composition and structure Emphasizing physical properties chemical synthesis and characterization of inorganic polymers Inorganic and Organometallic Polymers presents valuable and

informative coverage of the field With numerous examples of real world practical applications and end of chapter exercises Inorganic and Organometallic Polymers is suitable for use as a text in special topics in organic and polymer chemistry courses The book features useful sections on Classification schemes for inorganic polymers Synthesis of inorganic polymers including step growth syntheses chain polymerizations ring opening polymerizations and reductive coupling reactions Practical inorganic polymer chemistry topics such as polymer elastomers dental and medical polymers lubricants lithographic resists pre ceramics and more Inorganic and Organometallic Polymers is a valuable one volume introduction for professional and student inorganic chemists polymer chemists and materials scientists     Handbook of Pulping and Papermaking

Christopher J. Biermann,1996-08-01 In its Second Edition Handbook of Pulping and Papermaking is a comprehensive reference for industry and academia The book offers a concise yet thorough introduction to the process of papermaking from the production of wood chips to the final testing and use of the paper product The author has updated the extensive bibliography providing the reader with easy access to the pulp and paper literature The book emphasizes principles and concepts behind papermaking detailing both the physical and chemical processes A comprehensive introduction to the physical and chemical processes in pulping and papermaking Contains an extensive annotated bibliography Includes 12 pages of color plates     **Polymers** Adisa Azapagic,Alan Emsley,Ian Hamerton,2007-12-10 Recycling von Kunststoffen

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*Seymour/Carraher's Polymer Chemistry* Raymond Benedict Seymour,Charles E. Carraher Jr.,Charles E. Carraher,2000-03-15 An introduction to the synthetic natural organometallic and inorganic polymers integrating scientific principles with modern applications This fifth edition is based on the American Chemical Society s Committee on Professional Training guidelines with an enhanced section on biologically essential macromolecules and the biological flow of information An Exam Question booklet is available to instructors     Cellular Polymers III ,1995     *Seymour/Carraher's Polymer Chemistry, Seventh Edition* Charles E. Carraher Jr.,Charles E. Carraher,Raymond Benedict Seymour,2008 Updated to reflect a growing focus on green chemistry in the scientific community and in compliance with the American Chemical Societye tm s Committee on Professional Training guidelines Carrahere tm s Polymer Chemistry Eighth Edition integrates the core areas that contribute to the growth of polymer science It supplies the basic understanding of polymers essential to the training of science biomedical and engineering students New in the Eighth Edition Updating of analytical physical and special characterization techniques Increased emphasis on carbon nanotubes tapes and glues butyl rubber polystyrene polypropylene polyethylene poly ethylene glycols shear thickening fluids photo chemistry and photophysics dental materials

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**Green Organic Chemistry and its Interdisciplinary Applications** Vera M. Kolb, 2017-04-21 Green Organic Chemistry and Its Interdisciplinary Applications covers key developments in green chemistry and demonstrates to students that the developments were most often the result of innovative thinking Using a set of selected experiments all of which have been performed in the laboratory with undergraduate students it demonstrates how to optimize and develop green experiments The book dedicates each chapter to individual applications such as Engineering The chemical industry The pharmaceutical industry Analytical chemistry Environmental chemistry Each chapter also poses questions at the end with the answers included By focusing on both the interdisciplinary applications of green chemistry and the innovative thinking that has produced new developments in the field this book manages to present two key messages in a manner where they reinforce each other It provides a single and concise reference for chemists instructors and students for learning about green organic chemistry and its great and ever expanding number of applications



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