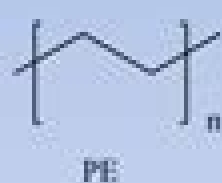


# Thermal Degradation

Depending upon the presence of oxygen, temperature and structure of polymer, degradation and/or oxidation reactions will occur.

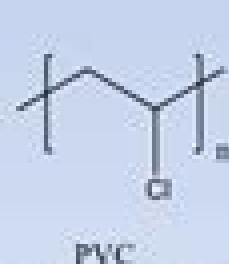
Theoretical point of view most commercial polymer systems should be relatively stable above their melting point in the absence of oxygen.

It is interesting to note that saturated hydrocarbons are much more stable than polyethylene (PE) in the absence of oxygen as are chloroalkanes when compared with PVC.



$$T_{\text{deg PE}} < T_{\text{deg Butadecane}}$$

or



$$T_{\text{deg PVC}} < T_{\text{deg 2,4,6-trichloroheptane}}$$

In some cases this temperature difference may be as high as 200°C. There are mainly two reasons for this difference in behavior;

- The first of which is simply that polymers by virtue of long chain nature are able to breakdown into smaller molecular fragments i.e. monomer formation via unzipping reactions

# Elements Of Polymer Degradation

**Charles E. Carraher Jr.**



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*Elements of Polymer Degradation* Leo Reich, Salvatore S. Stivala, 1971      **Elements of Polymer Degradation [by] Leo Reich [and] Salvatore S. Stivala** Leo Reich, 1971      **Chemical Physics of Polymer Degradation And Stabilization** N. Nikolai Markovich Emanuel', Anatoliï Leonidovich Buchachenko, 1987-06      Polymer Degradation W. Schnabel, 1981-12-31

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Materials Degradation and Its Control by Surface Engineering Andrew W. Batchelor, Loh Nee Lam, Margam Chandrasekaran, 2011 This book provides a general holistic view of materials degradation without undue emphasis on aqueous corrosion with the neglect of other important topics such as liquid metal corrosion Discussion of materials degradation is balanced by detailed description and evaluation of surface engineering as a means of managing materials degradation Thus the trainee engineer is presented with a comprehensive view of the problem rather than just a part of the problem The control or management of materials degradation is not only discussed in scientific terms but the economics or financial aspects of materials degradation and surface engineering is also discussed in detail with the help of analytical models      *Handbook of Biodegradable Polymers* Catia Bastioli, 2020-03-09 This handbook covers characteristics processability and application areas of biodegradable polymers with key polymer family groups discussed It explores the role

of biodegradable polymers in different waste management practices including anaerobic digestion and considers topics such as the different types of biorefineries for renewable monomers used in producing the building blocks for biodegradable polymers

*Crosslinking and Scission in Polymers* O. Güven, 2012-12-06

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### **Macromolecules Containing Metal and Metal-Like Elements,**

**Volume 10** Alaa S. Abd-El-Aziz, Charles E. Carraher, Jr., Pierre D. Harvey, Charles U. Pittman, Jr., Martel Zeldin, 2010-06-22

Metal and metalloid containing macromolecules are defined as large molecules i.e. polymers DNA proteins that contain a metal or metalloid group affiliated with the molecule This volume describes what is possible with metal containing polymers where the metal is an essential ingredient in obtaining desired optical and electronic properties Covering applications in nonlinear optical materials solar cells light emitting diodes photovoltaic cells field effect transistors chemosensing devices and biosensing devices this indispensable guide focuses on the photochemistry and photophysics of metal containing polymers with chapters by leading contributors to the core advances in this field

**Speciality Polymers / Polymer Physics**, 2022-01-19 No detailed description available for Speciality Polymers Polymer Physics

**Macromolecules** H.G. Elias, 2013-11-11 The second edition of this textbook is identical with its fourth German edition and it thus has the same goals precise definition of basic phenomena a broad survey of the whole field integrated representation of chemistry physics and technology and a balanced treatment of facts and comprehension The book thus intends to bridge the gap between the often oversimplified introductory textbooks and the highly specialized texts and monographs that cover only parts of macromolecular science The text intends to survey the whole field of macromolecular science Its organization results from the following considerations The chemical structure of macromolecular compounds should be independent of the method of synthesis at least in the ideal case Part I is thus concerned with the chemical and physical structure of polymers Properties

depend on structure Solution properties are thus discussed in Part II solid state properties in Part III There are other reasons for discussing properties before synthesis For example it is difficult to understand equilibrium polymerization without knowledge of solution thermodynamics the gel effect without knowledge of the glass transition temperature etc Part IV treats the principles of macromolecular syntheses and reactions *Materials for Sustainable Environmental, Energy, and*

*Bioresource Applications* Phuong Nguyen-Tri, 2024-08-08 This proceedings book showcases the latest research and developments in materials sciences and their applications for solving environmental and energy related challenges The book features insightful contributions from leading researchers academics professionals and students in the field who share their expertise experiences and perspectives on the key issues and innovations in materials sciences and engineering The book is helpful to those interested in environmental sustainability energy efficiency or bioresource utilization Introduction to

Polymer Chemistry Charles E. Carraher Jr., 2012-12-17 Continuing the tradition of its previous editions the third edition of *Introduction to Polymer Chemistry* provides a 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 third 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 the 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 addresses environmental concerns and green polymeric materials including biodegradable polymers and microorganisms for synthesizing materials Case studies woven within the text illustrate various developments and the societal and scientific contexts in which these changes occurred Now including new material on environmental science *Introduction to Polymer Chemistry Third Edition* remains the premier book for understanding the behavior of polymers Building on undergraduate work in foundational courses the text fulfills the American Chemical Society Committee on Professional Training ACS CPT in depth course requirement

*Carraher's Polymer Chemistry, Ninth Edition* Charles E. Carraher Jr., 2013-09-05 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

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