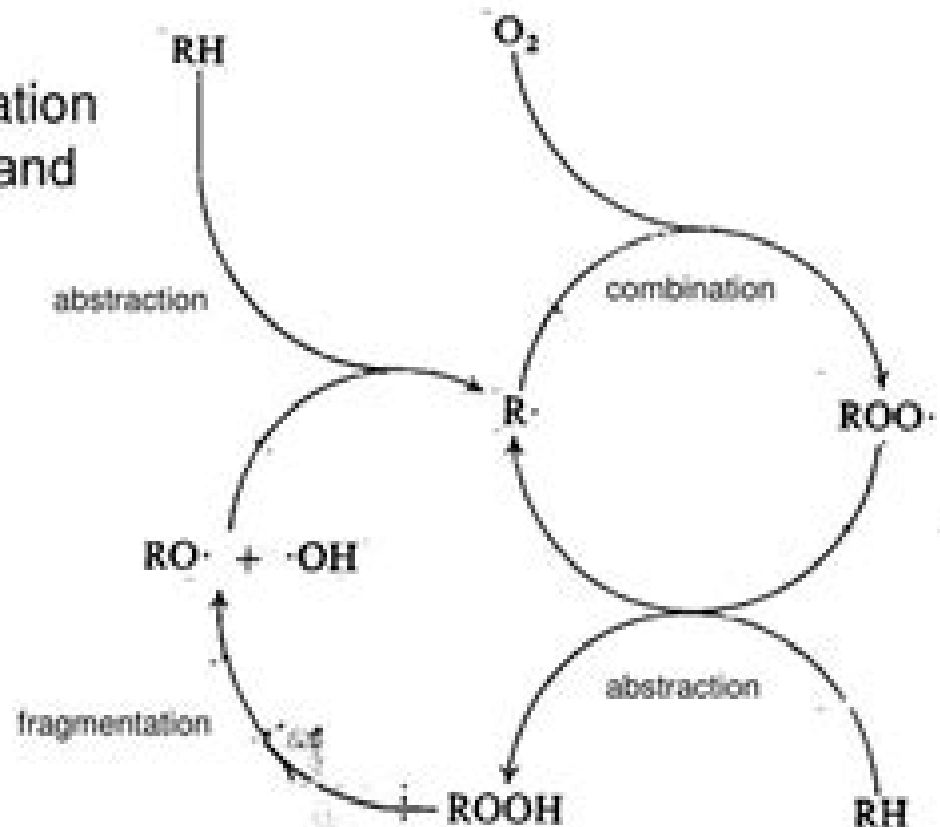


Oxidative Degradation

Polymer degradation is almost always faster in the presence of oxygen (air), due primarily to the autoaccelerating nature of reactions between oxygen and carbon centred radicals.

Interactions with oxygen lead to an increase in the concentration of polymer alkyl radicals ($R\cdot$), and therefore to higher levels of scission and crosslinking products.

Additionally, fragmentation reactions of oxygen-centred radicals ($RO\cdot$) yield new species (oxidation products), not found in polymers processed under air-free conditions.



Polymer Stabilization And Degradation

Niyazi, Savenkova



Polymer Stabilization And Degradation:

Fundamentals of Polymer Degradation and Stabilization N.S. Allen, M. Edge, 1992-10-31 During the past decade the field of polymer degradation and stabilization has become a subject of central importance in polymer science and technology This book provides a fundamental source of information designed for those with only a basic understanding of the background of the field Polymer Degradation and Stabilisation Norman Grassie, Gerald Scott, 1988-04-14 The study of

polymer degradation and stabilisation is of considerable practical importance as the industrial uses of polymeric materials continue to expand In this book the authors lucidly relate technological phenomena to the chemistry and physics of degradation and stabilisation processes Degradation embraces a variety of technologically important phenomena ranging from relatively low temperature processes such as weathering of plastics fatigue of rubbers through the processing of polymers in shearing mixers to very high temperature processes such as flammability and ablation All these technological phenomena have in common certain basic chemical reactions Thus weathering has its roots in photo oxidation fatigue and melt degradation in mechano oxidation and flammability and ablation in ablation in pyrolysis and vapour phase oxidation

Polymer Degradation and Stabilization W. L. Hawkins, 2012-12-06 The development of polymers as an important class of material was inhibited at the first by the premature failure of these versatile compounds in many applications The deterioration of important properties of both natural and synthetic polymers is the result of irreversible changes in composition and structure of polymers molecules As a result of these reactions mechanical electrical and or aesthetic properties are degraded beyond acceptable limits It is now generally recognized that stabilization against degradation is necessary if the useful life of polymers is to be extended sufficiently to meet design requirements for long term applications Polymers degrade by a wide variety of mechanisms several of which affect all polymers through to varying degree This monograph will concentrate on those degradation mechanisms which result from reactions of polymers with oxygen in its various forms and which are accelerated by heat and or radiation Those stabilization mechanisms are discussed which are based on an understanding of degradation reaction mechanisms that are reasonably well established The stabilization of polymers is still undergoing a transition from an art to a science as mechanisms of degradation become more fully developed A scientific approach to stabilization can only be approached when there is an understanding of the reactions that lead to degradation Stabilization against biodegradation and burning will not be discussed since there is not a clear understanding of how polymers degrade under these conditions *Polymer Degradation and Stabilization* W. Lincoln Hawkins, 1984

Handbook of Polymer Degradation S. Halim Hamid, Mohamed B. Amin, Ali G. Maadhah, 1992 This useful reference provides up to date coverage from both the engineering and scientific viewpoints of the most recent findings in the expanding field of polymer degradation and stabilization including areas in which polymers have only recently been used and detailed information has not previously been available as advanced material for more in depth study Handbook of Polymer

Degradation introduces new data on the effects of increased UV radiation on polymers and discusses how to decrease those effects considers artificially accelerated weathering and its relationship with natural weather examines weathering degradation of polyethylene with the relevant experimental results emphasizes the environmental aspects and waste management of polymers and combines insights on the environmental toxicology of plastics with a survey of current legislative issues different parts of the world Handbook of Polymer Degradation is an essential reference for chemical polymer environmental pollution control mechanical and materials scientists and engineers chemists environmental regulators and policy makers and upper level undergraduate and graduate students in these disciplines *Stabilization and Degradation of Polymers* David L. Allara, W. Lincoln Hawkins, 1978 **Polymer Analysis, Degradation, and Stabilization** Gennadii Efremovich Zaikov, Alfonso Jiménez, 2005 Polymer Analysis Degradation Stabilization *Stabilization of Polymeric Materials* Hans Zweifel, 2012-12-06 Plastics are used worldwide in everyday life e g as food packaging electronics construction automotive parts and household appliances To produce these products with the desired service lifetimes the use of suitable stabilizers is necessary This book provides a concise and comprehensive overview of the basic mechanisms of plastic degradation processes caused by heat and light At its core is a detailed description of the stabilization of different polymers including an explanation of stabilization mechanisms and the influence of commonly used additives such as fillers flame retardants and pigments on the stability of plastic Every polymer scientist material technologist or application engineer dealing with the design of the properties of plastics will benefit from this new overview **Polymer Stabilization and Degradation** Peter P. Klemchuk, 1985 *Handbook of Polymer Degradation* S. Halim Hamid, 2000-06-30 Covers recent advances in polymer degradation and stabilization Focuses on the basics of photo and bio degradability Delineates special and general environmental parameters such as solar irradiation temperature and agrochemical exposure Surveys plastic waste disposal strategies such as recycling incineration chemical recovery by pyrolysis and source reduction **Polymer Degradation and Stabilization** W L Hawkins, H J Harwood, 1983-12-01 *Degradation and Stabilization of Polymers* Hans Helmut Gunter Jellinek, 1983 Polymer Stabilization and Degradation Peter P. Klemchuk, 1985 Degradation and Stabilisation of Polymers G. Geuskens, 1975 *Photodegradation and Light Stabilization of Heterochain Polymers* Niyazi, Savenkova, 2006-11-14 Photodegradation and light stabilization are very important aspects of polymer aging Polymer degradation includes different types of processes thermodegradation oxidation acting of ozone photodegradation radiation hydrolysis mechanical degradation and biodegradation It is very important to know the mechanism of polymer degradation in orde Mechanisms of Polymer Degradation and Stabilisation G. Scott, 2011-10-06 The purpose of this publication is two fold In the first place it is intended to review progress in the development of practical stabilising systems for a wide range of polymers and applications A complemen tary and ultimately more important objective is to accommodate these practical developments within the framework of antioxidant theory since there can be little question that further major advances in the

practice of stabilisation technology will only be possible on a firm mechanistic foundation With the continual increase in the number of commercial anti oxidants and stabilisers often functioning by mechanisms not even considered ten years ago there is a need for a general theory which will allow the potential user to predict the performance of a particular antioxidant structure under specific practical conditions Any such predictive tool must involve a simplified kinetic approach to inhibited oxidation and in Chapter 1 Denisov outlines a possible mechanistic approach with the potential to predict the most useful antioxidant to use and the limits of its usefulness In Chapter 2 Schwetlick reviews the current state of knowledge on the antioxidant mechanisms of the phosphite esters with particular emphasis on their catalytic peroxidolytic activity Dithiophosphate v vi PREFACE derivatives show a similar behaviour but for quite different reasons and in Chapter 3 Al Malaika reviews information available from analytical studies particularly using ^{31}P NMR spectroscopy to elucidate the complex chemistry that leads to the formation of the antioxidant active agents

Photodegradation and Light

Stabilization of Heterochain Polymers Niyazi, Savenkova, 2006-11-14 Photodegradation and light stabilization are very important aspects of polymer aging Polymer degradation includes different types of processes thermodegradation oxidation acting of ozone photodegradation radiation hydrolysis mechanical degradation and biodegradation It is very important to know the mechanism of polymer degradation in order to select stabilizers against the degradation This volume presents the analysis of achievements in the field of photodegradation of polymers It includes first of all data of Russian investigators who have decisively contributed in the development of this field of knowledge the schools headed by academicians V V Korshak N M Emanuel N S Enikolopov A A Berlin and many others Aspects of Degradation and Stabilization of Polymers Hans Helmut Gunter Jellinek, 1978 *Polymer degradation and stabilization* Norman Grassie, Gerald Scott, 1988

Thermal

Stability of Polymers T. R Crompton, 2012-05-08 In recent years numerous research papers have been published on the changes in chemical structure and in physical properties of polymers when they are exposed to heat over a range of temperatures For example these changes can occur at any time during the injection moulding of the plastic in the subsequent processing and in its end use application when exposed to elevated temperatures Thermal stability is a very important parameter which must be taken into account when selecting polymers whether for their use as constructional or engineering applications or in the packaging of food at high temperatures The mechanisms by which such changes occur are many and it is important to know what these are and to be able to measure the rate of change of polymer structure and its dependence on temperature and time Development of an understanding of the mechanisms of thermal degradation will help the chemist to develop materials with better thermal stability This is particularly important in newer developments in engineering and aerospace This book reviews in nine chapters the measurement of these properties in the main types of polymers in use today Numerous techniques are discussed ranging from thermogravimetric analysis differential scanning calorimetry infrared and nuclear magnetic resonance based methods to pyrolytic techniques such as those based on pyrolysis gas chromatography and

mass spectrometry The book is aimed at those engaged in the manufacture of polymers and the development of end use applications It is essential that students of polymer science should have a thorough understanding of polymer stability and an additional aim of the book is to help in the development of such an interest

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