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Journal of Environmental Polymer Degradation **Handbook of Polymer Degradation** *Environmental Aspects of the Degradation and Stabilisation of Polymers* **Progress in Polymer Degradation and Stability Research Degradable Polymers** *Fibrous Polymeric Composites Handbook of Environmental Degradation of Materials* Photodegradation of Polymers **Freshwater Microplastics Environmental Degradation of Industrial Composites** Handbook of Polymer Degradation, Second Edition, **Fibrous Polymeric Composites** Handbook of Polymer Degradation, Second Edition, **Reviews of Environmental Contamination and Toxicology, Volume 227** Environmental Degradability of Polyurethanes **Eco-friendly and Smart Polymer Systems** *Environmental Degradation of Polymers and Polymer Composites* **Environmental Degradation of Industrial Composites** *Special Issue: Environmental Degradation of Polymers and Polymer Composites* **Thermoplastic Elastomers Environmental Risk of Polymers and Their Degradation Products Hazardous Chemicals Associated with Plastics in the Marine Environment** Marine Anthropogenic Litter **Environmental Fate of Fluorotelomer-based Acrylate Polymers** *Polymers and the Environment* **Biodegradability of Conventional Plastics Long-Term Properties of Polyolefins Polymers and the Environment** *Polymer Degradation and Stabilization Plastics and the Environment Polymers* **Recycled Polymers Green Composites** *Polymer Photodegradation Plastics in the Environment* **A Handbook of Applied Biopolymer Technology** *New Polymer Nanocomposites for Environmental Remediation* **Polymers** Failure of Plastics and Rubber Products Biodegradable Polymers in the Circular Plastics Economy

* Timely information on the environmental impact of polymer recycling. * Ample sample questions and answers in chapters. * Provides material on the economics and legislation of recycling, and on LCA. * Examines the advantages and disadvantages of polymer recycling. Biodegradability of Conventional Plastics: Opportunities, Challenges, and Misconceptions brings together innovative research on the biodegradability of conventional plastics, providing an extensive overview of approaches and strategies that may be implemented, while also highlighting other methods for alleviating the eventual environmental impact of plastics. The book begins by providing a lifecycle assessment of plastics, the environmental impact of plastic waste, and the factors that affect the biodegradability of plastics. The different categories and terminologies surrounding bio-based plastics and biodegradable plastics are then defined and explained in detail, as are the issues surrounding bioplastics. Other sections discuss biodegradability, approaches for enhanced biodegradability of various major types of plastics, including polyolefins, polyethylene terephthalate (PET), polystyrene, poly(vinyl chloride), automotive plastics and composites, and agricultural plastic waste. The final part of the book focuses on further techniques and emerging areas, including the utilization of chemical additives, nanomaterials, the role of microbes in terms of microbial degradation and microbial attaching, revalorization of plastic waste through industrial biotechnology, and future opportunities and challenges. Explains the fundamentals of plastic waste, lifecycle assessment and factors that influence the biodegradability of plastics Provides novel techniques for improved biodegradability, exploring areas such as pre-treatment, chemical additives, nanomaterials and microbial degradation Addresses current challenges and limitations in relation to bio-based and biodegradable plastics, microplastics and nanoplastics from bioplastics and plastic waste 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. During the last two decades, the production of polymers and plastics has been increasing rapidly. In spite of developing new polymers and polymeric materials, only 40~60 are used commercially on a large scale. It has been estimated that half of the annual production of polymers is employed outdoors. The photochemical instability of most polymers limits their outdoor application as they are photodegraded quickly over periods from months to a few years. To the despair of technologists and consumers alike, photodegradation and environmental ageing of polymers occur much faster than can be expected from knowledge collected in laboratories. In order to improve polymer photostability there has been a very big effort during the last 30 years to understand the mechanisms involved in photodegradation and environmental ageing. This book represents the author's attempt, based on his 25 years' experience in research on photodegradation and photo stabilization, to collect and generalize a number of available data on the photodegradation of polymers. The space limitation and the tremendous number of publications in the past two decades have made a detailed presentation of all important results and data difficult. The author apologizes to those whose work has not been quoted or widely presented in this book. Because many published results are very often contradictory, it has been difficult to present a fully critical review of collected knowledge, without antagonizing authors. For that reason, all available theories, mechanisms and different suggestions have been presented together, and only practice can evaluate which of them are valid. This volume consists of 15 chapters and focuses on hazardous chemicals, how they are associated with plastics, and their environmental risks. It includes background information on plastics and additives chemistry, and their observed or potential effects on living organisms as well as the oceanographic aspects of marine debris dispersion. The respective chapters provide insights into the sorption/desorption of chemicals in and out of plastics, the mechanisms and kinetics, but also the scale of the concentrations of chemicals found in marine debris, particularly in microplastics. The occurrence of the various chemicals is analyzed, as well as the distribution profiles of the chemicals in microplastics throughout the world’s oceans. The implications of the fact that plastics carry within them several chemicals are discussed in detail. In closing, new research topics that warrant further attention are identified. The book will appeal to all scientists who are already working or interested in starting to work on the topic of marine debris, as well as policymakers, NGOs and the broader informed public. Plastics in the Environment is a collection of reviewed and relevant research chapters, offering a comprehensive overview of recent developments in the field of plastic pollution and how it is affecting the environment. The book comprises single chapters authored by various researchers and edited by an expert active in the research area. All chapters are complete in themselves but united under a common research study topic. This publication aims at providing a thorough overview of the latest research efforts by international authors on the trending topic of plastics in the environment and opens new possible research paths for further novel developments. This handbook covers the latest

research in green chemistry principles for new, environmentally friendly processes in the fields of engineering, science, and technology. As environmental performance becomes increasingly important, the development of man-made polymers and their associated benefits has been overshadowed by problems relating to their ultimate disposal. In the light of wider acceptance of polymers for use in high technology applications, Polymers and the Environment aims to redress the balance. The book reviews the properties and industrial applications of polymers and discusses their environmental benefits compared with traditional materials. It also addresses the issues of polymer durability, recycling processes to aid waste minimization and biodegradable polymers. This text is intended to introduce the non-specialist reader to the benefits and limitations of polymeric materials from an environmental viewpoint, and will prove a useful book for both students and professionals. Polymers constitute a separate area on the environmental issues. Due to the generation of excessive amounts of polymers wastes by industries and householders, the world has confronted a serious crisis. Furthermore, due to the rising environmental awareness, economical and petroleum concerns an increasing attempt is being made to cope with the polymers wastes during the last few years. The traditional methods used to dispose polymer wastes such as combustion of polymers wastes or burying underground show a negative influence on the environment.From the existing studies, it seems that the recycling process is one of the best techniques to treat the waste polymer products. Recycling of polymers through advanced techniques is an important topic that is driven by both the commercial and environmental influences. Several new techniques have been developed along with the means of reusing recycled polymers. Some of the commercially important technological processes for recycling of waste polymers include mechanical recycling, chemical or feedstock recycling and energy recovery. Keeping in mind the advantages of the recycled polymers, this book gives an overview of on properties and processing of different kinds of recycled polymers along with their composites for a range of applications. This book is unique in the sense that it deals exclusively with the properties and processing of different recycled polymers which are otherwise considered as waste.The book is the outcome of untiring efforts of the researchers from different parts of the world with extensive research experience in the field of recycled polymers across different disciplines. Some of the main features are:- Present state-of-the-art recycled polymers from different resources - Includes contributions from world renowned experts on recycled polymers - Discusses the properties and durability of recycled polymers based materials - Highlights new frontiers in the properties and applications of recycled polymers - Focus on recyclability and up-to date progress on recycled polymers - Effect of different parameters on properties of recycled polymers are presented - Solutions for widespread application are recommended - Current problems, recent developments and applications are discussed Few scientific developments in recent years have captured the popular imagination like the subject of'biodegradable' plastics. The reasons for this are complex and lie deep in the human subconscious. Discarded plastics are an intrusion on the sea shore and in the countryside. The fact that nature's litter abounds in the sea and on land is acceptable because it is biodegradable - even though it may take many years to be bioassimilated into the ecosystem. Plastics litter is not seen to be biodegradable and is aesthetically unacceptable because it does not blend into the natural environment. To the environmentally aware but often scientifically naive, biodegradation is seen to be the ecologically acceptable solution to the problem of plastic packaging waste and litter and some packaging manufacturers have exploited the 'green' consumer with exaggerated claims to 'environmentally friendly' biodegradable packaging materials. The principles underlying environmental degradation are not understood even by some manufacturers of 'biodegradable' materials and the claims made for them have been categorized as 'deceptive' by USA legislative authorities. This has set back the acceptance of plastics with controlled biodegradability as part of the overall waste and litter control strategy. At the opposite end of the commercial spectrum, the polymer manufactur ing industries, through their trade associations, have been at pains to discount the role of degradable materials in waste and litter management. This negative campaign has concentrated on the supposed incompatibility of degradable plastics with aspects of waste management strategy, notably materials recycling. The growing interest in environmental issues and increasing demands to develop materials that do not burden the natural environment significantly are currently observed. In this connection many studies on polymer degradation in different environments are carried out. It is important to consider the influence of synergistic action of various factors in order to understand the environmental degradation of synthetic polymers. This requires understanding of interactions between polymer and living organisms. Biodegradable Polymers in the Circular Plastics Economy A comprehensive overview of the burgeoning field of biodegradable plastics As the lasting impact of humanity’s reliance on plastics comes into focus, scholars have begun to seek out solutions to plastic litter. In Biodegradable Polymers in the Circular Plastics Economy, an accomplished team of researchers delivers a focused guide (1) to understand plastic degradation and its role in waste hierarchy besides recycling, and (2) to create and use biodegradable plastics where appropriate. Created preferably from renewable resources, these eco-friendly polymers provide an opportunity to create sustainable and lasting solutions to the growing plastic-driven pollution problem. The broad approach to this handbook allows the authors to cover all aspects of these emerging materials, ranging from the problems present in the current plastics cycle, to the differences in type, production, and chemistry available within these systems, to end-of-life via recycling or degradation, and to life-cycle assessments. It also delves into potential commercial and policy issues to be addressed to successfully deploy this technology. Readers will also find: A thorough introduction to biodegradable polymers, focusing not only on the scientific aspects, but also addressing the larger political, commercial, and consumer concerns Mechanisms of biodegradation and the environmental impact of persistent polymers An in-depth discussion of degradable/hydrolysable polyesters, polysaccharides, lignin-based polymers, and vitrimers Management of plastic waste and life cycle assessment of bio-based plastics Biodegradable Polymers in the Circular Plastics Economy is the perfect overview of this complicated but essential research field and will appeal to polymer chemists, environmental chemists, chemical engineers, and bioengineers in academia and industry. The book is intended as a step towards a circular plastics economy that relies heavily on degradable plastics to sustain it. In this book on physical characteristics and practical aspects of polymer photodegradation Rabek emphasizes the experimental work on the subject. The most important feature of the book is the physical interpretation of polymer degradation, e.g. mechanism of UV/light absorption, formation of excited states, energy transfer mechanism, kinetics, dependence on physical properties of macromolecules and polymer matrices, formation of mechanical defects, practics during environmental ageing. He includes also some aspects of polymer photodegradation in environmental and space condition. Nothing stays the same for ever. The environmental degradation and corrosion of materials is inevitable and affects most aspects of life. In industrial settings, this inescapable fact has very significant financial, safety and environmental implications. The Handbook of Environmental Degradation of Materials explains how to measure, analyse, and control environmental degradation for a wide range of industrial materials including metals, polymers, ceramics, concrete, wood and textiles exposed to environmental factors such as weather, seawater, and fire. Divided into sections which deal with analysis, types of degradation, protection and surface engineering respectively, the reader is introduced to the wide variety of environmental effects and what can be done to control them. The expert contributors to this book provide a wealth of insider knowledge and engineering knowhow, complementing their explanations and advice with Case Studies from areas such as pipelines, tankers, packaging and chemical processing equipment ensures that the reader understands the practical measures that can be put in place to save money, lives and the environment. The Handbook's broad scope introduces the reader to the effects of environmental degradation on a wide range of materials, including metals, plastics, concrete,wood and textiles For each type of material, the book describes the kind of degradation that effects it and how best to protect it Case Studies show how organizations from small consulting firms to corporate giants design and manufacture products that are more resistant to environmental effects Thermoplastic elastomers (TPEs), commonly known as thermoplastic rubbers, are a category of copolymers having thermoplastic and elastomeric characteristics. A TPE is a rubbery material with properties very close to those of conventional vulcanized rubber at normal

conditions. It can be processed in a molten state even at elevated temperatures. TPEs show advantages typical of both rubbery materials and plastic materials. TPEs are a class of polymers bridging between the service properties of elastomers and the processing properties of thermoplastics. Nowadays, the best use of thermoplastics is in the field of biomedical applications, starting from artificial skin to many of the artificial human body parts. Apart from these, thermoplastic elastomers are being used for drug encapsulation purposes, and since they are biocompatible in many cases, their scope of applications has been broadened in the biotechnological field as well. The present book highlights many biological and biomedical applications of TPEs from which the broader area readers will benefit. This book emphasizes the scientific origin of deformation and damage of FRP composites under various environmental effects and analyses present understanding on degradation mechanisms, role of interfaces and addition of nanofillers Discusses micro-characterization of composites and interfaces, also includes micro-mechanisms and microscopic evidences to establish the structure-property correlation Elucidates advantages and limitations of FRP composites in supercritical applications Polymer-based materials are found everywhere in the environment, but their impacts are yet to be fully understood. The degradation of different polymer types has been extensively investigated under specific laboratory conditions. However, only limited data are available on their degradation under environmentally relevant conditions, where a number of processes are assessed at once. This thesis therefore describes a series of outdoor aquatic microcosm studies and laboratory experiments to investigate the degradation of a case study polymer (natural rubber latex), to characterise the formation of degradation products, and to assess the effects these may have on aquatic organisms. The outdoor microcosm studies showed that the exclusion of light and material thickness had a greater influence on degradation rate than media pH and sample movement. Analysis of the degradation solutions demonstrated that when the latex polymer degraded, there was an increase in the formation of microscopic latex particles; zinc (used to speed up the rate of curing processes) migrated from the latex polymer into the test solutions; and a mixture of dissolved substances that are potentially oxidised latex oligomers with additives residues were formed. Further analyses also showed that the atmosphere is a receiving environmental compartment for polymer degradates though the identification of a range of volatile substances produced during the degradation process. Laboratory experiments were then conducted to investigate the direct toxicity of the formed degradate mixtures, using two freshwater organisms with different life cycle traits, the water column crustacean Daphnia magna and the sediment-dwelling larvae of Chironomus riparius. The results suggest that, to the organisms tested, there is limited environmental risk associated with latex degradation products. Overall, environments receiving polymer debris are potentially exposed to a mixture of compounds that include the parent polymer, fragmented particles, leached additives, and subsequent degradation products; however at environmentally relevant concentrations this latex degradates pose little risk. This book emphasizes the scientific origin of deformation and damage of FRP composites under various environmental effects and analyses present understanding on degradation mechanisms, role of interfaces and addition of nanofillers Discusses micro-characterization of composites and interfaces, also includes micro-mechanisms and microscopic evidences to establish the structure-property correlation Elucidates advantages and limitations of FRP composites in supercritical applications Plastics and rubbers together make up the most adaptable and varied class of materials available to product designers. They may be transparent or opaque, rigid or flexible, lightweight, insulating, and weatherproof. They are used in almost every industry, and in every part of the home. Applications range from the humble hot water bottle to the sheathing on a high voltage cable, and from a simple scrubbing brush to a tank for storing hydrochloric acid. Products may be disposable (e.g. packaging goods) or intended to last for decades, such as a buried sewage pipe. However, it is this very diversity which makes materials selection so difficult, and appropriate design so important. Indeed the one thing that all these particular products have in common is their presence in this book of failures. Failures due to degradation may result from exposure to the weather or an aggressive operating environment. Alternatively they may be caused by the introduction of an external agent unforeseen by the product designer. They may be rapid or very slow, and they may result from a combination of factors. In this book Dr. Wright describes the following mechanisms of polymer degradation, and then illustrates each failure mechanism with a number of case studies: Thermo-oxidation, Photo-oxidation, Degradation due to ionising radiation, Chemical attack, Environmental stress cracking, Other miscellaneous effects, including treeing, electrochemical degradation and biodegradation. Many of the case studies are based on Dr. Wrights own experiences whilst working at Rapra. In each case he describes the circumstances of the failure, and discusses both the consequences of the failure and the lessons that may be learned from it. Most of the failed products are familiar to us all, and his style is both readable and informative. Photographs are included where available. The book will be essential reading for designers, engineers, product specifiers and forensic engineers. Materials suppliers and processors will also benefit from the pragmatic analysis and advice it contains. It will also be of value to all students of polymer science and technology, providing an essential insight into the practical application of plastics and rubbers and the potential problems. Finally, it will be of interest to a much broader readership, including anyone who ever wondered why things break, and it should become a standard reference work in all technical libraries. This book was written with the support of the UK Department of Trade and Industry. It is intended to raise awareness of the causes and consequences of polymer product failures, in order to reduce the future incidences of such failures, and their considerable costs to industry This book describes how man-made litter, primarily plastic, has spread into the remotest parts of the oceans and covers all aspects of this pollution problem from the impacts on wildlife and human health to socio-economic and political issues. Marine litter is a prime threat to marine wildlife, habitats and food webs worldwide. The book illustrates how advanced technologies from deep-sea research, microbiology and mathematic modelling as well as classic beach litter counts by volunteers contributed to the broad awareness of marine litter as a problem of global significance. The authors summarise more than five decades of marine litter research, which receives growing attention after the recent discovery of great oceanic garbage patches and the ubiquity of microscopic plastic particles in marine organisms and habitats. In 16 chapters, authors from all over the world have created a universal view on the diverse field of marine litter pollution, the biological impacts, dedicated research activities, and the various national and international legislative efforts to combat this environmental problem. They recommend future research directions necessary for a comprehensive understanding of this environmental issue and the development of efficient management strategies. This book addresses scientists, and it provides a solid knowledge base for policy makers, NGOs, and the broader public. Thanks to their low density and tailored properties, polymer matrix composites are attractive candidates for a large number of industrial applications ranging from aerospace to transportation and energy. However, the behaviour of polymer-based materials is strongly affected by a number of environmental factors. Environmental Degradation in Industrial Composites provides vital information on the effects of environmental factors such as temperature, liquid and gas exposure, electrical fields and radiations, and how micro- and micromechanical calculations during design and manufacture must take these effects into account. The book concludes with reviews on standard and specific testing methods for the various environmental factors and their combinations, helping mechanical/materials engineers and specifiers to predict possible changes due to environmental conditions. Each chapter is supplemented by industrial case studies to help in the understanding of degradation of composites in real life situations. This book will help you to... * Understand how environmental factors lead to degradation effects in polymer matrix composite structures * Build these factors into calculations when predicting the part performance and lifetime of structures * Compare real-life situations from case studies with your predicted results * Predict probable composite behaviour with greater accuracy This book will help you to... * Understand how environmental factors lead to degradation effects in polymer matrix composite structures * Build these factors into calculations when predicting the part performance and lifetime of structures * Compare real-life situations from case studies with your predicted results * Predict probable composite behaviour with greater accuracy There is an increasing movement of scientists and engineers who are dedicated to minimising the environmental

impact of polymer composite production. Life cycle assessment is of paramount importance at every stage of a product’s life, from initial synthesis through to final disposal and a sustainable society needs environmentally safe materials and processing methods. With an internationally recognised team of contributors, Green Composites examines fibre reinforced polymer composite production and explains how environmental footprints can be diminished at every stage of the life cycle. The introductory chapters look at why we should consider green composites, their design and life cycle assessment. The properties of natural fibre sources such as cellulose and wood are then discussed. Chapter 6 examines recyclable synthetic fibre-thermoplastic composites as an alternative solution and polymers derived from natural sources are covered in Chapter 7. The factors that influence the properties of these natural composites and natural fibre thermoplastic composites are detailed in Chapters 8 and 9. The final four chapters consider clean processing, applications, recycling, degradation and reprocessing. Green composites is an essential guide for agricultural crop producers, government agricultural departments, automotive companies, composite producers and material scientists all dedicated to the promotion and practice of eco-friendly materials and production methods. Reviews fibre reinforced polymer composite production Explains how environmental footprints can be diminished at every stage of the life-cycle This book reviews the and industrial applications of properties polymers and discusses their environmental benefits compared with traditional materials. It also addresses the issues of polymer durability, recycling processes to aid waste minimization, and biodegradable polymers. This book introduces the non-specialist to the benefits and limitations of polymeric materials from an environmental viewpoint. Reviews of Environmental Contamination and Toxicology attempts to provide concise, critical reviews of timely advances, philosophy and significant areas of accomplished or needed endeavor in the total field of xenobiotics, in any segment of the environment, as well as toxicological implications. Polymer matrix composites have been manufactured on an industrial scale for many years. Their uses are manifold, from thrust bearing pads, through insulation materials to oil and gas pipes, but they are affected by the environment in which they are used. The environmental effects can be detrimental and can lead to loss of performance, failure and break-down. This book provides vital information on the effects of factors such as time, temperature, ageing, fluid immersion and electrical fields on polymer matrix composites. It also reviews standard and specific testing methods for the various environmental factors and their combinations. Industrial case studies help complete this comprehensive volume which will be essential for mechanical engineers, materials engineers, consultants, specifiers and manufacturers. * Explains how and why composites react to environmental factors * Allows prediction of future events * Important topic, vital to industry "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." This book is open access under a CC BY 4.0 license. This volume focuses on microscopic plastic debris, also referred to as microplastics, which have been detected in aquatic environments around the globe and have accordingly raised serious concerns. The book explores whether microplastics represent emerging contaminants in freshwater systems, an area that remains underrepresented to date. Given the complexity of the issue, the book covers the current state-of-research on microplastics in rivers and lakes, including analytical aspects, environmental concentrations and sources, modelling approaches, interactions with biota, and ecological implications. To provide a broader perspective, the book also discusses lessons learned from nanomaterials and the implications of plastic debris for regulation, politics, economy, and society. In a research field that is rapidly evolving, it offers a solid overview for environmental chemists, engineers, and toxicologists, as well as water managers and policy-makers. New Polymer Nanocomposites for Environmental Remediation summarizes recent progress in the development of materials’ properties, fabrication methods and their applications for treatment of contaminants, pollutant sensing and detection. This book presents current research into how polymer nanocomposites can be used in environmental remediation, detailing major environmental issues, and key materials properties and existing polymers or nanomaterials that can solve these issues. The book covers the fundamental molecular structure of polymers used in environmental applications, the toxicology, economy and life-cycle analysis of polymer nanocomposites, and an analysis of potential future applications of these materials. Recent research and development in polymer nanocomposites has inspired the progress and use of novel and cost-effective environmental applications. Presents critical, actionable guidelines to the structure and property design of nanocomposites in environmental remediation Focuses on taking technology out of the lab and into the real world Summarizes the latest developments in polymer nanocomposites and their applications in catalytic degradation, adsorptive removal and detection of contaminants in the environment Enables researchers to stay ahead of the curve, with a full discussion of regulatory issues and potential new applications and materials in this area This proceedings book presents the main findings of the 13th International Seminar on Polymer Science and Technology (ISPST 2018), which was held at Amirkabir University of Technology, Tehran, on November 10–22, 2018. This forum was the culmination of more than three decades of academic and industrial activities of Iranian scholars and professionals, and the participation of many notable international scientists, in covering various important polymer-related subjects of concern to Iran and the world at large, including polymer synthesis, processing and properties, as well as issues concerning polymer degradation, stability, and environmental aspects. For the past half a century, the growing concern for advancing human health, quality of life, and – especially in the last few decades – avoiding and combating environmental pollution have shaped and driven scientific activities geared toward the creation of smart materials that are compatible with the human body, and have prompted scientists and technologists to pursue research using natural and sustainable sources. This book highlights efforts to responsibly address the problems caused by, and which can potentially be solved by, polymers and plastics. Polymer degradation is a change in the properties -- tensile strength, colour, shape, etc -- of a polymer or polymer based product under the influence of one or more environmental factors such as heat, light or chemicals. These changes may be undesirable, such as changes during use, or desirable, as in biodegradation or deliberately lowering the molecular weight of a polymer. Such changes occur primarily because of the effect of these factors on the chemical composition of the polymer. In a finished product such a change is to be prevented or delayed. However, the degradation process can be useful from the view points of understanding the structure of a polymer or recycling/reusing the polymer waste to prevent or reduce environmental pollution. Polymers molecules are very large on the molecular scale which derive their unique and useful properties from their size. "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." Fluorotelomer (FT)-based acrylate polymers have applications in textile, upholstery, carpet, and apparel and leather industries as components of surface protecting coatings. Currently, there is concern that these polymers may be a potential indirect source of perfluoro-carboxylic acids (PFCAs) in the environment. To address this concern, the current thesis investigated the lability of the ester linkages of a model FT-based acrylate polymer in two potential environmental compartments: sewage wastewater, and surface waters. The in-house synthesized model FT-based acrylate polymer was characterized by 1H and 19F NMR spectroscopy and MALDI-ToF. Potential degradation products including FT alcohols and PFCAs were analyzed by GC-MS and LC-MS/MS respectively. Also, polymer degradation was monitored by 19F NMR spectroscopy and MALDI-ToF. Evidence of FT polymer degradation was observed in the hydrolysis and wastewater studies, suggesting that FT-polymer degradation potentially contributes to the PFCA burden in the environment. Recycling von Kunststoffen, Gummi und anderen Polymeren: Wie beeinflussen solche Prozesse unsere Umwelt? Dieser Frage geht der vorliegende Band nach, wobei sich der Autor auf die neue Gesetzgebung in den USA, Japan und der EU bezieht, die Polymerhersteller zum Recycling zwingt. Vor- und Nachteile der Recyclingkreisläufe werden einander gegenübergestellt. Alle Kapitel enthalten

Beispielfragen und -antworten. Plastics offer a variety of environmental benefits. However, their production, applications, and disposal present many environmental concerns. Plastics and the Environment provides state-of-the-art technical and research information on the complex relationship between the plastic and polymer industry and the environment, focusing on the sustainability, environmental impact, and cost—benefit tradeoffs associated with different technologies. Bringing together the field's leading researchers, Anthony Andrady's innovative collection not only covers how plastics affect the environment, but also how environmental factors affect plastics. The relative benefits of recycling, resource recovery, and energy recovery are also discussed in detail. The first of the book's four sections represents a basic introduction to the key subject matter of plastics and the environment; the second explores several pertinent applications of plastics with environmental implications–packaging, paints and coatings, textiles, and agricultural film use. The third section discusses the behavior of plastics in some of the environments in which they are typically used, such as the outdoors, in biotic environments, or in fires. The final section consists of chapters on recycling and thermal treatment of plastics waste. Chapters include: Commodity Polymers Plastics in Transportation Biodegradation of Common Polymers Thermal Treatment of Polymer Waste Incineration of Plastics The contributors also focus on the effectiveness of recent technologies in mitigating environmental impacts, particularly those for managing plastics in the solid waste stream. Plastic and design engineers, polymer chemists, material scientists, and ecologists will find Plastics and the Environment to be a vital resource to this critical industry. "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,