Fire Retardancy Of Polymeric Materials Second Edition

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Flame Retardant Polymeric Materials

Flame - Retardant Polymeric Materials

A comprehensive reference on the properties, selection, processing, and applications of the most widely used nonmetallic engineering materials. Section 1, General Information and Data, contains information applicable both to polymers and to ceramics and glasses. It includes an illustrated glossary, a collection of engineering tables and data, and a guide to materials selection. Sections 2 through 7 focus on polymeric materials--plastics, elastomers, polymer-matrix composites, adhesives, and sealants--with the information largely updated and expanded from the first three volumes of the Engineered Materials Handbook. Ceramics and glasses are covered in Sections 8 through 12, also with updated and expanded information. Annotation copyright by Book News, Inc., Portland, OR

Flame Retardancy Of Polymeric Materials

R. W. DYSON There will be few readers of this book who are not aware of the contribution that polymers make to modern life. They are to be seen around the home, at work, in transport and in leisure pursuits. They take many forms which include plastic mouldings and extrusions, plastic film and sheet, plastic laminates (fibreglass and formica) rubber gloves, hoses, tyres and sealing rings, fibres for textiles and carpets and so on, cellular products for cushioning and thermal insulation, adhesives and coating materials such as paints and varnishes. The majority of these polymers are synthetic and are derived from oil products. The most important of these in terms of tonnage used are polymers based upon styrene, vinyl chloride, ethylene, propylene and butadiene among plastics and rubber materials, and nylons, polyethylenetere phthalate and polyacrylonitrile among fibres. The total amount of these polymers used each year runs into millions of tonnes. These polymers are sometimes known as commodity polymers because they are used for everyday artefacts. They are available in many grades and formats to meet a variety of applications and processing techniques. The and light stabilizers, properties can be adjusted by using additives such as heat plasticizers, and reinforcing materials. Often, grades are specially designed and formulated to meet particular requirements and, in a sense, these might be regarded as specialities. Much has been written about these materials elsewhere and they are not the concern of this book.

Flame Retardants

Lignin - Trends and Applications consists of 11 chapters related to the lignin structure, modification, depolymerization, degradation process, computational modeling, and applications. This is a useful book for readers from diverse areas, such as physics, chemistry, biology, materials science, and engineering. It is expected that this book may expand the reader's knowledge about this complex natural polymer.

Smart Inorganic Polymers

Fire Retardancy of Polymeric Materials

The use of polymers is restricted by their flammability - they may indeed initiate or propagate fire. Fire Retardancy of Polymers focuses on mineral additives from either micro- or nano-composites for application in fire retardants. With the use of fire retardant additives containing halogen or phosphorus compounds in decline, the need for other systems is evident. The major materials that are used are alumina trihydrate or magnesium hydroxide which account for more than 50% by weight of the world-wide sales of fire retardants. Recent works have shown that such halogen-free compounds may give enhanced fire retardancy to polymeric materials when used in low levels, alone, or in synergistic mixtures. The corresponding fire performance depends on the dispersion of the mineral filler, with micrometer-scale dispersion leading to the best performances. Specialists discuss these new applications of mineral fillers with particular emphasis on action mechanisms, new materials including textiles, toxicology and hazards. With extensive references, this book provides a comprehensive and up-to-date view of these applications. This book will appeal to professionals, materials scientists and engineers looking for novel ways to eliminate fire hazards and improve flame retardancy of materials, with a special interest in sustainable development.

Fire Retardant Materials

Due to the emphasis on replacing halogenated flame retardantswith alternate technologies, this handbook contains in one placeall of the current commercial non-halogenated flame retardanttechnologies, as well as experimental systems nearcommercialization. This book focuses on non-halogenated flame retardants in aholistic but practical manner. It starts with an overview ofthe regulations and customer perceptions driving non-halogenatedflame retardant selection over older halogenatedtechnologies. It then moves into separate chapters coveringthe known major classes of non-halogenated flame retardants. These chapters are written by known experts in those specificchemistries who are also industrial experts in how to apply thattechnology to polymers for fire safety needs. The handbookconcludes with some of the newer technologies in place that areeither niche performers or may be commercial in the nearfuture. Future trends in flame retardancy are alsodiscussed. The Non-Halogenated Flame Retardant Handbook book takes apractical approach to addressing the narrow subject ofnon-halogenated flame retardancy. This includes more emphasison flame retardant selection for specific plastics, practicalconsiderations in flame retardant material design, and what thestrengths and limits of these various technologies are. Previous flame retardant material science books have coverednon-halogenated flame retardants, but they focus more on how theywork rather than how to use them.

Fire Retardancy of Polymeric Materials, Second Edition

Recent disasters caused by the spread of fire in buildings and in transportations remind us of the importance of fire protection. Using flame-retardant materials is one important element of the firefighting strategy, which aims to prevent fire development and propagation. These materials are used in different applications, such as in textiles, coatings, foams, furniture, and cables. The development of more efficient and environmentally friendly flame-retardant additives is an active multidisciplinary approach that has attracted a great deal of interest. Studies have aimed at the development of new, sustainable, and flame-retardant additives/materials, providing high performance and low toxicity. Also studied were their properties during ageing and recycling, as well as modeling physical and chemical processes occuring before ignition and during their combustion. The development of sustainable flame retardants and understanding their modes of action provide a strong link between these topics and cover many fields from organic chemistry, materials engineering, and toxicology, to physics and mathematics.

Towards Bio-based Flame Retardant Polymers

This updated edition provides an overview of flame retardants that are in commercial use, were recently used, or are in development. The book is organized polymer-by-polymer and provides a guide to advantages, limitations, and patented and patent-free formulations, with insight into favorable and unfavorable combinations. The targeted readership is the plastics or textile finish compounder and the plastic additives R&D worker, as well as market development and sales. This edition contains, besides a compendium of current flame retardants, updated information relevant to performance testing, mode of action, and safety and regulatory aspects. Industrial or academic researchers will find useful a discussion of unsolved problems with possible new approaches. Both authors have extended, productive experience in both basic and applied research on a wide range of flame retardancy topics.

Fire Retardancy of Polymers

Fire and Polymers V

This book is the first to deal with the important topic of the fire behaviour of fibre reinforced polymer composite materials. The book covers all of the key issues on the behaviour of composites in a fire. Also covered are fire protection materials for composites, fire properties of nanocomposites, fire safety regulations and standards, fire test methods, and health hazards from burning composites.

Polypropylene

This text represents the state of the art in the field of fire and polymers, with specific emphasis on non-halogen approaches to flame retardancy, including additives and intrinsically fire-retardant polymers (fire-smart polymers). It is divided into six sections: noncomposites, fire-smart polymers, polyurethanes, non-halogen (ecofriendly) flame retardants, halogen flame retardants and assessment and performance of flame retardant polymers.

Flame Retardants for Plastics and Textiles

Polyester is one of the most important polymers for fibers and composites. Significant developments in nanoparticle-doped polyester composites, polyester recycling, flame-retardant unsaturated polyester resins, and application of polyester for construction and automotive industry are currently carried out. Thus, this book provides leading edge research on improvements of functional properties of polyester, modifications of unsaturated polyester resins, and polyester (especially recycled polyester) usage in construction and in automotive application areas in the form of fiber, resin, and composite. The book also covers the characterization of unique features of polyester found by mechanical, chemical, physical, microstructural, and thermal analyses. This book intends to provide an understanding of the developments of functional polyester production, synthesis, and characterization and support to many academic researchers and graduate students in textile, polymer, composite, chemical science, and research and development managers in recycling and composite applications of polyester in the construction and automotive industry.

Fire Properties of Polymer Composite Materials

This book provides an overview of polymer nanocomposites and hybrid materials with polyhedral oligomeric silsesquioxanes (POSS). Among inorganic nanoparticles, functionalized POSS are unique nano-building blocks that can be used to create a wide variety of hybrid and composite materials, where precise control of nanostructures and properties is required. This book describes the influence of incorporation of POSS moieties into (organic) polymer matrices on the mechanical, thermal and flammability behavior of composites and hybrid organic-inorganic materials. Importantly, POSS-containing materials can be bio-functionalized by linking e.g. peptides and growth factors through appropriate surface modification in order to enhance the haemo-compatibility of cardiovascular devices made of these materials. This volume includes descriptions of synthesis routes of POSS and POSS-containing polymeric materials (e.g. based on polyolefines, epoxy resins and polyurethanes), presentation of POSS’ role as flame retardants and as biocompatible linker, as well as the depiction of decomposition and ageing processes.

The Non-halogenated Flame Retardant Handbook

Flammability has been recognized as an increasingly important social and scientific problem. Fire statistics in the United States (Report of the National Commission on Fire Prevention and Control. "America Burning:' 1973) emphasized the vast devastation to life and property--12.000 lives lost annually due to fire. and these deaths are usually caused by inhaling smoke or toxic gases: 300.000 fire injuries: 11.4 billion dollars in fire cost at which 2.7 billion dollars is related to property loss: a billion dollars to burn injury treatment: and 3.3 billion dollars in productivity loss. It is obvious that much human and economic misery can be attributed to fire situations. In relation to this. polymer flammability has been recognized as an in creasingly important social and scientific problem. The development of flame-retardant polymeric materials is a current example where the initia tive for major scientific and technological developments is motivated by sociological pressure and legislation. This is part of the important trend toward a safer environment and sets a pattern for future example. Flame retardancy deals with our basic everyday life situations-housing. work areas. transportation. clothing and so forth-the "macroenvironment" capsule within which "homosapiens" live. As a result. flame-retardant polymers are now emerging as a specific class of materials leading to new and diversified scientific and technological ventures.

Polymer/POSS Nanocomposites and Hybrid Materials

Flammability has been recognized as an increasingly important social and scientific problem. Fire statistics in the United States (Report on the National Commission on Fire Prevention and Control, "America Burning," 1973) emphasized the vast devastation to life and property-12,000 lives lost annually due to fire and these deaths are usually caused by inhaling smoke or toxic gases; 300,000 fire injuries; 11. 4 billion dollars in fire cost of which 2. 7 billion dollars is related to property loss; a billion dollars to burn injury treatment; and 3. 3 billion dollars in productivity loss. It is obvious that much human and economic misery can be attributed to fire situations. In relation to this, polymer flammability has been recognized as an increasingly important social and scientific problem. The development of flame-retardant polymeric materials is a current example where the initiative for major scientific and technological developments is motivated by sociological pressure and legisla tion. This is part of the important trend toward a safer environment and sets a pattern for future example. Flame retardancy deals with our basic everyday life situations-housing, work areas, transportation, clothing and so forth the "macroenvironment" capsule within which "homosapiens" live. As a result, flame-retardant polymers are now emerging as a specific class of materials leading to new and diversified scientific and technological ventures.

Polymer Yearbook 16

The latest developments in fire retardancy of polymeric materials, including new systems, formulations and test-methods are detailed in this book.

Fire Retardancy of Polymers

Sustainable development has become a great concern in modern society. The authors of this brief describe how one strategy to reach this objective is to replace oil-based materials with bio-based materials. They emphasize the great efforts that have been made to synthesize new bio-based polymers or additives or to replace glass fibers by natural fibers in composites. Flame retardancy is one of the most desired properties for many applications in wires and cables, building, transport, electric and electronic devices. The authors of this fascinating and timely brief summarize this important field in three parts. The flame retardancy of biobased polymers, the flame retardancy of natural fibers composites, and the synthesis and efficiency of biobased flame retardants.

Engineered Materials Handbook, Desk Edition

Flame Retardant Polymeric Materials provides a comprehensive and up-to-date overview of the field, from basic properties and mechanisms of action for flame retardants to emerging methods, materials, and industrial applications. With over 120 black and white images, Hu and Wang cover the latest in the development of novel polymer nanocomposites such as graphene, CNTs, LDHs, POSS, and techniques such as layer-by-layer assembly. These expert authors also include discussions on the important flame-retardant systems based on phosphorus, silicon, and boron. In doing so, they highlight the use of flame-retardants in varying industries, for example, construction, textiles, and aviation. This comprehensive handbook is an essential read for students and academics of physics with a particular interest in flame-retardant materials. It would also be recommended for professionals within the materials science and engineering fields.

Flame Retardant Polymer Nanocomposites

Polyester

This volume addresses recent advances in fire retardancy and examines progress that has been made in controlling fires.

Novel Fire Retardant Polymers and Composite Materials

This volume addresses the state of the art in fire retardancy studies and the need for fire retardant chemicals and fire-retarded polymers, while considering the interrelationship among polymer degradation, fire retardant efficacy, fire testing and environmental concerns. The work examines the principles of polymer science with respect to fire retardancy.

Halogen-Free Flame-Retardant Polymers

Novel Fire Retardant Polymers and Composite Materials reviews the latest scientific developments and technological advances in the design and manufacture of fire retardant polymers and composite materials. Fire retardant polymeric materials are used in a broad range of applications in fields such as aviation, automotive, computer, construction, electronics, and telecommunications. It is essential to have a better understanding of the scientific technology used in the design and manufacture of fire-resistant materials and their end products. This book includes the latest developments in fire retardant technologies for different polymeric material systems, such as PU, PP, PE, PLA, epoxy, rubber, textile, phenol resin, and PA, etc. Provides cutting-edge research in flame retardant materials, relevant to both scientific and industrial applications Presents the latest and most up-to-date fire retardant technologies Discusses the most popular fire retardant polymer systems Includes the latest developments in fire retardant technologies for different polymeric material systems, such as PU, PP, PE, PLA, epoxy, rubber, textile, phenol resin, and PA

Fire and Polymers VI: New Advances in Flame Retardant Chemistry and Science

My heart sank when I was approached by Dr Hastings and by Professor Briggs (Senior Editor of Materials Science and Technology and Series Editor of Polymer Science and Technology Series at Chapman & Hall, respectively) to edit a book with the provisional title Handbook of Poly propylene. My reluctance was due to the fact that my former book [1] along with that of Moore [2], issued in the meantime, seemed to cover the information demand on polypropylene and related systems. Encour aged, however, by some colleagues (the new generation of scientists and engineers needs a good reference book with easy information retrieval, and the development with metallocene catalysts deserves a new update!), I started on this venture. Having some experience with polypropylene systems and being aware of the current literature, it was easy to settle the titles for the book chapters and also to select and approach the most suitable potential contributors. Fortunately, many of my first-choice authors accepted the invitation to contribute. Like all editors of multi-author volumes, I recognize that obtaining contributors follows an S-type curve of asymptotic saturation when the number of willing contributors is plotted as a function of time. The saturation point is, however, never reached and as a consequence, Dear Reader, you will also find some topics of some relevance which are not explicitly treated in this book (but, believe me, I have considered them).

Fire and Polymers

When dealing with challenges such as providing fire protection while considering cost, mechanical and thermal performance and simultaneously addressing increasing regulations that deal with composition of matter and life cycle issues, there are no quick, one-size-fits-all answers. Packed with comprehensive coverage, scientific approach, step-by-step directions, and a distillation of technical knowledge, the first edition of Fire Retardancy of Polymeric Materials broke new ground. It supplied a one-stop resource for the development of new fire safe materials. The editors have expanded the second edition to echo the multidisciplinary approach inherent in current flame retardancy technology and put it in a revised, more user-friendly format. More than just an update of previously covered topics, this edition discusses: additional fire retardant chemistry developments in regulations and standards new flame retardant approaches fire safety engineering modeling and fire growth phenomena The book introduces flame retardants polymer-by-polymer, supplemented by a brief overview of mode of action and interaction, and all the other ancillary issues involved in this applied field of materials science. The book delineates what, why, and how to do it, covering the fundamentals of polymer burning/combustion and how to apply these systems and chemistries to specific materials classes. It also provides suggested formulations, discusses why certain materials are preferred for particular uses or applications, and offers a starting point from which to develop fire-safe materials.

Advanced Flame Retardant Materials

This handbook provides an introduction to and reference information about the science behind the production and use of particulate fillers in polymer applications. Fillers play an important role and are used with practically all types of polymers: thermoplastics, thermosets, elastomers.Readers will find an introduction to the topic of particulate fillers for polymer applications and their importance. The first chapters describe the use and characteristics of fillers in different polymer types, such as thermoplastics, thermosets and elastomers. The following chapters compile and summarize comprehensive information about different filler materials which find application nowadays, including mineral fillers (for example feldspars, wollastonites, and many more) and inorganic fillers (barium sulphate, or clays), bio-fillers, recycled and sustainable fillers, and fillers for specific applications (for example flame-retardant fillers, fillers for electrically conductive applications, or thermally conductive additives).Offering key information, compiled by a mixed team of authors from academia and industry, this handbook will appeal to researchers and professionals working on and with particulate polymer fillers alike.

Characteristics and Analysis of Non-Flammable Polymers

This important book provides a comprehensive account of the advances that have occurred in fire science in relation to a broad range of materials. The manufacture of fire retardant materials is an active area of research, the understanding of which can improve safety as well as the marketability of a product. The first part of the book reviews the advances that have occurred in improving the fire retardancy of specific materials, ranging from developments in phosphorus and halogen-free flame retardants to the use of nanocomposites as novel flame retardant systems. Key environmental issues are also addressed. The second group of chapters examines fire testing issues and regulations. A final group of chapters addresses the application of fire retardant materials in such areas as composites, automotive materials, military fabrics and aviation materials. With its distinguished editors and array of international contributors, this book is an essential reference for producers, manufacturers, retailers and all those wishing to improve fire retardancy in materials. It is also suitable for researchers in industry or academia. Reviews advances in improving the retardancy of materials Addresses key environmental issues Examines fire testing issues and regulations and the challenges involved

Advances in Fire Retardant Materials

This is a comprehensive source of information on all aspects of fire retardancy. Particluar emphasis is placed on the burning behaviour and flame retarding properties of polymeric materials and textiles. It covers combustion, flame retardants, smoke and toxic products generally and then goes on to concentrate on some more material-specific aspects of combustion in relation to textiles, composites and bulk polymers. Developments in all areas of fire retardant materials are covered including research in new areas such as nanocomposition. Fire retardant materials is an essential reference source for all those working with, researching into, or designing new fire retardant materials. Detailed analysis of the burning behaviour and flame retarding properties of ploymers, composites and textiles Covers smoke and toxic gas generation Analysis of material performance in fire

Encyclopedia of Polymer Applications, 3 Volume Set

Provides complete and undiluted knowledge on making inorganic polymers functional. This comprehensive book reflects the state of the art in the field of inorganic polymers, based on research conducted by a number of internationally leading research groups working in this area. It covers the synthesis aspects of synthetic inorganic polymers and looks at multiple inorganic monomers as building blocks, which exhibit unprecedented electronic, redox, photo-emissive, magnetic, self-healing and catalytic properties. It also looks at the applications of inorganic polymers in areas such as optoelectronics, energy storage, industrial chemistry, and biology. Beginning with an overview of the use of smart inorganic polymers in daily life, Smart Inorganic Polymers: Synthesis, Properties and Emerging Applications in Materials and Life Sciences goes on to study the synthesis, properties, and applications of polymers incorporating different heteroelements such as boron, phosphorus, silicon, germanium, and tin. The book also examines inorganic polymers in flame-retardants, as functional materials, and in biology. An excellent addition to the polymer scientists' and synthetic chemists' toolbox Summarizes the state of the art on how to make and use functional inorganic polymers, from synthesis to applications Edited by the coordinator of a highly funded European community research program (COST action) that focuses specifically on the exploration of inorganic polymers Features contributions from top experts in the field Aimed at academics and industrial researchers in this field, Smart Inorganic Polymers: Synthesis, Properties and Emerging Applications in Materials and Life Sciences will also benefit scientists who want to get a better overview on the state-of-the-art of this rapidly advancing area.

Polymer Green Flame Retardants

This book presents an overview of recent academic and industrial research efforts concerning halogen-free flame-retardant (FR) polymers and their nanocomposites. It summarizes the synthesis methods for various types of halogen-free FR polymers and their nanocomposites, and critically reviews their flame-retardant behavior, toxic-gas evolution during combustion, and inhibition methods. In turn, the book discusses the importance of metal oxide nanoparticles, nanoclay, and graphene in flame inhibition and addresses the FR properties of various FR compounds containing polymers, their FR mechanisms, and fire toxicant releasing and inhibition methods in detail. It systematically covers the synergetic effects between different FR compounds, and explains the significance of thermal stability and melt dripping for polymers’ FR properties. The fundamental concepts described here are essential to understanding the FR behaviors of various polymers and their nanocomposites, and to developing efficient, environmentally friendly FR polymers and nanocomposites for a wide range of applications. This book is ideally suited for researchers in the fields of polymer science and engineering, and for graduate students in chemistry and materials science.

Specialty Polymers

Polymer Green Flame Retardants covers key issues regarding the response of polymers during fire, the mechanisms of their flame retardation, the regulations imposed on their use, and the health hazards arising from their combustion. Presenting the latest research developments, the book focuses in particular on nanocomposites, believed to be the most promising approach for producing physically superior materials with low flammability and ecological impact. The fire properties of nanocomposites of various matrixes and fillers are discussed, the toxicological characteristics of these materials are analyzed, addressing also their environmental sustainability. Edited by distinguished scientists, including an array of international industry and academia experts, this book will appeal to chemical, mechanical, environmental, material and process engineers, upper-level undergraduate and graduate students in these disciplines, and generally to researchers developing commercially attractive and environmentally friendly fire-proof products. Provides recent findings on the manufacture of environmentally sustainable flame retardant polymeric materials Covers legislation and regulations concerning flame retarded polymeric material use Includes tables containing the fire properties of the most common polymeric materials

Fire Retardant Polymeric Materials

Polymer Yearbooks provide reviews of Japanese and Russian polymer science not otherwise readily available in English. An essential desk reference of general interest to polymer scientists, they contain reviews covering topics in polymer synthesis, degradation, renewable polymer sources, drug release, thermodynamics of polymers under shear, etc. The books also contain lists of recent publications in polymer science and a compilation of dissertation abstracts. Names and addresses of research annuals in polymer science and their editors are listed, together with useful information such as standard abbreviations and trade names. Containing summaries of useful physical, chemical, and mathematical data along with definitions of terms in polymer science, the Polymer Yearbook is a must for any practicing polymer chemist. This volume also contains reviews on state-of-the-art Japanese research presented in the annual Spring and Fall meetings of the

Japanese Polymer Science Society. The aim of this section is to make information on the progress of Japanese polymer science, and on topics of current interest to polymer scientists in Japan, more easily available worldwide.

Natural Fibers, Plastics and Composites

In recent years there has been an increasing demand for fire retardant versions of a range of plastics. Such applications are fire retardancy in vehicles, aircraft, manned space vehicles, marine and industrial applications such as electronics and a wide range of applications in the building industry including roofing and interior walls. Also in domestic applications such as furniture, clothes, bedding, upholstery and electrical goods. Fire retardancy in polymers can be achieved by either of three ways. Firstly there are forms of polymers, such as polytetrafluoroethylene, which are intrinsically fire retardant. The second type are rendered fire retardant by the inclusion of a suitable additive in the formulation. These include additives based on bromine, antimony, nitrogen phosphorus and silicon. An essential requirement for fire retardant polymers used in enclosed spaces is that they do not release any toxic products upon combustion. In this respect antinomy containing additives are going out of favour due to the release of toxic antimony volatiles upon combustion. Thirdly, introduction of intumescence into polymers by the introduction of suitable compounds is being increasingly used as a means of imparting fire retardancy in polymers. There exists a plethora of methods used to assess fire retardancy in polymers. These are discussed and summarised in this book. The book will be of interest not only to working in industry but also to design engineers and producers in the polymer fabrication industries.

The Combustion of Organic Polymers

Fillers for Polymer Applications

This book summarizes comprehensively many recent technical research accomplishments in the area of flame retardant research. It presents mainly flame retardant studies of polymer blends, composites and nano composites such as rubber, thermosets and thermoplastics. This book discusses different types of flame retardant using in polymers especially nano composites, as well as the role and chemistry. Leading researchers from industry, academy, government and private research institutions across the globe contribute to this book. Academics, researchers, scientists, engineers and students in research and development will benefit from an application-oriented book that helps them to find solutions to both fundamental and applied problems.

New Technologies in Protective Coatings

Flame Retardant Polymer Nanocomposites takes a comprehensive look at polymer nanocomposites for flame retardancy applications and includes nanocomposite fundamentals (theory, design, synthesis, characterization) as well as polymer flammability fundamentals with emphasis on how nanocomposites affect flammability. The book has practical examples from literature, patents, and existing commercial products. Readers can design new work based upon the material in the book or use it as a handy reference for interpreting existing work and results.

Flame-Retardant Polymeric Materials

Undoubtedly the applications of polymers are rapidly evolving. Technology is continually changing and quickly advancing as polymers are needed to solve a variety of day-to-day challenges leading to improvements in quality of life. The Encyclopedia of Polymer Applications presents state-of-the-art research and development on the applications of polymers. This groundbreaking work provides important overviews to help stimulate further advancements in all areas of polymers. This comprehensive multi-volume reference includes articles contributed from a diverse and global team of renowned researchers. It offers a broad-based perspective on a multitude of topics in a variety of applications, as well as detailed research information, figures, tables, illustrations, and references. The encyclopedia provides introductions, classifications, properties, selection, types, technologies, shelf-life, recycling, testing and applications for each of the entries where applicable. It features critical content for both novices and experts including, engineers, scientists (polymer scientists, materials scientists, biomedical engineers, macromolecular chemists), researchers, and students, as well as interested readers in academia, industry, and research institutions.

Lignin

Provides the latest research in flame retardant chemistry, stemming from the 2012 ACS symposium on the subject.

Fire Retardancy of Polymers

Materials are at the center of all technological advances; it is evident in considering the spectacular progress that has been made in fields as diverse as engineering, medicine, biology, etc. Materials science and technology must develop researches allowing the generation of new methods of protection to reduce fundamentally the losses of human life as well as the economic ones. The former are impossible of quantifying, while the latter are highly significant; thus, only those derived from corrosive processes in their different forms reach, in technologically developed countries, about 4% of the Gross National Product (GNP), while those derived from fire action range from 0.5 to 1.0% of the mentioned GNP. The book, in the different chapters, displays original systems of superficial protection and of low environmental impact to minimize the losses by corrosion and the fire action.

Flame Retardancy of Polymeric Materials

Covers the following topics: Strategies; Intumescence: Mechanism studies; New intumescent polymetric materials; Flame retarded intumescent textiles; Intumescence - an environmentally friendly process?