



Book Review

POLYMERS AND THE ENVIRONMENT

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It is well known that the progress of human society was influenced by the development of man-made polymers. One the other hand, in recent years a main subject discussed concerning polymers is represented by their ultimate disposal, taking into account although packaging is still the major application for plastics, engineering polymers are increasingly gaining acceptance in high technology applications, particularly in aircraft and in motor vehicles where fuel conservation is of paramount importance. In these conditions this book is intended to introduce the non-specialist reader to the environmental benefits of polymeric materials. This is why the first chapter presents the **Polymers in modern life**. Both natural and synthetic polymers are presented from their molecular structure point of view along with main fields of applications and possible interactions with environmental. This subject is detailed in the second chapter-**Environmental impact of polymers**. The following aspects are discussed: plastics in packaging, polymers in transport, plastics in agriculture, polymers in the home and office, polymers in building and civil engineering, plastics in the public utilities, polymers in biology and medicine. As a conclusion of this chapter *the public image of "plastics"* is analyzed having in view the advantages and disadvantages of the polymers utilizations. The environmental impact of polymers is not the only concern of the public, but the producers have to be concerned to design of polymer -based products according to their performances for long term and the environmental limitations. From this point of view the most important aspects are presented in the third chapter **Environmental stability of polymers**. The introduction of polymers materials into consumer products has resulted in reduced energy utilization during manufacture and use. The extending the life of polymers is dependent on their durability which has to represent a design parameter. Therefore, the assessment of polymer durability is discussed taking

into account the different ways which are known for polymers. In the case of chemical degradation, thermal and oxidative degradations are considered along with those characteristic to polymer processing. All polymers degrade also in the outdoor environment, an important role being ascribed to the impurities introduced during manufacturing operations. In these conditions degradation of polymers involve complicated aspects concerning biodegradation as function of their provenience (natural or synthetic) and structure. Obviously, the degradation is determined by synergistic mechanisms which is connected with the introduction in polymers of different ingredients, such as: heat stabilizers (peroxide decomposers, hydrogen chloride scavengers, chain-breaking antioxidants), light stabilizers (UV absorbers and screens, light stable peroxide decomposers), fire retardants (ignition inhibitors, vapor phase retarders, inert gas generators). The environmental impact of polymer additives is analyzed along with the possibilities to limit their influence by finding different ways to design polymer-bound antioxidants and light stabilizers. A main problem of the polymer utilization is represented by their non-degradability. In these conditions is important to discuss the **Management of polymer wastes** (chapter 4). From this point of view the author presents a situation of generation of post-used plastics which has determined both practical measures to recycle them and a specific legislation at worldwide and European level (some examples are mentioned). The disposing of post-consumers plastics is discussed having in view energy consumption, air pollution, water pollution, and waste pollution. As a function of nature of polymers waste there are proposed different ways to treat them, such as: **mechanical recycling** [poly(ethyleneterephthalate), poly(vinylchloride), poly(styrene), poly(propylene), poly(ethylene)], **reprocessing of mixed plastics wastes** (there are the following commercial processes

known as: Reclamat , Reverzer , Remaker, Flita. Klobbie), **energy recovery by incineration, and liquid fuel and feedstock recovery**. The fifth chapter is dedicated to **Biodegradable polymers**. Although there is still considerable debate even among scientists about the meaning of the term “biodegradable” it was accepted to describe the fate of polymers in the environment.

There are a lot of examples of polymers specially designed for their capacity to be transformed under the environmental factors in different fields of applications. Thus the photolytic, peroxidisable, photo-biodegradable, hydro-biodegradable polymers and biodegradable copolymers and composites are known. The most important applications were mentioned in agriculture where the polymers are used as degradable mulching film due to their advantages such as: economics, soil sterilization, controlled release of chemicals, agricultural packaging.

At the same time this kind of materials were designed to be bio-assimilated (e.g. photo-biodegradable plastics) and to be integrated in the waste management according to corresponding policy and standards. These standards existing at worldwide and European level are presented for sewage, compost and litter.

This book which presents polymers as materials indispensable for human civilization contains useful information recommended for those researching and working in the field of polymers and environmental protection.

All orders should be addressed to: The Royal Society of Chemistry, Turpin Distribution Services Limited, Blackhorse Road, Letchworth, Herts SG6 1HN, UK.

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