

Biodegradable Plastics: A Broad Outlook

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Biodegradable plastics are the plastic materials that get completely degraded and decomposed by microbes and other living organisms. There are two main classes of biodegradable plastics. Bioplastics, the term has been coined from renewable raw materials and plastics that are derived from the hydrocarbons, petro-chemicals with biodegradable moieties that stimulate biodegradation like Polyanhydrides and polyvinyl alcohol. There are wide spread expansions in various spheres of the biodegradable plastic industries. They are likely to flourish significantly by next decade. The liberation of carbon dioxide, carbon monoxide and unburnt hydrocarbons after the disposal of plastics are accumulating to an alarming level. It has various climatically, chemical and biological adverse effects. The replacement and substitution of hazardous petroleum products, bi-products and plastics by renewable materials could balance the toxic content of gases in the atmosphere. Expansion in the markets, advancement of technology, and increase in consumption seems to be the prominent reason. Scientist's through-out the world are paying keen attention on biopolymer development. European countries emphasize on the recovery of packaging waste. Organic recovery by composting the waste materials is the most commonly used technique for waste reduction. They are planning to incorporate recycled plastics to manufacture the packaging materials. They are the pioneers in biopolymer research. Therefore, the preservation of environment, space and responsible disposal of the waste are its key considerations. Hence, Chinese researchers are focusing on refinement of microbially produced. The German government has demarcated and amended strict regulations regarding acceptable gas emission levels. Various eco-friendly bio-materials and bio-composites have been synthesized by extrusion and injection

moulding techniques. PHA North American researchers are increasing the use of renewable feed stocks resource. In United States, most land filled materials are dumped into landfills that are subsequently captured as methane biogas for use as judicious, clean, inexpensive energy source. With various chances, mutations and other influencing factors bacteria have developed the ability to degrade plastics. It has been already explored and evidenced already with nylon. Two types of nylon eating bacteria, *Flavobacteria* and *Pseudomonas*, were established in 1975 that possess enzymes (nylonase) capable of breaking down nylon. The concept of biodegradable plastics is new to India, which the study stated is primarily due to the cost factor. The cost of biodegradable plastics is 2- 10 times more than conventional plastics. However, efforts are being made to explore judicious and alternate options.

As the biopolymer industry flourishes several issues related to production are encountered. Multilayer films containing starch or natural fibers tend to have adhesion problems and the relations between structures, processing and properties of starch based materials remains unresolved. Standards organizations such as the ASTM and ISO have presented the various reference protocols for testing on biodegradable plastic materials testing. A need to review, improve and amend these tests has come to light with the expansion of industry using biopolymers. The materials derived from nature and natural resources require different parameters and considerations rather than those for synthetic materials. The biopolymer industry has a bright future, driven mainly by the environmental benefits of using renewable resources and the conservation of the energy. The aim of these efforts and development is to find a material with optimum technical performance and high biodegradability.

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