



Production of Bioplastic: Today's Demand Tomorrow's Solution

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With the increasing environmental concerns as well as high petroleum cost, plastics wastes and other synthetic materials, that are uneconomical and non-environmental friendly has attracted scientists, industrial as well as environmental expert, to do research and production of its alternative. Recently, bio plastics are the most attractive materials which are biodegradable and eco-friendly. Bio-plastics materials comprise, one-time-used items such as utensils, plates, cups, wrapping films and paper coatings used by fast-food companies. Apart from this, biomedical industries are using bio-plastic materials such as compost bags, clothing fibres etc.

Types of Bioplastics

Based on nature of the materials which are used for manufacturing of bio-plastics, these may be classified as Biodegradable plastics, Degradable plastics, Bio-based plastics, Compostable plastics, Starch-Based Bio-plastics.

- Biodegradable Plastics:** A biodegradable plastic is a type of plastic which is degraded by micro-organism (bacteria and fungi) activity. In this process, bio-plastic polymer materials are converted into carbon dioxide, water and biomass. This type of plastics is made from renewable natural resources or might be produced from fossil fuels and biodegradability depends on nature of used material and its thickness.
- Degradable Plastics:** Degradable plastics are the plastic which are decomposed by abiotic factors (UV radiation, oxygen attack) as well as biotic factors. Most important component of this type of plastic is polyethylene and sometime additive are added to polyethylene to increase the rate of plastic degradation.

Direct Impact and Motivation of Bioplastics for Society

Agricultural Mulch, Industrial Packaging, Surgical Implants, Foodservice, Pharmaceuticals and personal care are hot application areas which have been identified in India for the potential use of biodegradable plastics. Many international companies are planning to start the use of bio-plastics as packaging materials and it has become a hot line in research.

During 2016-2020, the Compound Annual Growth Rate (CAGR) was found to be 29.3%. It has been predicted that demand of bio-plastics will increase from about 2.05 million tonnes (2017) to around 2.44 million tonnes in 2022. Bio-based raw materials (starch and vegetable crop derivatives), renewable resources (hydropower, ethanol energy, solar energy) and biomass are key driven factors for bio-plastic market. This global bio-plastic

market will reduce the dependence on petroleum-based plastics as well as decrease the environmental pollution.

The use of bio-plastics can prevent plastic pollution that harms the earth and environment and will be an attractive alternative path for saving energy. It has been proved that production of bio-plastic process is energy efficient and it needs about 65% less energy than conventional production of plastics. Thus, Bio-plastics production may help in industrial sustainability reduce fossil fuels dependency, save energy consumption and will allow industrial production to diversify feed.

Starch-based Bio-plastics “Future Eye”

Now-a-day bio-plastics are manufactured by using starch as raw material. Starch based bio plastics are produced either by using starch directly or by fermentation process. Poly-lactic acid (PLA) are well known starch-based bio-plastic. Poly-lactic acid or PLA: It comes in the categories of biodegradable plastic which is eco-friendly material. PLA is produced renewable resources such as potatoes, sugar cane corn etc.

The characteristics of PLA match with polyethylene, polypropylene and polystyrene and can be converted into bio-plastic using injection modelling and deep drying machine. PLA properties can be changed by addition of different additive, which leads to manufacturing of varieties of products. PLA products are naturally biodegradable. For example, if a bottle made up of PLA is left in ocean, it will degrade automatically within six to twenty-four months.

