

Production of Biodegradable Plastics Polyhydroxyalkanoates from Waste Frying Oil

Yaman Keskin, O.

Istanbul Technical University Department of Food Engineering

Istanbul, Turkey

The use of non-renewable traditional commercial polymers, derived from fossil feedstocks such as petroleum and natural gas, has led to many environmental problems related to their disposal. Broader usage of biodegradable plastics in packaging and disposable products as a solution to environmental problems would heavily depend on further reduction of costs and the discovery of novel biodegradable plastics with improved properties. In the search for a biodegradable plastic of natural or biological origin, a family of more than 40 polyhydroxyalkanoates (PHAs) and their related copolymers has been discovered, and has emerged as environmentally friendly materials. These polymers are completely biodegradable into carbon dioxide and water within a few months of burial . Polyhydroxyalkanoates are biopolymers, which can replace petrochemical plastics in many applications. However, these bioplastics are currently far more expensive than petrochemical plastics. Many researchers are investigating the use of inexpensive substrates derived from waste streams. Waste frying oil has to be filtered for the production of soap or biodiesel, but it can be used in PHA-production without filtration. *Cupriavidus necator* (formerly known as *Ralstonia eutropha*) is a versatile organism for the production of PHAs. Plant oils, because of their complex mix of triglycerides, yield higher PHA in comparison with other tested substrates such as sugars. Plant oils are derived from oil-bearing crops, such as soybean, rapeseed, palm, sunflower, and corn. The collection of waste frying oil is becoming more widespread, making waste oil a good alternative to purified oil for PHA production.