Determination of the polyhydroxyalkanoate content in bacteria by gel permeation chromatography

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Abstract

Polyhydroxyalkanoates are popular biopolymers which pertain to the biodegradable polymers group. This scientific work aims to examine the production of PHA polymers via microbial fermentation and employ fast methods for extraction and characterization of the polymer. Analytical methods as gel permeation chromatography, fluorescence microscopy and Raman spectroscopy were used to determine whether the polymer was produced or extracted successfully. Until now no fast method for this polyester of interest was invented. Multiple fermentations of the bacteria *Pseudomonas Oleovorans* were cultivated under different operation modes with octanoic acid as a substrate. Afterwards, various cell disruption methods involving some chemical treatment with etylenediaminetetraaceic acid and critical carbon dioxide drying were used to destroy the gram-negative bacteria.

All in all, the results from gel permeation chromatography were correlated with the ones from Raman spectroscopy, but the methods failed to identify the presence of the desired polyhydroxyalkanoate or any of its monomers from the fermentations.