

POLY(3-HYDROXYBUTYRATE-CO-3-HYDROXYVALERATE) PRODUCTION FROM GLYCEROL AND PROPIONIC ACID BY *Pandoraea* sp. MA03prp25 AT 10 LITERS SCALE-BIOREACTOR

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Abstract

Polyhydroxyalkanoates (PHAs) are microbial polyesters accumulated as intracellular granules of energy reserve materials under nutrient imbalance such as excess carbon with limited nitrogen, phosphorus or oxygen. Although PHAs represent environmental advantages to replace the petrochemical polymers, their expensive production price limit their use for general application. Whereas 40-48% of the total cost is ascribed to raw materials in which the carbon source could reach 70-80% of the total expense, alternative solutions have been proposed to implement waste carbon sources or industrial byproducts for the bacterial cultures with the aim of reducing the production costs. Once the biodiesel glycerol is becoming a waste product with an associated disposal cost, it is interesting the implementation of biorefineries that coproduce value-added products along with biofuels such as the PHAs biopolymers. In this study the mutant strain *Pandoraea* sp. MA03prp25 was analysed for P3HB-co-3HV production from glycerol and propionic acid at a 10l scale-bioreactor. The mutant strain was inoculated from agar plates in Luria-Bertani medium for 24h at 30°C and 150 rpm. A volume of 30 ml was transferred to 1l Mineral Salts Medium (MSM) containing 10 g.l⁻¹ glycerol and 1g.l⁻¹ (NH₄)₂SO₄ for 18h at 30°C and 150 rpm. The bioreactor cultivations started with 10% inocula with a total volume of 5l containing 20g.l⁻¹ glycerol and 2g.l⁻¹ (NH₄)₂SO₄ at 34°C, pO₂ of 20%. The cultivations were performed in two steps with the first one for bacterial growth. The second step started after nitrogen limitation with a feed regimen of 250g.l⁻¹ carbon source containing a mixture of glycerol and propionic acid (10:1 w/w). The glycerol concentration was determined by liquid chromatography with Prominence UFLC apparatus (Shimadzu®). Samples of about 10mg of freeze-dried cells were subjected to propanolysis for P3HB-co-3HV determination. The propyl esters were assayed by GC-MS QP2010 Ultra (Shimadzu®) with the column Rtx®-5MS. The best results of polymer production was obtained after 48h, when it was observed a co-polymer production of 62.53% of the cell dry weight and 16.97mol% of 3HV monomer. These results suggest that *Pandoraea* sp. MA03prp25 is a promising strain for P3HB-co-3HV production from glycerol and propionic acid.

Key-words: P3HB-co-3HV, *Pandoraea*, biodiesel, glycerol, biopolymer

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