Title: POLY(3-HYDROXYBUTYRATE) PRODUCTION SYNTHESIZED BY *CUPRIAVIDUS NECATOR* DSM 545 BY FED-BATCH CULTURE USING GLYCEROL.

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Abstract:

Poly(3-hydroxybutyrate), P(3HB), is a natural and biodegradable polyester, produced and accumulated as an energy reserve for various microorganisms. It is considered an attractive substitute for the petrochemical polymers, it has the advantage of being degraded in the soil within a few months by the action of microorganisms. As a result of the national policy of adding biodiesel in fossil fuels, glycerol, the main by-product of biodiesel is being produced on a large scale due to the rise of the use of biofuels, so it is need to find commercial uses for this surplus production. The glycerol may be used for several purposes, like a carbon source for the cultivation of microorganisms. Given the availability of glycerol, the purpose of this study was to synthesize P(3HB) from the cultivation of the bacterium *Cupriavidus necator* with glycerol as a source of additional carbon in different conditions performed in duplicate: without glycerol (SG), with addition of 20 g L^{-1} glycerol in the polymer produced (AG-FP) and addition of 20 g L^{-1} of glycerol at the start of cultivation (AG-IC), in order to evaluate its effect on cell growth and the synthesis of the polymer. The results showed that the addition of glycerol at the start of culture led to highest values of accumulation percentage the P(3HB) (64.12%) and productivity in P(3HB) in the production phase (0.32 g L^{-1} h^{-1}), when compared to the tests where the addition of glycerol was only in the production phase (AG-FP) or when there was no addition of glycerol (SG). On the other hand, in the experiments without glycerol, can be observed higher values of the biomass to substrate yield (0.17 g g^{-1}) when compared with tests in which there was no addition of glycerol. The parameters of accumulation of P(3HB) (%), of the biomass to substrate yield and polymer productivity in the production phase ($P_{P(3HB)prod}$) presented statistically significant differences in function of the cultivation strategy used. The characterization of the polymers synthesized in bioreactor showed the formation of P(3HB), and it was found that the use of glycerol did not modify the film properties.

Key words: poly(3-hydroxybutyrate),*Cupriavidus necator*, glycerol

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