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Biotransformation of Glycerine Pitch as Renewable Carbon Resource into P(3HB-co-4HB) Biopolymer

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Abstract : Oleochemical industry in Malaysia has been diversifying significantly due to the abundant supply of both palm and kernel oils as raw materials as well as the high demand for downstream products such as fatty acids, fatty alcohols and glycerine. However, environmental awareness is growing rapidly in Malaysia because oleochemical industry is one of the palm-oil based industries that possess risk to the environment. Glycerine pitch is one of the scheduled wastes generated from the fatty acid plants in Malaysia and its discharge may cause a serious environmental problem. Therefore, it is imperative to find alternative applications for this waste glycerine. Consequently, the aim of this research is to explore the application of glycerine pitch as direct fermentation substrate in the biosynthesis of poly(3-hydroxybutyrate-co-4-hydroxybutyrate) [P(3HB-co-4HB)] copolymer, aiming to contribute toward the sustainable production of biopolymer in the world. Utilization of glycerine pitch (10 g/l) together with 1,4-butanediol (5 g/l) had resulted in the achievement of 40 mol% 4HB monomer with the highest PHA concentration of 2.91 g/l. Synthesis of yellow pigment which exhibited antimicrobial properties occurred simultaneously with the production of P(3HB-co-4HB) through the use of glycerine pitch as renewable carbon resource. Utilization of glycerine pitch in the biosynthesis of P(3HB-co-4HB) will not only contribute to reducing society's dependence on non-renewable resources but also will promote the development of cost efficiency microbial fermentation towards biosustainability and green technology.

Keywords : biopolymer, glycerine pitch, natural pigment, P(3HB-co-4HB)
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