Fuel

Optimization of media components and culture conditions for polyhydroxyalkanoates production by Bacillus megaterium

K. Mohanrasu[a,b,] R. Guru Raj Rao[c,] G.H. Dinesh[a,b,] Kunyu Zhang[d,] G. Siva Prakash[a,b,]

Dong-Po Song[e,] Sudhakar Muniyasamy[f,g,] Arivalagan Pugazhendhi[h,] J. Jeyakanthan[c,] A. Arun[b,*]

[a] Department of Energy Science, Alagappa University, Karaikudi, Tamil Nadu, India

[b] Department of Microbiology, Alagappa University, Karaikudi, Tamil Nadu, India

[c] Department of Bioinformatics, Alagappa University, Karaikudi, Tamil Nadu, India

[d] School of Chemical Engineering and Technology, Tianjin University, China

[e] School of Materials Science and Engineering, Tianjin University, China

[f] CSIR Materials Science and Manufacturing, Polymers and Composites Competence Area, P.O. Box 1124, Port Elizabeth 6000, South Africa

[g] Department of Chemistry, Faculty of Science, Nelson Mandela Metropolitan University, P.O. Box 77000, Port Elizabeth 6031, South Africa

[h] Innovative Green Product Synthesis and Renewable Environment Development Research Group, Faculty of Environment and Labour Safety, Ton Duc Thang University, Ho Chi Minh City, Viet Nam

https://www.sciencedirect.com/science/article/pii/S0016236120305172?via%3Dihub

Abstract

Polyhydroxybutyrate (PHB) accumulating Bacillus megaterium was isolated from marine water. To increase the PHB productivity by Bacillus megaterium, steps were taken to evaluate the effects of carbon sources (arabinose, glucose, glycerol, lactose, lactic acid, mannitol, sodium acetate, starch and sucrose at a level of 20 g/L), nitrogen sources (ammonium chloride, ammonium sulphate, glycine, potassium nitrate, protease peptone and urea at a level of 2 g/L) and different pH. A maximum yield of 2.74 g/L of PHB was achieved for glucose as the carbon source and ammonium sulphate as the nitrogen source at pH 7. The optimized conditions were further used for batch fermentation throughout 72 h. Significantly maximum PHB of 5.61 g/L was obtained in a laboratory scale bioreactor at 64 h. The extracted polymer was compared with the authentic PHB and was confirmed to be PHB using FTIR, 1H NMR, DSC and TGA analysis, respectively.