

Topic: Production of Polyhydroxyalkanoate from glycerol using mixed cultures

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ABSTRACT

The research examined PHA production from glycerol by using mixed culture. Optimal condition in 1-L cultivation was observed at 10% v v⁻¹ glycerol, 30°C. The results showed that PHB content and productivity were 50.1% and 0.01 g PHB L⁻¹ h⁻¹ after 120 h and the highest growth in 1-L and 10-L reactors were 7.90 and 6.42 g L⁻¹, respectively. The PHB content and productivity in 10-L were 51.1% and 0.01 g PHB L⁻¹ h⁻¹ at 120 h. At the optimal conditions, dominant bacteria were analyzed and belonged to genera *Bacillus*, *Bacteroides*, *Citrobacter*, *Clostridium* and *Klebsiella*. Effects of co-carbon and/or nitrogen were examined. The maximum percentage of PHB content and productivity was 68.4 % and 0.02 g L⁻¹ h⁻¹ in 1-L and culture was proceeded at 30°C for 120 h in medium, containing 10% v v⁻¹ glycerol and 0.14% w v⁻¹ (NH₄)₂SO₄. The percentage of PHB content was accomplished after 72 h incubation, which was 89% for 1-L, and 83% for 10-L that the mixed cultures in their reactors were analyzed using DGGE. The members of *Bacillus* sp., *Citrobacter freundii*, *Klebsiella* sp. and *Clostridium* sp. were present in both. Finally, the activated sludge of wastes was used to capable of converting 5% v v⁻¹ crude glycerol to PHA production. The 16S rRNA sequences of dominant RISA bands showed bacterial communities cultivated which were closely related to *Azoarcus* sp., *Bacillus cereus*, *Bacillus pseudofirmus*, *Flavobacterium columnare* and *Thauera* sp. Interestingly, the *Bacillus* sp. was grown both commercial and crude glycerol.

Keywords: Polyhydroxyalkanoate (PHA), Denaturing Gradient Gel Electrophoresis mixed (DGGE), Ribosomal Intergenic Spacer Analysis (RISA), Mixed Cultures, Glycerol, Activate sludge