Study on Converting Glycerol to 2,3-Butanediol by Suspended and Immobilized Bacterial Strains

黃端文、吳建一, 顏裕鴻, 陳小玲

E-mail: 387163@mail.dyu.edu.tw

ABSTRACT

Among the promising chemical, 2,3-butanediol (2,3-BDO) is a bio-based diols, which for a wide range of applications in food and cosmetic industry, antifreezes and additives. This study is reported the isolation of two strains Klebsiella sp. Wu1 and K. pneumoniae Wu2, capable to convert glycerol in to 2,3-BDO. The effects of pH, carbon and nitrogen substrate concentration, aeration and agitation rate on the production of 2,3-BDO were investigated. Peptone was a better nitrogen source when considering the 2,3-BDO production performance. The 2,3-butanediol formation reached a maximum yield were 7.2 and 8.4 g/l for Klebsiella sp. Wu1 and K. pneumoniae Wu2 in batch culture, respectively, when glycerol concentration were 40 and 60 g/L. Additionally, the study was also to focus on the feasibility of production of 2,3-BDO using PVA-PU immobilized-cell beads in the fluidized bed reactor. The effect of typical process variables such as hydraulic retention (HRT), influent glycerol concentration level and particle number density on 2,3-BDO production were studied. The maximum 2,3-BDO production by immobilized Klebsiella sp. Wu1 and K. pneumoniae Wu2 beads in fluidized bed reactor were 16.35 and 17.12 g/L at HRT of 24h, respectively.

Keywords : 2,3-butanediol、glycerol、immobilization、fluidized bed reactor、Polyvinyl Alcohol (PVA)、polyurethane (PU)、K. pneumonia、 Klebsiella sp.

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