Study on isolation of cellulose-degrading strain and bioethanol production strain

謝明綸、吳建一
E-mail: 322076@mail.dyu.edu.tw

ABSTRACT
In recent years, with world reserves of petroleum fast depleting, ethanol has emerged as most important alternative resource for biofuel and has generated a great deal of research interest in ethanol fermentation. Production of ethanol from renewable cellulosic resources may improve energy availability, decrease atmospheric CO2 accumulation and air pollution. Therefore, this study is to use microbial conversion of cellulosic waste into ethanol, the result is divided into two parts: The first: In order to produce CMCase that can be transformed to reducing sugar, more than 3 bacteria isolates were screened from food factory, paper sludge, insect intestinal bacteria and then identified according to their 16S rDNA gene sequences. The three strain with high cellulose degrading capability were identified as Bacillus subtilis CELL, Bacillus sp. and Arthrobacter woluwensis Wu1, respectively. Additionally, the effects of the fermentation parameters such as initial pH, temperature, and nitrogen source on the CMCase production were studied using carboxymethyl cellulose (CMC) as the carbon source. CMCase from Arthrobacter woluwensis Wu1, Bacillus subtilis CELL and Bacillus sp. was maximally secreted at 37°C, initial pH 5.0, 6.0, 7.0 with are all 15 g/L of CMC as carbon source, and 1, 5, 5 g/L of yeast extract as organic nitrogen source, respectively. The second: The fermentative ability of Candida tropicalis Wu1 yeast to produce ethanol was examined. The effects of the fermentation parameters such as initial stirred speed, and nitrogen source on the ethanol production were studied using glucose as the carbon source in batch cultures. Ethanol from Candida tropicalis Wu1 was maximally yield at 30°C, static cultures with 20 g/L of glucose as carbon source, and 2.5 g/L of (NH4)2SO4 as nitrogen source, respectively. Additionally, conversion of glucose to ethanol by immobilized C. tropicalis Wu1 beads were examined. The results showed that the maximum ethanol productivity of immobilized C. tropicalis Wu1 was 0.33 g/L/h with 50 g/L glucose at 30℃ and 50 rpm.
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