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

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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°C and 50 rpm.

Keywords : Cellulose、Ethanol、Reducing sugar、Immobilized

Table of Contents

目錄 封面內頁 簽名頁 授權書iii 中文摘要iv 英文摘要vi 誌謝viii 目錄ix 圖目錄xiv 表目錄xxiv 1.前言1 1.1 緣起1 1.2 研究目的及架構2 2.文獻回顧4 2.1微生物能源轉換之優缺點4 2.2國內之纖維素廢棄物背景說明5 2.3木質纖維素介紹7 2.3.1纖維素8 2.3.2半纖維素9 2.3.3木質素10 2.4纖維素水解酵素之種類及作用機制12 2.4.1內切型纖維素分解酵素13 2.4.2外切型纖維素分解酵素14 2.4.3 β -葡萄糖?酵素14 2.5纖維分解菌株15 2.5.1纖維分解菌株之類型15 2.5.2纖維分解過程中的抑制影響20 2.5.3環境因子對纖維分解菌株分解纖維之影響21 2.6生質酒精之重要性24 2.7生質酒精之開發生質酒精之生產25 2.7.1國內生質酒精之研發概況25 2.7.2國外生質酒精之研發概況27 2.8生質酒精之生產31 2.8.1酒精生產之微生物31 2.8.2固定化酵母菌發酵生產酒精之相關研究36 2.8.3酒精的抑制影響38 2.9環境因子對酒精生產之影響40 3.材料與方法49 3.1實驗材料49 3.1.1實驗試藥49 3.1.2實驗設備50 3.2菌株來源與菌種篩選及鑑定51 3.2.1菌株來源51 3.2.2菌株之分離與純化51 3.2.3優勢菌株之16S rDNA鑑定53 3.2.4建立分離菌株之親緣樹狀圖54 3.3固定化微生物顆粒之製備54 3.3.1大量培養菌體並準備固定化54 3.3.2菌體量之量測55 3.3.3固定化分離菌株之製備及基本性質測定56 3.3.4固定化分離菌株之重複批次試驗57 3.4探討分離菌株之最適生長條件57 3.4.1不同氮源種類對菌株生長及生產之影響57 3.4.2不同碳、氮源濃度對菌株生長及生產之影響58 3.4.3環境因子對菌株生長及生產之影響58 3.5分離之纖維分解菌株作用於不同基質下之纖維分解能力59 3.5.1分解不同纖維素來源之基質59 3.5.2從不同基質測定纖維水解酵素之種類59 3.6分析方法60 3.6.1還原醣定性與定量60 3.6.2Glucose 與 cellobiose 之分析62 3.6.3剛果紅測試62 3.6.4纖維素分解酵素活性測試63 3.6.4.1內切型纖維素分解酵素(CMCase)活性分析63 3.6.4.2外切型纖維素分解酵素活性分析64 3.6.4.3 β -葡萄糖?酵素(β -glucosidase)活性分析64 3.6.5酒精之檢測64 4.結果與討論65 4.1纖維分解65 4.1.1纖維分解菌株之篩選及鑑定65 4.1.2纖維分離菌株之最適生長條件及Arrhenius、動力學解析75 4.1.2.1最適的氮源種類75 4.1.2.2最適的碳源濃度81 4.1.2.3最適的氮源濃度90 4.1.2.4最適的pH值99 4.1.2.5最適的溫度及Arrhenius解析108 4.1.2.6最適的震盪速率121 4.2纖維分離菌株作用於不同基質下之纖維分解能力130 4.2.1菌株分解不同纖維素來源基質之比較130 4.2.2分析纖維水解酵素之種類133 4.3酒精生產136 4.3.1酒精生產菌株之篩選136 4.3.2固定化及懸浮酒精生產菌株之生產條件試驗139 4.3.2.1震盪速率對酒精生產菌株生產酒精之影響139 4.3.2.2氮源種類對酒精生產菌株生產酒精之影響144 4.3.2.3氮源濃度對酒精生產菌株生產酒精之影響149 4.3.3不同粒徑之固定化酒精生產菌株Candida tropicalis Wu1 顆粒對生產酒精之 影響154 4.3.4固定化顆粒之重複批次試驗157 4.3.5碳源濃度對酒精生產菌株生產酒精之影響161 5.結論166 參考文獻168 圖目錄 Figure 1-1 Schematic of this study procedure3 Figure 2-1 Composition of lignocellulosic materials and their potential hydrolysis products7 Figure 2-2 Partial structure of cellulose9 Figure 2-3 Structure of 5-Carbon sugars in hemicellulose10 Figure 2-4 General structure of hemicellulose10 Figure 2-5 Partial structure of lignin11 Figure 2-6 The synergy effect of cellulose hydrolysis12 Figure 3-1 Schematic diagram of immobilization method of Candida tropicalis Wu1 using PVA materials55 Figure 3-2 The standard calibration curve of glucose61 Figure 4-1 Congo red test (A)-(B): cellulose degradation activites of experimental cellulolytic microbes isolates on CMC agar plate67 Figure 4-2 Congo red test (C)-(E): cellulose degradation activites of experimental cellulolytic microbes isolates on CMC agar plate68 Figure 4-3 Congo red test (F)-(H): cellulose degradation activites of experimental cellulolytic microbes isolates on CMC agar plate69 Figure 4-4 Congo red test (F)-(H): cellulose degradation activites of experimental cellulolytic microbes isolates on CMC agar plate70 Figure 4-5 Phylogenetic dendrogram showing a comparison of the aligned 16S rDNA sequences of known Bacillus species with that of strain Bacillus sp72 Figure 4-6 Phylogenetic dendrogram showing a comparison of the aligned 16S rDNA sequences of known Bacillus species with that of strain Bacillus subtilis CELL73 Figure 4-7 Phylogenetic dendrogram showing a comparison of the aligned 16S rDNA sequences of known Arthrobacter species with that of strain Arthrobacter woluwensis WU174 Figure 4-8 Effect of nitrogen source on cellulose degradation activities from CMC (10g/L)-agar plate by isolated Arthrobacter woluwensis Wu1, after incubation at 37°C, for 24 h77 Figure 4-9 Effect of nitrogen source on cellulose degradation activities from CMC (10g/L)-agar plate by isolated Bacillus subtilis CELL, after incubation at 37°C, for 24 h78 Figure 4-10 Effect of nitrogen source on cellulose degradation activities from CMC (10g/L)-agar plate by isolated Bacillus sp., after incubation at 37°C, for 24 h79 Figure 4-11 The time course of reducing sugar and biomass by isolated Arthrobacter woluwensis WU1 at different concentration CMC in batch cultures at 150 rpm and 37°C84 Figure 4-12 Effect of initial CMC concentration on specific growth rate and yield of reducing sugar by Arthrobacter woluwensis Wu1 at 37°C85 Figure 4-13 The time course of reducing sugar and biomass by isolated Bacillus subtilis CELL at different concentration CMC in batch cultures at 150 rpm and 37 °C86 Figure 4-14 Effect of initial CMC concentration on specific growth rate and yield of reducing sugar by Bacuillus subtilis CELL at 37°C87 Figure 4-15 The time course of reducing sugar and biomass by isolated Bacillus sp. at different concentration CMC in batch cultures at 150 rpm and 37°C88 Figure 4-16 Effect of initial CMC concentration on specific growth rate and yield of reducing sugar by Bacillus sp. at 37°C89 Figure 4-17 The time course of reducing sugar and biomass by isolated Arthrobacter woluwensis WU1 at different concentration of yeast extract in batch culture at 150 rpm and 37°C93 Figure 4-18 Effect of initial yeast extract concentration on specific growth rate and yield of reducing sugar by Arthrobacter woluwensis WU1 at 37°C94 Figure 4-19 The time course of reducing sugar and biomass by isolated Bacillus subtilis CELL at different concentration of yeast extract in batch culture at 150 rpm and 37°C95 Figure 4-20 Effect of initial yeast extract concentration on specific growth rate and yield of reducing sugar Bacuillus subtilis CELL at 37°C96 Figure 4-21 The time course of reducing sugar and biomass by solated Bacillus sp. at different concentration of yeast extract in batch culture at 150 rpm and 37°C97 Figure 4-22 Effect of initial yeast extract concentration on pecific growth rate and yield of reducing sugar Bacillus sp. at 37°C98 Figure 4-23 The time course of reducing sugar and biomass by solated Arthrobacter woluwensis WU1 at different pH in batch cultures at 37°C and 150 rpm102 Figure 4-24 Effect of initial pH on specific growth rate and yield of reducing sugar by Arthrobacter woluwensis WU1 at 37°C103 Figure 4-25 The time course of reducing sugar and biomass by isolated Bacillus subtilis CELL at different stirrer speed in batch cultures at 37°C and 150 rpm104 Figure 4-26 Effect of initial pH on specific growth rate and yield of reducing sugar by Bacuillus subtilis CELL at 37°C105 Figure 4-27 The time course of reducing sugar and biomass by isolated Bacillus sp. at different stirrer speed in batch cultures at 37°C and 150 rpm106 Figure 4-28 Effect of initial pH on specific growth rate and yield of reducing sugar by Bacillus sp. at 37°C107 Figure 4-29 The time course of reducing sugar and biomass by isolated Arthrobacter woluwensis WU1 at varying temperature in batch culture at 150 rpm112 Figure 4-30 Effect of initial temperature on specific growth rate and yield of reducing sugar by Arthrobacter woluwensis WU1 at 150 rpm113 Figure 4-31 Arrhenius plots for specific growth rate and yield of reducing sugar by Arthrobacter woluwensis WU1114 Figure 4-32 The time course of reducing sugar and biomass by isolated Bacillus subtilis CELL at varying temperature in batch culture at 150 rpm115 Figure 4-33 Effect of initial temperature on specific growth rate and yield of reducing sugar by Bacuillus subtilis CELL at 150 rpm116 Figure 4-34 Arrhenius plots for specific growth rate and yield of reducing sugar by Bacuillus subtilis CELL117 Figure 4-35 The time course of reducing sugar and biomass by isolated Bacillus sp. at varying temperature in batch culture at 150 rpm118 Figure 4-36 Effect of initial temperature on specific growth rate and yield of reducing sugar by Bacillus sp. at 150 rpm119 Figure 4-37 Arrhenius plots for specific growth rate and yield of reducing sugar by Bacillus sp120 Figure 4-38 The time course of reducing sugar and biomass by isolated Arthrobacter woluwensis WU1 at different stirred speed in batch cultures at 37°C124 Figure 4-39 Effect of stirred speed on specific growth rate and yield of reducing sugar by Arthrobacter woluwensis WU1 at 37°C125 Figure 4-40 The time course of reducing sugar and biomass by isolated Bacillus subtilis CELL at different stirred speed in batch cultures at 37°C126 Figure 4-41 Effect of stirred speed on specific growth rate and yield of reducing sugar by Bacillus subtilis CELL at 37°C127 Figure 4-42 The time course of reducing sugar and biomass by isolated Bacillus sp. at different stirred speed in batch cultures at 37°C128 Figure 4-43 Effect of stirred speed on specific growth rate and yield of reducing sugar by Bacillus sp. at 37°C129 Figure 4-44 Effect of carbon sources on cellulose degradation activities by isolated Arthrobacter woluwensis WU1 and Bacillus sp. and Bacillus subtilis CELL, after incubation at 37°C132 Figure 4-45 Effects of added different substrates on reducing sugar product by Bacillus subtilis CELL at 40°C for 24 h134 Figure 4-46 Effects of added different substrates on cellubiose degradation by Bacillus subtilis CELL at 37°C for 6 day135 Figure 4-47 The time course of ethanol product by suspended yeast at batch and static cultures using glucose as carbon source137 Figure 4-48 Phylogenetic dendrogram showing a comparison of the aligned 16S rDNA sequences of known Candida species with that of strain Candida tropicalis Wu1138 Figure 4-49 The time course of biomass and ethanol product by suspended and immobilized Candida tropicalis Wu1 cell beads (25 g-bead/250 ml) at different stirred speed in batch cultures141 Figure 4-50 The results of average specific growth rate, cell mass yield, ethanol yield on glucose, and ethanol yield on cell mass at different stirred speed in suspended cell system142 Figure 4-51 The results of ethanol yield on glucose, and ethanol yield on immobilized-cell beads at different stirred speed in immobilized-cell beads system143 Figure 4-52 The time course of biomass and ethanol product by suspended and immobilized Candida tropicalis Wu1 cell beads (25 g-bead/250 ml) at different nitrogen source in batch cultures146 Figure 4-53 The results of average specific growth rate, cell mass yield, ethanol yield on glucose, and ethanol yield on cell mass at different nitrogen source in suspended cell system147 Figure 4-54 The results of ethanol yield on glucose, and ethanol yield on immobilized-cell beads at different nitrogen source in immobilized-cell beads system148 Figure 4-55 The time course of biomass and ethanol product by suspended and immobilized Candida tropicalis Wu1 cell beads (25 g-bead/250 ml) at different concentration of (NH4)2SO4 in batch cultures151 Figure 4-56 The results of average specific growth rate, cell mass yield, ethanol yield on glucose, and ethanol yield on cell mass at different (NH4)2SO4 concentration in suspended cell system152 Figure 4-57 The results of ethanol yield on glucose, and ethanol yield on immobilized-cell beads at different (NH4)2SO4 concentration in immobilized-cell beads system153 Figure 4-58 The time course of biomass and ethanol product by immobilized Candida tropicalis Wu1 cell beads (25 g-bead/250 ml) at different beads size in batch cultures155 Figure 4-59 The results of ethanol yield on glucose, and ethanol yield on immobilized-cell beads at different beads size in immobilized-cell beads system156 Figure 4-60 The results of the production of ethanol by immobilized Candida tropicalis Wu1 cell beads during repeat-batch fermentation158 Figure 4-61 Microbial population development and distribution of PVA gel beads during continuous operation. (A) beads prior to start-up; (B) beads after 5 times of incubation. Dash 1 and 2 respectively indicate the whole beads and surface area159 Figure 4-62 Microbial population development and distribution of PVA gel beads during continuous operation. (A) beads prior to start-up; (B) beads after 5 times of incubation. Dash 1 and 2 interior of beads160 Figure 4-63 The time course of biomass and ethanol product by suspended and immobilized Candida tropicalis Wu1 cell beads (25 g-bead/250 ml) at different concentration of glucose in batch cultures163 Figure 4-64 (a) Effect of the ethanol product of different glucose concentration in suspended cell system (b) Lineweaver-Burk plot of the different concentration of glucose164 Figure 4-65 (a) Effect of the ethanol product of different glucose concentration in immobilized-cell beads system.(b) Substrate inhibition of the different oncentration of glucose165 表目錄 Table 2-1 The contents of cellulose, hemicellulose, and lignin in common a gricultural residues and wastes5 Table 2-2纖維分解菌株之種類18 Table 2-3國內纖維分解及纖維分解菌株的相關研究19 Table 2-4國內生質酒精之推廣政策27 Table 2-5國外生質酒精之推動情形30 Table 2-6 Yeast species which produce ethanol as the main fementation product33 Table 2-7不同固定化方法之優缺點比較38 Table 3-1 Modified Mandels-Reese medium52 Table 3-2 Yeast Extract Peptone Dextrose (YPD) medium53 Table 3-3 PCR program53 Table 3-4 PCR primers used in this study54 Table 3-5 The composition of DNS reagent61 Table 4-1 Comparison with cellulose degrading ability of different cellulose degrading bacteria66 Table 4-2 Comparison with cellulose degrading ability of different cellulose degrading bacteria under various nitrogen source80

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