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### 棉秆脱毒水解液发酵生产2,3-丁二醇的工艺优化

#### Process optimization for producing 2, 3-butanediol by fermentation of cotton stalk hydrolysate after detoxification

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英文关键词: [hydrolysis](#) [detoxification](#) [fermentation](#) [cotton stalk](#) [2,3-Butanediol](#)

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中文摘要:

2,3-丁二醇是一种重要的化工产品,利用棉秆水解液替代淀粉原料制备2,3-丁二醇可保证粮食安全并降低成本。该文以棉秆稀酸水解液为基础,研究了其中糠醛和苯酚微波辅助加热-活性炭吸附的脱毒条件,优化结果为:活性炭用量1%、微波功率330 W、作用时间10 min。在此工艺条件下,糠醛的去除率为81.2%,苯酚的脱除率为92.3%,总糖的损失为10.6%。脱毒棉秆水解液为底物发酵生产2,3-丁二醇研究表明,水解液浓度为40 g/L时Klebsiella pneumoniae XJ-Li菌体浓度和2,3-丁二醇的产率最高,补料批次发酵可以缓解高浓度棉秆水解液对微生物生长与代谢的抑制作用。通过采用添加60 mg/L维生素C和维持发酵液pH值于5.5的复合调控方法,2,3-丁二醇的质量浓度达到了45.1 g/L,产率为0.45 g/g。发酵试验表明脱毒的棉秆水解液作为碳源发酵制备2,3-丁二醇具有可行性。

英文摘要:

2,3-Butanediol is an important chemical product. Utilization of cotton stalk hydrolysate instead of starch for 2,3 -butanediol production can ensure food security and reduce costs. Cotton stalk was hydrolyzed by dilute acid in this research. The detoxification of furfural and phenol from cotton stalk dilute acid hydrolysate was performed by microwave assistant? heating-activated carbon adsorption method, the optimized technical conditions were determined as activated carbon 1%, microwave power 330 W and detoxification time 10 min. The detoxification ratio of furfural was 81.2% and 92.3% of phenol, and the loss of total sugar was only 10.6%. The batch cultures showed that the biomass of Klebsiella pneumoniae XJ-Li and the yield of 2,3-butanediol reached to peak value when the total sugar concentration was 40 g/L in media. The results of research demonstrated that the inhibition effect of high concentration of cotton stalk hydrolysate on the growth and metabolic of microorganism could be reduced by fed-batch fermentation. The multiplexed regulation method of adding 60 mg/L of vitamin C into media and maintaining pH of broth at 5.5 was applied, and 45.1 g/L of 2,3-butanediol was reached with the yield of 0.45 g/g. The cornhusk dilute acid hydrolysate after detoxification can be the substitution of glucose as a carbon source for producing succinic acid by anaerobic fermentation. Fermentation experiments showed that it is feasible to produce 2,3-butanediol by fermentation using cotton stalks hydrolyzate detoxified as a carbon source .

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