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Tween 80和鼠李糖脂对稻草酶解的影响

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中文摘要

采用纤维素酶促水解的方法,以稻草为底物,探讨了添加化学表面活性剂Tween 80和生物表面活性剂鼠李糖脂对酶解过程的糖产率、酶稳定性、纤维素转化率的的作用以及对酶动力学特征和酶在纤维素上吸附的影响.结果表明,不同浓度的Tween 80和鼠李糖脂对稻草酶解有不同程度的促进,添加0.016%和0.048% Tween 80使糖产率分别提高18.07%和11.98%,而添加0.01%和0.03% 鼠李糖脂使糖产率分别增加了23.01%和22.16%,相比较鼠李糖脂的效果更好.表面活性剂能有效增强酶的稳定性,添加高浓度表面活性剂的酶稳定性优于添加低浓度表面活性剂,添加浓度为0.048%的Tween 80得到最高相对CMCA(羧甲基纤维素酶活)108.06%和最高相对FPA(滤纸酶活)80.26%.表面活性剂能提高酶解反应的纤维素转化率,而且添加鼠李糖脂的转化率明显高于Tween 80.表面活性剂不仅能够提高最大反应速度并使米氏常数变大,而且显著地降低了纤维素酶在纤维素上的吸附.

英文摘要

The method of enzymatic hydrolysis was adopted and straw was used as substrate to study the effects of reducing sugar yield,enzyme stability and convention rate of cellulose during the course of enzymatic hydrolysis as well as the impacts of enzyme kinetic characteristics and adsorption of cellulase on cellulose by addition of chemical-surfactant Tween 80 and biosurfactant rhamnolipid.The results indicated that Tween 80 and rhamnolipid at different concentrations enhanced the production of reducing sugar.Tween 80 at 0.016% and 0.048% increased reducing sugar yield by 18.07% and 11.98%,while rhamnolipid at 0.01% and 0.03% increased reducing sugar yield by 23.01% and 22.16%,respectively.It can be seen from the experimental results that surfactants improved enzyme stability availably.Surfactants at high concentrations were superior to those at low concentrations in enzyme stability.Tween 80 at 0.048% obtained maximal relative carboxymethylcellulose activity(CMCA) 108.06% and maximal relative filter paper activity(FPA) 80.26%.Surfactants also enhanced conversion rate of cellulose,and that in the present of rhamnolipid,the percent conversion of cellulose was higher than those with Tween 80 distinctly.Moreover,surfactants not only promoted maximal velocity of enzymatic reaction and largened Michaelis constant but also reduced adsorption of cellulase on cellulose remarkably.

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