REDUCTION OF MICROBIAL INHIBITORS IN HEMICELLULOSIC HYDROLYSATES BY POLYELETROLYTES

RM Ramos,[1] SS Silva[2] and IM Mancilha[2]

[1]UFV/Food Technology Department-36570000-Vicosa-M.G.Brazil.
[2]FAENQUIL/ Biotechnology Department-12600000-Lorena-SP Brazil.

Introduction

The hydrolysis of lignocellulosic residues has been used on the obtention of sugars for fermentation processes. During the hydrolysis appreciable amounts of toxic products to the microbial metabolism are generated, such as acetic acid, phenolic compounds, furfural, hydroxymetilfurfural, and so on (1-5). For the use of the hemicellulosic fraction in fermentation processes is fundamental to remove these toxic compounds from the hydrolysate. Several techniques have been used for this propose like liquid-liquid extration, overliming the medium, precipitation, active charcoal and ion-exchange resins (6). In our work we present a methodology of clarification of sugar cane bagasse hemicellulosic hydrolysate using polyeletrolytes (aluminium polychlorite and aluminium sulfate) and its effect on the further fermentation.

Materials and Methods

The experiments were performed according to a previous statistical factorial plan, evaluating also the effect of the factors: pH, temperature and polyelectrolyte concentration. The fermentation runs were done in 125 mL Erlenmeyer flasks containing the sugar cane bagasse hydrolysate added the nutrients (7) and 0.5 g/L cells of *Candida guilliermondii* FTI 20037 at 30 °C/200 min^{-1}.

The cell concentration was determined by the relations between optical density (600 nm) and dry cell weight. Xylose, glucose, arabinose and xylitol were determined by high performance liquid chromatography (HPLC)

Results and Discussion

According to the results, the polyelectrolyte concentration is the major factor that influences on the clarification of the hydrolysate, independendently of the type of the polyelectrolyte used. The temperature has minor influence on the clarification process using aluminium sulphate. The second and third order interation between the factors evaluated was not significant, except the interation between pH and aluminium polyelectrolyte concentration. The best conditions for clarification of sugar cane hydrolysate were attained at pH 8.0, 50 °C using 10 g/L of aluminium sulphate or 1 m/L of aluminium polychloride (ADESOL P 887) for 49 mL of hydrolysate.

The cell growth and consumption of the sugars in the sugar cane bagasse hydrolysate presented the same performance of the results on the synthetic medium without inhibitors. Both polyelectrolytes evaluated showed to be efficient on the processes of clarification and removal of toxic compounds present on biomass hydrolysates and can be useful for applications in industrial biochemical processes.

1. Lawford HG, Rosseau JD. Applied Biochemistry and Biotechnology 1993; 39/40:687-699.

2. Lawford HG, Rosseau JD. Applied Biochemistry and Biotechnology 1993; 39/40:301-322.

3. Lee YY, McCaskey TA. Biotechnology 1983;66(5):102-107.

4. Beck MJ. Biotechnology and Bioengineering Symposium 1986;17:617-627.

5. Azhar AF, *et al.* Biotechnology and Bioengineering Symposium 1981; 14:293-300.

6. Frazer FR, McCaskey TA Biomass 1989;18:31-42.

7. Felipe, *et al.* Arquivos de Biologia e Tecnologia 1993;36(1):103-114.