Simultaneous saccharification and fermentation of sago hampas into biobutanol by Clostridium acetobutylicum ATCC 824

ABSTRACT

Simultaneous saccharification and fermentation (SSF) by Clostridium acetobutylicum ATCC 824 was conducted to produce biobutanol from sago hampas. Sago hampas is a waste generated from the processing of sago starch. This waste is composed of 54.6% starch and 31.7% of cellulose and hemicellulose, with only 3.3% of lignin. In order to fully utilize the starch and cellulosic materials, saccharification using a mixture of amylase (Dextrozyme) and cellulase (Acremonium cellulase) was conducted using 0.09 g/mL sago hampas, producing 67.0 g/L of fermentable sugar. The SSF and delayed SSF (DSSF) were conducted using 0.07 g/mL sago hampas with the optimized enzyme loading of Dextrozyme amylase (71.4 U/gsubstrate) and Acremonium cellulase (20 FPU/gsubstrate). The SSF of sago hampas generated 6.12 g/L of solvents with biobutanol concentration of 3.81 g/L and the yield of 0.11 g- biobutanol/g- sugar. In order to improve biobutanol concentration and productivity, DSSF was intrduced. In DSSF, the inoculum was introduced into the system after 24 hour of fermentation to allow the optimal saccharification process for sugar production. This process generated 4.62 g/L of biobutanol which was 18% higher than normal SSF since the saccharification and fermentation were operated at their optimal condition.

Keyword: Hemodialysis; Sleep quality; Nutritional parameters; Hyperkalemia; Pittsburgh sleep quality index