

Evaluation of Sawdust Hemicellulosic Hydrolysate for Bioproduction of Xylitol By Enzyme Xylose Reductase

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ABSTRACT

Sawdust hemicellulosic hydrolysate can be used as a promising xylose source for enzymatic conversion to xylitol, a specialty product. The aim of this study was to design various factors by observing their effects on xylitol production from hemicellulosic hydrolysate by xylose reductase (XR) enzyme. The one-factor-at-a-time (OFAT) strategy was adopted to determine the effective levels of process factors influencing xylitol yield. Enzymatic xylitol production was conducted in batch mode using different levels of reaction time (2–18 h), temperature (20–70 °C), pH (4.0–9.0), xylose concentration (9.4–37.6 g/L), NADPH concentration (1.17–5.32 g/L), enzyme concentration (2–6%), and agitation (50–150 rpm). Among the factors examined, time, temperature, pH, NADPH, and enzyme concentration significantly influenced the biosynthesis of xylitol with the suitable level of 10 h, 30 °C, 7.0, 3.66 g/L, and 3% (v/v), respectively. Xylitol yield obtained was 56% (w/w) under these observed optimum conditions. This is the first report on the bioproduction of xylitol from lignocellulosic substrate by XR.

KEYWORDS: Biotransformation; Hemicellulosic hydrolysate; Parameter design; Xylitol; Xylose; Xylose reductase

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