

High Yield of Isosorbide Production from Sorbitol Dehydration Catalysed By Amberlyst 36

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Abstract:

Isosorbide (ISB), one of the important polyols, can be produced through the sequential intramolecular dehydration of sorbitol derived from abundance renewable biomass resource. The advantages of its rigid structure has granted the ISB a wide application in the polymer industries. Acidic catalyst in liquid phase was conventionally used in the dehydration process. This homogeneous catalysed reaction gave low ISB yield and required additional downstream processes to separate catalyst. The present study employed solid acidic ion exchange resin, Amberlyst 36 in the sorbitol dehydration at a mild condition. The effect of important operating parameters such as stirring speed, catalyst loading, temperature and reaction time was investigated. The increase of catalyst loading from 5 wt% to 7 wt% did not significantly affect the ISB yield. A higher temperature increased the reaction rate whereas a prolonged reaction time (4h) increased the conversion of sorbitol and yield of ISB to the maximum. Both sorbitol conversion and ISB yield of >99% were recorded after a 4-hr reaction at the reaction temperature of 150°C, catalyst loading of 5wt% and stirring speed of 300rpm. The reaction kinetics was evaluated under a mass transfer resistances free condition at the reaction temperature ranged from 100°C to 150°C.

Keywords: Sorbitol dehydration; Amberlyst 36; Homogeneous catalysed

ACKNOWLEDGMENT

This research was supported by Universiti Malaysia Pahang (grant numbers: RDU1803108)