

Integration Of Membrane Processes Into Bioconversions

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Continuous Hydrolysis of Lignocellulosic Biomass via Integrated Membrane Processes

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4.1 Introduction

Prior to the discovery of crude oil, society met all its energy needs from plant or lignocellulosic biomass. Today increasing world energy demand coupled with decreasing fossil fuel reserves, continues to drive the quest for new energy sources. In addition, political and environmental concerns are driving the development of sustainable energy sources. Biofuels derived from lignocellulosic biomass are one of the leading renewable energy candidates to replace fossil-based transportation fuels [1–3]. Unlike first generation biofuels, such as bioethanol from sugarcane and corn stover, production of second generation biofuels from lignocellulosic biomass is far more complex. Development of efficient separation and purification operations are essential for the production of competitive second generation drop-in biofuels. Membrane-based separation processes are attractive as they could lead to significant process intensification and hence reduced operating costs [4].

Three main strategies exist for conversion of lignocellulosic biomass into liquid fuels and chemical intermediates: gasification, pyrolysis, and hydrolysis [1]. Here, we focus on hydrolysis of lignocellulosic biomass followed by fermentation. Figure 4.1 is a schematic representation of a lignocellulose to biofuel biorefinery. The overall process consists of the

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