

CACHE Process Design Case Study Vol. 9: Conceptual Design of Second Generation Bioethanol Production via Gasification of Lignocellulosic Biomass

This case study deals with the conceptual design of production processes for obtaining ethanol using switchgrass as raw material using the thermal route. The switchgrass is gasified with either low pressure indirect gasification or high pressure direct gasification to produce syngas. The resulting gas is reformed and cleaned up in a series of stages to remove solids and sour gases. In the next step, the syngas is used to obtain ethanol either via fermentation or by catalytic synthesis. Finally, the products are purified using different technologies for dehydration or ethanol recovery from a mix of alcohols. Two reports are presented from two groups of students. Based on the same initial information, the groups selected different flowsheets for the production of ethanol, the major difference being the choice of fermentation versus catalytic synthesis. The reports consist of 3 memos: literature survey and selection of initial flowsheet, mass and heat balances of selected flowsheet and economic evaluation. Short-cut models are used and the reasons behind the selection among the alternatives and the results are discussed. Background material and teaching aids are also included.

This case study and solution can be ordered as a pdf on the CACHE Superstore Site, \$30 for member departments and \$50 for non-member departments. Printed copies are \$20 more.