

293c Ethanol Production: Applicability of Reactive Separation

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Anhydrous ethanol is costly to produce with two reasons: ethanol production and anhydrous ethanol separation. Ethanol production can be accomplished by biomass fermentation to produce a mixture of ethanol and water. However, higher productivity of ethanol cannot be achieved by the process since cell metabolism of the employed yeast would be inhibited and subsequently destroyed at much higher concentration of ethanol. Commercially, anhydrous ethanol can be produced by simple distillation to distill 12 wt% ethanol to 94.6 wt% ethanol. In this case, ethanol forms an azeotropic mixture of 94.6 wt% ethanol and 5.4 wt% water. To obtain anhydrous ethanol, the last 5.4 wt% of water in the azeotropic mixture has to be removed by azeotropic distillation using benzene as entrainer. Azeotropic distillation is a very energy intensive technique. With a high demand of ethanol for fuel uses – gasohol, enhancing ethanol production with reduction cost of anhydrous ethanol separation is in high demand. The objective of this work is to develop a novel method, combining ethanol fermentation and separation into one process – “reactive separation”. The intend is to serve both purpose, overcoming the limited 12% ethanol production and reducing the separation cost. Preliminary results of the findings are encouraging and will be discussed and presented.