

Co-production of 1,4-pentanediol and adipic acid from corn stover: process synthesis and analysis

오민영, 원왕연[†]

경희대학교

(wwon@khu.ac.kr[†])

Recently, global environmental issues are spotted and mainly caused by the indiscriminate use of fossil-derived resources, especially plastic. Corn stover, an abundant and renewable source in nature, can be produced to adipic acid (ADA), a source of nylon 6.6, and 1,4-pentanediol (1,4-PDO), biodegradable plastic monomer. This study presents the integrated co-production process of ADA and 1,4-PDO by integrating separation and catalytic conversion processes. In the proposed process, biomass derivatives, cellulose and hemicellulose, are simultaneously converted into gamma-valerolactone (GVL) and split into ADA and 1,4-PDO productions. The external utility requirement is reduced by heat integration. By comparing three representative cases with different GVL split ratios, the techno-economic analysis and life-cycle assessment are performed to evaluate the economic and environmental impacts of the proposed process. The results indicate that the case producing the most ADA leads to an optimal minimum selling price of \$1,325/ton and has a marginal impact on the environment. This co-production process can provide flexibility correspond to market conditions and environmental policy.