

Techno-economic Analysis for Methanol Production Process from Shale Gas integrated with BTX Conversion of Ethane and Propane

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Herein, we propose techno-economic analysis (TEA) of methanol production process from shale gas integrated with benzene-toluene-xylene (BTX) production of ethane and propane as an alternative of conventional methanol production process integrated with cryogenic distillation. Our proposed processes consist of acid gas removal unit, BTX production and separation process (Mo/H-ZSM-5), partial oxidation process, methanol synthesis, and methanol purification process. Furthermore, the proposed BTX production process can enhance the amount of CH₄ with high BTX yield (15%) by performing fractionation of ethane and propane. Most importantly, our TEA based on rigorous mathematical modeling revealed that the methanol production cost is estimated to be approximately 0.30 \$/kg-methanol with 21% enhancement of methanol production. Such low methanol production cost is comparable to that of the most mature methanol production process (0.32 \$/kg) due to a combination of high BTX sales and enhanced methanol productivity, supporting the feasibility of a methanol production process integrated with BTX production by co-aromatization of ethane and propane.