Modeling and simulation of TPA (terephthalic acid) production process by hydrolysis of DMT (dimethyl terephthalate)

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Polyethylene terephthalate (PET) is a linear thermoplastic polymer resin which can be synthesized by the esterification of terephthalic acid (TPA) and ethylene glycol (EG). With tremendous increase in yearly growith and extensive use of PET in various applications, its recycling has received wide attention for the preservation of resources and the protection of the environment. Chemical recycling is one the promising choices. PET is first converted to DMT by methanolysis and then DMT is hydrolyzed to TPA in a reactive distillation column. TPA production from DMT hydrolysis are simulated and the yield of TPA is optimized using Aspen Plus.

In this study, we consider hydrolysis of DMT at 260 °C and 24.2 atm. DMT feed rate was 125 kg/h and steam flow rate was 50 kg/h. NRTL model was used for phase equilibrium thermodynamics. The largest yield of TPA was 80 mol%.