**Abstract**

This report provides the general framework, and investigation on a potential cumene production process. We have been provided with an objective function that corresponds to breakeven price of cumene. This means that once we optimize our given objective function, the calculated minimum cost for cumene from our process, will be higher than the current selling price of cumene. The expected capacity of this process, is such that it is able to generate 100,000 metric tons/yr of cumene. The process will have to be profitable, during a 10 year plant-lifetime with an assumed interest rate of 15%. There will be two general reactions occurring in this process. The primary reaction will be the creation of cumene from propylene, and benzene. The secondary series reaction, which results from the combination of cumene and propylene, produces p-diisopropyl benzene. The general main flowsheet will consist of a reactor, fire heater, distillation columns, and a series of pumps. The reactor will be a packed bed that is either concurrent or countercurrent cooling, depending on which reactor configuration proves to be most economical. As part of our design we will also determine the appropriate amount, and orientation of distillation column necessary to achieve our goals. In general, we plan to optimize our proposed process using select decision variables that have a prominent effect on our system.