

**DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING
NORTH CAROLINA STATE UNIVERSITY**

CHE 596-028/605

Semester Project–Some Cost Data

Due March 24, 2020

The following cost data (based on year 2018) should be used in the cost analysis for the semester project.

Item	Syn Gas	Cu-ZnO-Al ₂ O ₃	Chilled Water	Electricity	Dimethylether	Steam
Price	\$0.000863/g-mol	\$10/kg	\$0.000819/kg	\$0.10/kWh	\$1.10/g-mol	\$0.02/kg

Aspen cost analysis results are expressed in **2011 dollar** in all categories except for cost of raw materials and product sale, which are expressed in 2018 dollars. Consumer price indices for 2011 and 2018 are 224.9 and 250.0, respectively. The 2011 costs should be adjusted to the 2019 dollars using the consumer price indices as follows:

$$2018 \text{ Cost} = 2011 \text{ Cost} * \frac{2018 \text{ CPI}}{2011 \text{ CPI}} = 2011 \text{ Cost} * \frac{250}{224.9} = 2011 \text{ Cost} * 1.112$$

The *Capital* or *Equipment Cost* should include the cost of packing the 500 reactor tubes with Cu-ZnO-Al₂O₃, which should include the catalyst cost (should be around \$82,000), and the installation cost, estimated to be at \$120,000. The results of Aspen's APEA analysis should be manually transferred to an *Excel* spreadsheet and updated to the 2018 dollars and adjusted to include the cost of the catalyst and packing in the reactor tubes. The economic viability of the project is established by a net difference, whether positive and negative, between the product sale and the total production cost.

For an optional investment analysis, the following information is relevant:

Operating life of a plant = 20 years

Length of plant start-up = 20 weeks

Start of basic engineering = January 1, 2018

Operation hours in 1 year = 8776.

Total Operating Cost includes Total Raw Materials Cost, Total Utilities Cost, Operating Labor Cost, Maintenance Cost, Operating Charges, Plant Overhead, General & Administrative Cost

Payout (P. O.) Period = Total Capital Cost/Annual Cash In-Flow + Construction Period