# ETHYLENE PRODUCTION VIA CRACKING OF ETHANE-PROPANE

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## ABSTRACT

### BACKGROUND

Ethylene (IUPAC name: ethene) is a hydrocarbon which has the formula C2H4 or H2C=CH2. It is a colourless flammable gas with a faint "sweet and musky" odour when pure. Ethylene is widely used in the chemical industry, and its worldwide production (over 150 million tonnes in 2016) exceeds that of any other organic compound. Ethylene is a critical building block for the petrochemical industry. It is usually produced in steam-cracking units from a range of petroleum-based feedstocks, such as naphtha, and is used in the manufacture of several major derivatives.

The most commonly used process for ethylene production from an ethane-propane mixture is steam-cracking process. The process can be divided into three main parts: cracking and quenching; drying; and separation.

### DESCRIPTION OF THE FLOWSHEET

Ethylene is formed by the steam cracking of ethane.

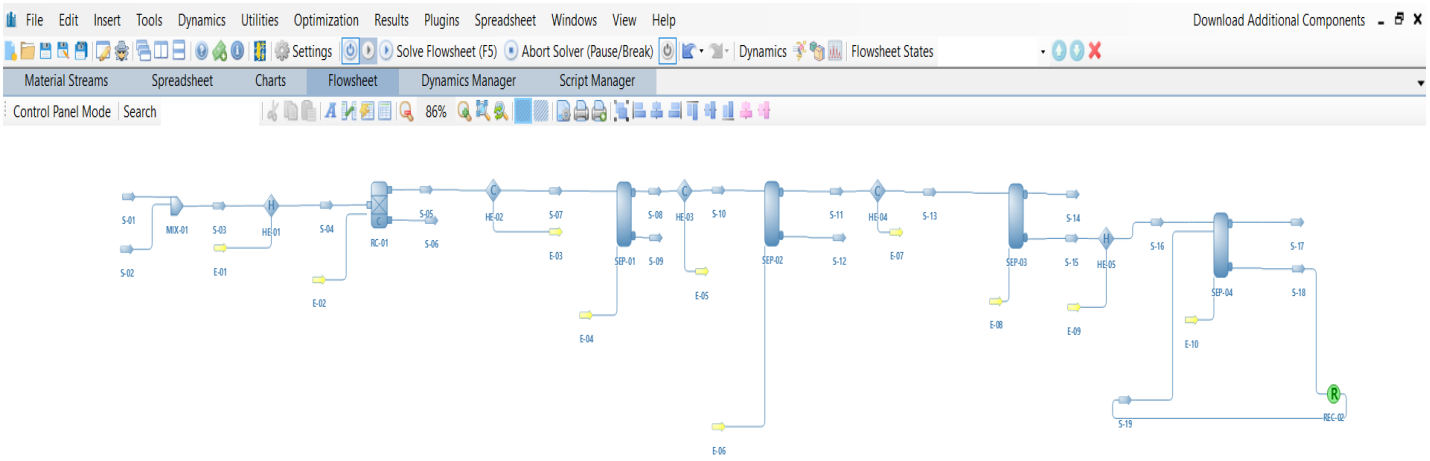
Here we are taking a mixture of ethane and propane in stream 1 and is diluting it with water. Further we are raising the temperature to 750-850°C. At this temperature, ethane converts into ethylene and propane will convert into propylene. We will get hydrogen as a by-product too. After this the feed is dried. Then we separated hydrogen and ethylene from rest of the material. Further the hydrogen is removed and we get purified ethylene. We can get purified propylene as well. But here our aim is to get ethylene, so we are restricting our flowsheet to its purification.

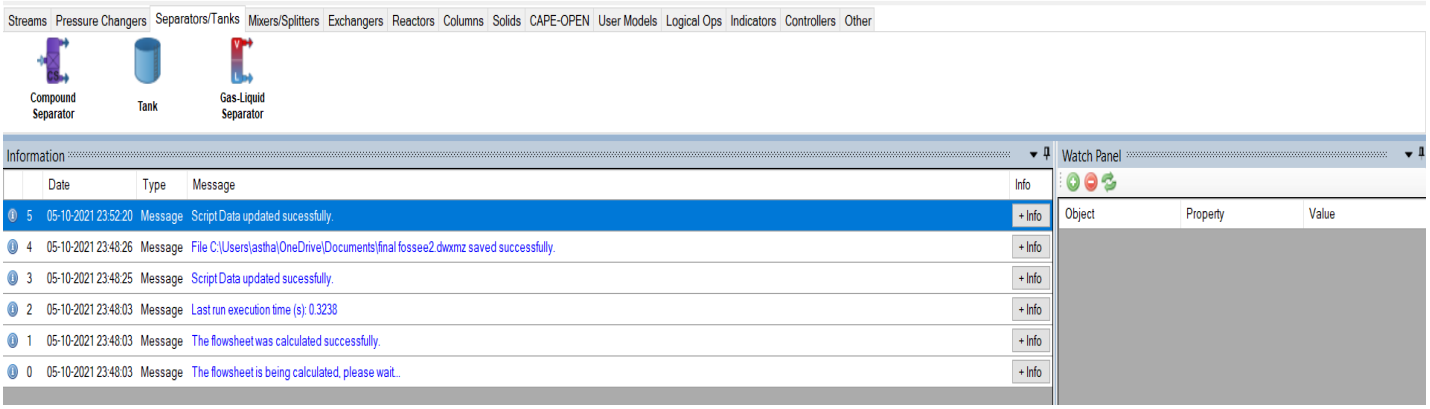
Cracking of ethane: C2H6—C2H4 +H2

### SYSTEM OF UNITS

All units are in SI

# FLOWSHEET




# RESULT

| Master Property Table | | | | | | |
|---|---|---|---|---|---|---|
| Object | S-18 | S-17 | S-14 | S-11 | S-09 | |
| Temperature | 188.309 | 188.309 | 73.15 | 178.15 | 298.15 | K |
| Pressure | 101325 | 101325 | 101325 | 101325 | 101325 | Pa |
| Molar Flow | 72.0833 | 0.397524 | 0.898492 | 1.33696 | 0.962471 | mol/s |
| Molar Fraction (Mixture) / Ethane | 0.00124174 | 0.00153142 | 1.65684E-09 | 0.0226125 | 0.000613333 | |
| Molar Fraction (Mixture) / Propane | 0.000172852 | 1.59413E-05 | 5.2281E-14 | 0.00310958 | 0.00258801 | |
| Molar Fraction (Mixture) / Ethylene | 0.338788 | 0.913357 | 3.02564E-07 | 0.263885 | 2.7219E-06 | |
| Molar Fraction (Mixture) / Propylene | 0.659797 | 0.0813633 | 1.41813E-12 | 0.0372423 | 0.0194216 | |
| Molar Fraction (Mixture) / Hydrogen | 1.50382E-07 | 0.0037328 | 1 | 0.673151 | 6.63461E-06 | |
| Molar Fraction (Mixture) / Water | 4.32165E-10 | 2.08197E-16 | 3.70685E-38 | 7.76687E-09 | 0.977368 | |

# REFERENCE


Ethylene Production via Cracking of Ethane-Propane - Chemical Engineering | Page 1