

Production of Ethylene by dehydration of Ethanol

Introduction:

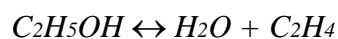
Ethylene is produced by dehydration of ethanol. It is an alternative to cracking for producing ethylene.

Background:

Ethylene is currently the most consumed intermediate product in the world. One of the most important uses of ethylene is the production of polyvinyl chloride

Reaction:

The dehydration reaction of ethanol to yield ethylene is shown below.



This reaction is zero-order and endothermic, having a standard heat of reaction (ΔH_{RXN}) of approximately 401 BTU/lb.

Description:

This flowsheet is used for the production of ethylene by dehydration of ethylene. The input is sent into pump for increasing the pressure. The stream gets heated in the heat exchanger while the recycle stream is cooled. The heated material stream is sent into heater for further increase in the temperature. This stream is sent into the reactor where conversion to ethylene and water take place. The recycle is stream is cooled to 122 F and is sent to separator. The top stream is again sent into separator and expander and collected as output. The bottom streams from the separators are mixed and sent into Distillation column for removal of water. The distillate and bottoms are obtained.

Units: FPS system

Result:

Property	Value
Temperature(F)	21
Pressure(psi)	375.6
Mass Flow(lbm/h)	214653.02
Ethylene molar fraction	0.99931678
Ethanol mass fraction	0.00051140496
Water mass fraction	0.00017181642