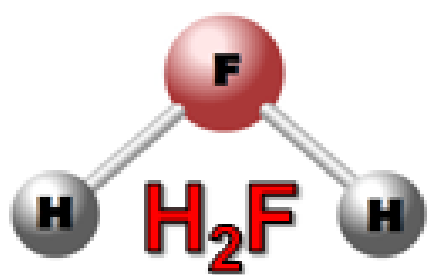


Production of Ethylene from Ethanol

Hani Baatiyyah, Hamed Al Hinai, Fawaz Alkhaldi

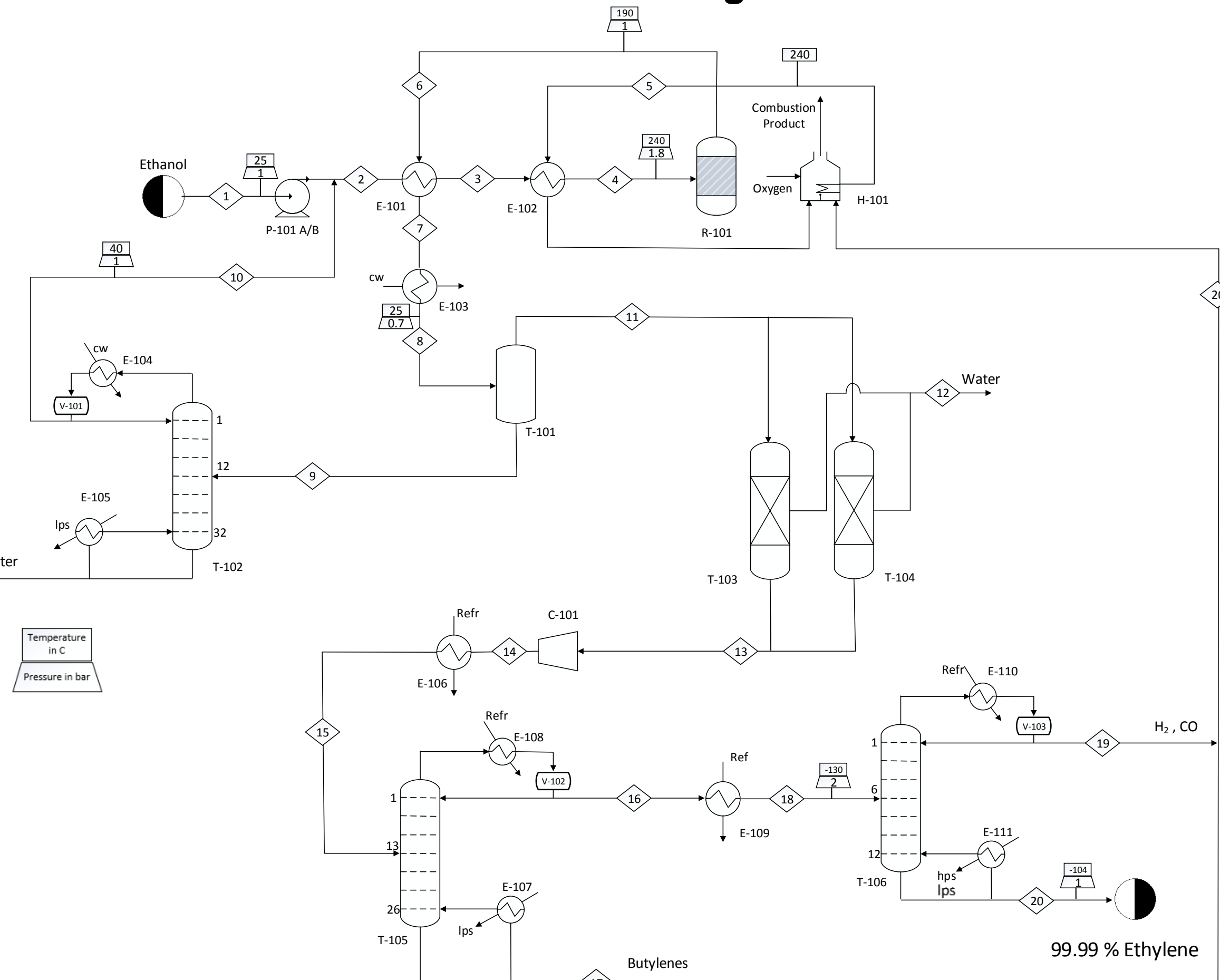


Faculty Advisor: Dr. Jonathan Whitlow, Dept. of Chemical Engineering, Florida Institute of Technology

Abstract

The purpose of this project is to design a chemical plant for the production of pure Ethylene from a feed which contains 5% water and 95% liquid Ethanol by weight. The proposed plant will produce 130,000 kg/hr of ethylene with a purity of 99.99% with an ethanol feed of 230,000 kg/hr. The plant will be located in Brazil, and the capital cost was estimated to be 120,000,000 USD. The simulation was performed using AspenPlus V8.8 software.

Process Flow Diagram

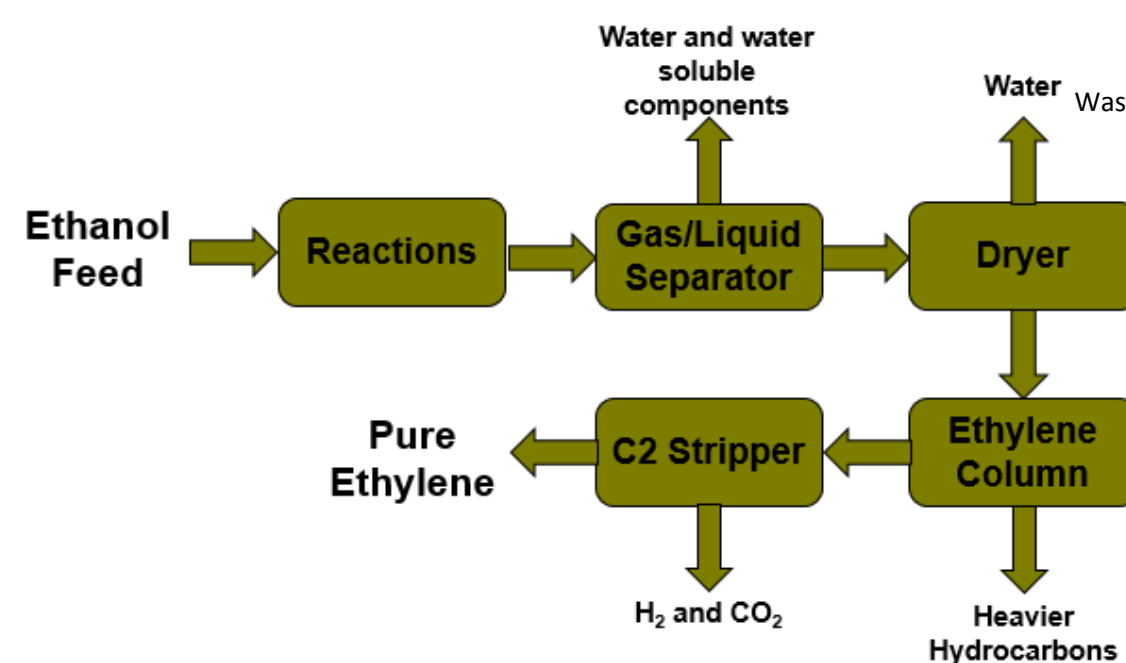


Products

- Polyethylene
- Polyvinyl Chloride
- Ethylene Glycol
- Ethylene Oxide
- Ethylbenzene
- (Poly)Styrene

Equipment Symbol	Equipment Name
P-101 A/B	Pump
E-101	Heat Exchanger
E-102	Heat Exchanger
E-103	Cooling Exchanger
E-106	Cooling Exchanger
E-109	Cooling Exchanger
E-104	Tower's Condenser
E-108	Tower's Condenser
E-110	Tower's Condenser
E-105	Tower's Boiler
E-107	Tower's Boiler
E-111	Tower's Boiler
R-101	Endothermic Reactor
H-101	Heating Furnace
T-101	Liq/Gas Separator
T-102	Ethanol Column
T-103	Dryer
T-104	Dryer
T-105	Ethylene Column
T-106	C ₂ Column
V-101	Vessel
V-102	Vessel
V-103	Vessel
C-101	Compressor

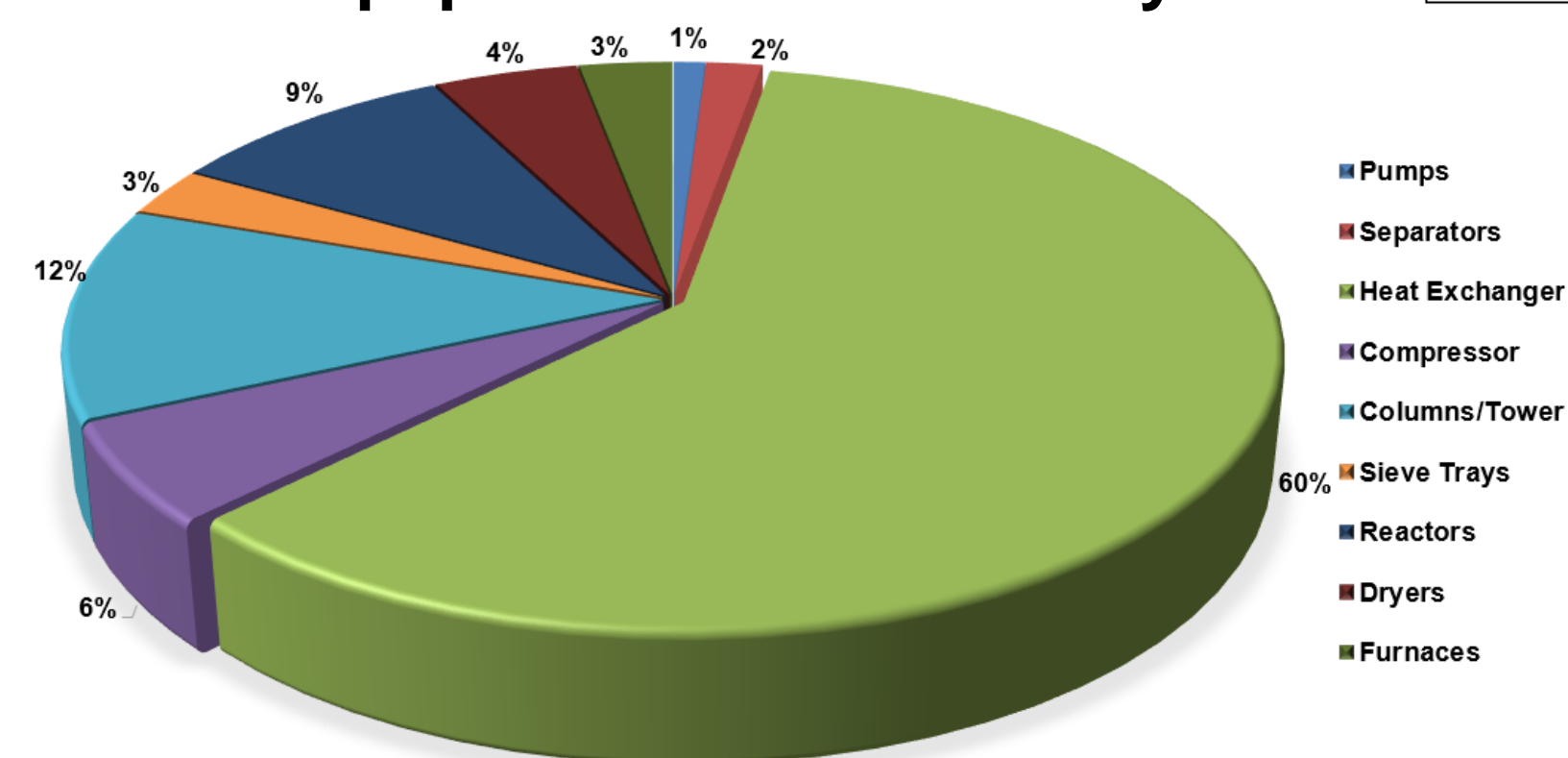
Block Flow Diagram



Reactions

Reactions	Selectivity (%)
$C_2H_5OH \rightarrow C_2H_4 + H_2O$	98.0
$2C_2H_5OH \rightarrow (C_2H_5)_2O + H_2O$	0.005
$2C_2H_5OH \rightarrow C_4H_8 + 2H_2O$	1.5
$C_2H_5OH \rightarrow C_2H_4O + H_2$	0.125
$2C_2H_5OH \rightarrow C_3H_6 + CO_2 + 3H_2$	0.0375
$2C_2H_5OH \rightarrow C_2H_6 + 2CO + 3H_2$	0.3125
$2C_2H_5OH \rightarrow 3CH_4 + CO_2$	0.02

Equipment Cost Summary



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