Simulation for Production of Ethyl Acetate

Rodney Craig Cutinho

Rahul Selvakumar

Faculty guide: Shivkumar

Department of Chemical Engineering,

B.M.S. College of Engineering, Bengaluru-560019

Abstract: This simulation was conducted to optimize the process of production of Ethyl Acetate by the Fischer esterification reaction between acetic acid and ethanol with the aid of the software 'DWSIM'.

The two reactants were mixed in a mixer 1 and The output was sent to mixer 2 where the feedback was added.

This was then sent to CSTR followed by a distillation column. The products were collected and a feedback provided.

Introduction:

Ethyl acetate has been largely employed as a solvent in paints, coatings, inks and adhesives. It can be used as an ideal substitute for aromatic compounds for the purpose of improving working environment because aromatic compounds cause serious damage to human beings and the production of ethyl acetate in industries is mainly classified into three categories. First, the

classical Fischer esterification process of ethanol with acetic acid. This process includes the usage of acid catalysts such as sulfuric acid and p-toluene sulfonic acid. Second, by Tishchenko reaction of acetaldehyde. This makes use of aluminum triethoxide as a catalyst. Third process is the one which has just been recently commercialized, is addition of acetic acid to

ethylene using clay and heteropoly acid as the catalyst of the reaction.

Fischer esterification process of producing ethyl acetate is an equilibrium reaction occurring between acetic acid and ethanol. In using this process for the production of ethyl acetate, one of the key issues that should be addressed is low reaction conversion. As a result of this low conversion, heavy capital investments and high energy costs are inevitable in this process, especially, based on the experience especially, based on the experience.

The equilibrium reactor has two products streams both of which were distilled. The streams gave the following results.

The output vapour steam had 95% Ethyl Acetate and

Ethanol 3.8% with minute quantities of water and acetic acid

The residue containing ethanol, acetic acid and water was recycled.
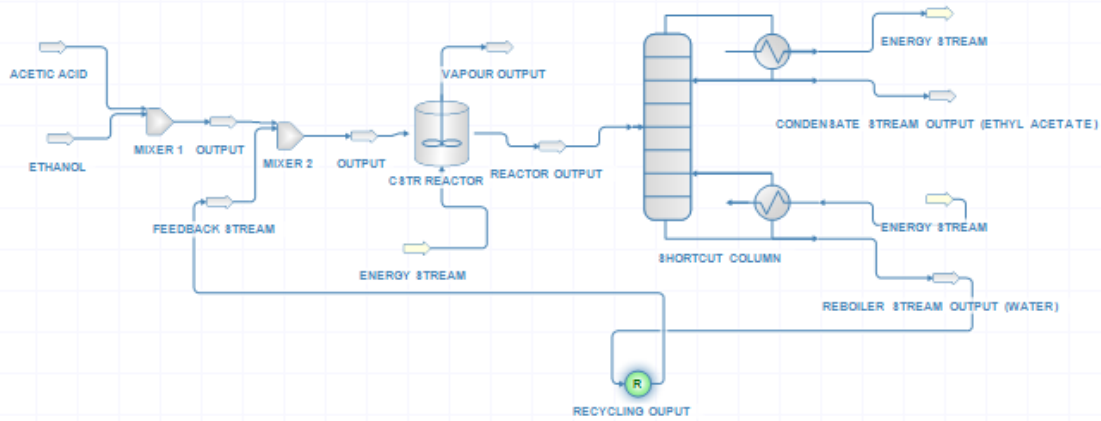
Acetic acid feed	
Flow rate (m3/h)	0.03
Temperature (degree C)	25
Pressure (bar)	1
Ethanol Feed	
Flow rate (L/min)	0.03
Temperature (degree C)	25
Pressure (bar)	1

Column	
No of segment	12
Column feed segment	6
Reflux Ratio	3
Reboiler Duty(kW)	758.856
Condenser type	Total
Condenser pressure(bar)	1

Reaction	
Type	Kinetic
K_w Source	Temperature Approach
Valid Phase	Liquid
Temperature(K)	2000

Conclusion: The process shows the yield obtained in the process of production of Ethyl Acetate by the Fischer esterification reaction using DWSIM.