

Transesterification of N-Butyl Acetate

Deep Pravinbhai Kotadia

Pandit Deendayal Energy University

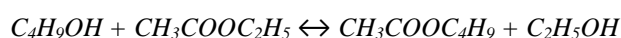
Background

n-Butyl acetate is transparent liquid that is widely used as an organic solvent, an extraction solvent and a dehydrant in industries. Butyl acetate is commonly produced by esterification of acetic acid with butanol. Apart from the esterification process, n-butyl acetate can also be produced from transesterification process. The two processes are equilibrium types and they need to be catalyzed by strong acids.

Reactive distillation is a process that combines both separation and chemical reaction in a single unit. It is especially very attractive whenever conversion is limited by reaction equilibrium because it combines the benefits of equilibrium reaction with distillation to enhance conversion provided that the product of interest has the largest or the lowest boiling point. In organic chemistry, Transesterification is the process of exchanging the organic group R'' of an ester with the organic group R' of an alcohol.

Flowsheet Description

This flowsheet has one reactive distillation column and one mixer which are labelled as D-01 and M-01 respectively. Feed stream such as S-01 and S-02 are Butanol and Ethyl Acetate respectively. Outlet stream such as S-03, S-04 and S-05 are Mixer outlet, Ethanol and N-Butyl Acetate respectively. D-01 contains 28 plates with the 14th plate serving as the mixer outlet stream M-01. The equilibrium reaction of the transesterification process occurring in the systems is as given in Equation.



System of Units

Temperature: K

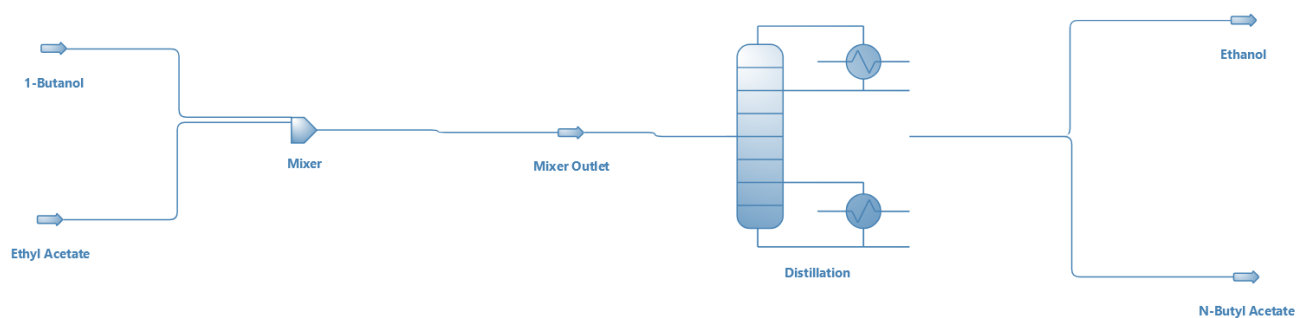
Pressure: Pa

Molar Flow: mol/s

Mass Flow: kg/s

Property Packages: UNIQUAC

Flowsheet:



Results:

Master Property Table						
Object	S-04	S-02	S-01	S-05	S-03	
Temperature	351.806	298.15	298.15	351.806	298.15	K
Pressure	101325	101325	101325	101325	101325	Pa
Mass Flow	0.000302176	0.000393462	0.000393462	0.000484748	0.000786924	kg/s
Molar Flow	0.00655928	0.00854081	0.00854081	0.0105223	0.0170816	mol/s
Volumetric Flow	4.11689E-07	5E-07	5E-07	6.60427E-07	1E-06	m3/s
Molar Fraction (Overall Liquid)	1	1	1	1	1	
Mass Fraction (Overall Liquid)	1	1	1	1	1	
Phases	Liquid Only	Liquid Only	Liquid Only	Liquid Only	Liquid Only	
Energy Flow	-0.231881	-0.375861	-0.375861	-0.371981	-0.751723	kW