

# Recovery of acetic acid from methyl acetate by reactive distillation

Trisha Dutta

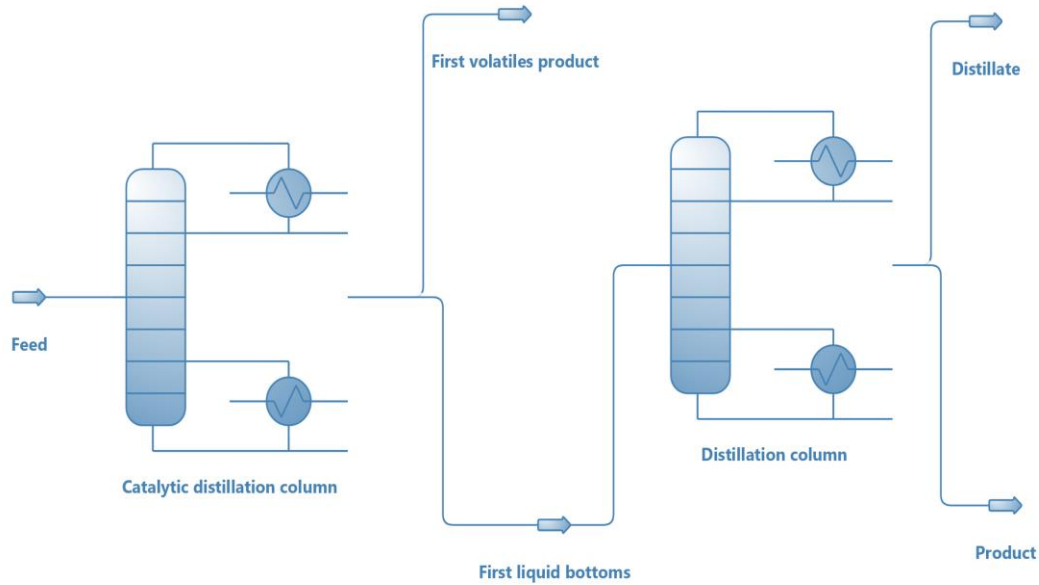
Laxminarayan  
Institute of  
Technology, Nagpur

## Background & Description:

Methyl acetate is obtained as a byproduct in preparation of polyvinyl alcohol (PVA) from polyvinyl acetate and methanol. After recovery of PVA, vinyl ester monomer is extracted for recycle to polymerization reactor. The remaining stream contains 75% methyl acetate, 23% methanol and 2% water. This stream is introduced into a catalytic distillation column containing an acidic catalyst. Methanol is dehydrated to produce dimethyl ether and water. This water hydrolyzes methyl acetate to acetic acid and methanol. The top product contains 99% dimethyl ether. The bottom stream is introduced into a distillation column from where substantially pure acetic acid is obtained as bottom product. Reaction 1 and 2 take place simultaneously so that there is no need of water to be added to the feed for the process. The process continues as long as there is methanol and water to react, hence this process is highly efficient.



**Flowsheet:**



## Recovery of acetic acid from methyl acetate by reactive distillation

### Results:

The stream wise results are given as follows:

Stream wise table						
Object	Product	First volatiles product	First liquid bottoms	Feed	Distillate	
Temperature	117.465	-21.5849	117.465	100	101.248	C
Pressure	1.033	1.033	1.033	10.33	1.033	kgf/cm <sup>2</sup>
Mass Flow	54.6808	26163.7	54.6808	100	2.78647E-05	kg/h
Molar Flow	531.5	306846	531.5	1063	0.00072684	m <sup>3</sup> /d @ BR
Molar Fraction (Mixture) / Methyl acetate	2.27619E-12	0.115354	2.27619E-12	0.54986	7.64347E-10	
Mass Fraction (Mixture) / Methyl acetate	2.83891E-12	0.173592	2.83891E-12	0.75	2.5583E-09	
Molar Fraction (Mixture) / Methanol	7.39915E-08	0.00523317	7.39915E-08	0.389846	3.67525E-05	
Mass Fraction (Mixture) / Methanol	3.99164E-08	0.00340633	3.99164E-08	0.23	5.32075E-05	
Molar Fraction (Mixture) / Water	0.0156343	8.30702E-09	0.0156343	0.0602937	0.896443	
Mass Fraction (Mixture) / Water	0.00474212	3.04012E-09	0.00474212	0.02	0.729679	
Molar Fraction (Mixture) / Dimethyl ether	1.19149E-14	0.879412	1.19149E-14	0	3.7078E-11	
Mass Fraction (Mixture) / Dimethyl ether	9.24155E-15	0.823001	9.24155E-15	0	7.71772E-11	
Molar Fraction (Mixture) / Acetic acid	0.984366	1.47434E-10	0.984366	0	0.0996089	
Mass Fraction (Mixture) / Acetic acid	0.995258	1.79858E-10	0.995258	0	0.270267	

