



Water/Ethanol/Ethyl Acetate at 30.00 C By NRTL

🕨 Left Phase 🛛 🔶 Right Phase

Mole Fractions

Weight Percent of (2)

## **Ethyl Acetate by Reactive Distillation**



Stream No.	1	2	3	4
Name	Acetic Acid	Ethanol	Ester	Water
Overall				
Molar flow kmol/hr	25.0	50.0	48.7	26.3
Mass flow kg/hr	1501.3	2106.6	3094.5	513.5
Temp C	70.0	70.0	71.5	90.3
Pres bar	1.2	1.2	1.0	1.0
Component mole fractions				
Ethanol	0.00	0.86	0.35	0.05
Acetic Acid	1.00	0.00	0.01	0.00
Ethyl Acetate	0.00	0.00	0.50	0.00
Water	0.00	0.14	0.14	0.95

## **DESCRIPTION:**

For reversible reactions, the equilibrium state can be shifted in desired direction by, i.a., adding one of reactants in excess or removing products from the reaction mass. This principle is the background of reactive distillation technique. Products are separated and removed from the distillation column due to difference in their relative volatilities, and due to counter-current reactants' flow, reactants are in excess to each other at several column stages.

This example shows how easily CHEMCAD 5 can cope with reactive distillation and extremely nonideal systems. Not only is a reversible reaction there; Acetic Acid, Ethanol, Water, and Ethyl Acetate form a thermodynamically complex system with two-liquid phases and vapor phase association. For a chemical engineer, though, the only task is to correctly select thermodynamic models, enter reaction(s) equilibrium or kinetic coefficients, and specify the column as he would do with more 'typical' distillation; CHEMCAD 5 will do the rest.