Rigorous RadFrac(Distillation)

- Model Gas Absorption - RadFrac
- Column Internals and Design
- % Flooding. Tray Spacing, Column Diameter
- Pressure profile
- Temperature profile

Problem Statement:

- A 1:2 water-methanol mixture must be separated
- The feed conditions are given as follows:
  - P = 18.4 psi, T = ? Unkown, X = saturated vapor, i.e. it is in its dew point
  - Water = 0.632 and Methanol = 0.368; asume mol Flow raltes
- Since polar-polar interaction, use activity models such as NRTL / NRTL-RK
- A series of analysis are to be run

Design Methodology:

- (A) Run a RadFrac for this Distillation Column, optimize No. Stages, Feed, Recycle Ratio and purities.
- (B) Change Column Internals
- (C) Perform Sensitivty Analysis on the column
- S-1 : Vary Feed Stage (1-9); verify Purity of Distillate
  - S-2 : Vary Reflux Ratio (1.5-5); verify Purity of distillate
  - S-3 : Vary Operating Pressure (Stage 1 – Condenser P = (18.4-184); verify Purity of distillate

Tray v/s Packed Column Internals

Tray:

Summary

	Value	Units
Number of Trayed/Packed stages	7	
Total height	14	ft
Total head loss (Hot liquid height)	1.36629	ft
Total pressure drop	0.474675	psi
Number of sections	1	
Number of diameters	1	
Pressure drop across sump		psi
Total residence time	0.120255	hr

Packed:

Summary

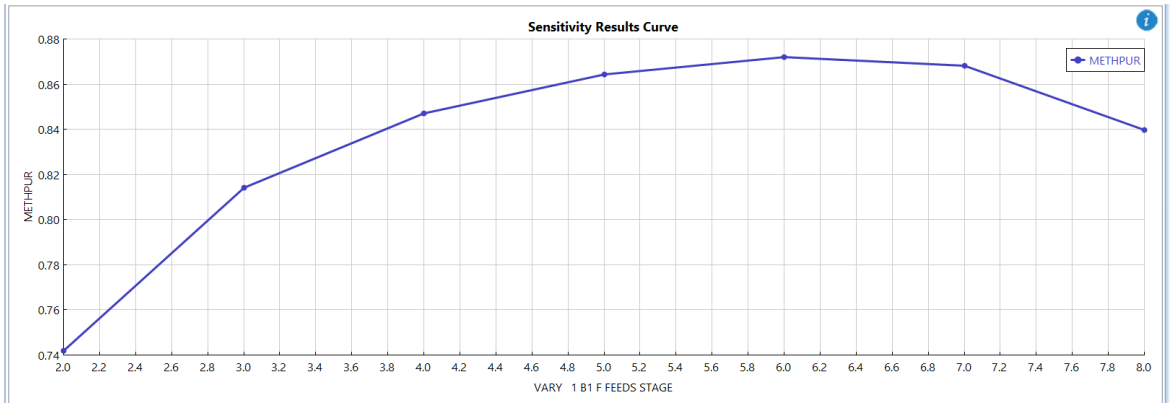
	Value	Units
Number of Trayed/Packed stages	7	
Total height	3.5	ft
Total head loss (Hot liquid height)	0.00962323	ft
Total pressure drop	0.00333282	psi
Number of sections	1	
Number of diameters	1	
Pressure drop across sump		psi
Total residence time	0	hr

Sections

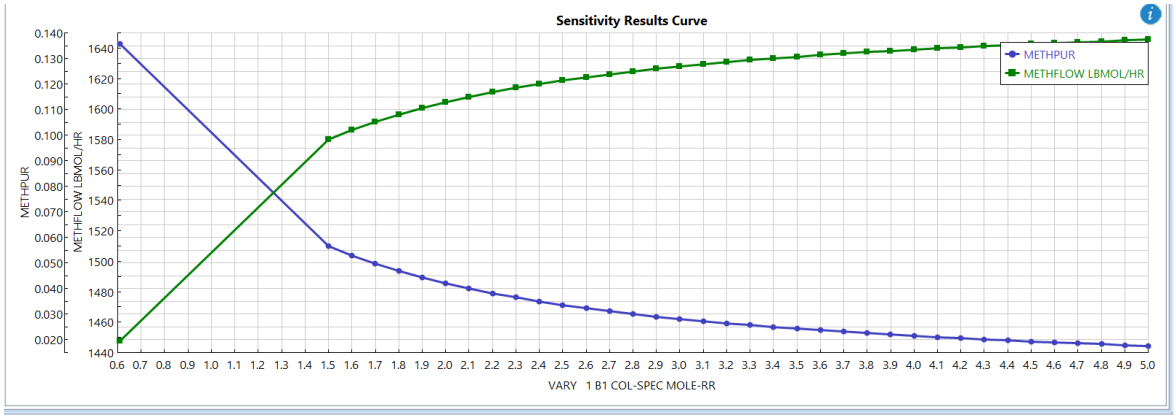
	Start Stage	End Stage	Diameter		Section Height		Internals Type	Tray Type or Packing Type	Section Pressure Drop		% Approach to Flood	Limiting Stage	
CS-1	2	8	24.5388	ft	3.5	ft	PACKING	RASCHIG	0.00333282	psi	13.5708	5	View

Sensitivity Analysis:

Feed Stage



Reflux Ratio



Pressure