Tips for Aspen Plus & Help Session for HW

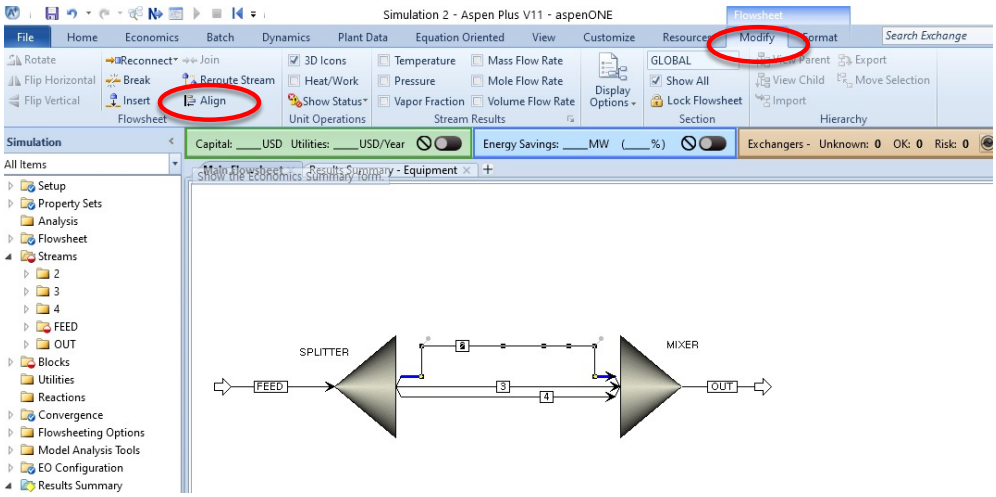
Jong Min Lee

School of Chemical & Biological Engineering

Align Streams and Blocks

You can straighten your stream lines by clicking “Align” button that can be found on the tab of

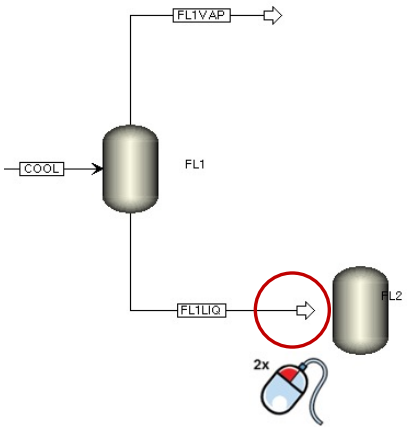
Flowsheet→ Modify → Align



Or draw a large rectangle to select all of your icons on the flowsheet and then right click to activate a pop up menu. Select the Align Blocks entry from this pop up menu.

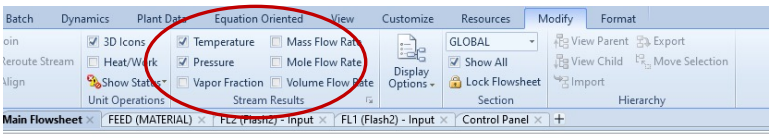
Connecting Streams to a Unit

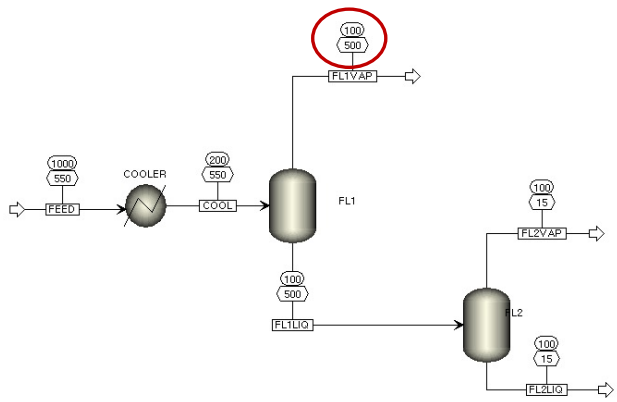
- **Double click** on the end of the stream you wish to connect to the unit
- Your mouse will gain the control **the end of the stream**
- Now **move** the end of the stream **over** one of the red or blue arrows **on the unit**.
- Red arrows represent required streams that must be connected



Display T, P, and other information on the stream

Select the options of Temperature, Pressure, etc. on the “Modify” Tab





Missing Info. of Aspen Tutorial Videos

- Fractional conversion of ethanol should be specified in RSTOIC reactor. The explanation is missing.

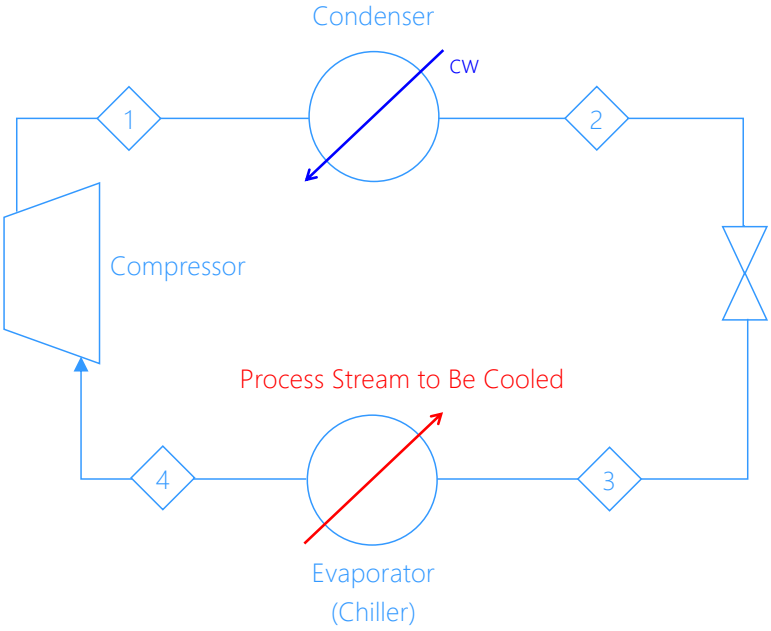
PFR and CSTR

- You need to define a reaction set for the simulation.

Table 1 Summary of reactor models in Aspen Plus™

Model	Stoichiometry	Kinetics	Rigorous	Feed
RSTOIC	Yes	No	No	Any
RYIELD	No	No	No	Any
REQUIL	No	No	No	Any
RGIBBS	No	No	No	Any
RBATCH	Yes	Yes	Yes	1
RCSTR	Yes	Yes	Yes	Any
RPLUG	Yes	Yes	Yes	1

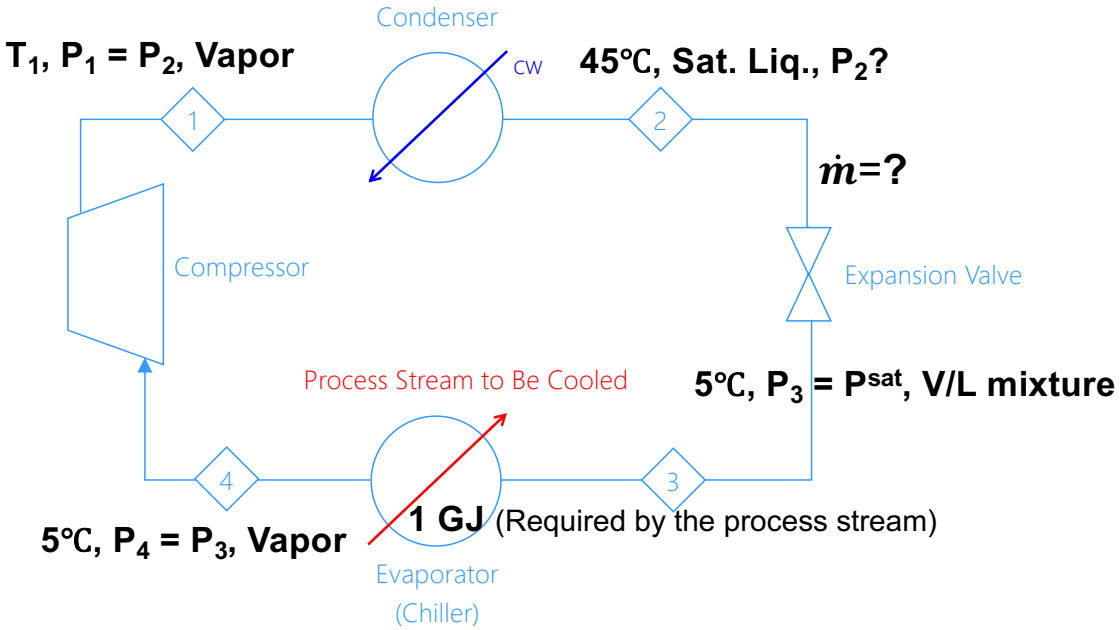
Example 8.5



Refrigerated cooling utility at 5 ℃

Refrigerant: R-152a (1,1-difluoroethane)

Determine the amount of R-152a to circulate in the loop in order to extract 1GJ of heat in the evaporator.



45℃, Sat. Pressure is P2

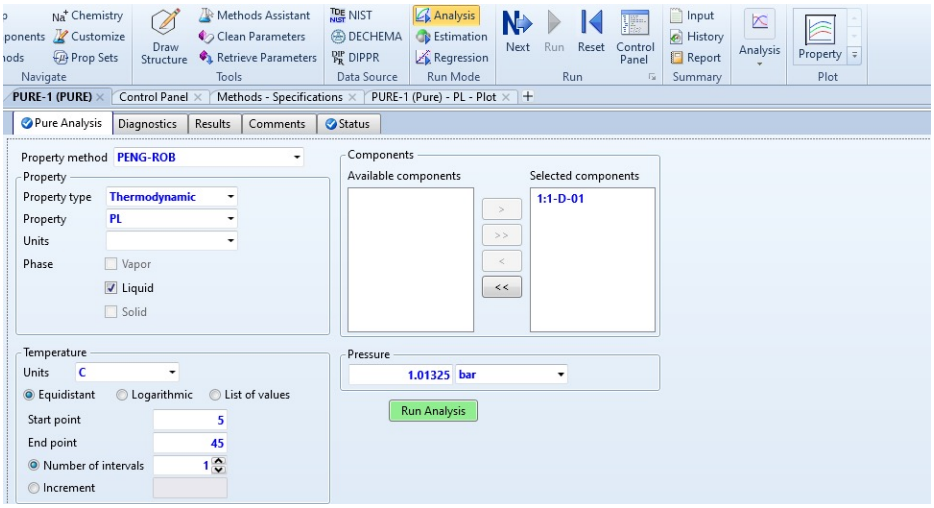
Property package: **Peng-Robinson**

(or one can use REFPROP – refrigerant property developed by NIST)

Estimation of vapor pressure

Analysis → Pure

Thermodynamic → PL



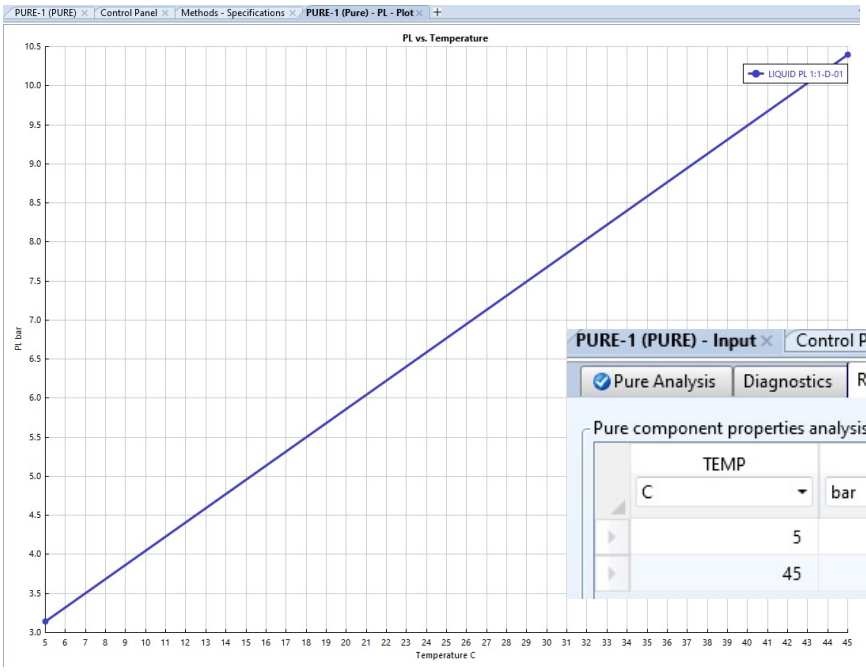
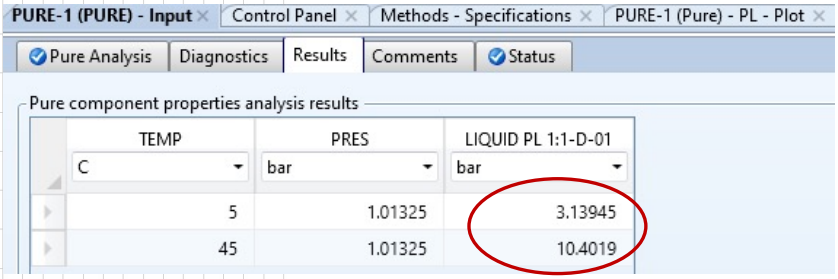
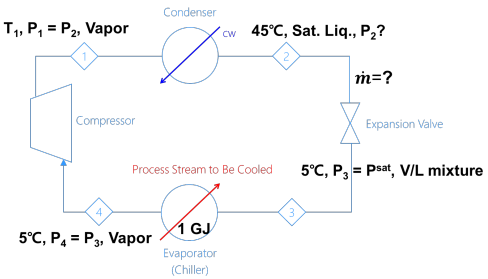


Table E8.5 Stream Conditions for Figure E8.5

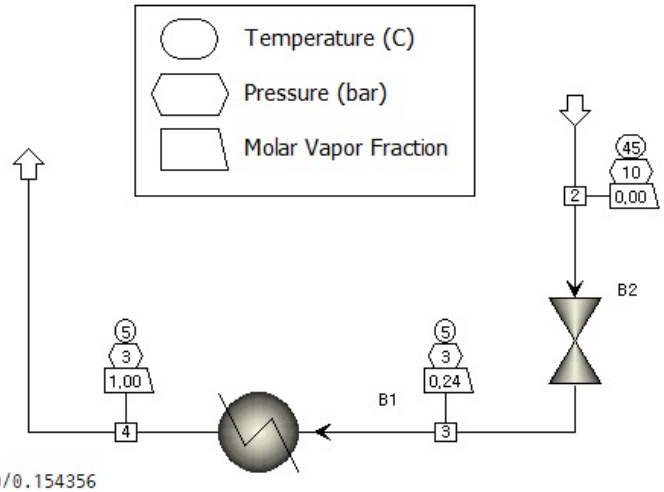
	Stream Number			
Condition	1	2	3	4
Pressure (bar)	10.41	10.41	3.19	3.19
Temperature (°C)	74.2	45.0	5.0	5.0
Vapor Fraction	1.0	0.0	0.2237	1.0



Stream 3 → Heat Duty w/ Basis of 10 kmol/h



Assume m = 10 kmol/h



B1 (Heater) - Results | Main Flowsheet | 4 (MATERIAL) | Control Panel | Se

Summary | Balance | Phase Equilibrium | Utility Usage | Status

Outlet temperature	5	C
Outlet pressure	3.13945	bar
Vapor fraction	1	
Heat duty	0.154356	GJ/hr
Net duty	0.154356	GJ/hr
1st liquid / Total liquid		
Pressure-drop correlation parameter		
Pressure drop	0.0505489	bar

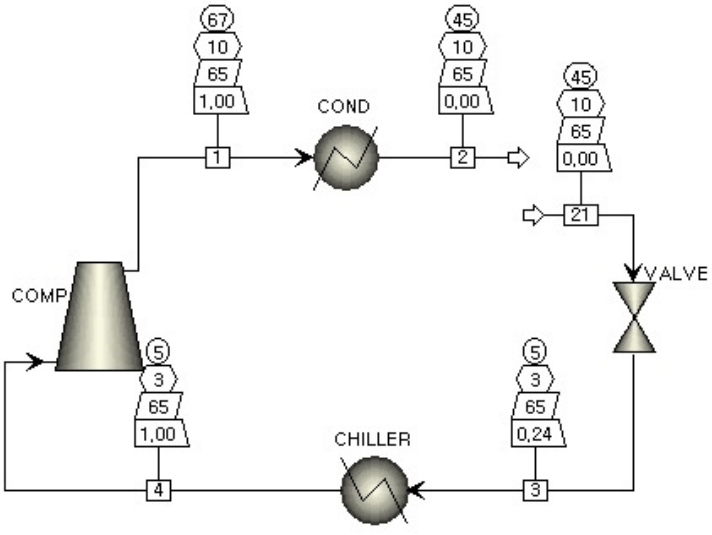
```
>> 10/0.154356

ans =

   64.7853
```

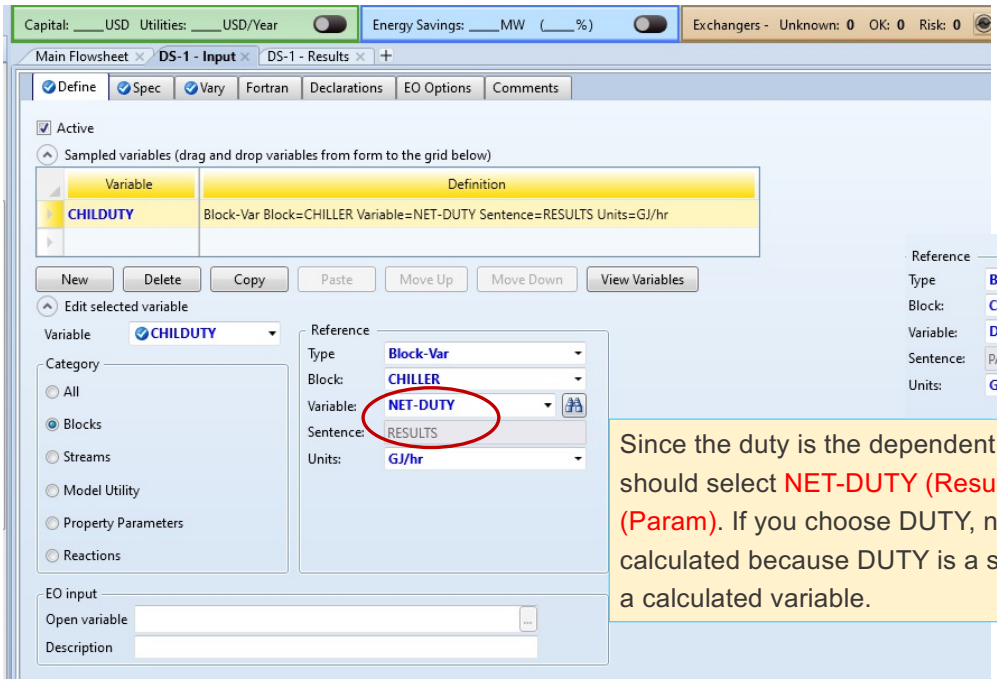
64.8 kmol/h is needed for 1GJ/hr

Ex 8.5) Method II: Using Design Specification

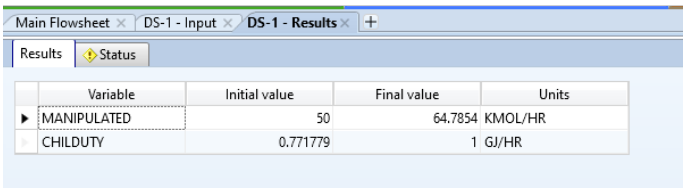


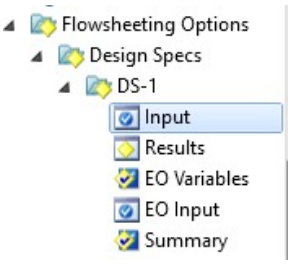
I split the stream 2 into 2 and 21 for better convergence, but closed-loop simulation may work.

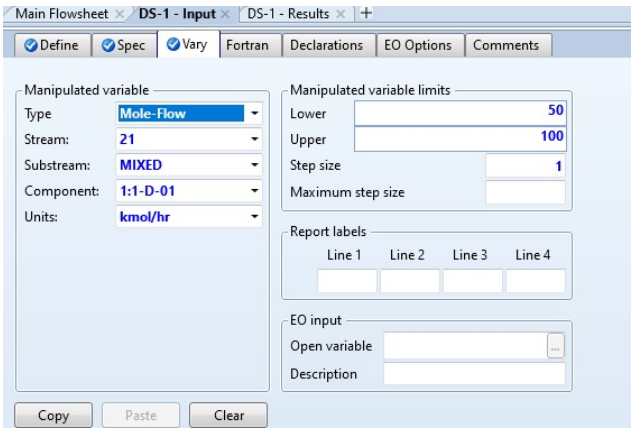
Ex 8.5) Method II: Using Design Specification



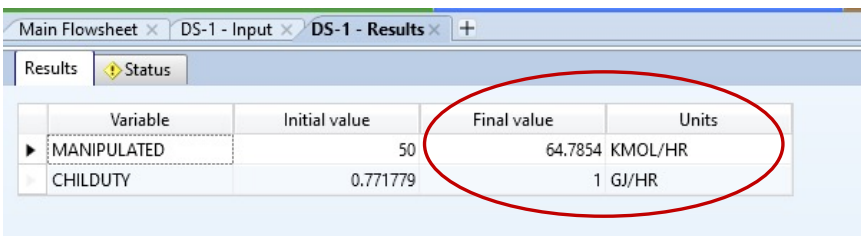
Since the duty is the dependent variable, we should select NET-DUTY (Results), not DUTY (Param). If you choose DUTY, nothing will be calculated because DUTY is a specification, not a calculated variable.





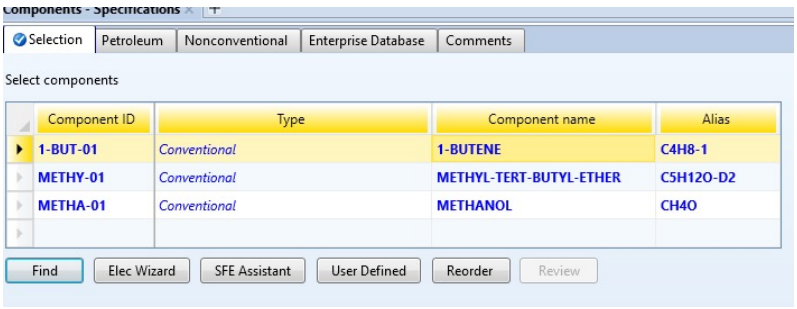


A third method will be using Sensitivity Analysis, which I am not showing here.



Azeotrope and Residue-Curve Maps @ 1 atm

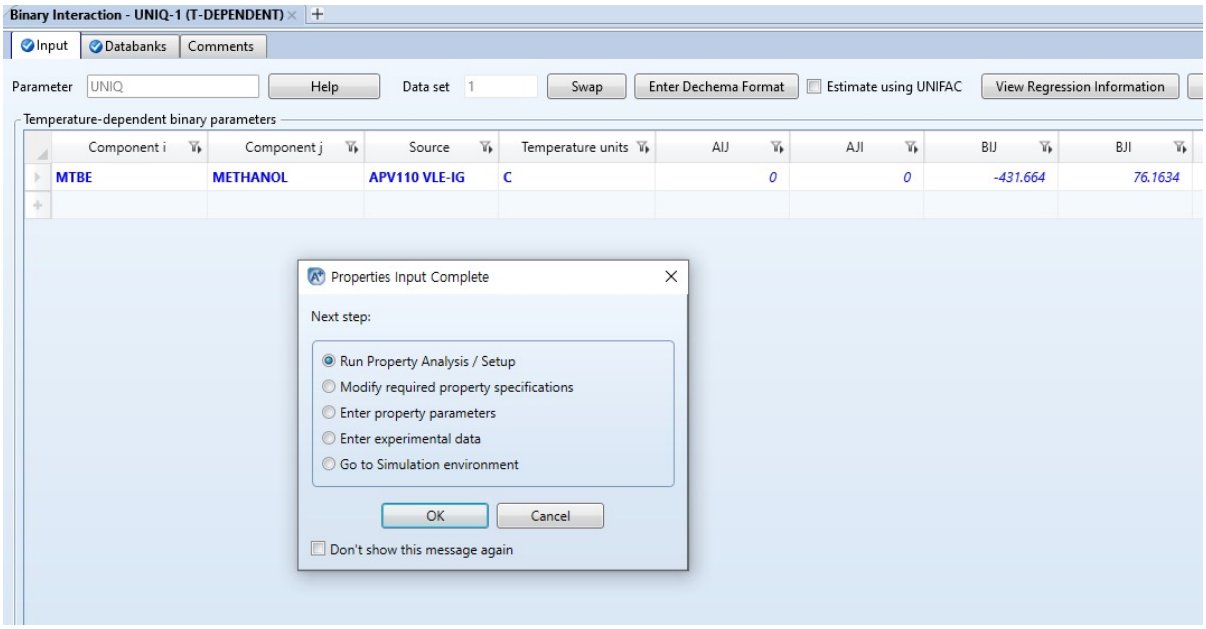
1-butene/ Methyl Tert-Butyl Ether (MTBE) / Methanol



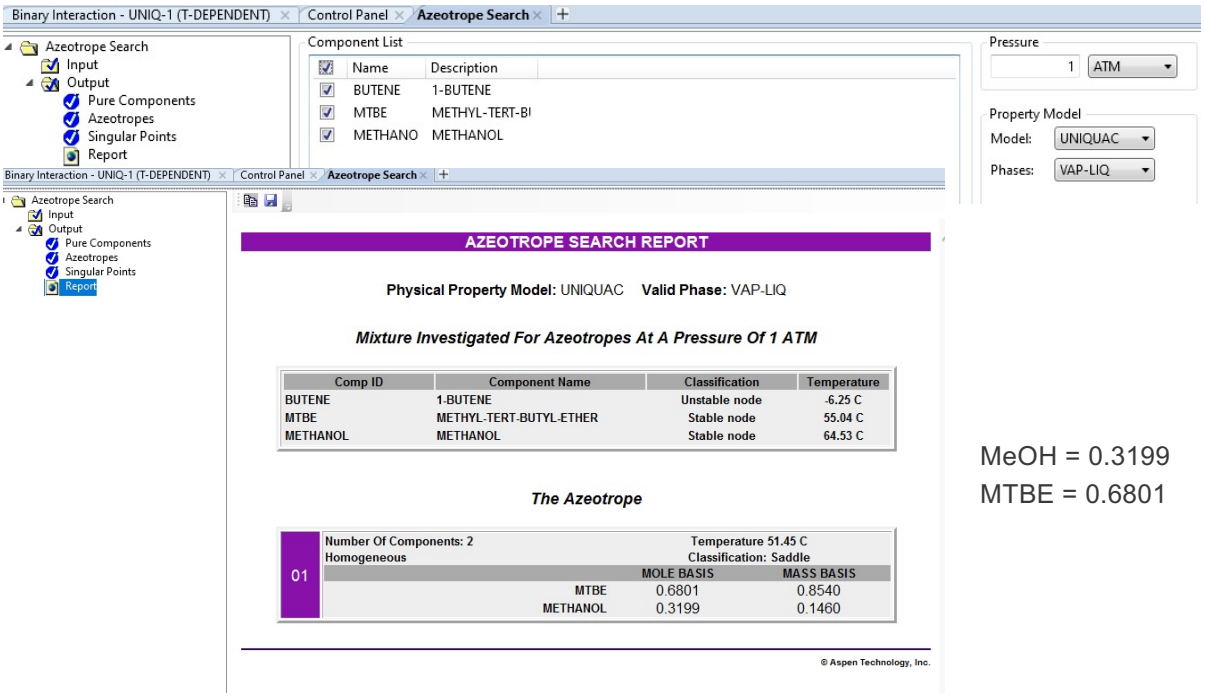
You can change Component ID for your convenience.

Use thermodynamic model of **UNIQUAC** (one of the activity coefficient models)

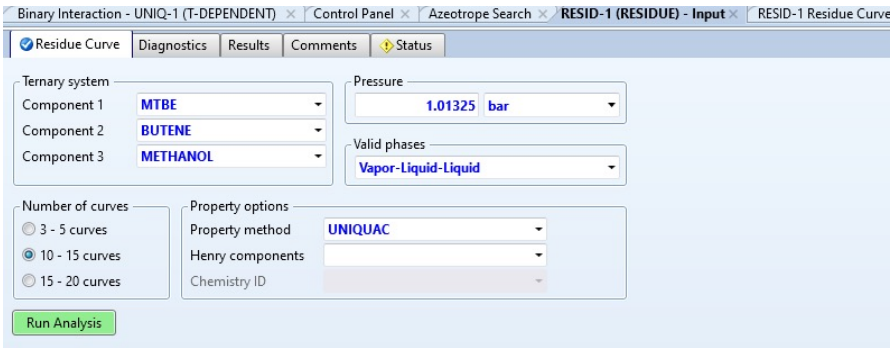
Binary Interaction Parameters of UNIQUAC

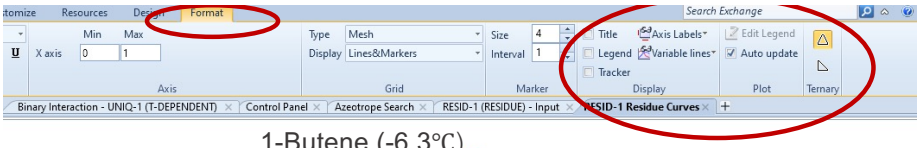


Residue Curves → Find Azeotropes

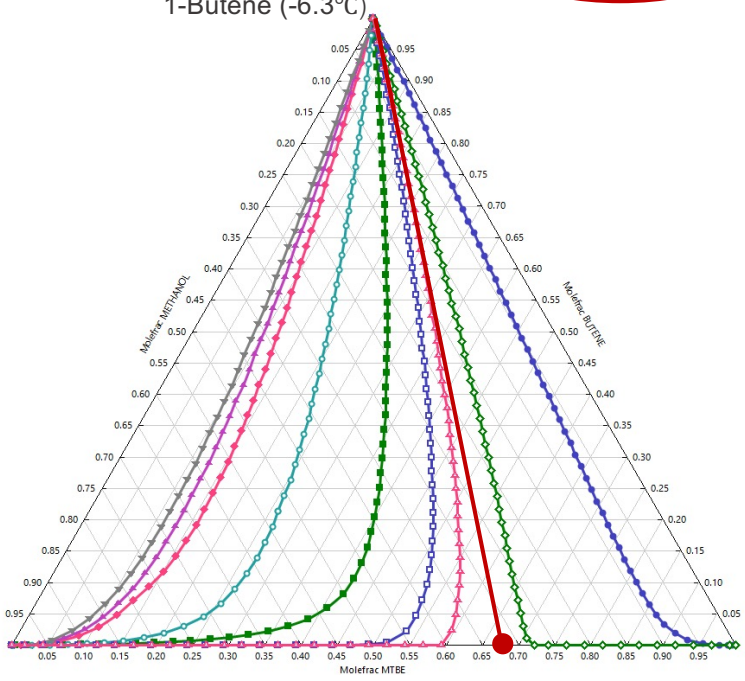


MeOH = 0.3199
MTBE = 0.6801





1-Butene (-6.3℃)



MeOH (64.5℃)

MTBE (55.1℃)

How to Setup RadFrac

- Pressure drop?
- Condenser pressure? Where do they come from? How do I get?