APLIKOM

-Azafilmi Hakiim-

RPS

49	**Nama Mata Kuliah**	: Aplikasi Komputer dalam Teknik Kimia
	Kode MK	: TKI61649
	Jumlah SKS	: 2 SKS

Deskripsi

Mata kuliah ini membahas tentang :

Dasar penyusunan algoritma perhitungan dan konsep logika matematika, da penggunaan berbagai perangkat lunak sering digunakan dalam menyelesaik permasalahan sistem proses kimia

Perangkat lunak yang digunakan meliputi :

a. Perangkat lunak berbasis
b. Paket seperti Ms Excel
c. Perangkat lunak keteknikkimiaan yang digunakan sebagai proses simulator
   - ChemCAD
   - HYSIS
   - Aspen Plus

Bentuk Pembelajaran

Bentuk pembelajaran dapat berupa : ceramah, diskusi, dan presentasi tugas

Bobot Nilai

Penilaian dosen meliputi

Tugas terstruktur	20%
Kuis	20%
UTS	30%
UAS	30%

Kriteria Penilaian

Penilaian dilakukan oleh dosen dengan menggunakan kriteria berikut

Kriteria penilaian

Nilai	Poin	Kisaran
A	4,00	≥ 76
B+	3,50	71-75
B	3,00	66-70
C+	2,50	61-65
C	2,00	56-60
D	1,00	46 – 55
E	0,00	≤ 45

Buku Referensi

1. Contantinides, A and Mostoufi N. 1999. Numerical Methodes for Chemical Engineers with MATLAB Applications. Prentice-Hall. Englewood Cliffs. Nj
2. Finlayson, BA. 2006. Introduction to Chemical Engineering Computing. John Willey and Sons Inc. New Jersey.
3. Hanselman, D and Littlefield, B. 1997. MATLAB : Bahasa Komputasi Teknis (terjemahan). ANDI offs. Yogyakarta
4. Sediawan, WB dan Prasetya, A. 1997. Pemodelan Matematis dan Penyelesaian Numeris dalam Teknik Kimia. ANDI Ofset. Yogyakarta.
5. Hyprotech. HYSIS-GetStart.

ABSEN


21-13 Riska Listiarini Iskandar
Bu Azafilmi Hakiim
21-29,42 Lutfi Pundi; Muhammad ...
21-17 Aldiana Bayhaqi Ilham
21-25 Firgi Siswantito
21-14 Saniatun Wilda
21-50 Natasya Shafira
Adifalah Maulana
21-47 Angelita Sendi Sinaga
21-44 Amalia Dian Fadilla
21-05 Fayzah Ahmad
21-21 24 Christin Eti
21-34 Putri Nur Hasanah
21-33 Nanda Aurelia Salsabila S
21-30 Melisa Nur Halimah
21-27 Gina Dea Ramadhani
21-39 Tasya Nur Shakila
21-06 Gita Sonia
21-48 Cindy Dwi
21-26 Ghina Nurul Fadhillah

ASPEN TECH

Aspen berarti Advance system for Process Engineering (didirikan th 1981)

Variasinya ada banyak : Aspen Hysys: Simulator yang digunakan khusus pada FLuid (gas dan liquid) –Perusahaan Migas

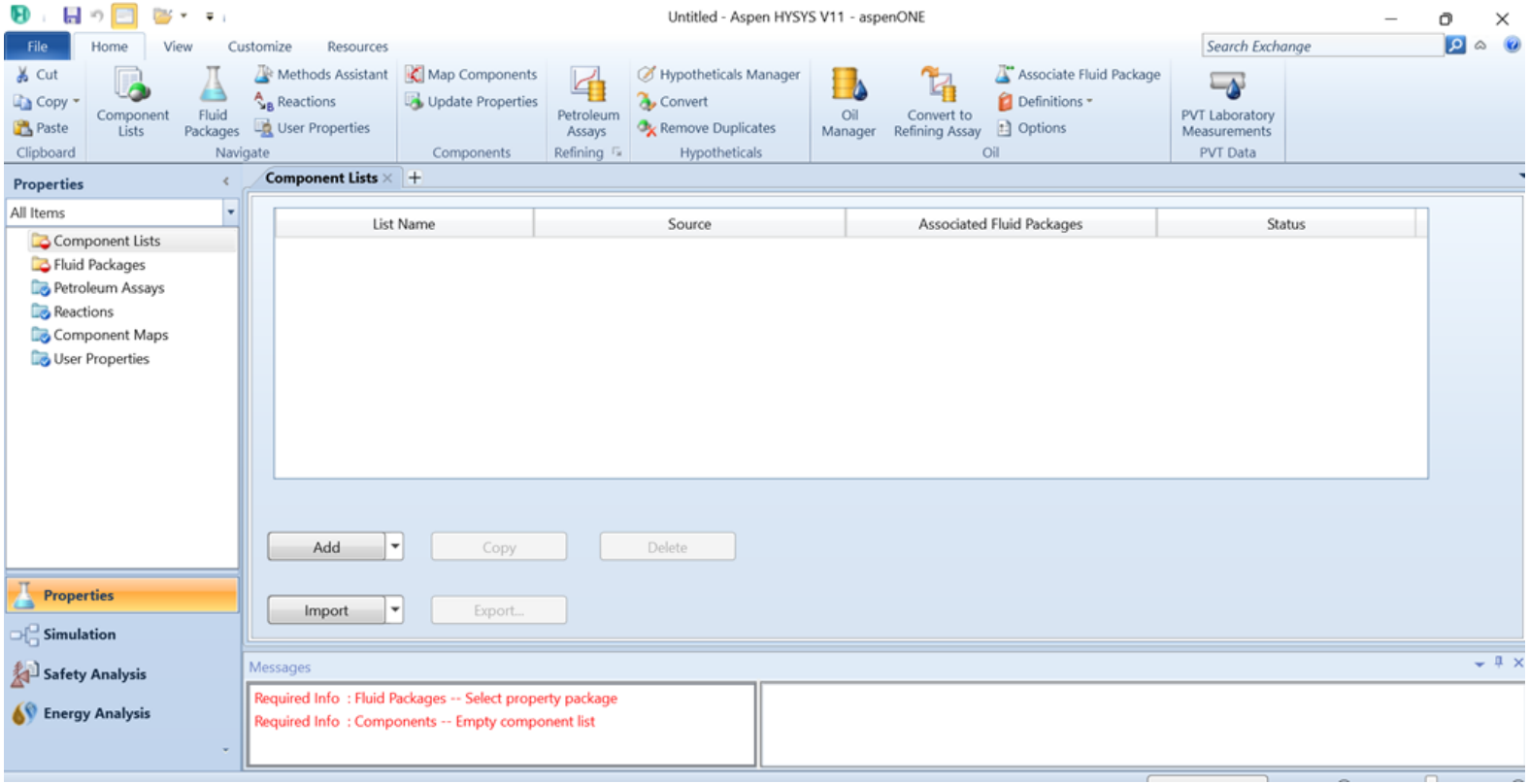
Aspen Plus: Simulator yang mensimulasi berbagai macam properties (solid, liquid)

Aspen EDR (Exchanger Design Rating)

ASPEn Energy Analyzer

ASpen Capital Cost Estimator

Bagaimana Memulai menggunakan Aspen Hysys



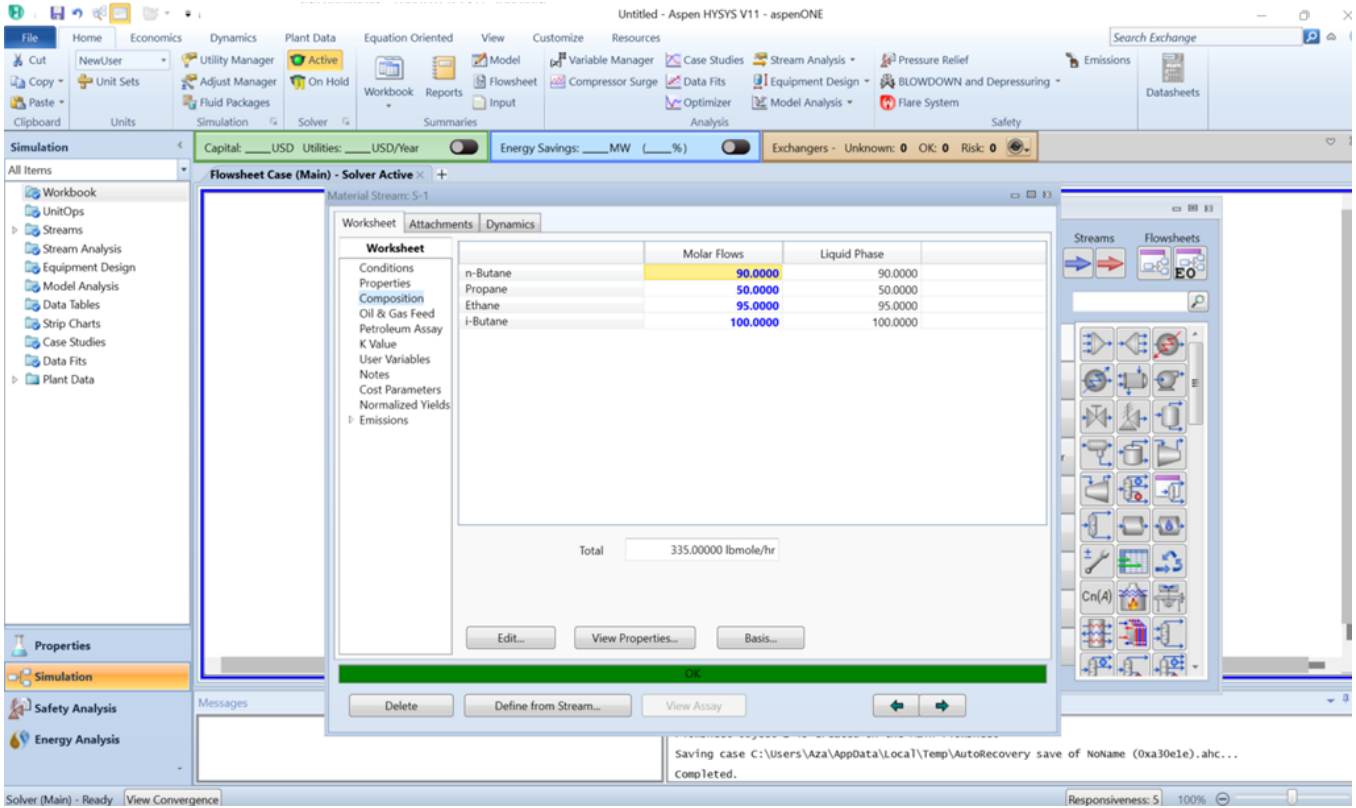
Uji Coba #1

Pada kasus simulasi kali ini, anda saya minta untuk memilih komponen berikut, gunakan persamaan peng robinson pada method properties equationnya.

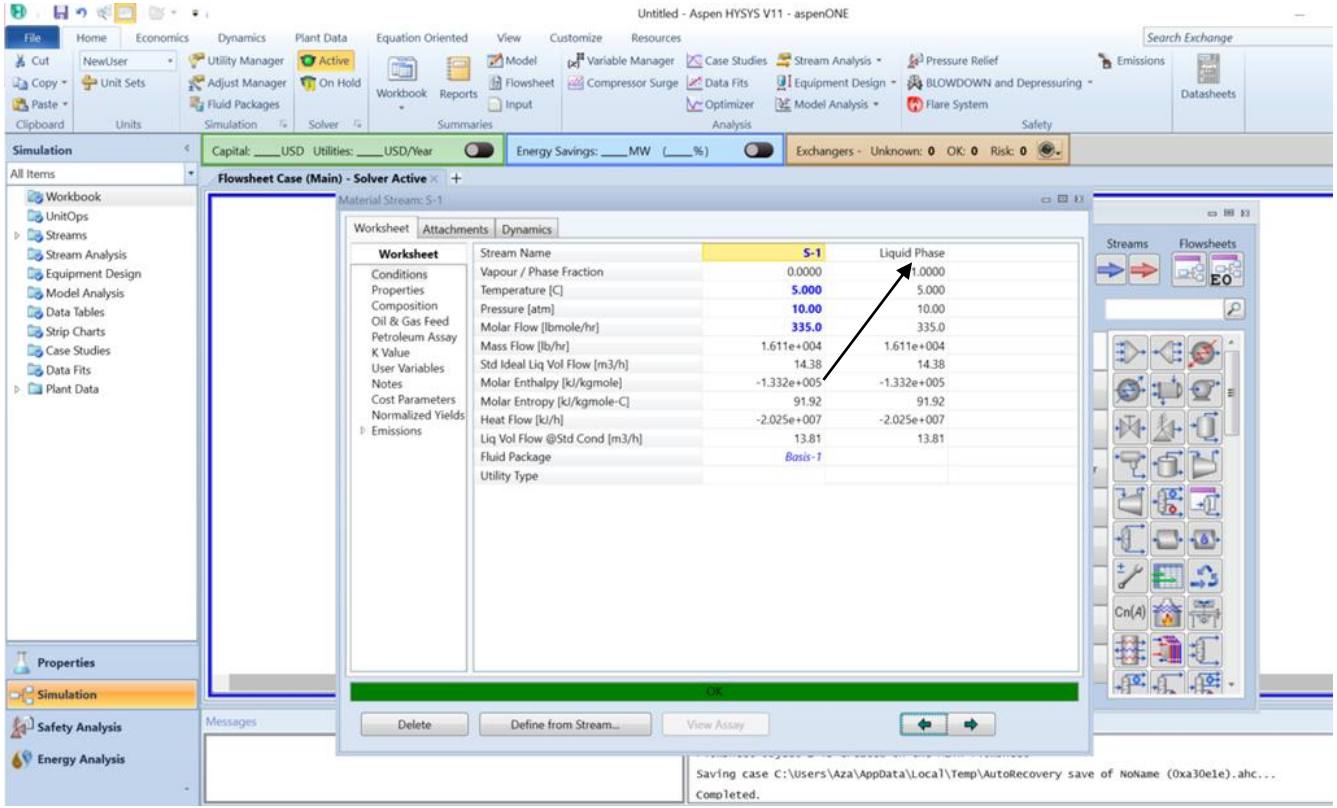
Ethana : 95 lbmole/h
Propana : 50 lbmole/h
n-Butana : 90 lbmole/h
Iso-butana : 100 lbmole/h

Pertanyaannya apakah fase komposisi diatas jika berapa pada temperatur 5 C dengan tekanan 10 atm.

COMPONENT LIST



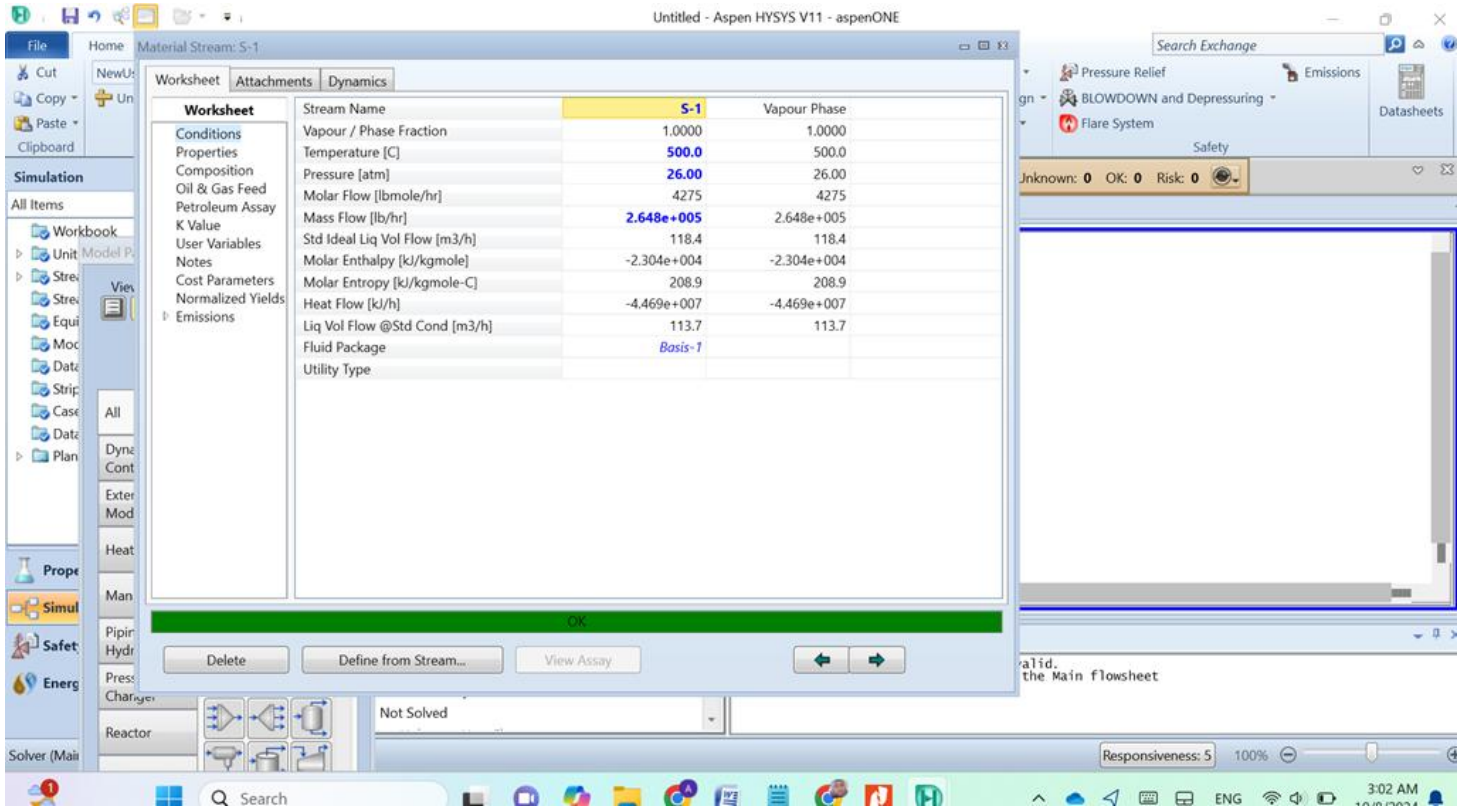
MEMASUKKAN 5 C 10 ATM



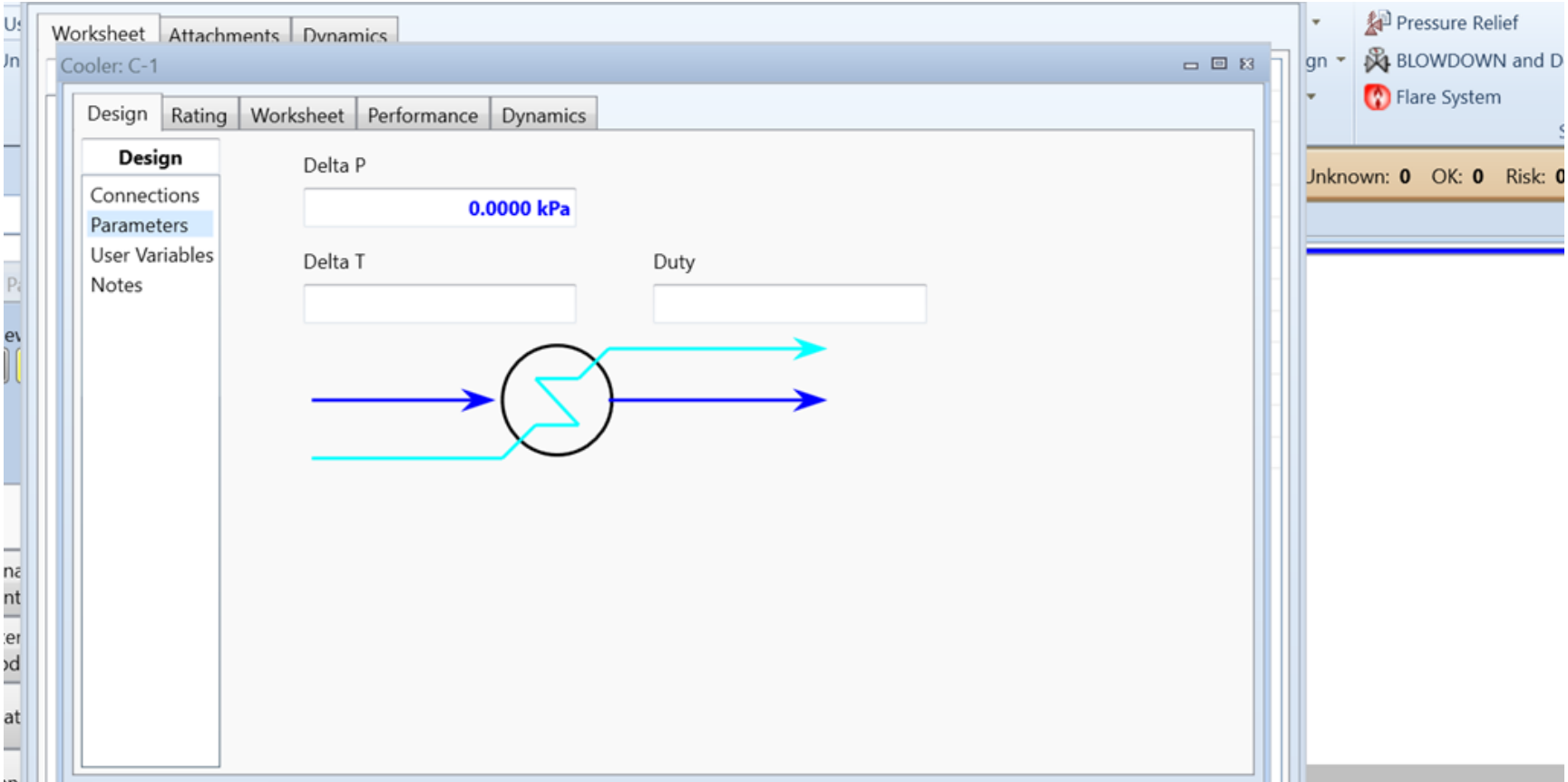
Uji COba 2

Aliran keluar reaktor pyrolysis dengan laju alir massa total 2664800 lb/hr terdiri 58300 lb/hr HCl, 100000 lb/hr Vinyl chloride dan 106500 lb/hr 1,2 dichloroethane pada 500 C dan 25 atm. Sebelum masuk ke bagian destilasi, aliran ini didinginkan dan dikondensasikan sampai 6 C pada 12 atm. Anggap bahwa ini dilakukan dalam tiga tahap, yang pertama pendinginan dalam alat penukar panas 1 pada 26 atm sampai suhu titik embun (dew point). Selanjutnya, kondensasi dalam alat penukar panas 2 pada 12 atm sampai 6 C. Tentukan beban panas (abaikan pressure drop dalam setiap alat penukar panas

List Component


Untitled - Aspen HYSYS V11 - aspenONE
Material Stream: S-1
Worksheet
Attachments
Dynamics
Conditions
Properties
Composition
Oil & Gas Feed
Petroleum Assay
K Value
User Variables
Notes
Cost Parameters
Normalized Yields
Emissions
Stream Name S-1 Vapour Phase
Vapour / Phase Fraction 1.0000 1.0000
Temperature [C] 500.0 500.0
Pressure [atm] 26.00 26.00
Molar Flow [lbmole/hr] 4275 4275
Mass Flow [lb/hr] 2.648e+005 2.648e+005
Std Ideal Liq Vol Flow [m3/h] 118.4 118.4
Molar Enthalpy [kJ/kgmole] -2.304e+004 -2.304e+004
Molar Entropy [kJ/kgmole-C] 208.9 208.9
Heat Flow [kJ/h] -4.469e+007 -4.469e+007
Liq Vol Flow @Std Cond [m3/h] 113.7 113.7
Fluid Package Basis-1
Utility Type
OK
Delete
Define from Stream...
View Assay
Pressure Relief
BLOWDOWN and Depressuring
Flare System
Emissions
Safety
Datasheets
Unknown: 0 OK: 0 Risk: 0
Not Solved
Responsiveness: 5
100%
3:02 AM
ENG

Delta P–abaikan –0



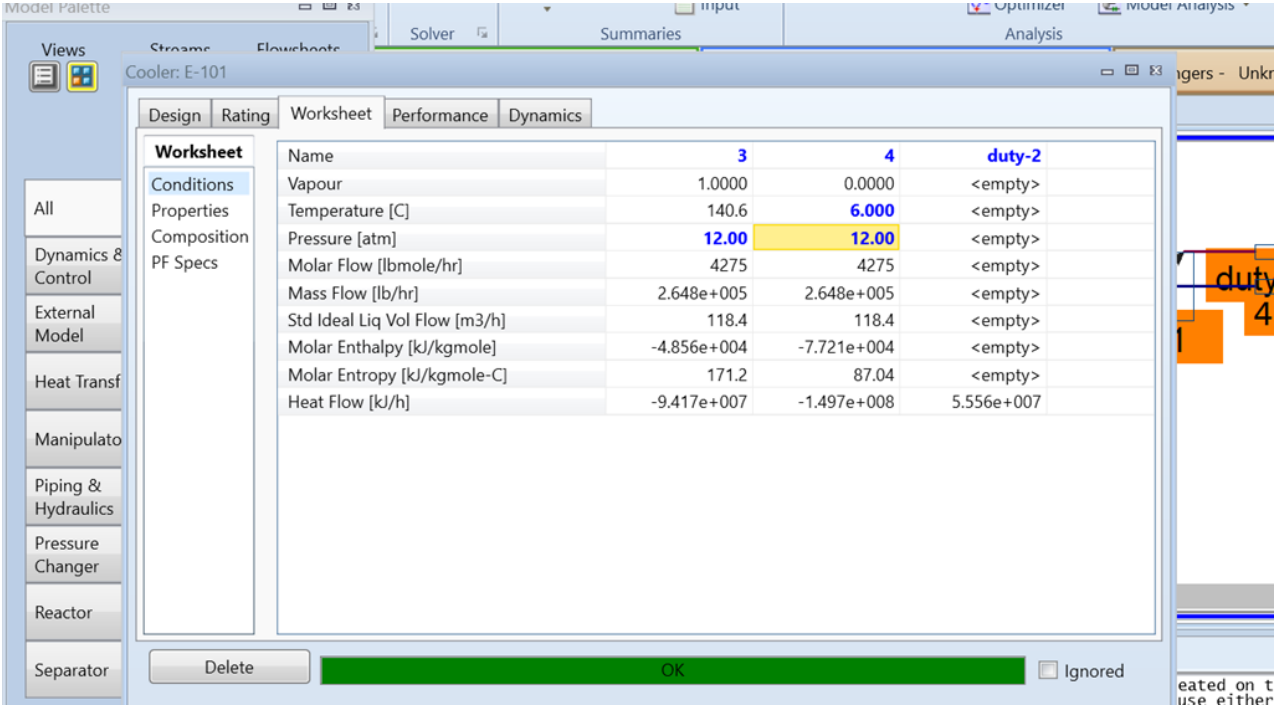
Design | Rating | Worksheet | Dynamics

Worksheet

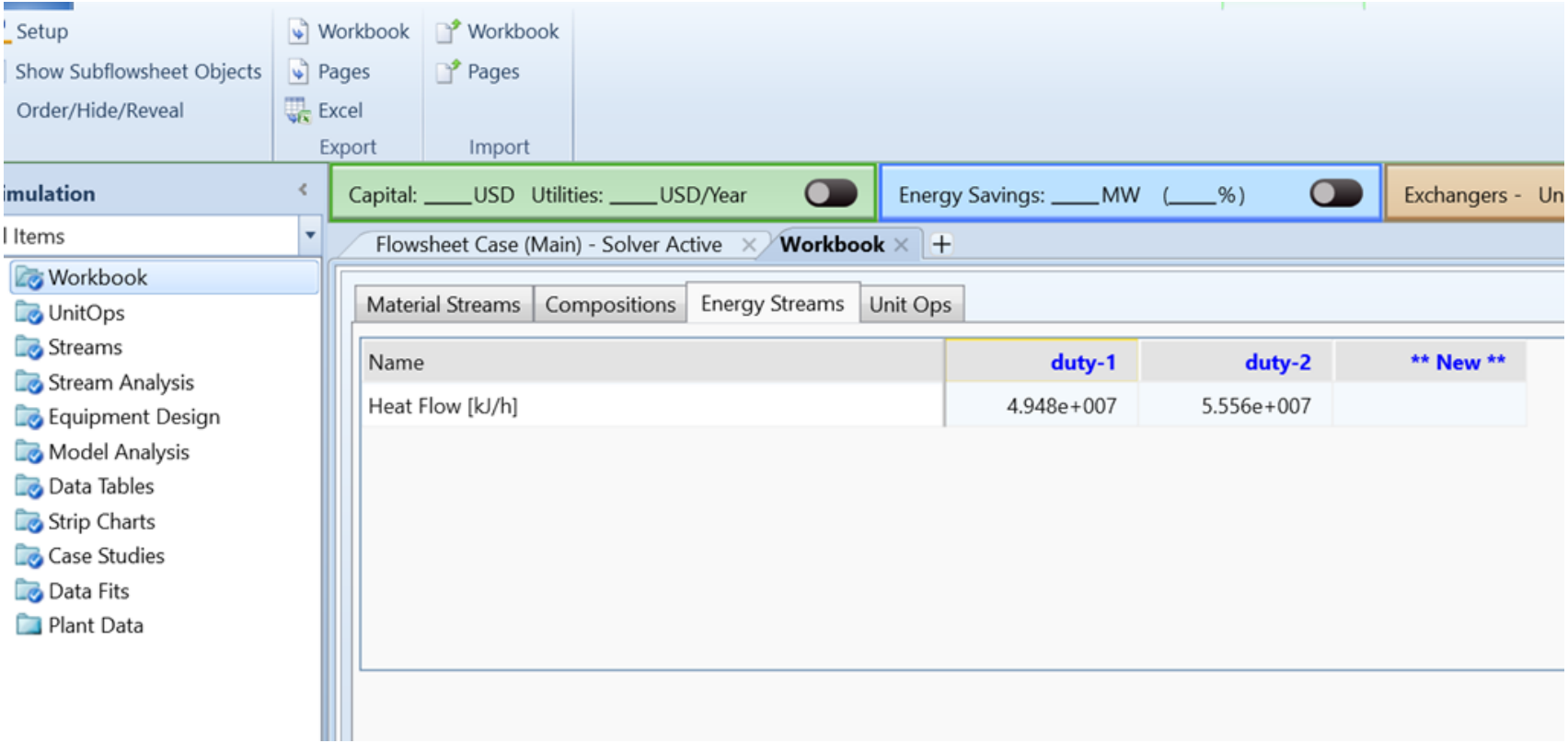
- Conditions
- Properties
- Composition
- PF Specs

Name	S-2	S-3
Vapour	1.0000	<empty>
Temperature [C]	158.3	<empty>
Pressure [atm]	26.00	<empty>
Molar Flow [lbmole/hr]	4275	4275
Mass Flow [lb/hr]	2.648e+005	2.648e+005
Std Ideal Liq Vol Flow [m3/h]	118.4	118.4
Molar Enthalpy [kJ/kgmole]	-4.856e+004	-4.856e+004
Molar Entropy [kJ/kgmole-C]	165.6	<empty>
Heat Flow [kJ/h]	-9.417e+007	-9.417e+007

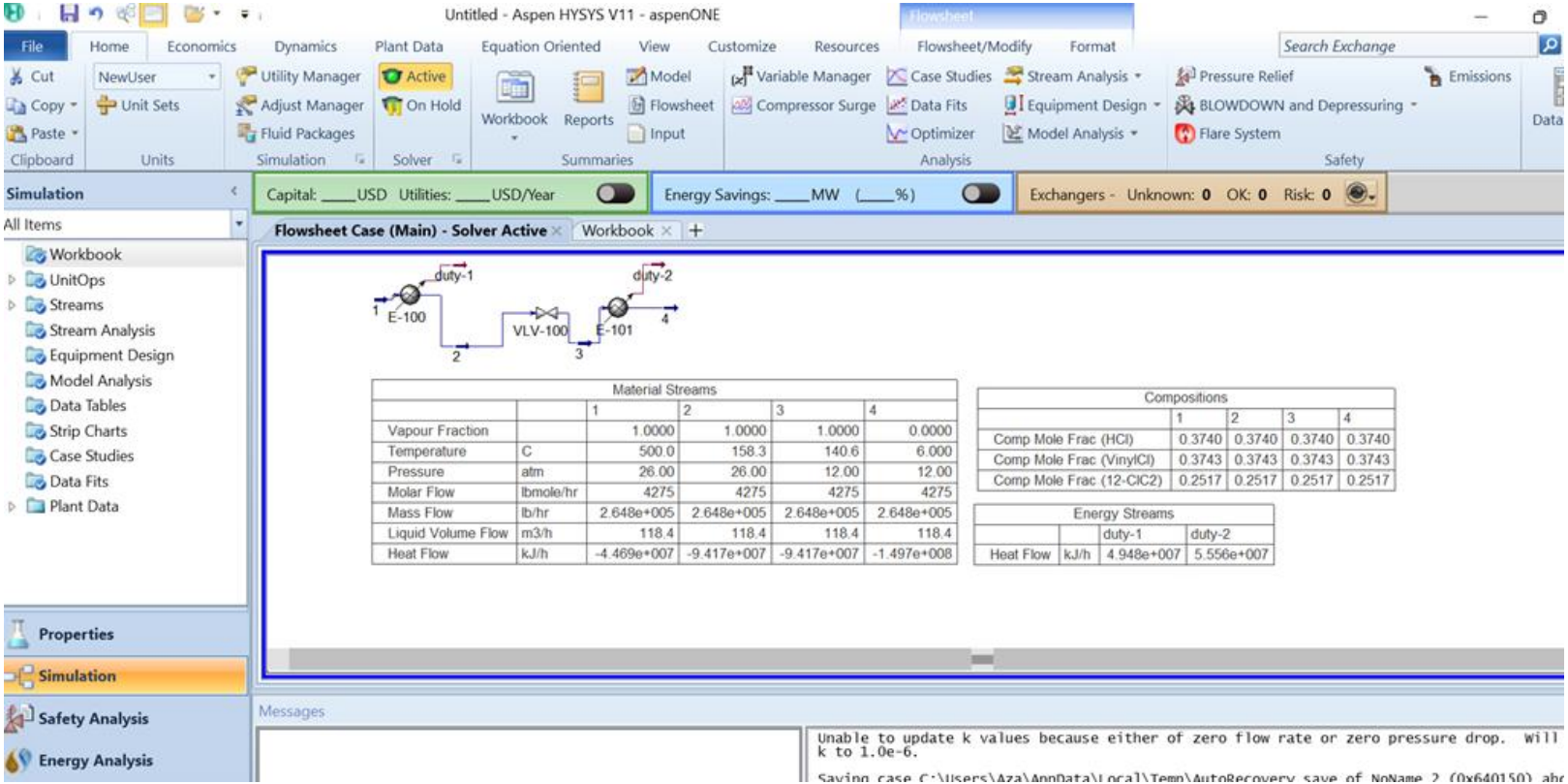
Perhatikan hasil 3 dan 4 (3 dimasukkan P-12), 4 dimasukkan 6 C , 12 atm



Energinya terisi dengan melihat di workbook



Hasil Akhir


Untitled - Aspen HYSYS V11 - aspenONE
File
Home
Economics
Dynamics
Plant Data
Equation Oriented
View
Customize
Resources
Flowsheet/Modify
Format
Search Exchange
Cut
Copy
Paste
Clipboard
NewUser
Unit Sets
Units
Utility Manager
Adjust Manager
Fluid Packages
Simulation
Active
On Hold
Solver
Workbook
Reports
Model
Flowsheet
Input
Summaries
Variable Manager
Compressor Surge
Case Studies
Data Fits
Optimizer
Stream Analysis
Equipment Design
Model Analysis
Analysis
Pressure Relief
BLOWDOWN and Depressuring
Flare System
Emissions
Safety
Simulation
All Items
Workbook
UnitOps
Streams
Stream Analysis
Equipment Design
Model Analysis
Data Tables
Strip Charts
Case Studies
Data Fits
Plant Data
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Flowsheet Case (Main) - Solver Active
Workbook
duty-1
duty-2
E-100
VLV-100
E-101
1
2
3
4
Material Streams
Vapour Fraction
Temperature C
Pressure atm
Molar Flow lbmole/hr
Mass Flow lb/hr
Liquid Volume Flow m3/h
Heat Flow kJ/h
1.0000 1.0000 1.0000 0.0000
500.0 158.3 140.6 6.000
26.00 26.00 12.00 12.00
4275 4275 4275 4275
2.648e+005 2.648e+005 2.648e+005 2.648e+005
118.4 118.4 118.4 118.4
-4.469e+007 -9.417e+007 -9.417e+007 -1.497e+008
Compositions
Comp Mole Frac (HCl) 0.3740 0.3740 0.3740 0.3740
Comp Mole Frac (VinylCl) 0.3743 0.3743 0.3743 0.3743
Comp Mole Frac (12-CIC2) 0.2517 0.2517 0.2517 0.2517
Energy Streams
Heat Flow kJ/h 4.948e+007 5.556e+007
Properties
Simulation
Safety Analysis
Energy Analysis
Messages
Unable to update k values because either of zero flow rate or zero pressure drop. Will
k to 1.0e-6.
Saving case C:\Users\Aza\AppData\Local\Temp\AutoRecovery save of NoName 2 (0x640150) abo

Uji#3

Single contact phase separation (flash)

100 kmol h-1 of a mixture containing 10, 20, 30 and 40 mol% of propane, n-butane, n-pentane, and hexane, respectively, is preheated before entering a distilallation tower. The liquid mole fraction of the mixture output from heater thus 80%. Calculated the composition of both liquid and vapor phases and the temperature of the vapor-liquid mixture at 700 kPa. Initial temperature of the mixture is 25 C

Masalah lain

1. Distillation column
2. Absorption -desorption
3. **Reactor (Sudah)**
4. Steam reforming
5. Sweetening Gas Alam

Reactor (With Reaction)

Ethylene glycol is porduced by direct hydration of ethylene oxide. The reaction proceeds inn the liquid phase without a catalyst at temperature of 200 C. In addtion to the hydration of ethylene to ethylene glycol, also its subsequent hydroxyalkalation for the formation of diethylene glycol or higher glycols can take place. To prevent **the subsequent** reaction, the process is carried out with a large excess of water. In the example, we consider the following main reaaction and side reaction with the given conversion:

C_2H_4O (ethylene oxide) + H_2O → $HOCH_2\text{-}CH_2OH$ **----(R-1)**

Conversion of C_2H_4O : 95%

$HOCH_2\text{-}CH_2OH$ (ethyleneglycol) + C_2H_4O → $(HOCH_2\text{-}CH_2)_2O$ (dietilenglycol) **---- (R-2)**

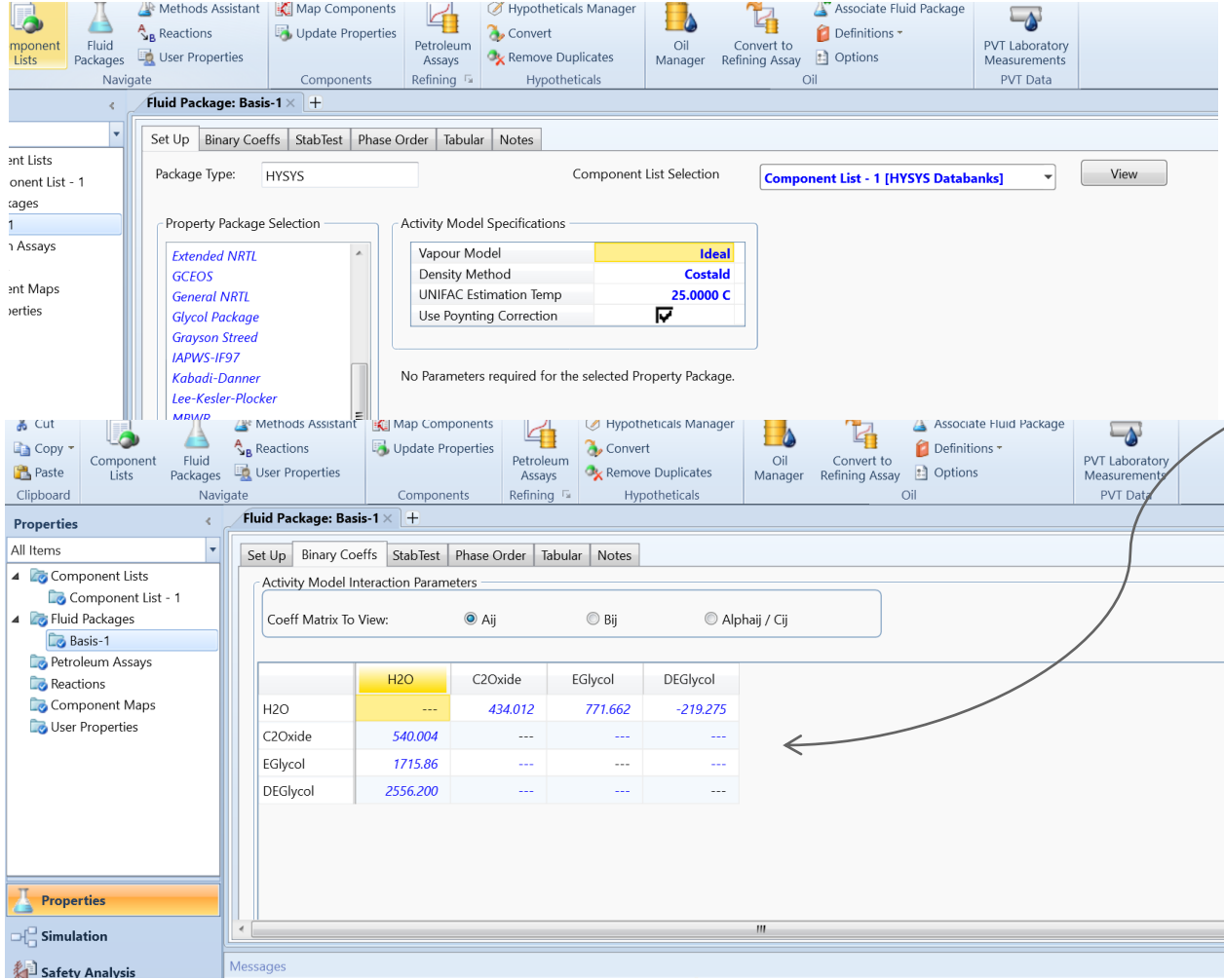
Convertion of C_2H_4O : 5%

The ratio of ethylene oxide to water 1:12

Ethylene oxide and water enter the reactor at **25 C and 3 Mpa**. **Reactor temperature is 200 C** and its pressure is 3 Mpa

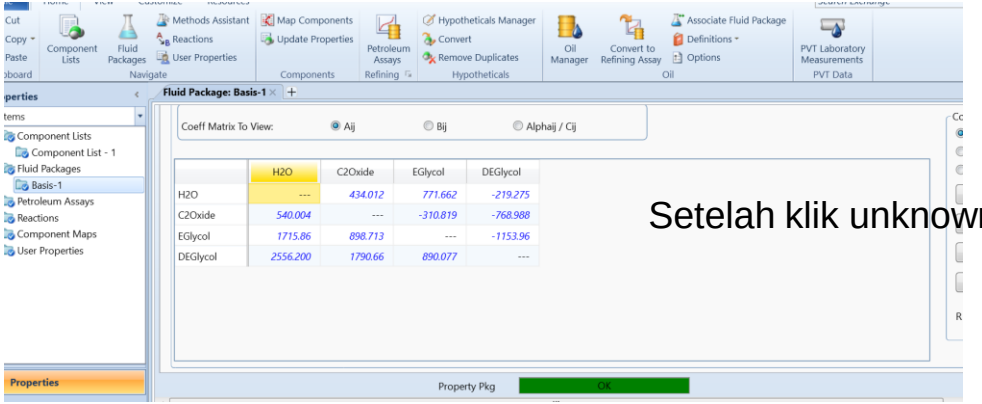
Using Aspen

a) Composition of the reaction products
b) Reaction heat duty if 100 kmol /hr of ethylene oxide is processed
c) Heat of reaction for both reactions if the reference temperature is 25 C, reference is 101.325 kPa, an the reference phase is liquid

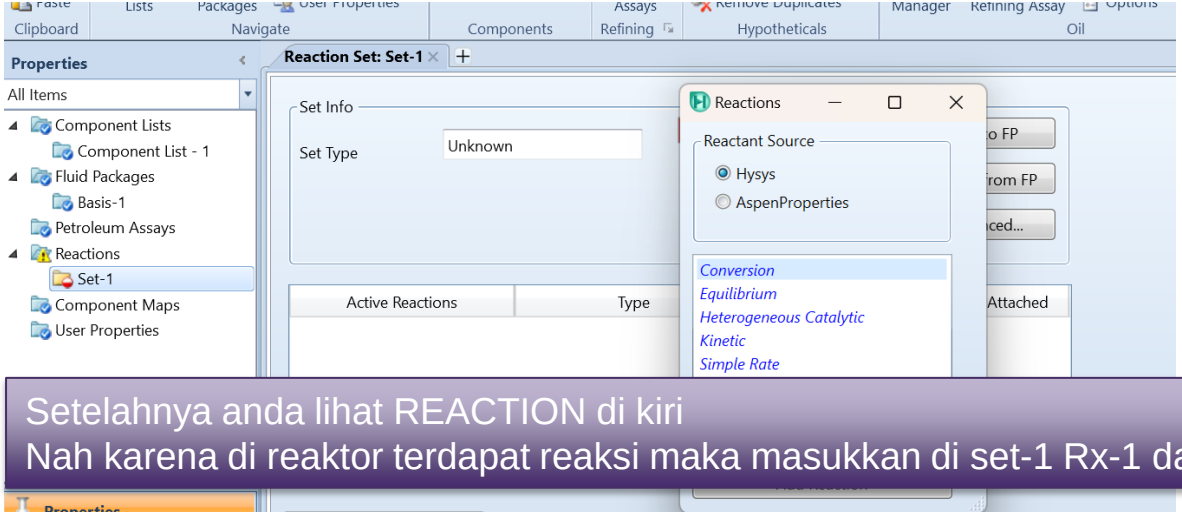


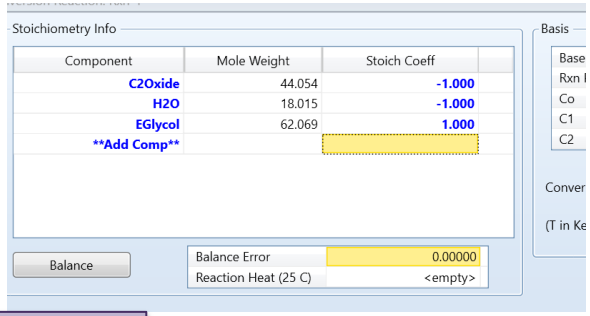
Memakai persamaan NRTL (set up)

Cek Binary Coeffs → Unknowns

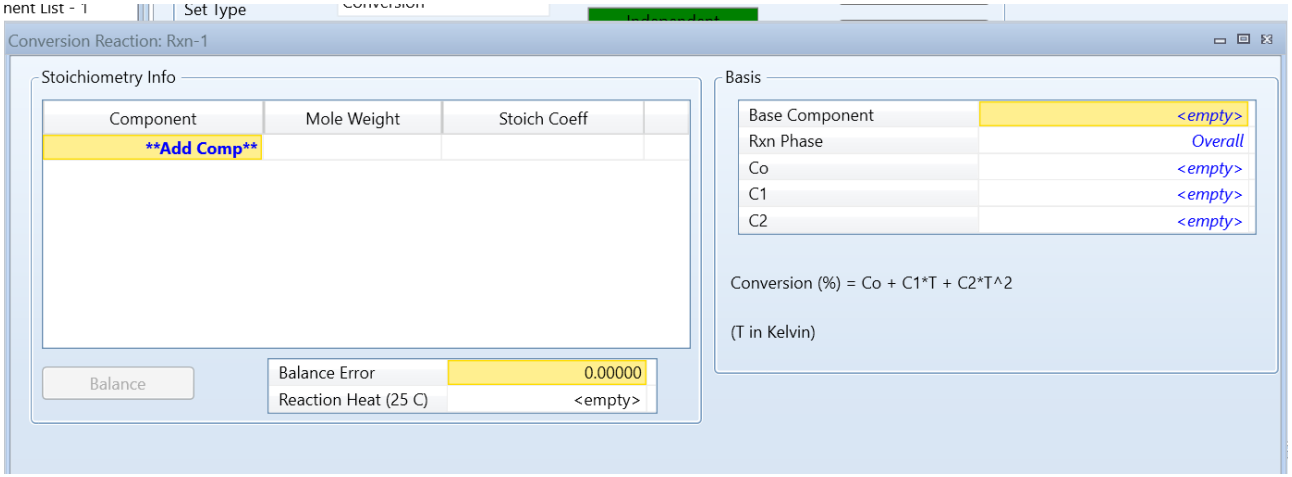


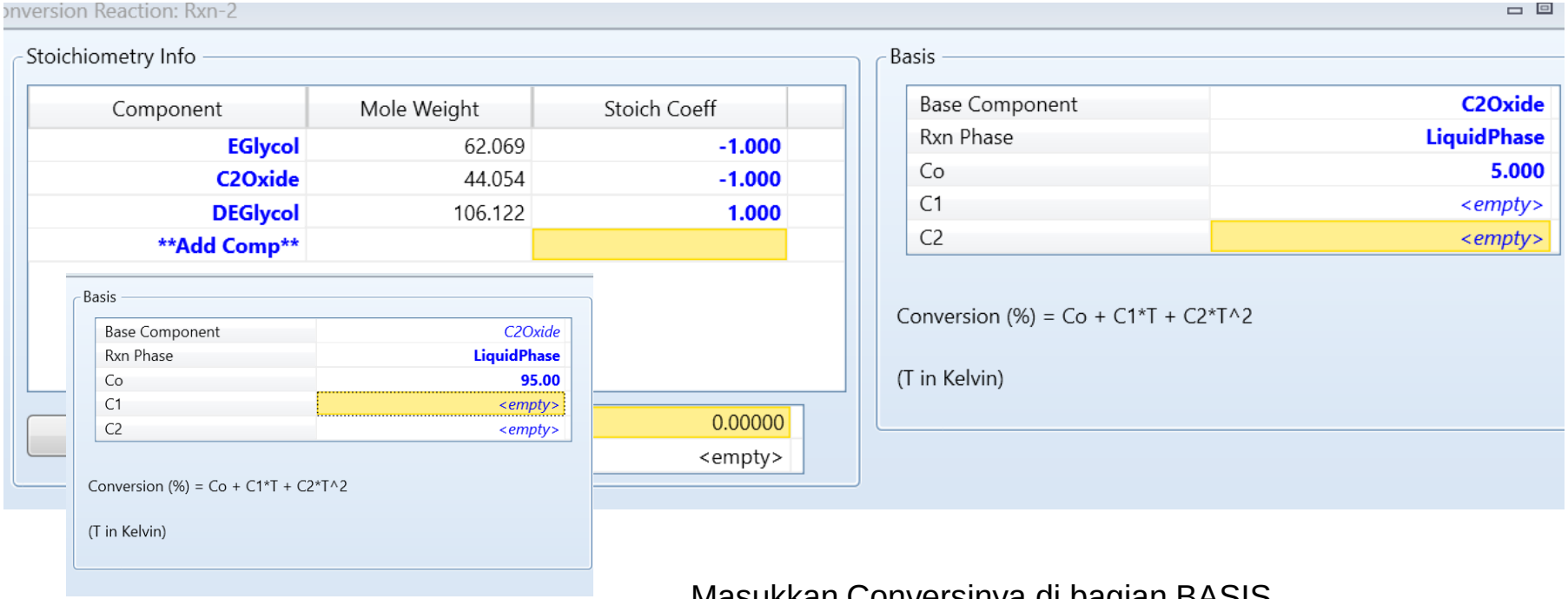
Setelah klik unknowns jadi terisi



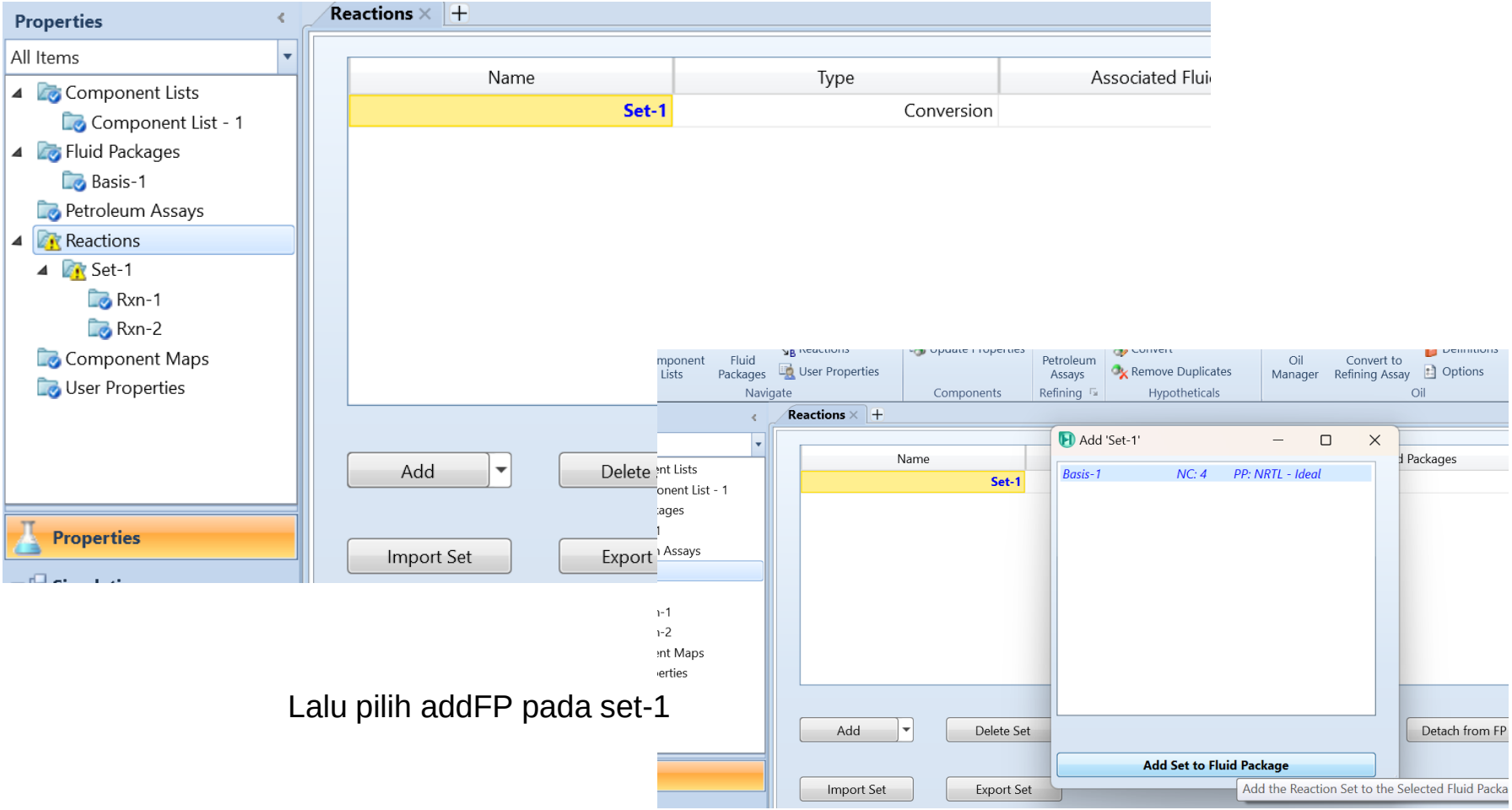


Setelahnya anda lihat REACTION di kiri
Nah karena di reaktor terdapat reaksi maka masukkan di set-1 Rx-1 dan Rx-2

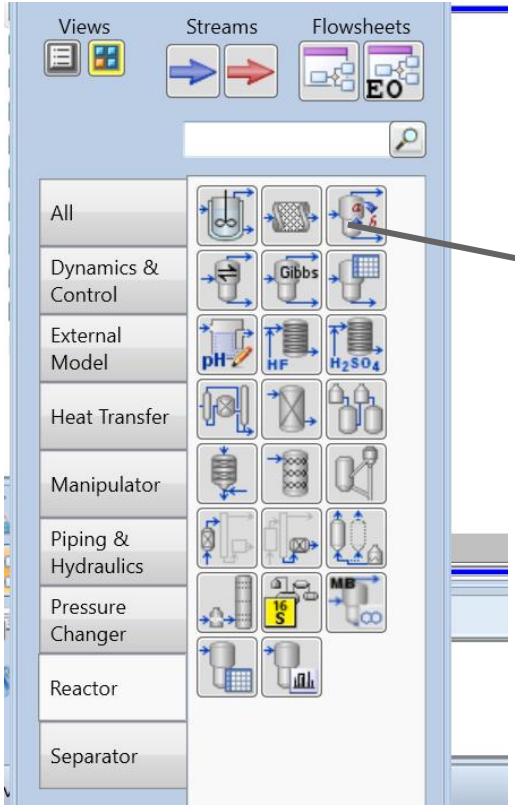


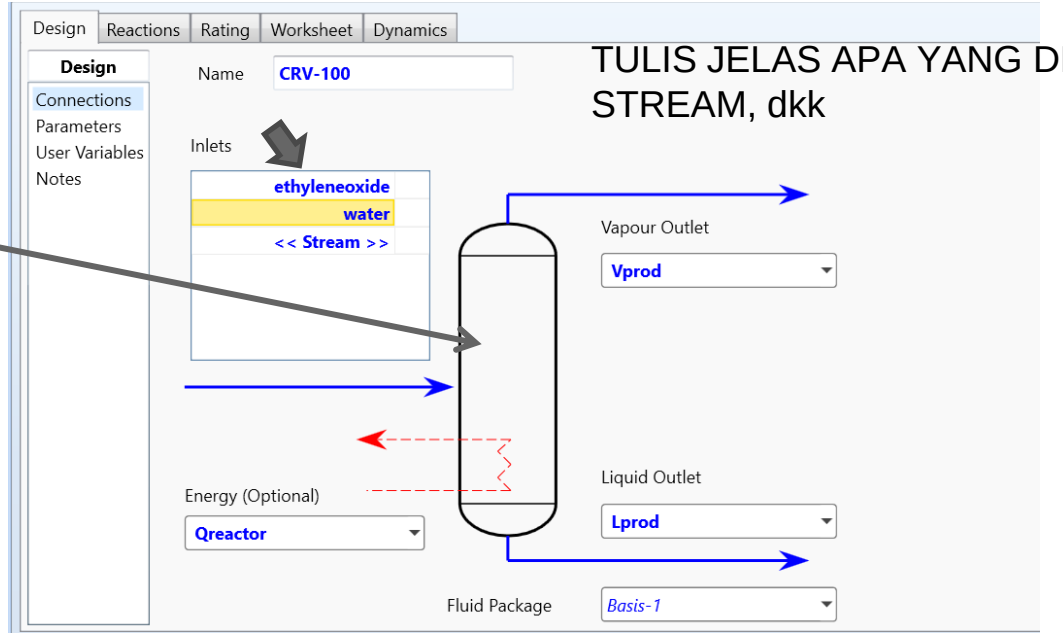


Masukkan Conversinya di bagian BASIS
Lihat di soal berapa untuk Rx-1 dan
Rx-2

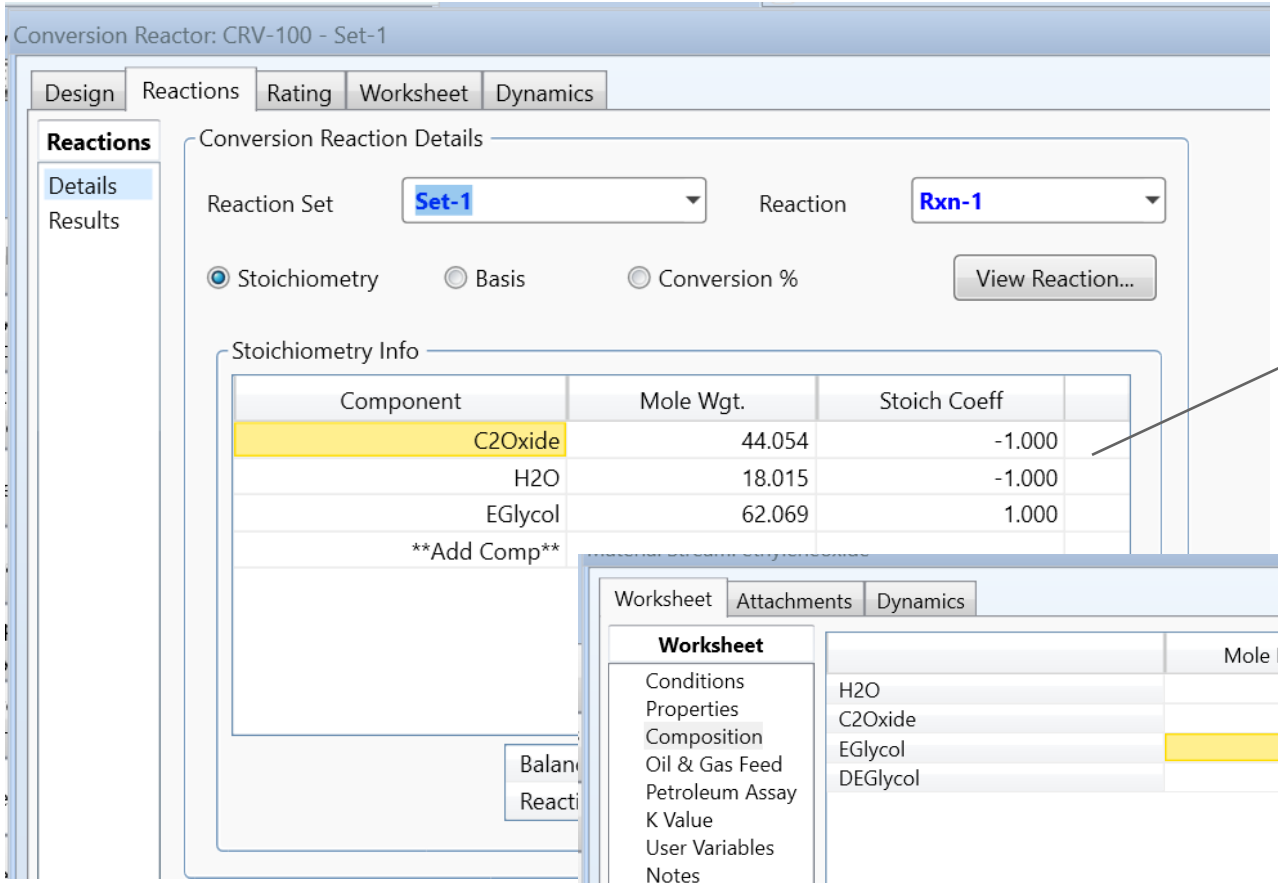


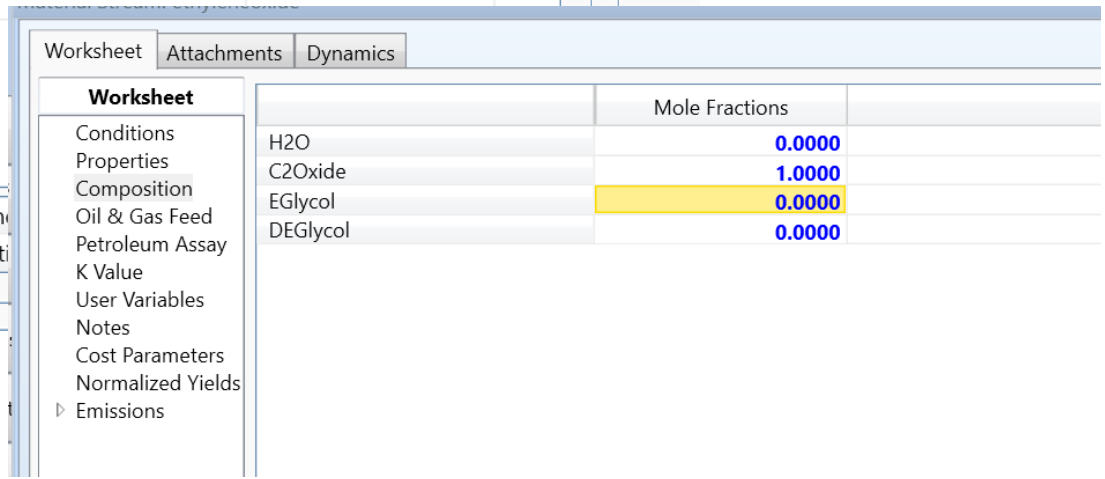
Lalu pilih addFP pada set-1





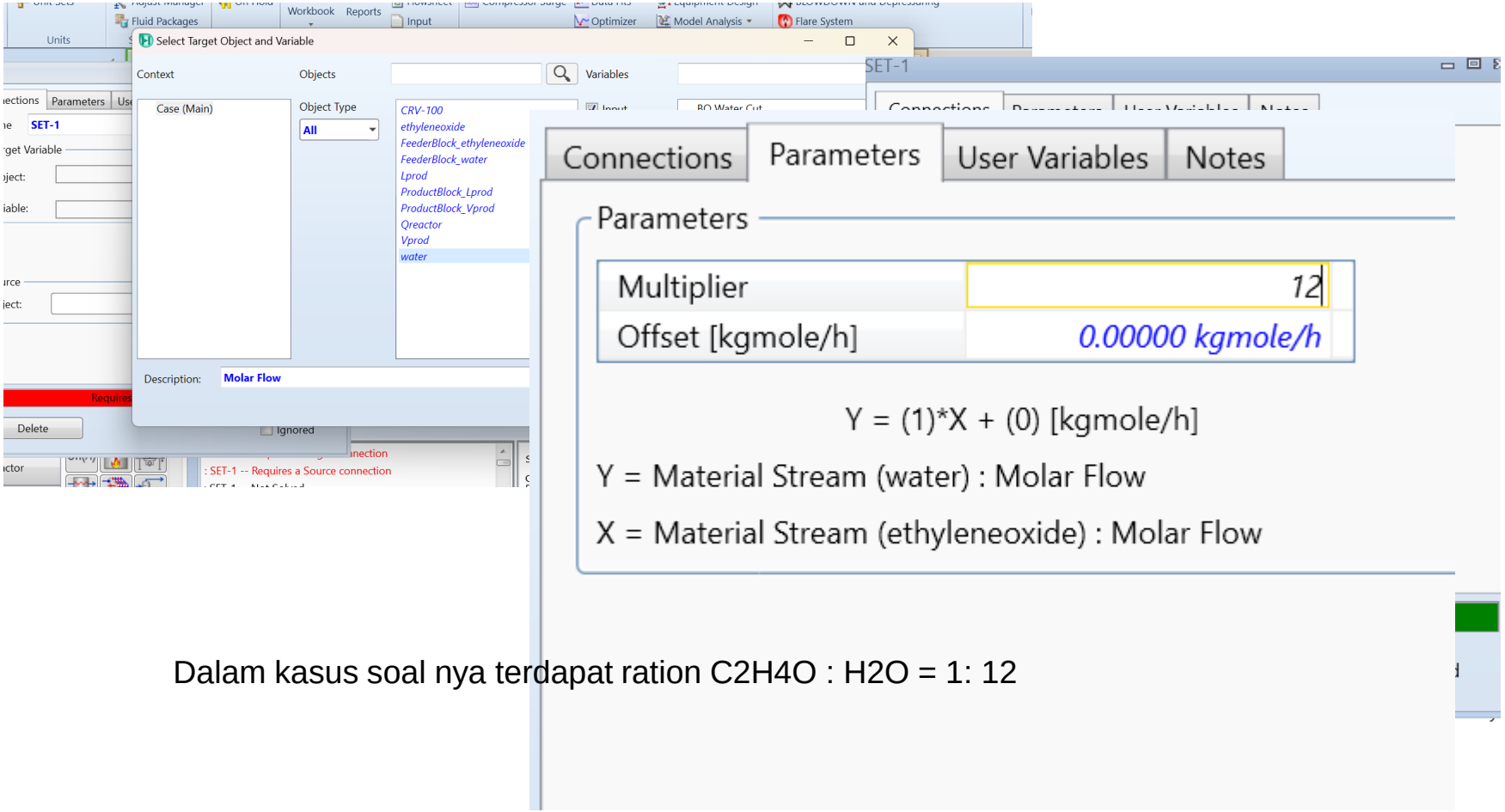
TULIS JELAS APA YANG DI STREAM, dkk





Silakan dibuat pada detail reactionnya

-1 (Reaktan)
1 (Produk)



Dalam kasus soal nya terdapat ration C2H4O : H2O = 1: 12

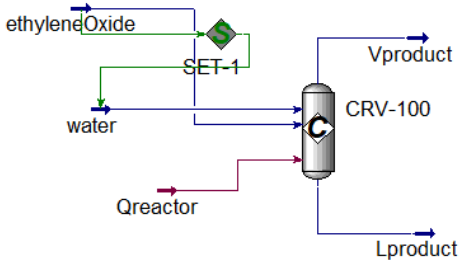
Lprodnya masukkan 200C

Design | Reactions | Rating | Worksheet | Dynamics

Worksheet

- Conditions
- Properties
- Composition
- PF Specs

	ethyleneoxide	water	Lprod	Vprod
H2O	**0.0000**	**1.0000**	0.9172	0.8900
C2Oxide	**1.0000**	**0.0000**	0.0039	0.0627
EGlycol	**0.0000**	**0.0000**	0.0786	0.0473
DEGlycol	**0.0000**	**0.0000**	0.0002	0.0000



Material Streams					
		ethyleneOxide	water	Vproduct	Lproduct
Vapour Fraction		0.0000	0.0000	1.0000	0.0000
Temperature	C	25.00	25.00	200.0	200.0
Pressure	MPa	3.000	3.000	3.000	3.000
Molar Flow	kgmole/h	100.0	1200	0.0000	1205
Mass Flow	kg/h	4405	2.162e+004	0.0000	2.602e+004
Liquid Volume Flow	m3/h	4.994	21.66	0.0000	25.50
Heat Flow	kJ/h	-7.782e+006	-3.418e+008	-0.0000	-3.403e+008