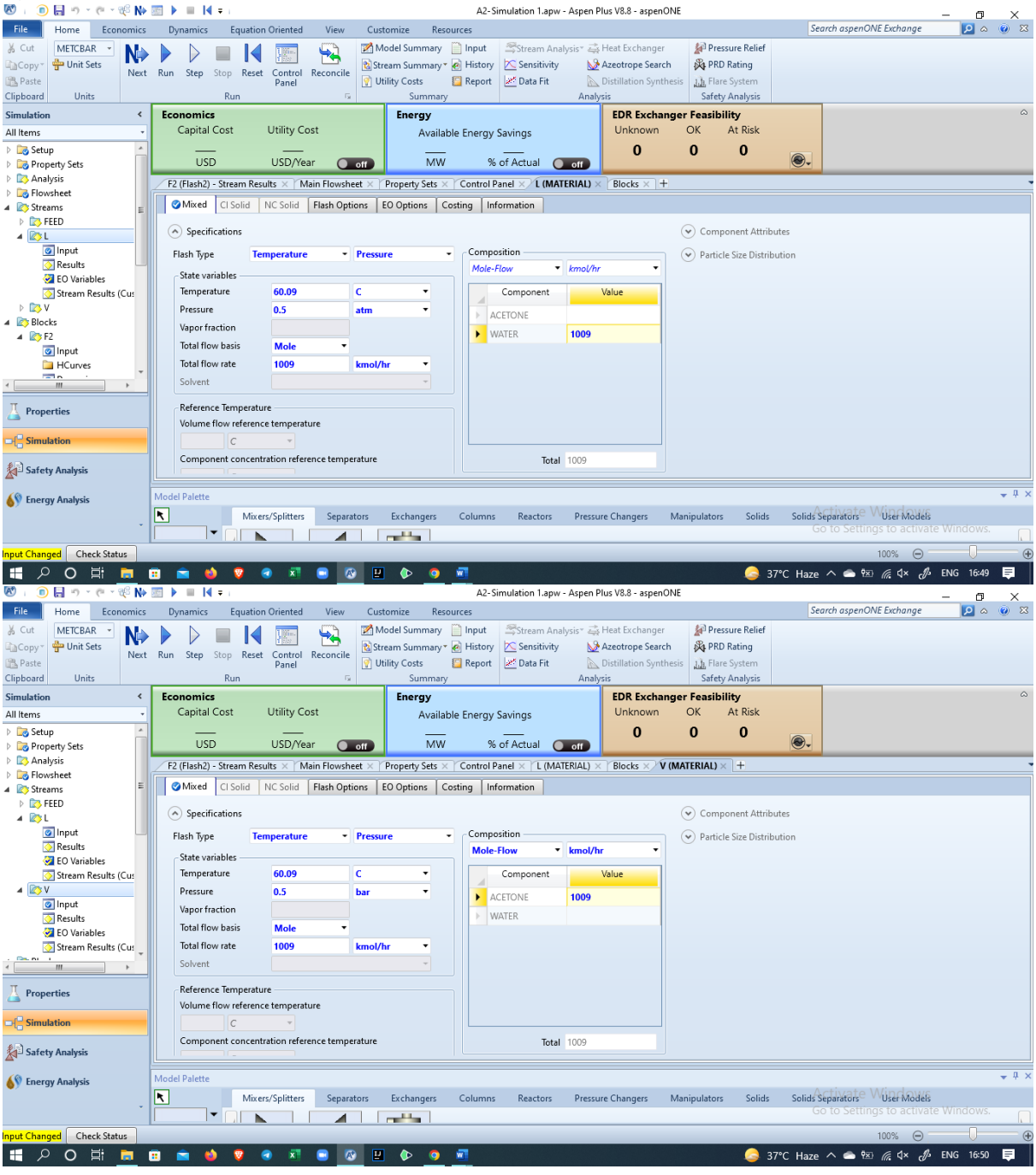
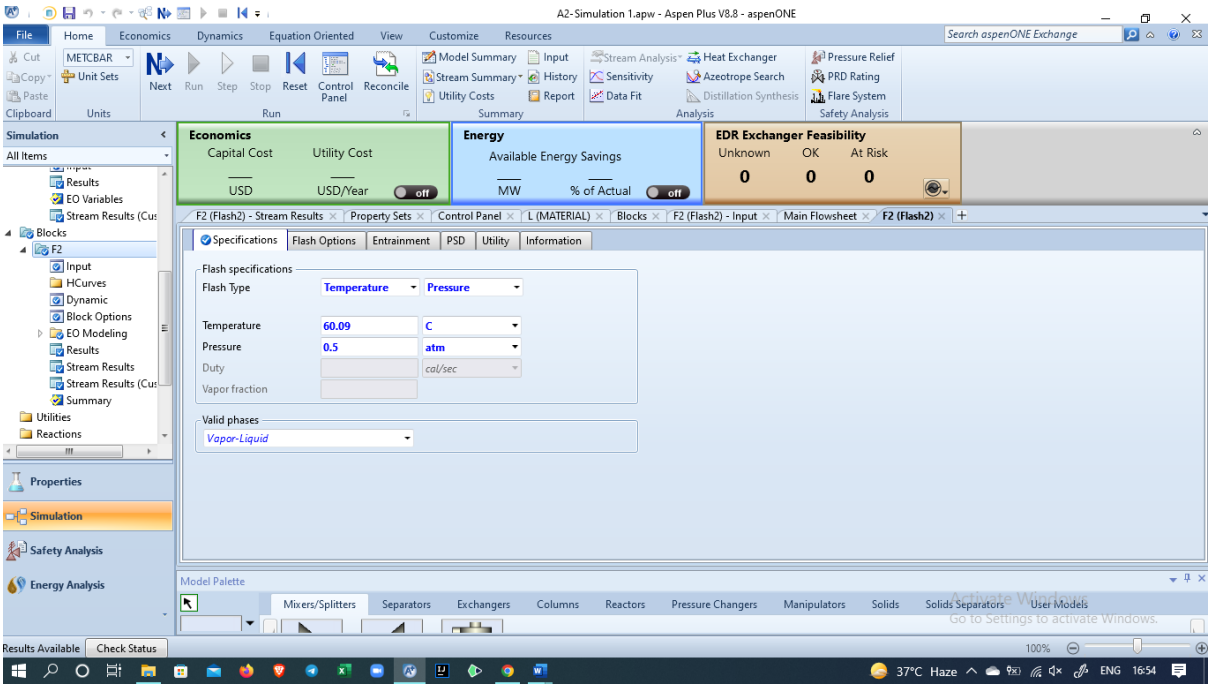
Assignment 2

SAYAN DEORI 200909

1. A)



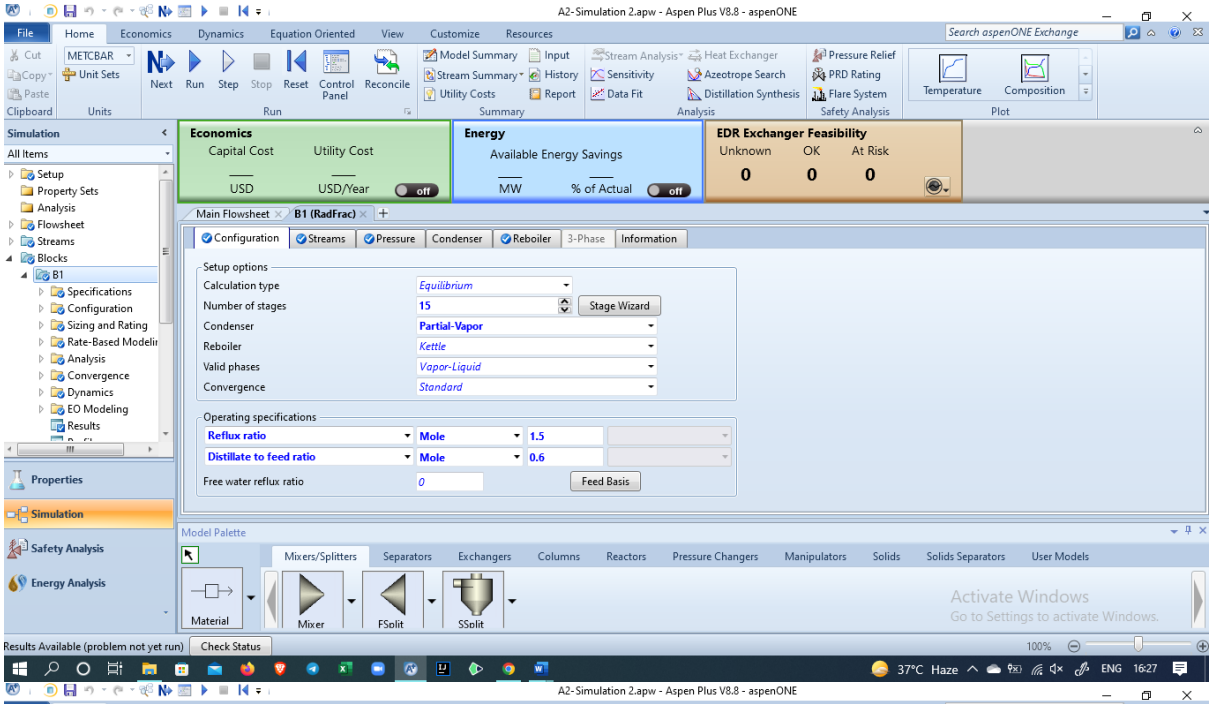


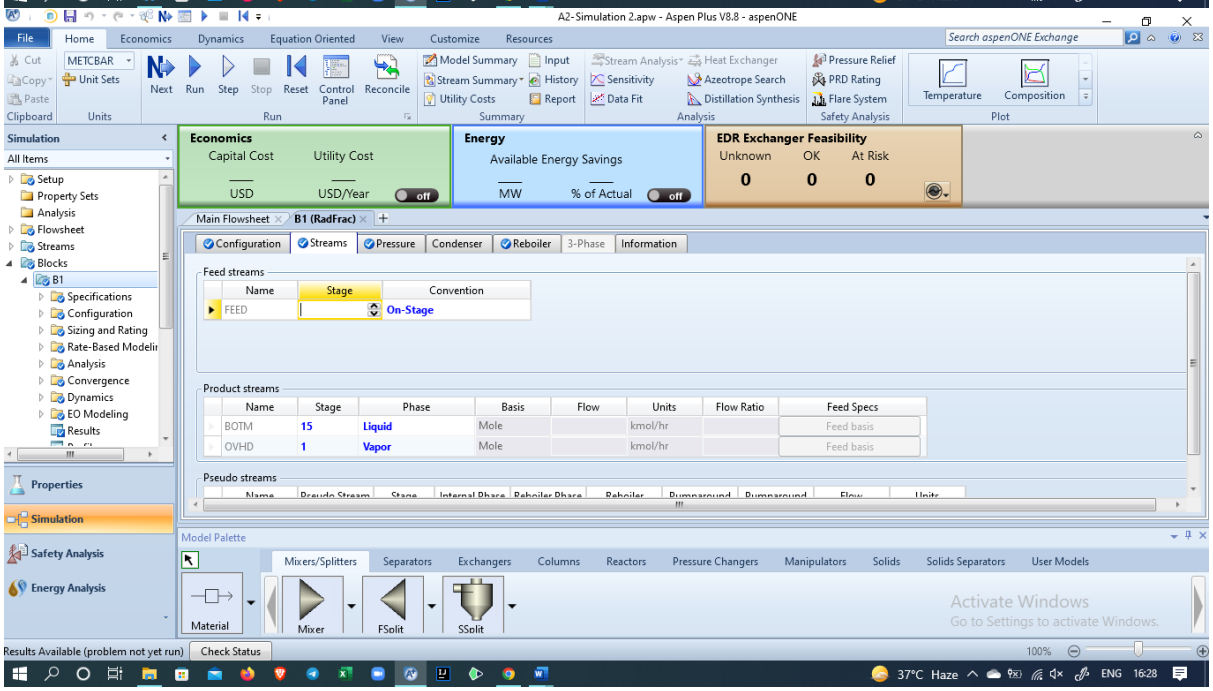
MAXIMUM TEMPERATURE = 100.12 degree Celsius
MINIMUM TEMPARATURE = 50.49 degree Celsius

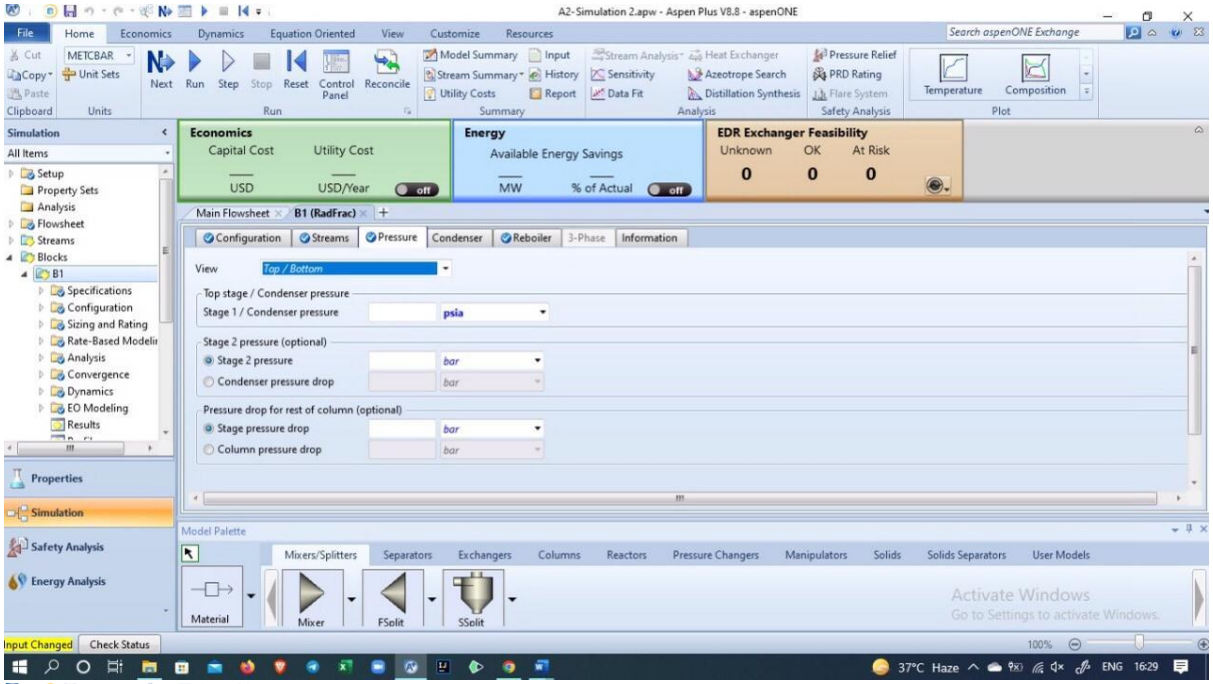
B)

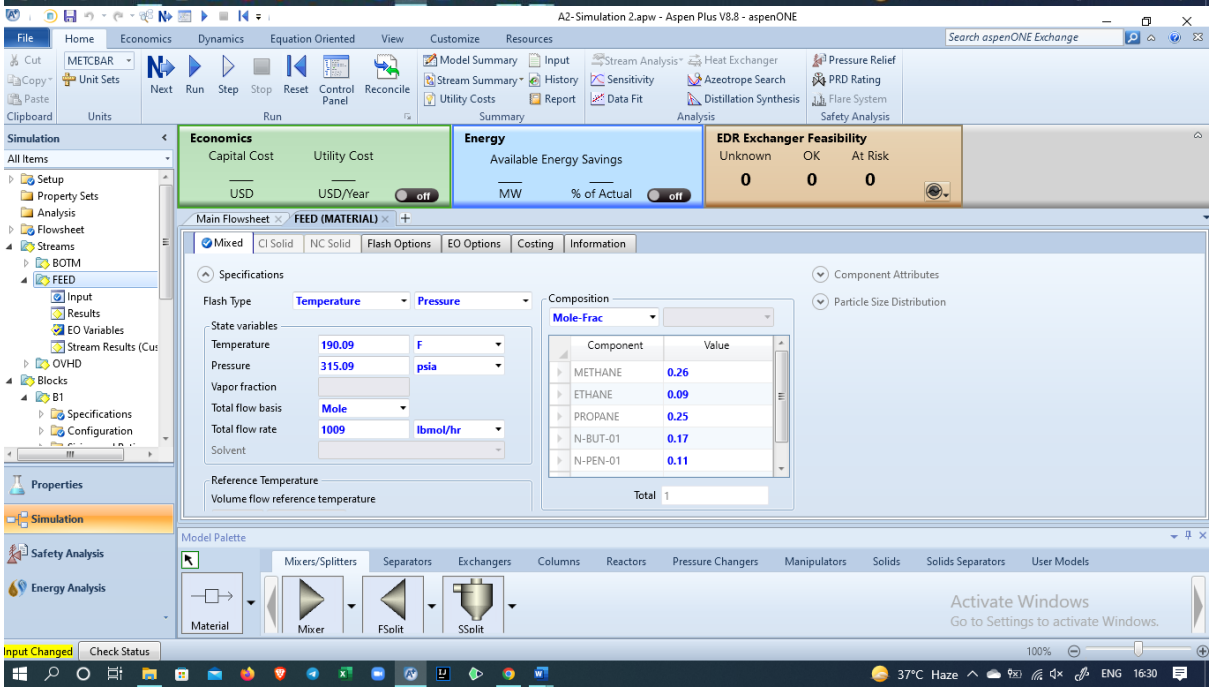
Heat and Material Balance Table				
Stream ID		FEED	L	V
From			F2	F2
To		F2		
Phase		LIQUID	LIQUID	VAPOR
Substream: MIXED				
Mole Flow	kmol/hr			
ACETONE		1058.000	380.6970	677.3030
WATER		1058.000	809.0560	248.9440
Total Flow	kmol/hr	2116.000	1189.753	926.2470
Total Flow	kg/hr	80508.85	36686.27	43822.58
Total Flow	l/min	1623.574	750.1642	8.44254E+5
Temperature	C	25.58000	60.09000	60.09000
Pressure	bar	1.580000	.5066250	.5066250
Vapor Frac		0.0	0.0	1.000000
Liquid Frac		1.000000	1.000000	0.0
Solid Frac		0.0	0.0	0.0
Enthalpy	cal/mol	-63599.05	-64514.56	-52644.92
Enthalpy	cal/gm	-1671.563	-2092.238	-1112.719
Enthalpy	cal/sec	-3.7382E+7	-2.1321E+7	-1.3545E+7
Entropy	cal/mol-K	-55.15602	-46.57422	-36.29906
Entropy	cal/gm-K	-1.449656	-1.510424	-.7672275
Density	mol/cc	.0217216	.0264331	1.82853E-5
Density	gm/cc	.8264572	.8150719	8.65114E-4
Average MW		38.04766	30.83520	47.31198
Liq Vol 60F	l/min	1623.081	712.8932	910.1881

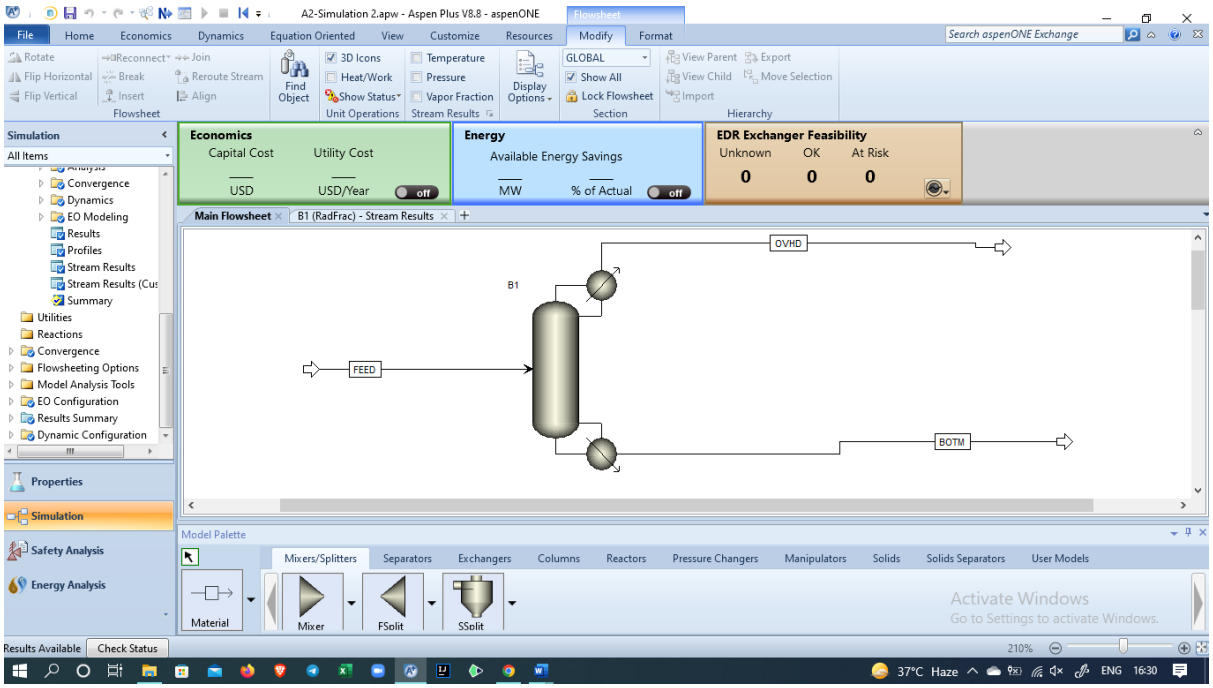
2.


A2-Simulation 2.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost
Utility Cost
Energy
Available Energy Savings
EDR Exchanger Feasibility
Unknown
OK
At Risk
Main Flowsheet
B1 (RadFrac)
Configuration
Streams
Pressure
Condenser
Reboiler
3-Phase
Information
Setup options
Calculation type
Equilibrium
Number of stages
15
Stage Wizard
Condenser
Partial-Vapor
Reboiler
Kettle
Valid phases
Vapor-Liquid
Convergence
Standard
Operating specifications
Reflux ratio
Mole
1.5
Distillate to feed ratio
Mole
0.6
Free water reflux ratio
Feed Basis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Activate Windows
Results Available (problem not yet run)
Check Status


A2-Simulation 2.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost
Utility Cost
Energy
Available Energy Savings
EDR Exchanger Feasibility
Unknown
OK
At Risk
Main Flowsheet
B1 (RadFrac)
Configuration
Streams
Pressure
Condenser
Reboiler
3-Phase
Information
Feed streams
Name
Stage
Convention
FEED
On-Stage
Product streams
Name
Stage
Phase
Basis
Flow
Units
Flow Ratio
Feed Specs
BOTM
15
Liquid
Mole
kmol/hr
Feed basis
OVHD
1
Vapor
Mole
kmol/hr
Feed basis
Pseudo streams
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Activate Windows
Results Available (problem not yet run)
Check Status

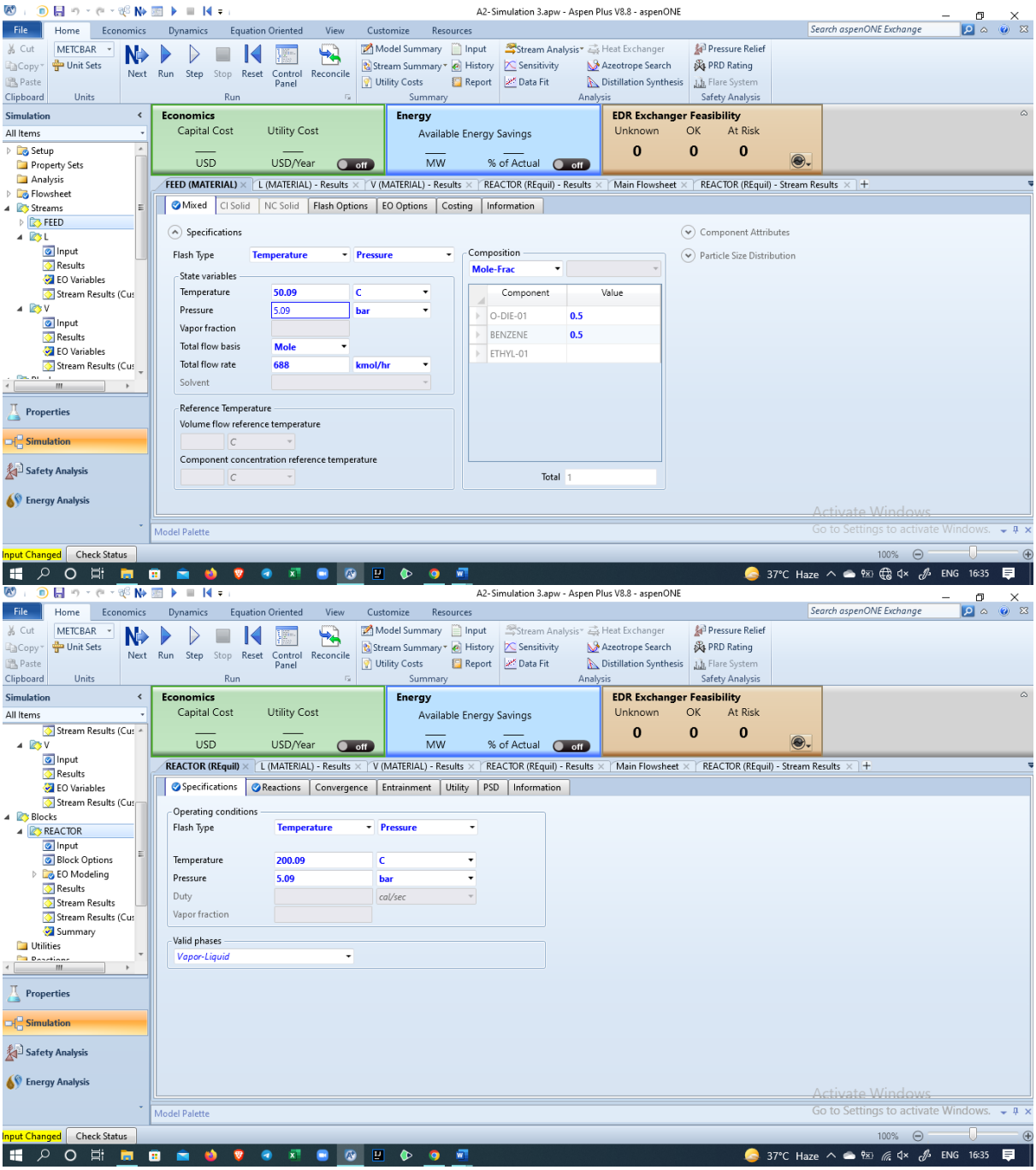

A2-Simulation 2.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost
Utility Cost
USD
USD/Year
Energy
Available Energy Savings
MW
% of Actual
EDR Exchanger Feasibility
Unknown
OK
At Risk
Main Flowsheet
B1 (RadFrac)
Configuration
Streams
Pressure
Condenser
Reboiler
3-Phase
Information
Top stage / Condenser pressure
Stage 1 / Condenser pressure
Stage 2 pressure (optional)
Pressure drop for rest of column (optional)
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Activate Windows
Go to Settings to activate Windows.
Input Changed
Check Status
37°C Haze
ENG
16:29

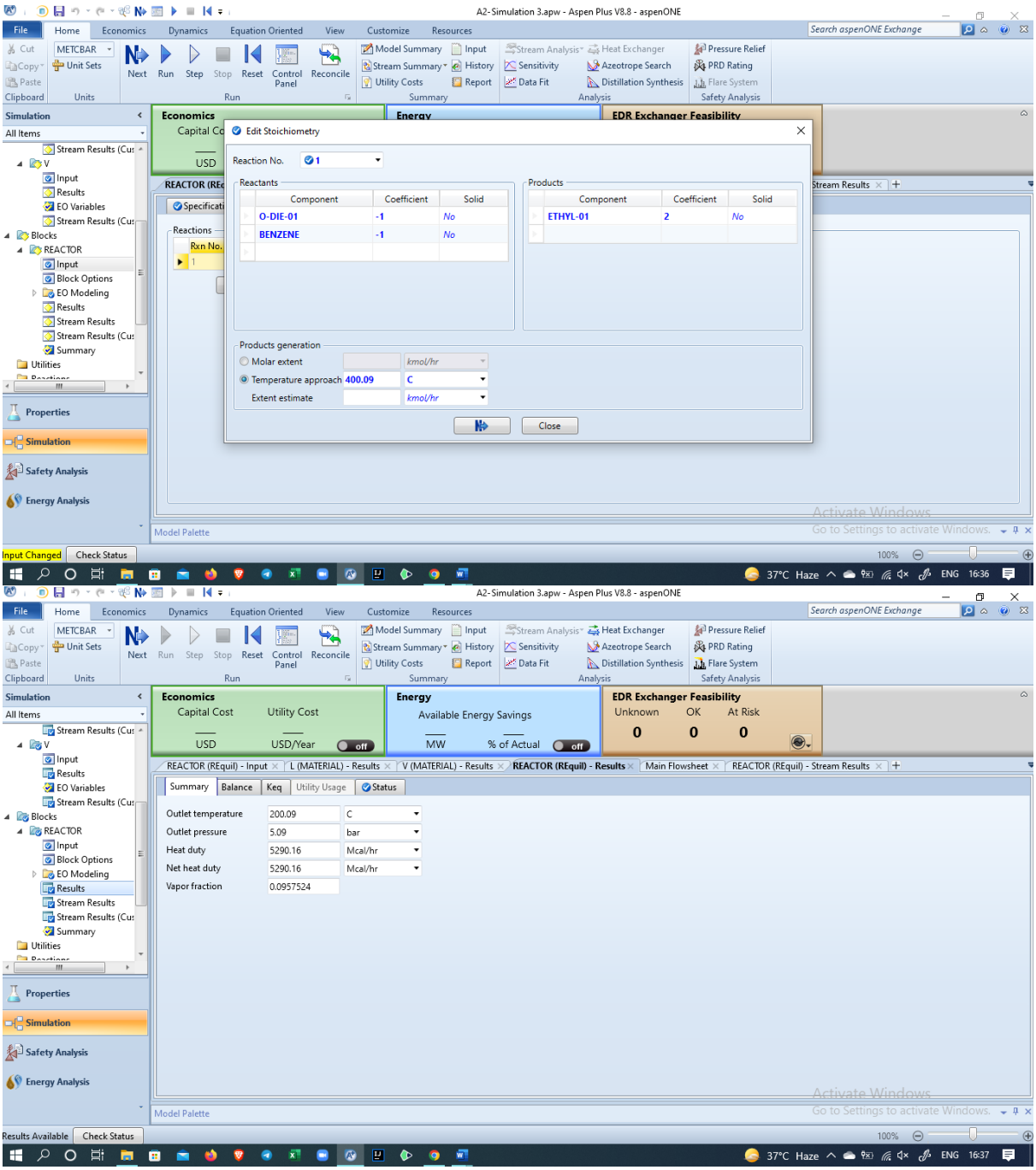

A2-Simulation 2.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost
Utility Cost
USD
USD/Year
Energy
Available Energy Savings
MW
% of Actual
EDR Exchanger Feasibility
Unknown
OK
At Risk
Main Flowsheet
FEED (MATERIAL)
Mixed
CI Solid
NC Solid
Flash Options
EO Options
Costing
Information
Specifications
Flash Type
Temperature
Pressure
State variables
Temperature
190.09
F
Pressure
315.09
psia
Vapor fraction
Total flow basis
Mole
Total flow rate
1009
lbmol/hr
Solvent
Reference Temperature
Volume flow reference temperature
Composition
Mole-Frac
Component
Value
METHANE
0.26
ETHANE
0.09
PROPANE
0.25
N-BUT-01
0.17
N-PEN-01
0.11
Total
Component Attributes
Particle Size Distribution
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Activate Windows
Go to Settings to activate Windows.
Input Changed
Check Status
37°C Haze
ENG
16:30

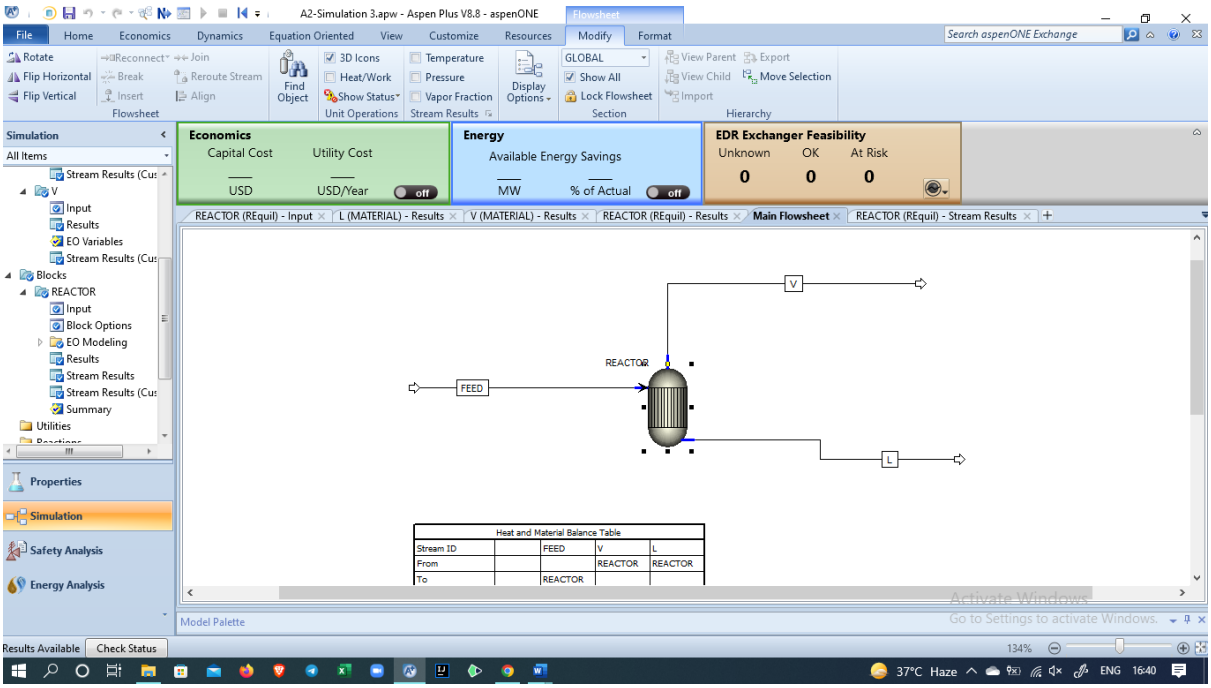

A2-Simulation 2.apw - Aspen Plus V8.8 - aspenONE
File
Home
Economics
Dynamics
Equation Oriented
View
Customize
Resources
Modify
Format
Search aspenONE Exchange
Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Temperature
Pressure
Vapor Fraction
Unit Operations
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Convergence
Dynamics
EO Modeling
Results
Profiles
Stream Results
Stream Results (Cus
Summary
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Properties
Simulation
Safety Analysis
Energy Analysis
Economics
Capital Cost
Utility Cost
USD
USD/Year
off
Energy
Available Energy Savings
MW
% of Actual
off
EDR Exchanger Feasibility
Unknown
OK
At Risk
0
0
0
Main Flowsheet
B1 (RadFrac) - Stream Results
OVHD
B1
FEED
BOTM
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Activate Windows
Go to Settings to activate Windows.
Results Available
Check Status
210%
37°C Haze
ENG
16:30

Heat and Material Balance Table				
Stream ID		FEED	BOTM	OVHD
From			B1	B1
To		B1		
Phase		MIXED	LIQUID	VAPOR
Substream: MIXED				
Mole Flow	kmol/hr			
METHANE		118.9954	7.25686E-5	118.9954
ETHANE		41.19072	.0172692	41.17345
PROPANE		114.4187	4.415138	110.0035
N-BUT-01		77.80470	73.38328	4.421416
N-PEN-01		50.34422	50.33316	.0110601
N-HEX-01		54.92096	54.92096	4.01031E-6
Total Flow	kmol/hr	457.6747	183.0699	274.6048
Total Flow	kg/hr	21080.63	12824.98	8255.644
Total Flow	l/min	6652.748	572.1874	4298.762
Temperature	C	87.82778	151.6098	23.34192
Pressure	bar	21.72469	21.75848	21.75848
Vapor Frac		.7025297	0.0	1.000000
Liquid Frac		.2974703	1.000000	0.0
Solid Frac		0.0	0.0	0.0
Enthalpy	cal/mol	-26863.15	-34508.18	-21561.61
Enthalpy	cal/gm	-583.2172	-492.5861	-717.1969
Enthalpy	cal/sec	-3.4152E+6	-1.7548E+6	-1.6447E+6
Entropy	cal/mol-K	-70.88079	-108.9178	-46.54566
Entropy	cal/gm-K	-1.538870	-1.554744	-1.548233
Density	mol/cc	1.14658E-3	5.33246E-3	1.06467E-3
Density	gm/cc	.0528118	.3735659	.0320078
Average MW		46.06028	70.05512	30.06373
Liq Vol 60F	l/min	675.1970	343.7085	331.4885

3.


A2-Simulation 3.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost
Utility Cost
Energy
Available Energy Savings
EDR Exchanger Feasibility
Unknown
OK
At Risk
FEED (MATERIAL)
Specifications
Flash Type
Temperature
Pressure
State variables
Temperature
50.09
Pressure
5.09
Vapor fraction
Total flow basis
Mole
Total flow rate
688
kmol/hr
Solvent
Reference Temperature
Volume flow reference temperature
Component concentration reference temperature
Composition
Mole-Frac
Component
Value
O-DIE-01
0.5
BENZENE
0.5
ETHYL-01
Total
Component Attributes
Particle Size Distribution
REACTOR (REquil)
Operating conditions
200.09
Duty
Valid phases
Vapor-Liquid
Model Palette
Input Changed
Check Status
Activate Windows
Go to Settings to activate Windows.
37°C Haze
ENG
16:35


A2-Simulation 3.apw - Aspen Plus V8.8 - aspenONE
Edit Stoichiometry
Reaction No. 1
Reactants
Component Coefficient Solid
O-DIE-01 -1 No
BENZENE -1 No
Products
Component Coefficient Solid
ETHYL-01 2 No
Products generation
Molar extent kmol/hr
Temperature approach 400.09 C
Extent estimate kmol/hr
Close
Economics
Energy
EDR Exchanger Feasibility
Input Changed
Check Status
37°C Haze
ENG 16:36
A2-Simulation 3.apw - Aspen Plus V8.8 - aspenONE
Economics
Capital Cost Utility Cost
USD USD/Year
Energy
Available Energy Savings
MW % of Actual
EDR Exchanger Feasibility
Unknown OK At Risk
0 0 0
REACTOR (REquil) - Input
L (MATERIAL) - Results
V (MATERIAL) - Results
REACTOR (REquil) - Results
Main Flowsheet
REACTOR (REquil) - Stream Results
Summary
Balance
Keq
Utility Usage
Status
Outlet temperature 200.09 C
Outlet pressure 5.09 bar
Heat duty 5290.16 Mcal/hr
Net heat duty 5290.16 Mcal/hr
Vapor fraction 0.0957524
Results Available
Check Status
37°C Haze
ENG 16:37



Net Heat Duty = 5290.16 Mcal/hr
Vapor fraction = 0.0957

Heat and Material Balance Table				
Stream ID		FEED	V	L
From			REACTOR	REACTOR
To		REACTOR		
Phase		LIQUID	VAPOR	LIQUID
Substream: MIXED				
Mole Flow	kmol/hr			
O-DIE-01		344.0000	4.025243	111.5778
BENZENE		344.0000	23.44856	92.15446
ETHYL-01		0.0	38.40384	418.3901
Total Flow	kmol/hr	688.0000	65.87764	622.1224
Total Flow	kg/hr	73043.17	6449.161	66594.01
Total Flow	l/min	1453.371	7554.917	1606.640
Temperature	C	50.09000	200.0900	200.0900
Pressure	bar	5.090000	5.090000	5.090000
Vapor Frac		0.0	1.000000	0.0
Liquid Frac		1.000000	0.0	1.000000
Solid Frac		0.0	0.0	0.0
Enthalpy	cal/mol	-394.8164	16889.95	6278.281
Enthalpy	cal/gm	-3.718810	172.5294	58.65181
Enthalpy	cal/sec	-75453.80	3.09075E+5	1.08496E+6
Entropy	cal/mol-K	-101.6987	-54.06321	-82.05500
Entropy	cal/gm-K	-.9579089	-.5522512	-.7665591
Density	mol/cc	7.88971E-3	1.45331E-4	6.45366E-3
Density	gm/cc	.8376295	.0142272	.6908205
Average MW		106.1674	97.89605	107.0433
Liq Vol 60F	l/min	1386.258	123.0008	1272.145