Steps for Problem 2 in Problem Set 7

Start PRO/II

Beginner or	expert, process simulation with PR0/II is easy! If you
are new to p	process simulation and would like a brief overview of
PRU/II's GU	JI Interface, then press:
	Overview
The PRO/II getting start	Tutorial Guide contains additional information on ed.
To create a	new simulation, select File/New from the ribbon bar.
PB0/II uses	s colors to convey the status of input data. The following
are samples	of how colors are used to indicate data entry status:
	Data or action is required
	Data of action is required
أنسسا	Default data or action, user may override
	User-supplied data, entry satisfied
1,2	Caution, user-supplied data outside normal limits
To improve	access to your most common actions through the ribbon bar you
can custom	ize ribbon bar, add/remove tools in each group, or create your ow
maun Diek	t click anywhere on active ribbonbar to do this.
group, nign	

Click OK

Click Express tab if not clicked

Click New File

Click on Input Description

SIMSCI - Problem D	escriptive Information	
UOM Range He	elp	
Project Identifier: Problem Identifier: User Name: Site:	E133 SepTest Spjut HMC	Print Report Date Based on Problem Execution Date Date:
A test of creating a s	Proble eparator for the final project. OK	m Description

Enter description and click on OK

Click on Units of Measure

If not already SI, Click on Initialize from UOM Library and choose SI

Change Time: Hour to Time: Seconds

asis: SI				Initialize from UOM Lib	rary
Default Units of Measure f	or Problem Data Input	_			
Temperature:	Kelvin	~	Denote Energy in 10 ⁶	Units.	
Pressure:	Kilopascal	\sim	Energy:	Kilojoule	1
Time:	Second	\sim	Duty:	Energy/Time	~
Weight (wt.):	Kilogram	\sim	Work:	Kilowatt	`
Liquid Volume:	Meter^3	~	Length:	Meter	`
Vapor Volume:	Meter^3	~	Fine Length:	Millimeter	`
Specific Liquid Volume:	Liquid volume/Wt-mole	~	Heat Trans. Coefficient:	Kilowatt/meter^2-K	``
Specific Vapor Volume:	Vapor volume/Wt-mole	~	Fouling Coefficient:	Meter^2-Kelvin/kW	`
Liquid Density:	Weight/Liquid volume	~	Viscosity:	Pascal-second	`
Vapor Density:	Weight/Vapor volume	~	Kinematic Viscosity:	Centistoke	`
Petroleum Density:	same as liquid density	~	Thermal Conductivity:	Watt/meter-K	`
Pressure Gauge Basis:	101.325 kPa	1	Surface Tension:	Newton/meter	`
Standard Condition	ons			TVP and RVP Conditions	
Default Flowrate Basis for	Problem Data Input				
Default Basis of Flowrate a	and Composition		Mole		``

Click OK

Click on Component Selection

You can either select from Lists... or just enter PROPANE, PROPENE, METHANE, HYDROGEN

OM Range	Help	Overview	Status	Notes		
Component Selec From System or Component: Petroleum Databank Hi	tion User-generated Databank Select from Lists User-defined erarchy Compo	Add -> Polymer		omponent Name/Alias 1 PROPANE 2 PROPENE 3 METHANE 4 HYDROGEN	Databank Search Order CURRENT CURRENT CURRENT CURRENT	Reorder List Top Up Down Bottom NBP MW Internal Edit List Delete Rename
			OK	L Cano		Databank

Click OK

Click on Thermodynamic Data and choose Category: Equations of State Primary Method: BWRS

Click Add->

UOM Range	Help		Overview	Status	Notes		
Selection of Pro	perty Calcula	tion Sy:	stem				
Category:			Primary Method:			Defined Systems	c
Most Commonly All Primary Meth Equations of Sta Liquid Activity	Used ods ate	î	PR-Huron-Vidal PR-PanagReid PR-Modified PanagRe Predictive Peng-Robins	id on 78	Add ->	BWRS01	
Special Packag	relations		BWBS			Default System:	
Electrolyte		~	Lee-Kesler-Plocker	~		BWRS01	~
Actions for Sele	cted Property	Calcul Dele	lation System		Duplicate	Ren	ame
Actions for Sele Modify Global Thermod Thermodynamic	cted Property	Calcul Dele t Option	lation System teView n Systems: Constant E	nthalpy - Do	Duplicate	Ren	ame
Actions for Sele Modify Global Thermod Thermodynamic This selection c	vnamic Rese Transfer Bel an be overwi	Calcul Dele t Option tween \$	lation System teView n Systems: Constant E y a Thermodynamic Rese	nthalpy - Do	Duplicate o not Reflash eded	Ren	ame \
Actions for Sele Modify Global Thermod Thermodynamic This selection c	ynamic Rese Transfer Bel an be overw	Calcul Dele t Option tween S ritten by	lation System te View n Systems: Constant E y a Thermodynamic Rese mic Data from External F	nthalpy - Do t Unit as new owsheet or I	Duplicate o not Reflash eded	Ren	ame
Actions for Sele Modify Global Thermod Thermodynamic This selection c	ynamic Rese Transfer Bel an be overwi	Calcul Dele t Option tween S ritten by	lation System te View n Systems: Constant E y a Thermodynamic Rese mic Data from External F	nthalpy - Do t Unit as new owsheet or	Duplicate o not Reflash eded Input File Browse	Ren	ame

Click OK

Click on side tab Utilities

Click on Stream Calculator icon



In the main screen, click to place a Stream Calculator



Click on the Streams icon and add one input stream and two output streams.



Click on the Zoom Full icon



Double click on S1 (input)

Set First Specification to: Temperature 300 K

Set Second Specification to: Pressure 101.325 kPa

Thermal Condition First Specification:			
Temperature	~	(300	К
Second Specification:			
Pressure	~	101.325	kPa

Click on Flowrate and Composition...

Set Total Fluid Flowrate: 100 kg-mol/s

Set the Composition Mole to:

PROPANE 0.5

PROPENE 0.5

METHANE 0 (won't actually show up)

HYDROGEN 0 (won't actually show up)

	Stream Data - Flowrate and Co	mposition		
a	UOM Range Help Tag			
Ji re	Specify flowrate and composition for Fluid Flowrate Specification	or stream S1	_	
e	Total Fluid Flowrate:	10	0 kg-mol/sec	Total LV or GV rate Basis:
P	O Individual Component Flowrat	es		Standard Basis 🗸 🗸
0	Component Concentrations Total Fluid Flowrate:		kg-mol/sec	
ne rs	Copy Component Paste PROPANE	Composition Mole		
e	PROPENE	0.5		
э	METHANE			
'n	HYDROGEN			
o I	Clear Compositions Total:	1.0000 OK	⊡ No Cancel	malize Component Flowrates Based on Specified Fluid Flowrate Cancel to PFD
1	Enter the composition			

Click OK and OK

Double click the Stream Calculator SC1

Click on Product Specification

UOM Define Ra	nge Help	Overview Status	Notes
Unit: SC1	Bottoms	Description: Duty: If negative flowrates are end rates to zero	x 10 ⁴ kJ/sec countered, <u>reset</u>
Product Specifications Pseudoproduct Specifications The stream calculator bottoms products.	Product Pseudoproduct will combine the fee	Thermodynamic System: ds. The composite feed is split i	Default (BWRS01) ~
white bring up the pro	OK.	Cancel	

Set: SPEC1 – Recovery of METHANE through HYDROGEN in the overhead product will be 1.000 in Mole Fraction

Click on the number 1 and click Insert

Set: SPEC2 – Recovery of PROPENE in the overhead product will be 0.99000 in Mole Fraction

Click on the number 2 and click Insert

SPEC3 – Recovery of PROPANE in the bottoms product will be 0.95000 in Mole Fraction

Stream Ca	alcul	ator - Product Specifications	
UOM D	efine	e Range Help	
Product S	opeci	ifications	
Cut	1	SPEC1 - <u>Recovery of METHANE through HYDROGEN</u> in the overhead product will be <u>1.0000</u> in <u>Mole</u> Fraction	
Reset	2	SPEC2 - <u>Recovery</u> of <u>PROPENE</u> in the <u>overhead product</u> will be 0.99000 in <u>Mole</u> Fraction	
	3	SPEC3 - <u>Recovery</u> of <u>PROPANE</u> in the <u>bottoms product</u> will be 0.95000 in <u>Mole</u> Fraction	
-			
r			
OKI	to PF	D OK Cancel Cancel to PFD	

Click OK and OK

Click on the Run icon.



In the Flowsheet Status dialog box that appears, click Run Simulation.

iowsheet status			×
O Local Input Status M	lessages	Global Input Status Messages	
🔘 Local Runtime Statu	us Messages	O Summary Of Runtime Status Messages	
Input Global Status Informatio	n:		
0 error(s), 1 warning(s), and 1	message(s) detected:		^
** warning ** For thermodyna ** message ** Unit 1, 'sc1' - b balance.	mic method set "bwrs01", the critical pro because both temp and dt are missing,	operties for 'hydrogen' have been reset. the operating temperature will be determined by hea	t
1			
			\sim
Showing Unit Operations wi	th Warning(s) in Different Color		~
Showing Unit Operations wi	th Warning(s) in Different Color O Suppress Color for Now	O Suppress Color till Flowsheet is Closed	~

The Stream Calculator should turn Blue indicating that everything ran successfully.

Zoom out a little

Click on the Stream Property Table icon



Click to place a Stream Property Table on the flowsheet

JOM Range Help		Overview		
Property List to be used: Property Label List Material Balance List Short Property List Stream Summary Dry Stream Summary	~	Table Appearance	Line Width: Border Width: Cell Character Width:	1 ¢ 2 ¢ 10 ¢
Define Component Groups		Maximum Streams/Row:	10	
 Stream Selection Include All Streams Include Flowsheet Source/Sink Streams 	Available St	Add -> Add All <- Remove	Displayed Streams: S1 S2 S3	Up Down Top
Include Stream Property Tal	ble in the Repo	tt	ncel	Bottom

Right Click on the table and choose Data Entry. Choose Material Balance List. Click Add All.

Click OK

Zoom out a little and resize the Stream Property Table if desired. Don't forget to save the file.

