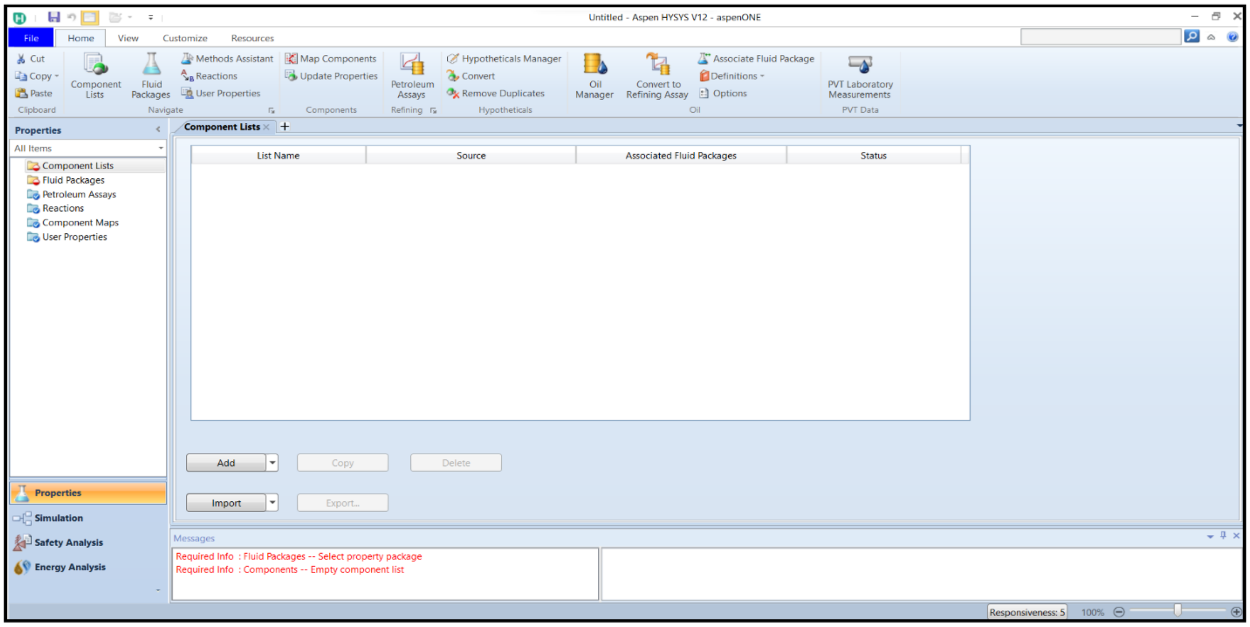
Educational Institute for Equipment and Process Design

Introduction to Aspen Hysys

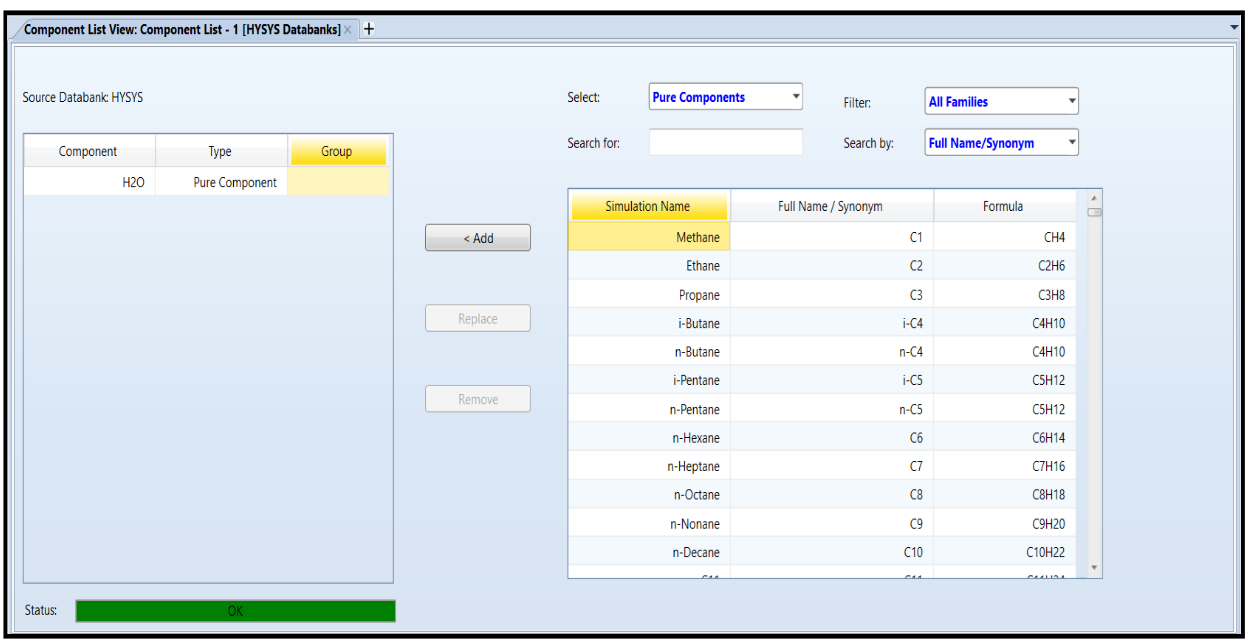
Example 1

Determine the vapor fraction of a stream containing water with flowrate of 5 kmole/hr., operating temperature of 25C and operating pressure of 100 kPa. Also, calculate the saturation temperature of water at 100 kPa.

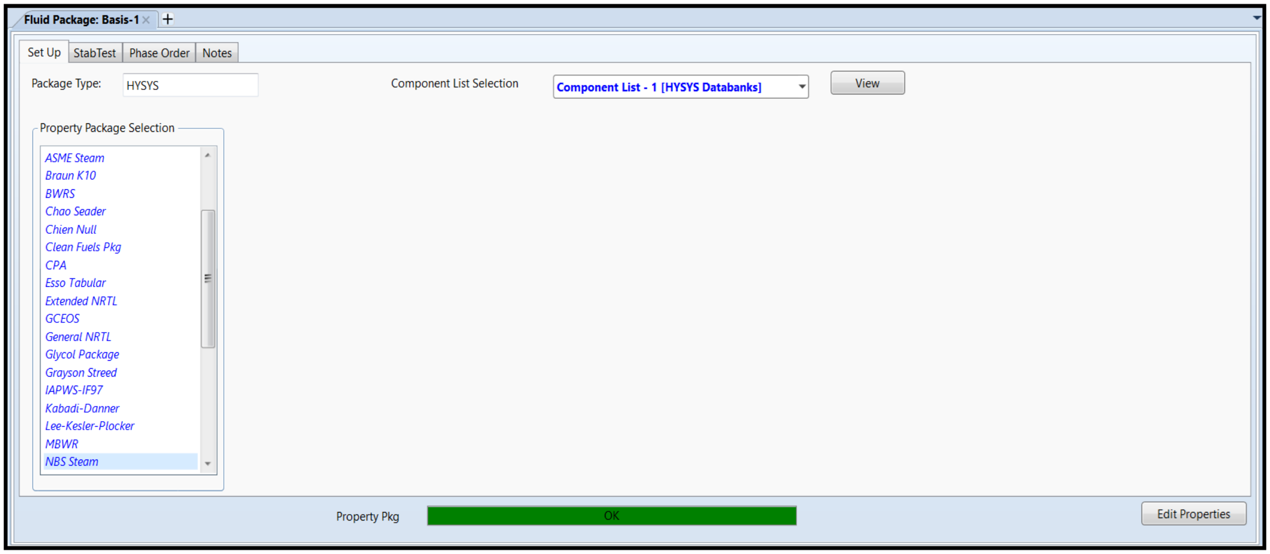
1.After creating a new case this page shows up and click add.



2. Search water in “search for” and select water.

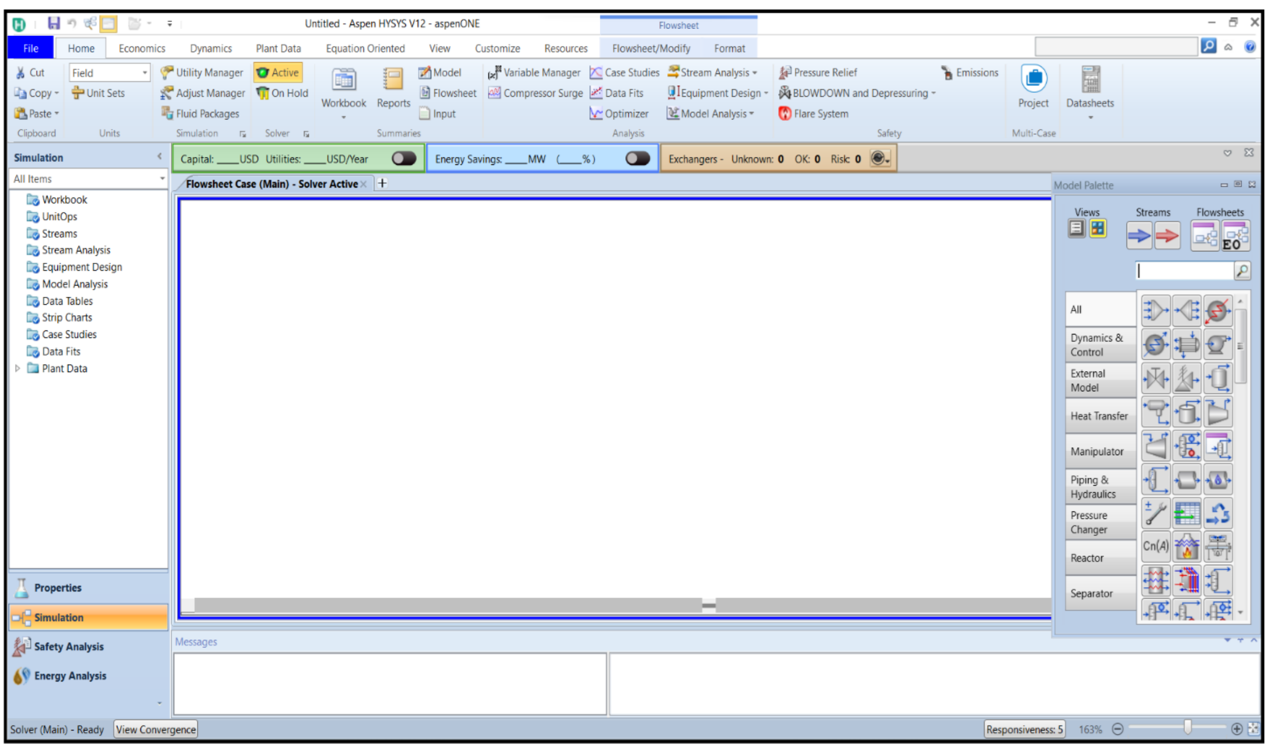


3.Click fluid package and then click Add. The following page shows up.

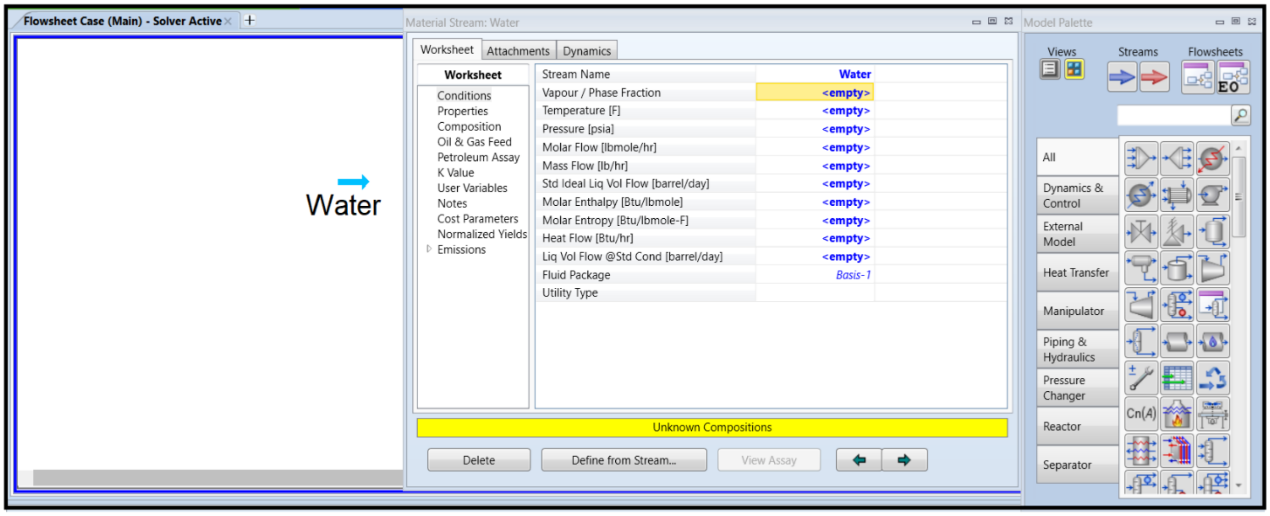


Select NBS Steam as the fluid package and the moment you do so, the red indication turns to green.

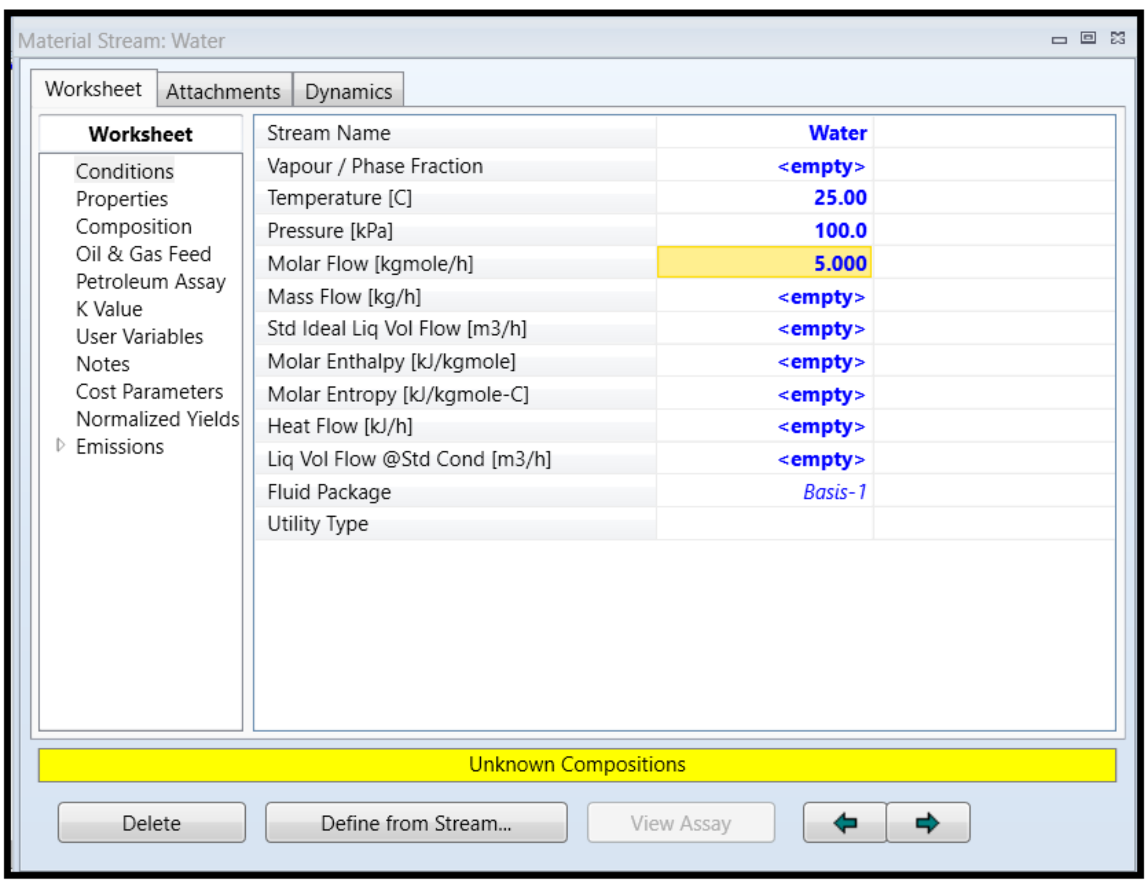
4.Enter simulation environment to see the following page:



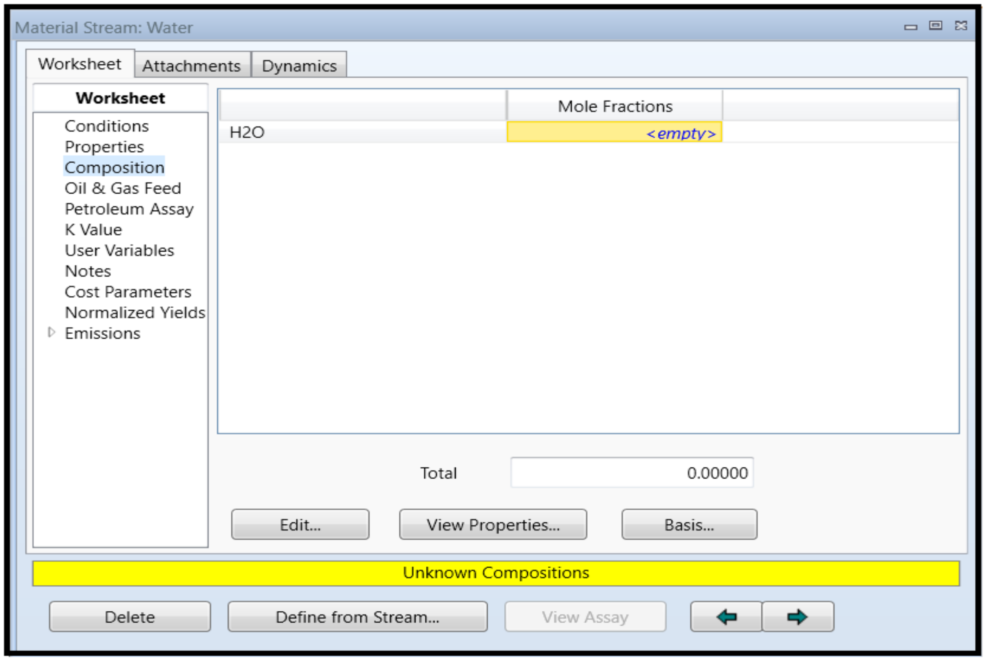
5.Under the Model Palette, click on blue arrow which is material stream and put in white flowsheet. Then double click on the stream 1 and change the name to Water.



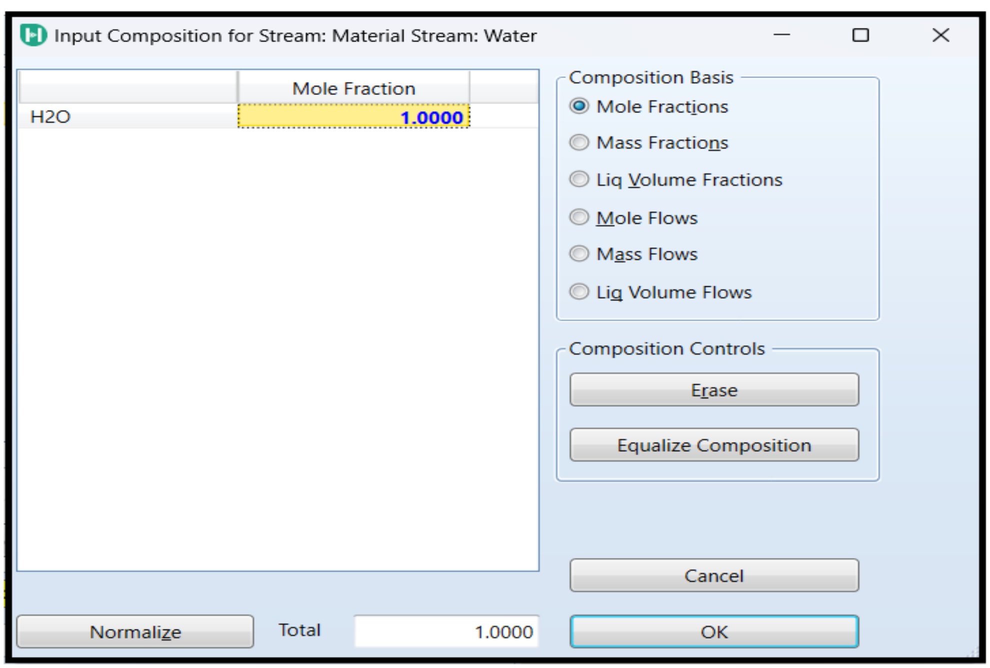
6.At this stage we enter operating conditions but before that if the units of measurement is Field, under Home/Units, change the unit to SI.



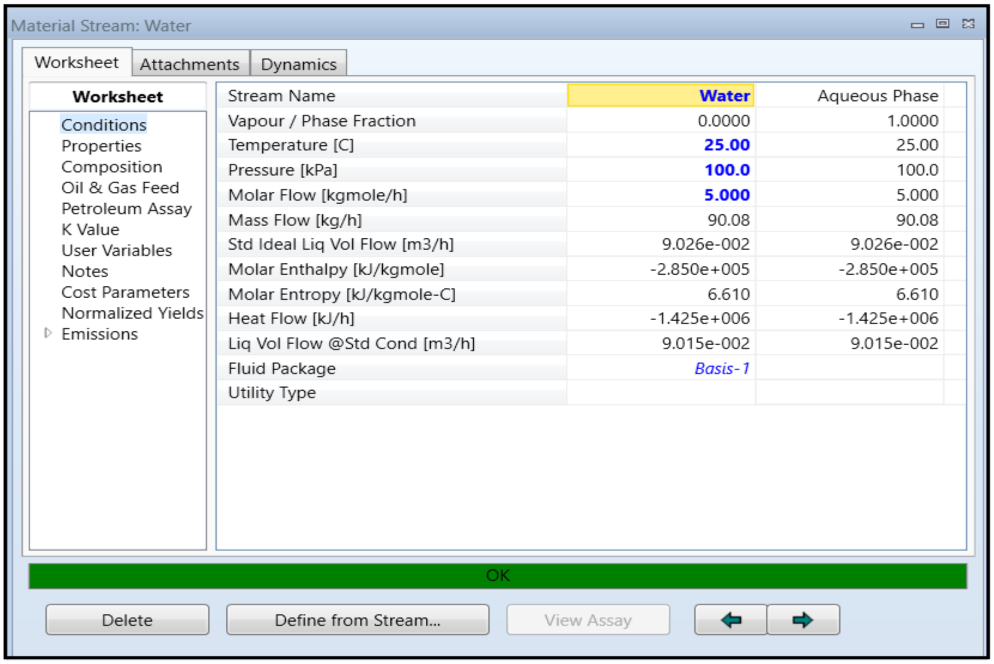
7.As shown on the yellow indication, the compositions are unknown. Under worksheet click compositions and the next page is shown.



8. Click Edit and set the mole fraction of water to 1. By doing so you should see the green indication.

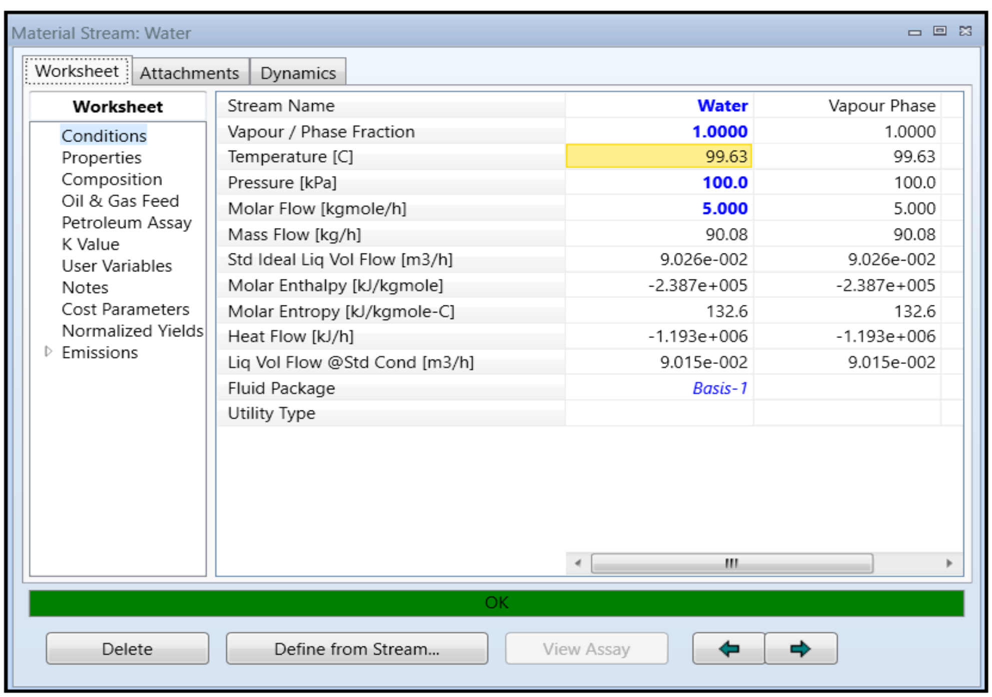


9. Based on the stream result, the vapor fraction is zero.



Stream Name	Water	Aqueous Phase
Vapour / Phase Fraction	0.0000	1.0000
Temperature [C]	25.00	25.00
Pressure [kPa]	100.0	100.0
Molar Flow [kgmole/h]	5.000	5.000
Mass Flow [kg/h]	90.08	90.08
Std Ideal Liq Vol Flow [m3/h]	9.026e-002	9.026e-002
Molar Enthalpy [kJ/kgmole]	-2.850e+005	-2.850e+005
Molar Entropy [kJ/kgmole-C]	6.610	6.610
Heat Flow [kJ/h]	-1.425e+006	-1.425e+006
Liq Vol Flow @Std Cond [m3/h]	9.015e-002	9.015e-002
Fluid Package	Basis-1	
Utility Type		

10. To calculate the saturation temperature, we only need to equal vapor phase to 1 and erase the temperature. Based on the picture below, the calculated saturation point is 99.63C.

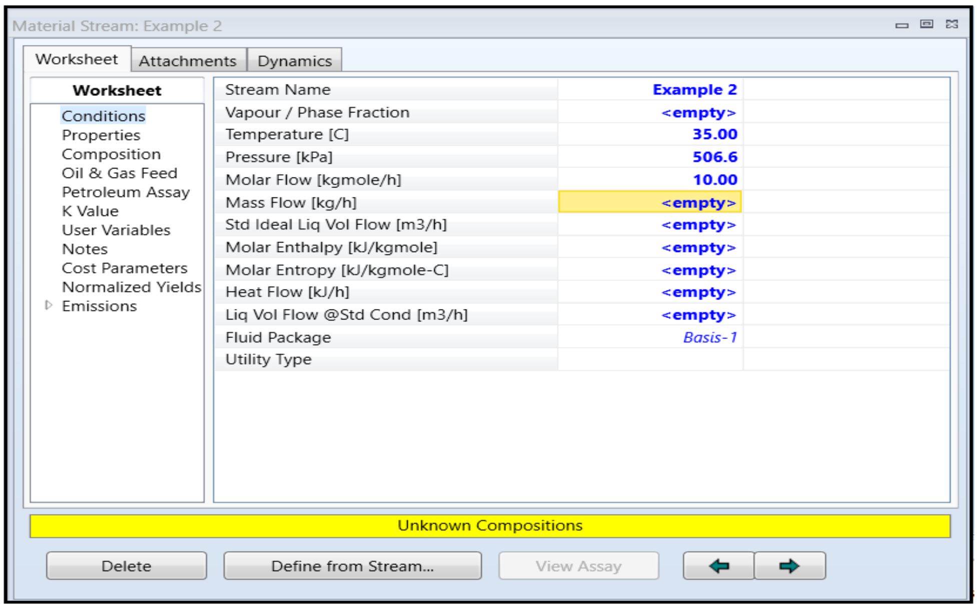


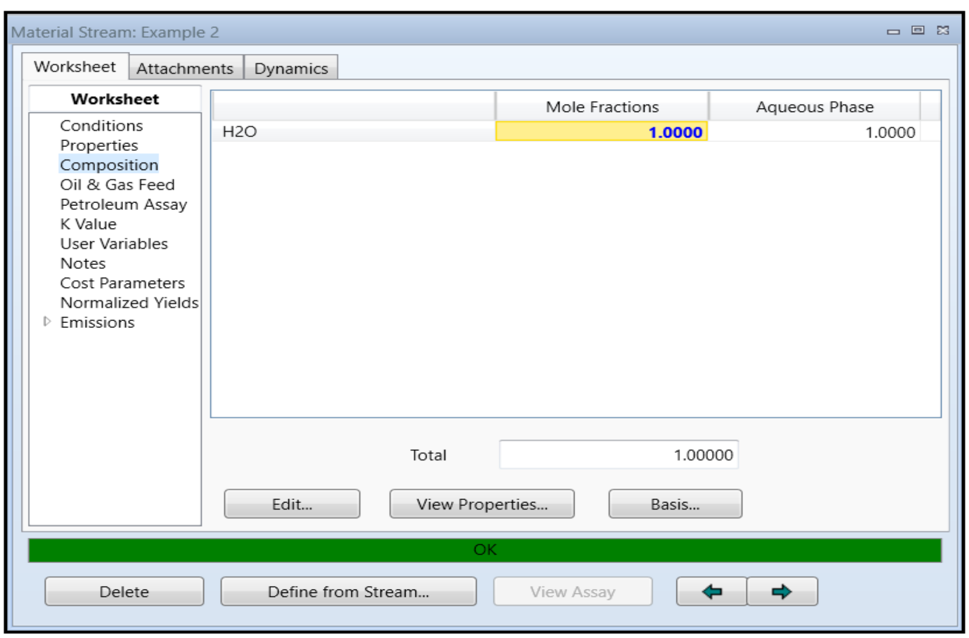
Stream Name	Water	Vapour Phase
Vapour / Phase Fraction	1.0000	1.0000
Temperature [C]	99.63	99.63
Pressure [kPa]	100.0	100.0
Molar Flow [kgmole/h]	5.000	5.000
Mass Flow [kg/h]	90.08	90.08
Std Ideal Liq Vol Flow [m3/h]	9.026e-002	9.026e-002
Molar Enthalpy [kJ/kgmole]	-2.387e+005	-2.387e+005
Molar Entropy [kJ/kgmole-C]	132.6	132.6
Heat Flow [kJ/h]	-1.193e+006	-1.193e+006
Liq Vol Flow @Std Cond [m3/h]	9.015e-002	9.015e-002
Fluid Package	Basis-1	
Utility Type		

Example 2: Using Aspen Hysys, calculate the heat needed to vaporize 10 kmole/hr. of water with operating temperature of 35C and operating pressure of 5 atm to its saturation point at 5 atm.

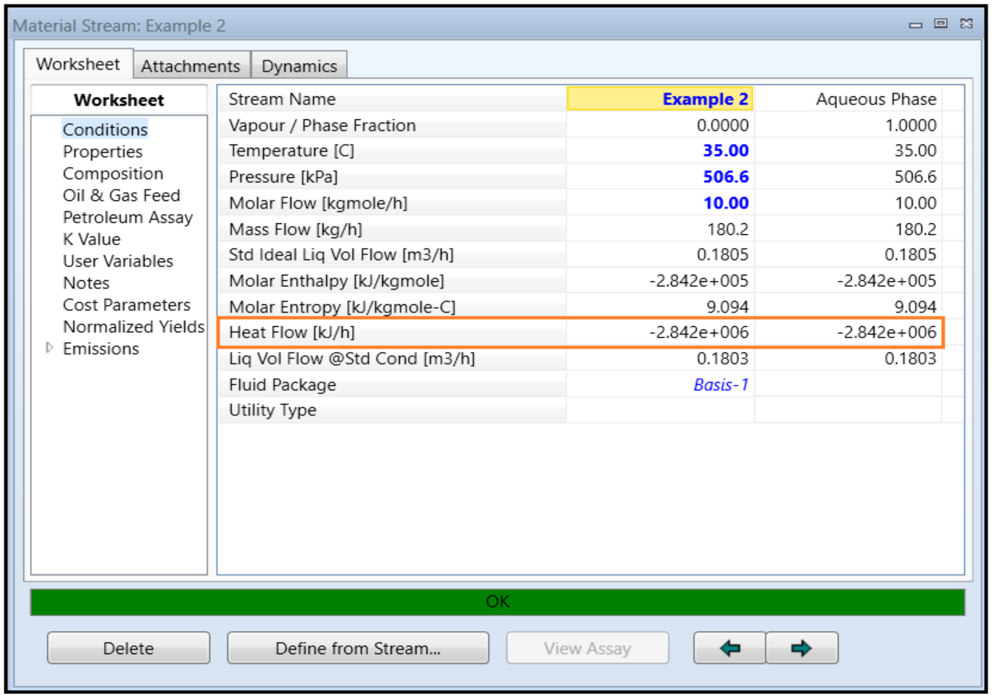
Solution:

1.Simply we need to calculate $\Delta H = H_2 - H_1$ or $\Delta H = H_S - H_L$. Aspen Hysys gives for each stream a thermodynamic property called Heat Flow. Thus, what we should do is to create the stream and change the conditions and let Aspen calculates Heat flow for each case.
2.Create the stream in the main flowsheet with above operating conditions.

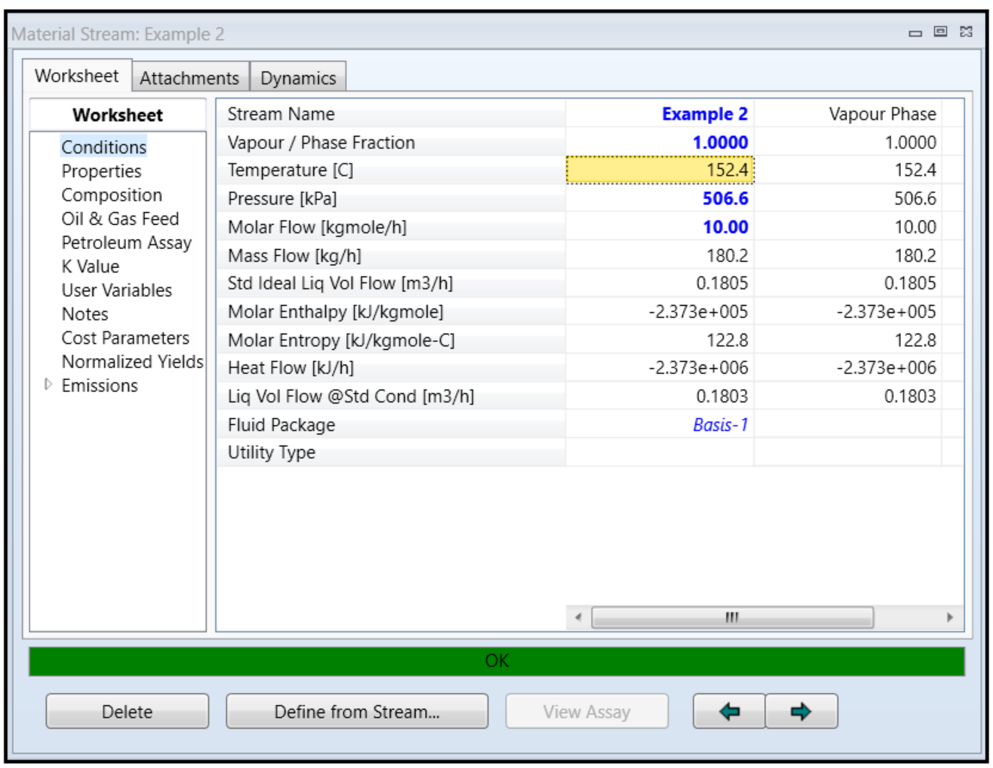




Based on the result, the H_1 is -2.842 × 10 ^{6} kJ/hr.



3.Now erase the temperature and set the vapor fraction to 1.



4.Based on the result, the Heat Flow for this case is -2.373 × 10^{6} kJ/hr. So, the heat required is:

$$\Delta H = H_S - H_L = -2.373 \times 10^{6} - (-2.842 \times 10^{6}) = 469 \times 10^{3} \text{ kJ/hr.}$$

5.Save the files. To do so, go to File/Save/Your Folder and save it.