ROSE-HULMAN INSTITUTE OF TECHNOLOGY

Foundation Coalition Sophomore Engineering Curriculum

ES 202 - Fluid & Thermal Systems

More exercise with water properties

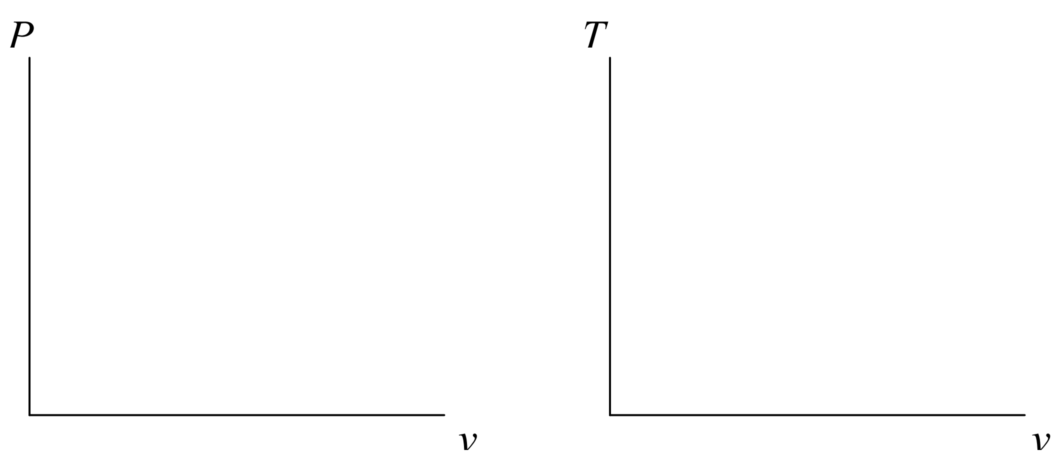
1. Provide the information requested in the table for WATER. When specifying the phases use the following abbreviations:

CL = compressed (subcooled) liquid
SL = saturated liquid
SM = saturated mixture
SV = saturated vapor
SHV = superheated vapor

Use "NA" for items that are not applicable at a particular state.

State	Phase	Pressure, *P* [kPa]	Temperature *T* [°C]	Quality, *x*	Specific Volume, *v* [m^3/kg]	Specific Internal Energy, *u* [kJ/kg]	Specific Enthalpy, *h* [kJ/kg]	Specific Entropy, *s* [kJ/(kg-K]
1		2000	200					
2		1000	200					
3		1553.8	200					
4			200		0.100			
5		100				2658.1		
6		100				800		
7		100	20					

2. Plot the states on the *P*-*v* and *T*-*v* diagrams below. Positions may be approximate but relative positions should be correct when compared with other states and saturation curves.



Exercise with interpolation

3. Sometimes property data does not fall on the points given in the table. Under these conditions, we must interpolate between the available data points to find the necessary information. Typically this is done using linear interpolation. This means that the missing data between the available points can be estimated by assuming that the functional relationship is a straight line.

Superheated water vapor, *v = v(P, T)*		
Temperature	**Pressure**	
	1.5 bars	**3.0 bars**
200 ^oC	1.444 m^3/kg	0.716 m^3/kg
240 ^oC	1.570 m^3/kg	0.781 m^3/kg

a) P = 1.5 bars, T = 215 ^oC (linear) v =

b) P = 2.0 bars, T = 200 ^oC (linear) v =

c) P = 2.0 bars, T = 215 ^oC (bi-linear) v =

d) P = 1.5 bars, v = 1.500 m^3/kg (linear) T =