

HW – 25: Entropy Evaluations for Real Fluids

No need to follow the formal solution procedure for these problems, but show work and reference appropriate tables. Note that you can review the solution for HW-8 to guide your approach.

- i) Complete the table below for R134a. Be sure to show work and indicate what table was used to determine properties for each state. Indicate phase region (CL, SL, SLVM, SV, SHV).

State	T, °C	P, kPa	s, kJ/kg-K	Phase Description
1	20		0.60005	
2	-12			SL
3		400	1.0701	
4	8	800		

- ii) Complete the table below for H₂O. Be sure to show work and indicate what table was used to determine properties for each state. Indicate phase region (CL, SL, SLVM, SV, SHV).

State	T, °C	P, kPa	s, kJ/kg-K	χ	Phase Description
1		200		0.7	
2	140		4.9887		
3	80	500			
4	360	1000			

HW – 26: Entropy Evaluations for Incompressible Substances

- i) Compare the changes in specific entropy for liquid water that is heated from a temperature of 20°C to 80°C at a constant pressure of 25 bar as determined using the following approaches: a) compressed liquid tables, b) saturated liquid values, c) constant specific heat evaluated at the average temperature, d) constant specific heat evaluated at the initial temperature.
- ii) A 2 kg piece of copper at 50°C is allowed to cool in an outdoor surrounding ambient that is at a constant temperature of 10°C until it is in equilibrium. Determine the a) heat transfer for the copper (in kJ), b) change in entropy of the copper (kJ/K), and c) entropy change of the surroundings (kJ/K). Assume that the surroundings are at a uniform and constant temperature. Note that you can review the solution for HW-12 to guide your approach for determining the heat transfer and the solution for HW-24 for evaluating the entropy change of the surroundings, but provide a complete solution here.