Example—Property Table Practice

Given: water, $P = 10$ MPa, $T = 350°C$
Find: v (spec. vol.)

P-TABLE: $T_{SAT} = 311°C < T \Rightarrow$ SHV

(2) T-TABLE:

SHV: $\frac{v - 0.01925}{0.02331 - 0.01925} = \frac{350 - 320}{360 - 320}$

$v = 0.02295$

$= \boxed{0.02230\ m^3/kg}$

Given: water, $P = 10$ MPa, $T = 360°C$
Find: v (spec. vol.)

(1) P-TABLE: $T_{SAT} = 311°C < T \Rightarrow$ SHV

T-TABLE: $P_{SAT} = 186.5\ bar > P \Rightarrow$ SHV

$\boxed{v = 0.02331\ m^3/kg}$

Given: water, $T = 360°C$, $v = 0.003\ m^3/kg$
Find: P, h

(3) SAT T-TABLE

$P = 186.5$ bar

$v = (1-x)v_f + xv_g = (1-x)(0.001893) + x(0.006945)$

$x = 0.2191$

$h = (1-x)h_f + xh_g$

$= (1-0.2191)(1760.5) + (0.2191)(2481)$

$= \boxed{1918\ kJ/kg}$

Given: water, $T = 20°C$, $P = 10$ MPa
Find: s (spec. entropy)

$P_{SAT} = 2.339$ kPa

$P \gg P_{SAT} \Rightarrow$ C.L.

C.L. TABLES

$s = 0.2945$ kJ/kg·K

Given: water, $T = 20°C$, $P = 4$ kPa
Find: s (spec. entropy)

NO CL TABLES FOR THIS RANGE!!!

COMPARE

$v_f\ (T = 20°C) = 0.001002$ $\qquad$ $v\ (T = 20°C) = 0.0009995$

$P = 2.339$ kPa $\qquad$ SMALL CHANGE $\qquad$ $P = 5$ MPa

$s_f = 0.2966$ $\qquad$ $s = 0.2956$

SMALL CHANGE

$\therefore \quad u \approx u_f(T)$

$s \approx s_f(T)$

$v \approx v_f(T)$

$h \approx h_f + v_f(P - P_{SAT})$