

Quiz 2 Solution

Given:

R-410a

Process $P = \frac{C}{V}$ or $PV = C = \text{constant}$

State 1

~~T = 50°C~~
 $T = 50^\circ\text{C}$ $x=1$

State 2

~~P = 200~~
 $P = 100 \text{ kPa}$

State 1

At $x=1$, $v = v_g$, so looking up tables for R-410a
at $T = 50^\circ\text{C}$

$$P_1 = 3065.2 \text{ kPa}, \quad v_1 = 0.00707 \text{ m}^3/\text{kg}$$

$$P_1 V_1 = C = 3065.2 \times 0.00707 = 21.671$$

State 2

$$P = 100 \text{ kPa}$$

$$P_2 V_2 = C$$

so

$$V_2 = \frac{C}{P_2} = \frac{21.671}{100} = 0.2167 \text{ m}^3/\text{kg}$$

Looking up the tables for R-410a (B.3.2)
interpolate for $P = 100 \text{ kPa}$

i.e.

T	P
-51.4	101.3
-55	84

$$T = -55 + \frac{(-51.4 + 55)}{(101.3 - 84)} (100 - 84) = -51.6^\circ\text{C}$$