

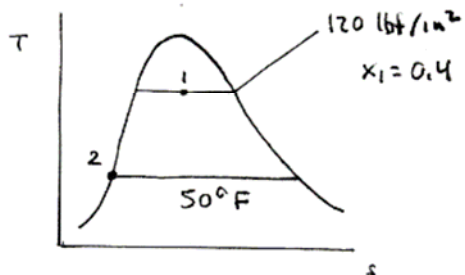
PROBLEM 6.43

KNOWN: one lb of R134a undergoes a process between specified states.

FIND: Determine the entropy change for the process. Can the process occur with $\phi=0$?

SCHEMATIC & GIVEN DATA:

ENGR. MODEL: The system is the one lb of R134a.



ANALYSIS: The entropy change can be determined using data from Tables A-10E, 11E

$$s_1 = s_f + x_1(s_g - s_f) = 0.0839 + 0.4(0.2165 - 0.0839) = 0.13694 \text{ Btu/lb}^\circ\text{R}$$

$$s_2 = 0.0585 \text{ Btu/lb}^\circ\text{R}$$

Thus, $\Delta S = (1 \text{ lb})[0.0585 - 0.13694] \text{ Btu/lb}^\circ\text{R} = -0.07844 \text{ Btu/lb}^\circ\text{R} \leftarrow$

To consider the possibility of an adiabatic process, begin with an entropy balance:

$$\Delta S = \int_1^2 \left(\frac{\delta Q}{T} \right)_b + \sigma$$

For an adiabatic process, the underlined term vanishes, giving $\Delta S = \sigma$. Since σ cannot be negative, ΔS also cannot be negative. Accordingly, the indicated process cannot occur adiabatically. \leftarrow