

1. We take  $p_3$  to be 80 kPa for both thermometers. According to Fig. 19-6, the nitrogen thermometer gives 373.35 K for the boiling point of water. Use Eq. 19-5 to compute the pressure:

$$p_N = \frac{T}{273.16 \text{ K}} p_3 = \left( \frac{373.35 \text{ K}}{273.16 \text{ K}} \right) (80 \text{ kPa}) = 109.343 \text{ kPa} .$$

The hydrogen thermometer gives 373.16 K for the boiling point of water and

$$p_H = \left( \frac{373.16 \text{ K}}{273.16 \text{ K}} \right) (80 \text{ kPa}) = 109.287 \text{ kPa} .$$

The pressure in the nitrogen thermometer is higher than the pressure in the hydrogen thermometer by 0.056 kPa.