

**17.43. Model:** Heating the material increases its thermal energy.

**Visualize:** Please refer to Figure P17.43. The material melts at 300°C and undergoes a solid-liquid phase change. The material's temperature increases from 300°C to 1500°C. Boiling occurs at 1500°C and the material undergoes a liquid-gas phase change.

**Solve:** (a) In the liquid phase, the specific heat of the liquid can be obtained as follows:

$$\Delta Q = Mc\Delta T \Rightarrow c = \frac{1}{M} \frac{\Delta Q}{\Delta T} = \left( \frac{1}{0.200 \text{ kg}} \right) \left( \frac{20 \text{ kJ}}{1200 \text{ K}} \right) = 83.3 \text{ J/kg K}$$

(b) The latent heat of vaporization is

$$L_v = \frac{Q}{M} = \frac{40 \text{ kJ}}{(0.200 \text{ kg})} = 2.0 \times 10^5 \text{ J/kg}$$