

Practice Questions:  $H_f + H_v$

19.  $Q_{\text{total}} = Q_1 + Q_2$

$Q_1$  required to heat to  $0^\circ\text{C}$   
 $Q_2$  required to melt

$$= m C \Delta T + m H_f$$

$$= (0.100 \text{ kg}) (2060 \frac{\text{J}}{\text{kg}\cdot^\circ\text{C}}) (20.0^\circ\text{C}) + (0.100 \text{ kg}) (3.34 \times 10^5 \text{ J/kg})$$

$$= 3.75 \times 10^4 \text{ J}$$

20.  $Q_{\text{total}} = Q_1 + Q_2 + Q_3$

$Q_1$  to heat to  $100^\circ\text{C}$

$Q_2$  to vaporize

$Q_3$  to heat to  $140^\circ\text{C}$

$$= m C_{\text{water}} \Delta T_1 + m H_v + m C_{\text{steam}} \Delta T_2$$

$$= (0.200 \text{ kg}) (4180 \frac{\text{J}}{\text{kg}\cdot^\circ\text{C}}) (40.0^\circ\text{C}) + (0.200 \text{ kg}) (2.26 \times 10^6 \frac{\text{J}}{\text{kg}}) + (0.200 \text{ kg}) (2020 \frac{\text{J}}{\text{kg}\cdot^\circ\text{C}}) (40^\circ\text{C})$$

$$= 5.02 \times 10^5 \text{ J}$$

21.  $Q = Q_1 + Q_2 + Q_3 + Q_4 + Q_5$

$Q_1 \Rightarrow$  heat up ice

$Q_2 \Rightarrow$  " melt ice

$Q_3 \Rightarrow$  " water

$Q_4 \Rightarrow$  vaporize

$Q_5 \Rightarrow$  heat steam

$$Q_1 = m C_{\text{ice}} \Delta T_1$$

$$Q_2 = m H_f$$

$$Q_3 = m C_{\text{water}} \Delta T_3$$

$$Q_4 = m H_v$$

$$Q_5 = m C_{\text{steam}} \Delta T_5$$

$$= 9.40 \times 10^5 \text{ J}$$