

CH 23

- 2 -

- *54. How much 100°C steam to melt 0°C Ice AND have remaining ice water @ 0°C ?

$$Q_{\text{melt}} = Q_{\text{CONDENSE}} + Q_{\text{COOL}}$$

$m = \text{mass of steam.}$

$$1g \left(\frac{80 \text{ cal}}{g} \right) = m \left(\frac{540 \text{ cal}}{g^\circ\text{C}} \right) + m \left(\frac{1 \text{ cal}}{g^\circ\text{C}} \right) (100^\circ\text{C})$$

$$80 \text{ cal} = m \left(\frac{540 \text{ cal}}{g^\circ\text{C}} + \frac{100 \text{ cal}}{g} \right)$$

$$\frac{80 \text{ cal}}{\frac{640 \text{ cal}}{g}} = m$$

$$m = 0.125g$$

55. $1g$ 100°C steam \rightarrow $1g$ ICE @ 0°C

$$i. Q_i = (1g) \left(\frac{540 \text{ cal}}{1g} \right)$$

$$= 540 \text{ cal}$$

$$ii. 100^\circ\text{C} \rightarrow 0^\circ\text{C}$$

$$Q = m \Delta T$$

$$Q_{ii} = (1g) \left(\frac{1 \text{ cal}}{g^\circ\text{C}} \right) (100^\circ\text{C})$$

$$= 100 \text{ cal}$$

$$iii. Q_{iii} = 1g \left(\frac{80 \text{ cal}}{g} \right)$$

$$= 80 \text{ cal}$$

$$Q_{\text{TOT}} = 540 \text{ cal} + 100 \text{ cal} + 80 \text{ cal}$$

$$Q_{\text{TOT}} = 720 \text{ cal}$$