

$$q_{\text{metal}} + q_{\text{H}_2\text{O}} = 0$$

$$q = c_p \cdot m \Delta t$$

$$q_{\text{metal}} = -q_{\text{H}_2\text{O}}$$

$$\frac{c_{p\text{metal}} \cdot m_{\text{metal}} \cdot \Delta t_{\text{metal}}}{m_{\text{metal}} \cdot \Delta t_{\text{metal}}} = - \frac{c_{p\text{H}_2\text{O}} \cdot m_{\text{H}_2\text{O}} \cdot \Delta t_{\text{H}_2\text{O}}}{m_{\text{metal}} \cdot \Delta t_{\text{metal}}}$$

$$c_{p\text{metal}} = - \frac{c_{p\text{H}_2\text{O}} \cdot m_{\text{H}_2\text{O}} \cdot \Delta t_{\text{H}_2\text{O}}}{m_{\text{metal}} \cdot \Delta t_{\text{metal}}}$$

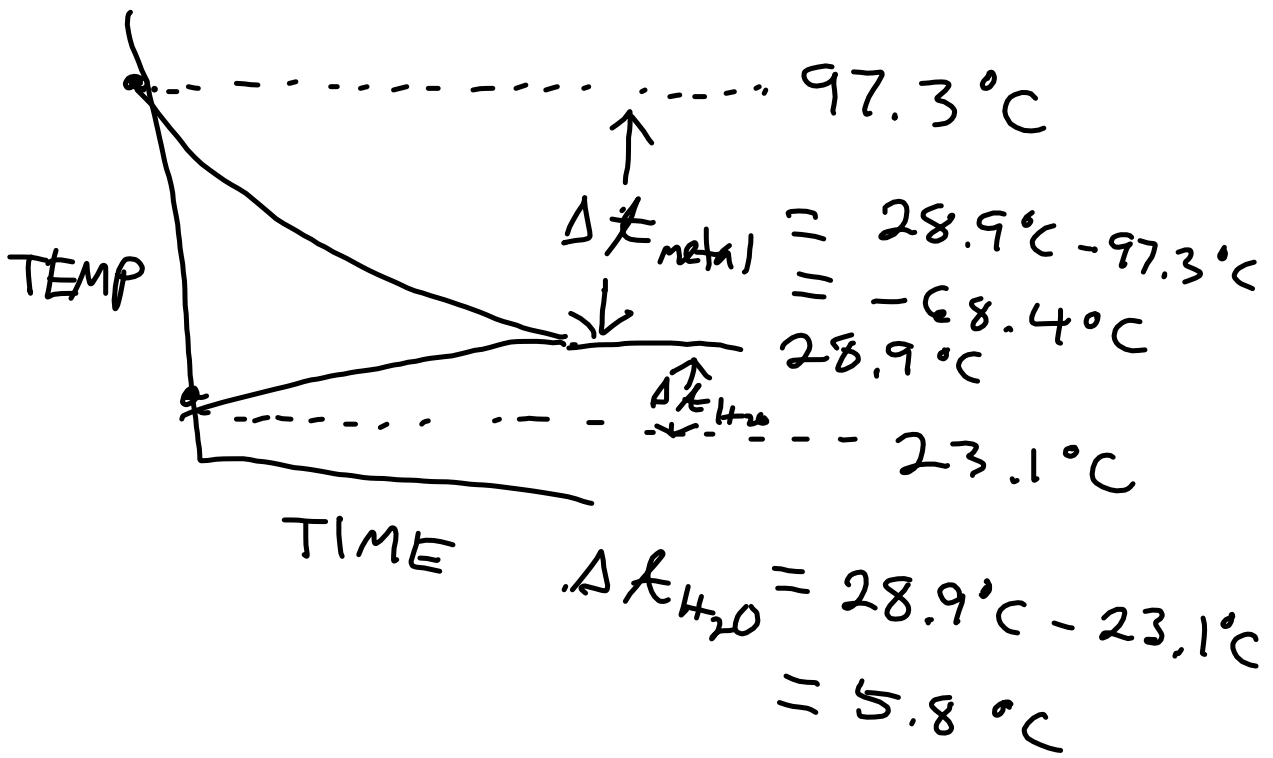
$$c_{p\text{H}_2\text{O}} = 4.18 \frac{\text{J}}{\text{g}^\circ\text{C}} \quad m_{\text{H}_2\text{O}} = 15.52 \text{ g}$$

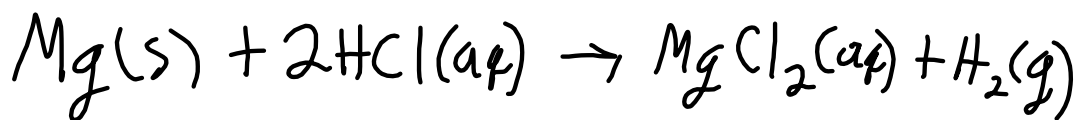
$$\Delta t_{\text{H}_2\text{O}} = 5.8^\circ\text{C}$$

$$m_{\text{metal}} = 5.18 \text{ g} \quad \Delta t_{\text{metal}} = -68.4^\circ\text{C}$$

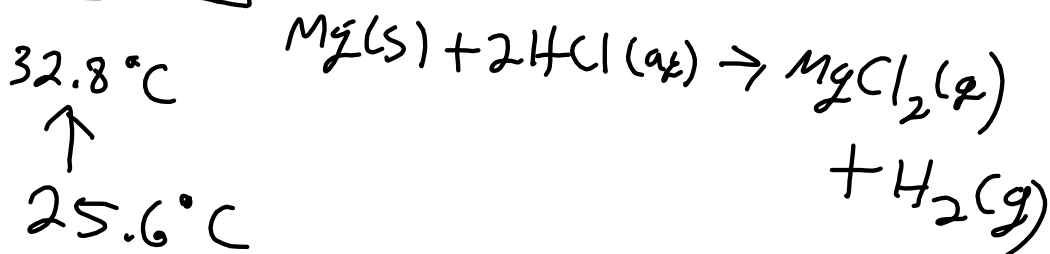
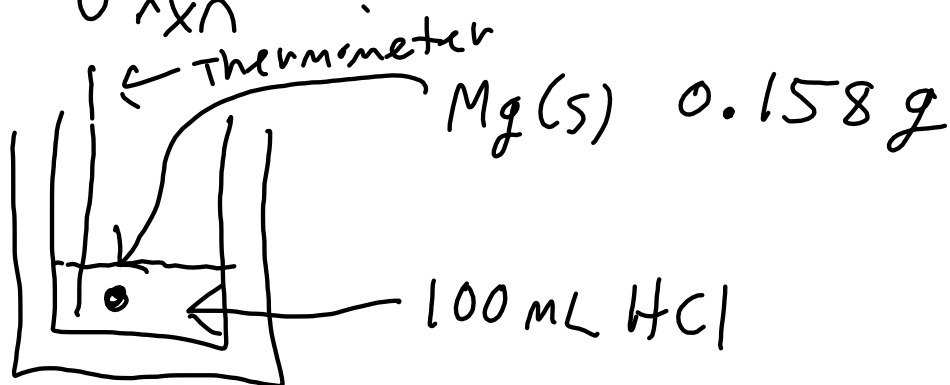
$$c_{p\text{metal}} = - \frac{(4.18 \frac{\text{J}}{\text{g}^\circ\text{C}}) (15.52 \text{ g}) (5.8^\circ\text{C})}{(5.18 \text{ g}) (-68.4^\circ\text{C})}$$

$$\approx 1.06 \frac{\text{J}}{\text{g}^\circ\text{C}}$$





$$q_{\text{rxn}} = ?$$



$$q_{\text{rxn}} + q_{\text{cal}} = 0$$

$$q_{\text{rxn}} = -q_{\text{cal}}$$

$$\begin{aligned} q_{\text{cal}} &= C_{p\text{cal}} \cdot M_{\text{cal}} \cdot \Delta T_{\text{cal}} \\ &= (4.18 \frac{\text{J}}{^\circ\text{C}}) (100 \text{ g}) (7.2^\circ\text{C}) \end{aligned}$$

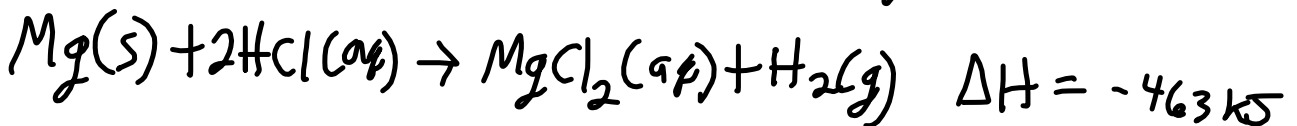
$$= 3009.6 \text{ J}$$

$$q_{\text{rxn}} = -q_{\text{cal}} = -3009.6 \text{ J}$$

$$100 \text{ mL} \left(1 \frac{\text{g}}{\text{mL}}\right) = 100 \text{ g}$$

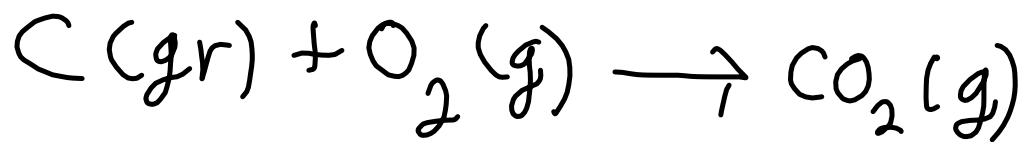
$$\begin{aligned} \Delta T &= T_f - T_i = 32.8^\circ\text{C} - 25.6^\circ\text{C} \\ &= 7.2^\circ\text{C} \end{aligned}$$

$$\begin{aligned}
 q_{\text{rxn}} &= \frac{-3009.6 \text{ J}}{0.158 \text{ g Mg}} \left(\frac{24.31 \text{ g Mg}}{1 \text{ mol Mg}} \right) \\
 &= -463059 \frac{\text{J}}{\text{mol Mg}} \\
 &\approx -463 \frac{\text{kJ}}{\text{mol Mg}}
 \end{aligned}$$



$$\Delta H = H_f - H_i$$

$$= \left(H_{\text{MgCl}_2(aq)} + H_{\text{H}_2(g)} \right) - \left(H_{\text{Mg}(s)} + H_{\text{HCl}(aq)} \right)$$



$$\Delta H = H_f - H_i$$

$$= (H_{\text{CO}_2 (\text{g})}) - (H_{\text{C (gr)}} + H_{\text{O}_2 (\text{g})})$$

