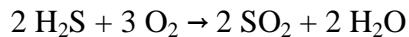
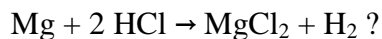


Calculate the enthalpy change for the reaction:



$$\begin{aligned}\Delta H_{\text{rxn}} &= \sum \Delta H_f^\circ (\text{products}) - \sum \Delta H_f^\circ (\text{reactants}) \\ &= \left[\left(\frac{2 \text{ mol SO}_2}{\text{mol rxn}} \right) \left(\frac{-296.830 \text{ kJ}}{\text{mol SO}_2} \right) + \left(\frac{2 \text{ mol H}_2\text{O}}{\text{mol rxn}} \right) \left(\frac{-241.818 \text{ kJ}}{\text{mol H}_2\text{O}} \right) \right] \\ &\quad - \left[\left(\frac{2 \text{ mol H}_2\text{S}}{\text{mol rxn}} \right) \left(\frac{-20.50 \text{ kJ}}{\text{mol H}_2\text{S}} \right) + \left(\frac{3 \text{ mol O}_2}{\text{mol rxn}} \right) \left(\frac{0.00 \text{ kJ}}{\text{mol O}_2} \right) \right] \\ &= -1036.30 \text{ kJ (mol rxn)}^{-1}\end{aligned}$$

0.0432g of Magnesium is placed into 50.0 mL of 6.00 M Hydrochloric acid ($s = 4.17 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, $d = 1.01 \text{ g mL}^{-1}$). The temperature increased from 22.4°C to 38.5°C . What is the enthalpy change for the reaction:



$$\begin{aligned}q_{\text{cal}} &= ms\Delta T = \left(0.0432 \text{ g} + (50.0 \text{ mL}) \left(\frac{1.01 \text{ g}}{\text{mL}} \right) \right) (4.17 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}) (38.5^\circ\text{C} - 22.4^\circ\text{C}) \\ &= 3.3933 \times 10^3 \text{ J}\end{aligned}$$

$$q_{\text{rxn}} = -q_{\text{cal}} = -3.3933 \times 10^3 \text{ J}$$

$$\Delta H = \frac{q_{\text{rxn}}}{n} = \frac{-3.3933 \times 10^3 \text{ J}}{0.0432 \text{ g Mg}} \times \frac{24.3050 \text{ g Mg}}{1 \text{ mol Mg}} \times \frac{1 \text{ mol Mg}}{1 \text{ mol rxn}} = -1.909 \times 10^6 \text{ J (mol rxn)}^{-1}$$