

1. (5 Pts) How much heat is evolved when 48.0 grams of ammonia is produced by the following reaction?

(Molar Masses: H 1.008; N 14.001)

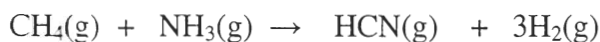


$$\frac{48.0 \text{ g NH}_3}{17.02 \text{ g}} \times \frac{\text{mol}}{1} \times \frac{91.8 \text{ kJ}}{2 \text{ mol NH}_3} = 129 \text{ kJ}$$

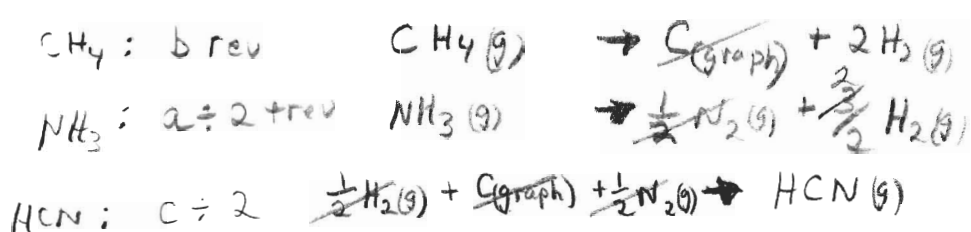
2. (5 Pts) Iron metal has a specific heat of $0.449 \text{ J/(g} \cdot ^\circ\text{C)}$. How much heat is necessary to raise the temperature of 25.00 g of iron from 20.0°C to 98.0°C .

$$\frac{0.449 \text{ J}}{\text{g} \cdot ^\circ\text{C}} \times 25.00 \text{ g} \times 78.0 ^\circ\text{C} = 875.5 \text{ J}$$

3. (10 Pts) Use Hess's law to calculate the heat of reaction for:



Use the following reactions:



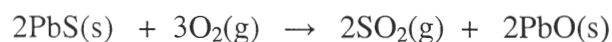
$$\begin{aligned} \Delta H &= +74.9 \text{ kJ} \\ \Delta H &= +45.9 \text{ kJ} \\ \Delta H &= +135.15 \text{ kJ} \end{aligned}$$



$$\boxed{255.95 \text{ kJ}}$$

4. (5 Pts) Calculate the enthalpy change for the reaction below using the given standard enthalpies.

(PbS(s) -98.32 kJ/mol; PbO(s) -274.5 kJ/mol; SO₂(g) -296.8 kJ/mol)



$$\begin{aligned} \Delta H &= \sum \Delta H_{\text{prod}} - \sum \Delta H_{\text{react}} \\ &= [2(-296.8) + 2(-274.5)] - [2(-98.32) + 0] \end{aligned}$$

$$\Delta H = -945.76 \text{ kJ}$$