

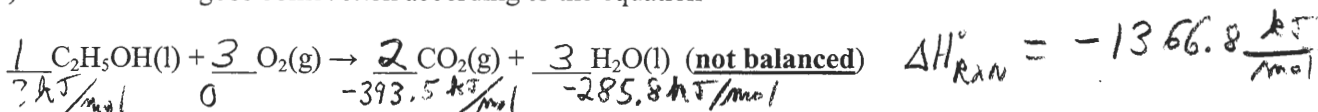
1. (5 Pts) Copper metal has a specific heat of 0.385 J/g·°C. Calculate the amount of heat required to raise the temperature of 24.5 g of Cu from 20.0°C to 85°C.

$$\frac{0.385 \text{ J}}{\text{g} \cdot ^\circ\text{C}} \times \frac{24.5 \text{ g}}{1} \times \frac{65^\circ\text{C}}{1} = 613 \text{ J}$$

2. (5 Pts) What would be the temperature change when a 35.0 g block of aluminum absorbs 24 kJ of heat? The specific heat of Al is 0.900 J/g·°C.

$$\frac{\text{g} \cdot ^\circ\text{C}}{0.900 \text{ J}} \times \frac{24 \times 10^3 \text{ J}}{1} \times \frac{1}{35.0 \text{ g}} = 762^\circ\text{C}$$

3. (6 Pts) Ethanol undergoes combustion according to the equation



The standard heat of combustion of ethanol, C₂H₅OH(l), is -1366.8 kJ/mol. Given that ΔH_f°[CO₂(g)] = -393.5 kJ/mol and ΔH_f°[H₂O(l)] = -285.8 kJ/mol. What is the standard enthalpy of formation of ethanol?

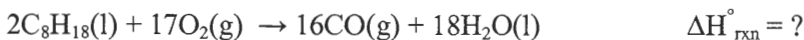
$$\Delta H_{\text{rxn}}^\circ = \sum \Delta H_{\text{products}} - \sum \Delta H_{\text{reactants}}$$

$$-1366.8 = (2(-393.5) + 3(-285.8)) - [(X + 0)]$$

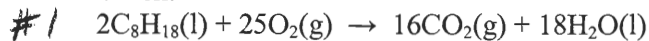
$$-1366.8 = -1644.4 - X$$

$$X = -277.6 \frac{\text{kJ}}{\text{mole}}$$

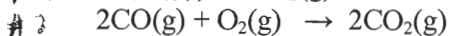
4. (6 Pts) Calculate the enthalpy change for the reaction:



Given:

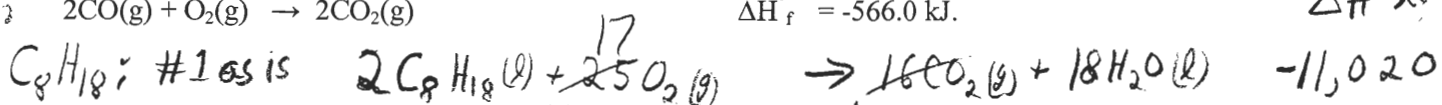


$$\Delta H_{\text{rxn}}^\circ = -11,020 \text{ kJ.}$$



$$\Delta H_f^\circ = -566.0 \text{ kJ.}$$

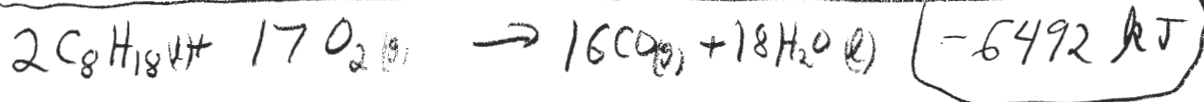
ΔH kJ



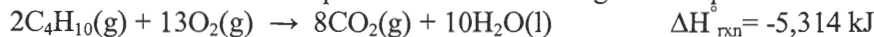
O₂: found in more than one equation



H₂O: Done in #1



5. (3 Pts) The combustion of butane produces heat according to the equation



How much heat is produced when 25 moles of butane are burned?

$$\frac{25 \text{ mol C}_4\text{H}_{10}}{2 \text{ mol C}_4\text{H}_{10}} \times \frac{5314 \text{ kJ}}{1} = 66,425 \text{ kJ}$$