

1. (3 Pts) The reaction that represents the standard enthalpy of formation for acetone ( $\text{CH}_3\text{COCH}_3$ ), a common ingredient in nail polish remover is:

- (A)  $3 \text{ C}(\text{graphite}) + 3 \text{ H}_2(\text{g}) + \frac{1}{2} \text{ O}_2(\text{g}) \rightarrow \text{CH}_3\text{COCH}_3(\text{l})$   
 B)  $6 \text{ C}(\text{diamond}) + 6 \text{ H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{ CH}_3\text{COCH}_3(\text{l})$   
 C)  $3 \text{ C}(\text{diamond}) + 3 \text{ H}_2(\text{g}) + \frac{1}{2} \text{ O}_2(\text{g}) \rightarrow \text{CH}_3\text{COCH}_3(\text{l})$   
 D)  $\text{CH}_3\text{COCH}_3(\text{l}) \rightarrow 3 \text{ C}(\text{graphite}) + 3 \text{ H}_2(\text{g}) + \frac{1}{2} \text{ O}_2(\text{g})$   
 E)  $\text{CH}_3\text{COCH}_3(\text{l}) + 4 \text{ O}_2(\text{g}) \rightarrow 3 \text{ CO}_2(\text{g}) + 3 \text{ H}_2\text{O}(\text{g})$

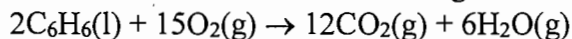
2. (2 Pts) An endothermic reaction causes the surroundings to

- A) warm up.  
 B) become acidic.  
 C) condense.  
 (D) decrease in temperature.  
 E) release  $\text{CO}_2$ .

3. (2 Pts) Which of the following has a  $\Delta H^\circ_f = 0 \text{ kJ/mol}$ ?

- A)  $\text{CO}_2(\text{g})$  B)  $\text{O}_3$  C)  $\text{Cl}^-(\text{aq})$  D)  $\text{NH}_3(\text{aq})$  (E)  $\text{I}_2(\text{s})$

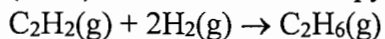
4. (6 Pts) The value of  $\Delta H^\circ_{\text{rxn}}$  for the following reaction is  $-6535 \text{ kJ/mol}$ .



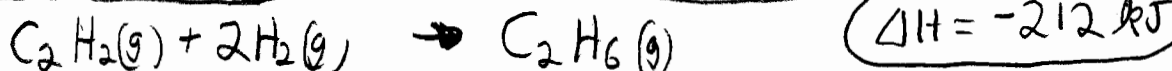
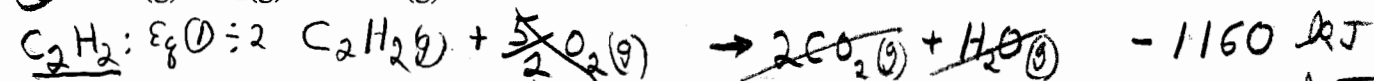
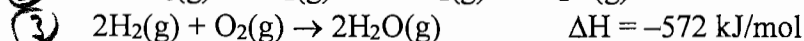
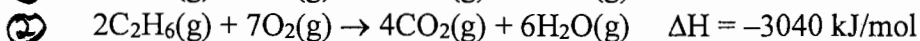
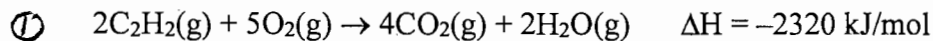
How many kilojoules of heat will be evolved during the combustion of 16.0 g of  $\text{C}_6\text{H}_6(\text{l})$ ?

$$\frac{16.0 \text{ g C}_6\text{H}_6}{78.11 \text{ g C}_6\text{H}_6} \times \frac{1 \text{ mol C}_6\text{H}_6}{2 \text{ mol C}_6\text{H}_6} \times 6535 \text{ kJ} = 669 \text{ kJ} \text{ signless since the term evolved is used}$$

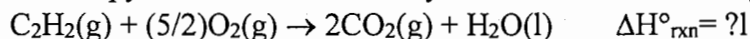
5. (6 Pts) Calculate the enthalpy for the reaction: (Show all work)



Given:



6. (6 Pts) The enthalpy of combustion of acetylene  $\text{C}_2\text{H}_2$  is described by



Calculate the enthalpy of combustion of acetylene, given the following enthalpies of formation

$$\Delta H^\circ_f[\text{CO}_2(\text{g})] = -393.5 \text{ kJ/mol} \quad \Delta H^\circ_f[\text{H}_2\text{O}(\text{l})] = -285.8 \text{ kJ/mol} \quad \Delta H^\circ_f[\text{C}_2\text{H}_2(\text{g})] = 226 \text{ kJ/mol}$$

$$\Delta H^\circ_{\text{rxn}} = \sum \Delta H^\circ_{\text{products}} - \sum \Delta H^\circ_{\text{reactants}}$$

$$\Delta H^\circ_{\text{rxn}} = [2(-393.5) + (-285.8)] - [226] = -1298.8 \text{ kJ}$$