

Preliminary quiz 13 (#9-1,2,3,4)

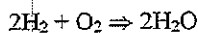
1. (#9-1)  $\Delta\text{Energy} = q + W$ . Which of the following is true of this statement?  $\rightarrow W$
- I. All energy from a car driving to school can be represented as either kinetic or potential energy. **NO**
  - II. An expanding gas from an inflating car tire and the car into the air is an example of work. **yes**
  - III. If  $q$  is "-" then  $W$  will have to be + **NO**
- a. I only  
**b. II only**  
 c. II and III only  
 d. I, II, and III
2. (#9-2) A block is placed in a sample of water and the block increases 10C. Which of the following is true?
- I. The water was originally hotter than the block. **yes**
  - II. The water and block changed the same degrees of temperature. **NO**
  - III. The energy lost by the water is gained by the block. **yes**
- a. I only  
**b. II and III only**  
 c. I and III only  
 d. I, II and III

3. *ENDOTHERMIC*
- $$33 \text{ kJ energy} + \text{C}_2\text{H}_5\text{OH}(l) \Rightarrow \text{C}_2\text{H}_5\text{OH}(g)$$
- (#9-3) Which of the following is true if 23g of ethanol is vaporized according to the process above (46g/mol):
- I. The process is endothermic **yes**
  - II. The ethanol will gain approximately 16.5kJ **yes (1/2 mol)**
  - III. The temperature will NOT increase during this process. **NO phase change**
- a. I only  
**b. II and III only**  
 c. I and II only  
 d. I, II, and III only

4.

substance	$\Delta H$ formation (kJ/mol)
O <sub>2</sub>	0
H <sub>2</sub>	0
H <sub>2</sub> O(g)	-241

(#9-4) Which of the following is true concerning this chemical reaction?



- I. Zero energy is involved in the bonds of O<sub>2</sub> and H<sub>2</sub>. **NO**
  - II. The energy needed to break bonds is smaller than the energy released as bonds form. **yes**
  - III. Breaking bonds always releases energy. **NO**
- a. I only  
**b. II only**  
 c. III only  
 d. II and III only

*-241(2) - 0  
 - 482 kJ  
 exothermic*

5. (#9-2) A copper cup is used for serving drinks. The heat of capacity of the cup is 34J/C (Quantity of energy needed to raise the sample 1°C). The cup is holding 100g of water is poured into the cup. This action causes the cup to be cooled by 50.0C.

a. How much energy did the cup gain?

$$50^\circ \frac{34\text{J}}{^\circ\text{C}} = 1700\text{J}$$

b. Student hypothesis: The cup cooled 50C so the water must have also warmed 50C. Justify or nullify the student hypothesis.

*NO,*

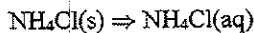
$$q = m \cdot \Delta T \cdot c$$

$$\Delta T = \frac{q}{m \cdot c}$$

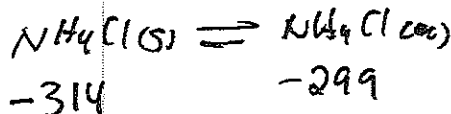
*many variables involved  
 those variables are not  
 specified  
 only q is equal*

6.

6.

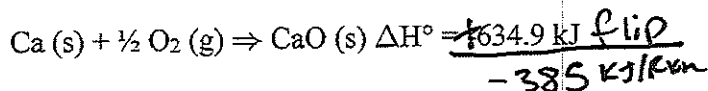
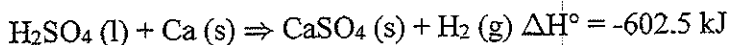
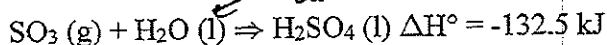
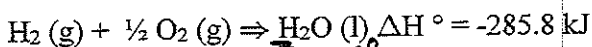
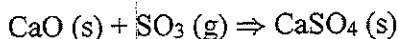


Ammonium Chloride is the active ingredient in cold packs. The package contains a pouch of water that when broken will dissolve ammonium chloride. Using the  $\Delta H_f$  tables, determine

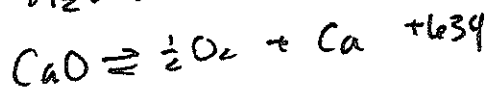
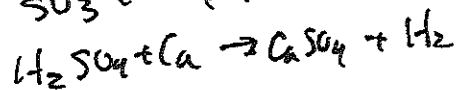
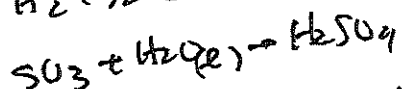
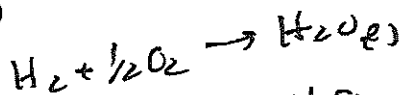


$$-299 - 314 = +15 \text{ kJ/mol}$$

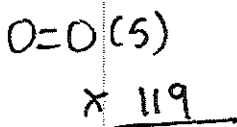
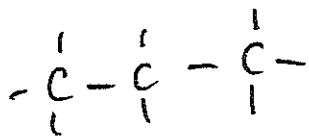
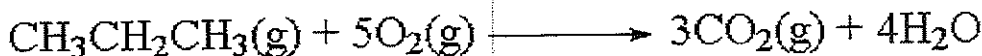
7. Using Hess's Law, determine the enthalpy change for the following reaction.



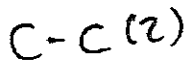
all quantities are good  $\Sigma H = \Delta H = 1$



8. Determine the quantity of energy needed to break all the bonds of the reactants. Use your bond energy tables.



$$\begin{array}{r} \text{C-H}(8) = 792 \\ \times 99 \\ \hline \end{array}$$



$$\begin{array}{r} \times 83 \\ \hline 166 \end{array}$$

$$\begin{array}{r} 594 \\ + 1553 \\ \hline \text{energy required} \end{array}$$