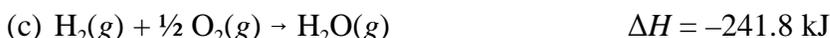
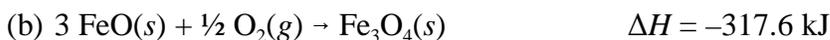


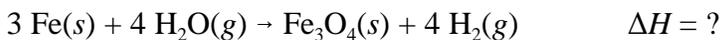
**Chem 115**  
**Practice Problems for Test 2**

1. A 1.45-g sample of acetic acid (m.w. = 60.06 u) was burned in excess oxygen in the bomb of a calorimeter with a heat capacity of 5.81 kJ/°C. The temperature of the calorimeter and its contents rose from 24.32 °C to 27.95 °C. From this experiment, what is the molar heat of combustion of acetic acid?

2. Given:



Calculate the value of  $\Delta H$  for the reaction



3. The combustion of hydrazine,  $\text{N}_2\text{H}_4(l)$  in excess oxygen produces  $\text{N}_2(g)$  and  $\text{H}_2\text{O}(l)$ . The standard enthalpy of combustion of  $\text{N}_2\text{H}_4(l)$  is  $-622.4 \text{ kJ}$ , and the standard enthalpy of formation of  $\text{H}_2\text{O}(l)$  is  $-285.9 \text{ kJ}$ . From this information, calculate the standard enthalpy of formation of  $\text{N}_2\text{H}_4(l)$ .

4. (a) How many grams of NaOH (f.w. = 40.00 u) are needed to prepare exactly 250 mL of a 1.25 M solution of NaOH(aq)?

(b) How many milliliters of 1.25 M NaOH solution are need to prepare exactly 500 mL of  $3.50 \times 10^{-3} \text{ M}$  NaOH solution?

(c) A 25.0-mL sample of  $3.50 \times 10^{-3} \text{ M}$  NaOH solution is titrated with  $5.00 \times 10^{-3} \text{ M}$  HCl solution. How many milliliters of the acid solution are needed to reach the equivalence point?

(d) If titration of a 25.0-mL sample of a solution of KOH of unknown concentration requires 32.5 mL of 0.100 M HCl solution to reach the equivalence point, what is the concentration of the KOH solution?

(e) What is the nitrate ion concentration in a solution prepared by mixing 40.0 mL of 0.100 M  $\text{Ca}(\text{NO}_3)_2(aq)$  with 30.0 mL of 0.200 M  $\text{NaNO}_3(aq)$ ?

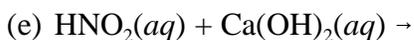
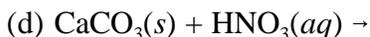
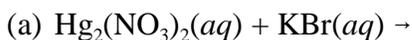
5. Indicate whether the following ionic compounds are soluble or insoluble in water. If sparingly soluble, write soluble.

$\text{PbSO}_4$		$\text{BaCO}_3$	
$\text{BaS}$		$\text{Cs}_3\text{PO}_4$	
$\text{Al}(\text{OH})_3$		$\text{AgC}_2\text{H}_3\text{O}_2$	

6. Indicate whether the following are strong electrolytes, weak electrolytes, or non-electrolytes.

$\text{H}_3\text{PO}_4(aq)$		$\text{NaNO}_3(aq)$	
$\text{PbS}(s)$		$\text{C}_2\text{H}_5\text{NH}_2(aq)$	
$\text{HClO}_4(aq)$		$\text{C}_2\text{H}_5\text{OH}(aq)$	

7. Write net ionic equations for each of the following, if a metathetical reaction occurs. If no reaction occurs, write "n. r."



8. Consider light with a wavelength of 625.6 nm. (speed of light =  $2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}$ ; Planck's constant =  $6.626 \times 10^{-34} \text{ J}\cdot\text{s}$ )

(a) What is the frequency?

(b) What is the energy of one photon of this light?

(c) How many photons would supply exactly 100 kJ of energy?