1. 5.00 g of a metal was heated to 100.0^{o}C and then plunged into 100.0 g of water at 24.0 ^{o}C. The temperature of the resulting mixture became 28.0^{o}C. The specific heat capacity of water is 4.184 J/g^{o}C. Show all work and units.

   a) How many joules did the water absorb?

   b) How many joules did the metal lose?

   c) What is the specific heat capacity of the metal?

2. 4.5 grams of KI was dissolved in 120 grams of water in a calorimeter. The temperature of the solution in the calorimeter fell from 27.0^{o}C to 19.0^{o}C. Calculate the enthalpy in kJ/mol for the solution process and label it as endo- or exo-thermic. The specific heat capacity of the solution is 1.15 J/g^{o}C. Show all work and units.

3. Calculate ΔH for the reaction $4\ NH_3\ (g) + 5\ O_2\ (g) \rightarrow 4\ NO\ (g) + 6\ H_2O\ (g)$, from the following Data. Show all work below – equations must be re-written to show how they sum to the overall.

$N_2\ (g) + O_2\ (g) \rightarrow 2\ NO\ (g)$	$\Delta H = -180.5$ kJ
$N_2\ (g) + 3\ H_2\ (g) \rightarrow 2\ NH_3\ (g)$	$\Delta H = -91.8$ kJ
$2\ H_2\ (g) + O_2\ (g) \rightarrow 2\ H_2O\ (g)$	$\Delta H = -483.6$ kJ

4. When potassium chloride reacts with oxygen under the right conditions, potassium chlorate is formed: $2\ KCl + 3\ O_2 \rightarrow 2KClO_3$

Given that the enthalpy of the reaction is 90 kJ, and the heat of formation of potassium chloride is –436 kJ/mol, calculate the heat of formation of potassium chlorate. Show all work and units.

5. Calculate the amount of energy released in Joules when 5.75 moles of A is consumed in the following reaction: $2A + 3B \rightarrow 5C \quad \Delta H = -678$ kJ

6. An electron transitions from n=5 to n=3.

   a. Calculate the energy released in this transition. Show all work and units.

   b. Calculate the wavelength of light in nm for this transition. Show all work and units.

8. Calculate the frequency of light emitted with a wavelength of 680nm. Show all work and units.

9. Answer the following questions involving quantum numbers:

a. Energy shell n=3 has what type of orbitals?

b. Energy shell n=2 can hold a maximum of how many electrons?

c. Give the ml values when l = 1. Explain what they mean specifically.

d. What is denoted by l = 0, 1?

e. What is the maximum number of electrons depicted by l = 2?

10. Draw a high energy "wave" of light and briefly indicate the type of wavelength and frequency associated with it.