**Study Guide for Ch 10 Test**

**Vachon Chemistry**

1. Organize your materials
   1. Your reading journal notes 10.1-10.4
   2. Your class notes
   3. PhET Heating and Cooling Simulation worksheet
   4. Heat of Fusion for Ice Lab
   5. Heating and Cooling Curve for water worksheet
   6. Calorimetery Worksheet
   7. Hess’s Law Worksheet
   8. Review Worksheet
   9. Hess’s Law Pre lab calculations
   10. Hess’s Law Post Lab questions
   11. Your Study Guide
2. Read over all materials listed above and be sure they are complete and you understand each of them.
3. Reread the Chapter – **Make your own Study Guide** in your reading journal.
   1. If you did not earn a 85% or better on the last test you must hand write your study guide and it must be at least three pages long. With the following 3 sections:
      1. **Vocabulary section (optional)**  
         Include all bold vocabulary from each section as well as any words you do not understand and know. See attached chapter review for a list of bold words.
      2. **Outline notes section**  
         From each section we covered write bulleted notes. Use the chapter review attached for guidelines and ideas of what to include.   
         Include at least one example with the answer from the examples boxes in the section as you take notes.
      3. **Example section**  
         Redo at least 2 examples from each of the in class and homework problems assigned from above. You may reprint the worksheets and attach them to your study guide.  
         Complete 1-3 of the section review questions at the end of each section.
4. Mark areas that you need to review and then GO BACK in the textbook and study each of these sections.
5. On the test you will be allowed:
   1. Your periodic table with appropriate marks
6. Take the online chapter quizzes from the textbook site for Ch 5 and 6. Take Standardized test prep for Ch 5 and 6 pgs 169 and 215.
7. Review your study guide and reading journal, get some sleep and a good breakfast!

**Review Ch 10 Energy Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Station 1**

1. Describe the difference between heat capacity and specific heat. Use an example such as a glass of water and a pool of water.
2. Explain the difference between temperature and heat. Also, state what determines the direction of heat transfer.
3. Why do we need some greenhouse gases? What is the problem with having too many greenhouse gases?

**Station 2**

1. Use the information below to calculate **Δ***H* for the following reaction.  
   2NO2(*g*)  N2O4(*g*)  
     
   N2(*g*) + 2O2(*g*)  2NO2(*g*) **Δ***H* = 67.7 kJ

N2(*g*) + 2O2(*g*)  N2O4 (*g*) **Δ***H* = 9.7 kJ

1. The specific heat of graphite is 0.71 J/gC. Calculate the energy required to raise the temperature of 750 g of graphite by 160C.

1. A 55.0-g piece of copper wire is heated, and the temperature of the wire changes from 19.0C to 86.0C. The amount of heat absorbed is 343 cal. What is the specific heat of copper?
2. Calculate the amount of heat released when 9.87 g of Fe2O3 reacts in the reaction below.  
   Fe2O3 (s) + 3CO (g) 2Fe (s) + 3CO2 (g) **Δ***H* = -23kJ/mol

**Station 3**

1. Describe the parts of a calorimeter and the function of each part.
2. At this station you will be calculating the theoretical enthalpy of the dissolution of ammonium chloride and comparing it to an experimentally calculated value in a mini lab. (Pay attention to sig figs and units!)
   1. Write out a balanced equation for the dissolution of NH4Cl(s)
   2. Calculate the theoretical enthalpy (**Δ***Htheor*) given the following information:  
      **Δ***H* **°f** NH4Cl (s) = -314.4 kJ/mol, **Δ***H* **°f** NH4+ (aq) = -132.5 kJ/mol,  
      **Δ***H* **°f** Cl- (aq) = -167.2 kJ/mol
   3. Draw an energy diagram for the dissolution reaction.
   4. Measure out aprox 5.00 grams of NH4Cl (s) record mass of   
      the dish \_\_\_\_\_\_\_\_\_\_\_\_\_ dish + NH4Cl (s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
      mass of NH4Cl (s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. Measure out approx 50 mL of water. Volume of water \_\_\_\_\_\_\_\_\_\_\_\_\_\_
   6. Take the initial temperature of the water. \_\_\_\_\_\_\_\_\_\_\_\_\_
   7. Place the water in the calorimeter.
   8. Add the NH4Cl(s) to the water and stir until dissolved. Record the highest final temperature. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   9. Calculate the heat of the calorimeter (water)
   10. What is the heat of the reaction?
   11. Calculate the experimental enthalpy for this dissolution **Δ***Hexp.*
   12. What is your percent error?

KEY

1. Heat capacity is the quantity of heat required to change an object's temperature by 1C. The heat capacity of any particular object varies with the mass of that object (as well as with the type of material in the object). The heat capacity of a steel girder is much greater than the heat capacity of a steel nail, for instance. Specific heat, on the other hand, does not vary with the mass of the object, but rather, depends only on the nature of the material in the object. Specific heat is the quantity of heat required to raise the temperature of 1 gram of a substance by 1C. The specific heats of the steel in the steel girder and the steel in the steel nail are identical (assuming the two steels are of the same composition). Specific heat is a property of a particular material; heat capacity is a property of a particular object.

2. Temperature is a measure of the “hotness or coldness of an object”, the is the measurement of the average kinetic energy of the particles in the substance. Heat is the energy that is transferred between two objects, of different temperature, that are in contact with each other. Temperature determines the direction of heat transfer. Heat always flows from the object of higher temperature to the object of lower temperature.

3. If it where not for greenhouse gases the temperature of the earth would be much colder than it currently is. Having too many greenhouse gases may cause the surface of the earth to rise to dangerous levels.

4. **Δ***H* = –58 kJ

5. **Δ***H* = 85,000 J

6. 9.31 x 10-2 cal/gC

7. 1.42 kJ

8. Generally a calorimeter consists of an insulated container, water, and a temperature-measuring instrument. The insulated container prevents heat from entering or leaving the system from the outside. There is water in the container to absorb heat. The temperature-measuring device is often a thermometer. Some calorimeters have a stirrer to distribute the heat evenly through the water. A bomb calorimeter may contain a set of ignition wires.

9a. NH4Cl(s)  NH4+ (aq) + Cl- (aq)

b. +14.7 kJ/mol

c-k varies

Remember to calc the qwater  you use the mass of the water the specific heat of water and the change in temperature of the water. The qwater = - qrxn

You will also need the moles of ammonium chloride in order to calculate the enthalpy. Remember **Δ***Hrxn* =