Chemistry: Final exam review 2012

Chemical Reactions: *you will not need an activity series or a solubility chart on your test*

1. Write an example of each of the following chemical reactions using compounds or symbols
   a. Synthesis

   b. Decomposition

   c. Combustion

   d. Single Replacement

   e. Double replacement

2. Complete and balance the following reactions
   a. ___CH_4 + ___O_2 →

   b. ___H_2 + ___O_2 →

   c. ___MgO →

   d. ___Ca + ___$AgCl$ →

   e. ___MgI_2 + ___$CaCl_2$ →

Gases: *you will be given the combined gas law, the ideal gas law, the equation to convert from Celsius to Kelvin, and all "R" constants, it will not be necessary for you to know the names of the gas laws*

1. Describe the relationship (inverse or direct) for the following gas properties. Be sure you can explain them at the molecular level
   a. Pressure and volume

   b. Volume and temperature

   c. Pressure and temperature

2. What is the new volume of a 3L balloon when the pressure has been increased from 55kPa to 105 kPa?

3. What is the new temperature of a gas that has a volume of 0.44 L at 280K when the volume increases to 1.1 L?

4. How many moles of gas are contained in a 8.5 L container at 20°C and 3.1 atm of pressure?

Thermochemistry: *you will be given the equation q=mcΔT and the specific heat of water*

1. Fill in the table below:

	Endothermic	Exothermic
Graph		
Sign of ΔH		
Sign of q		
Heat transfers from (system or surroundings)		
Heat transfers to (system or surroundings)		
Feels to the touch (hot or cold)		
Heat is written as a product or reactant?		
Energy of the reactants or products is higher?		

2. Draw a heating curve and cooling curve. Label the states of matter at each point where the temperature is changing. Label the phase changes at each flat part of the heating or cooling curve.

3. Label each of the following phase changes as endothermic or exothermic
   a. Freezing _____
   b. Melting _____
   c. Boiling _____
   d. Condensation _____

4. Given the following reaction: X + 2Y → 4Z + 50kJ, how many kJ of heat are released when 6 moles of X reacts with excess Y?

5. Hess' law: given the following reactions, find the ΔH of the reaction A + 2B → 3D

$$D + 2C → A \quad ΔH = 200 \text{ kJ}$$
$$B + C → D \quad ΔH = -110kJ$$

6. What does it mean if substance M has a HIGHER specific heat than substance O?

7. What does it mean when entropy increases?

8. What is it called when energy is transferred between gases? Convection or conduction?

9. Name two units of energy. What is the definition of a calorie?

10. What is the specific heat of a 20 g substance that RELEASES 600 J of heat as it cools form 40°C to 30°C?

IMFs

1. List the three intermolecular forces from strongest to weakest

2. Which is stronger: intermolecular forces or intramolecular forces? Give an example of each.

3. What type of intermolecular force holds each of the following molecules together?

a. I_2
b. HCl
c. CH_4

d. NH_3
e. O_2
f. H_2O

4. How do you know which has a stronger intermolecular force: Cl_2 or Br_2 even though they both experience London dispersion forces?

5. How does strength of intermolecular force affect the following properties?
    a. Melting point

    b. Boiling point

    c. Freezing point

Solids/substances/solutions

1. Describe the three states of matter: solid, liquid, and gas. Use pictures to help you and describe them in terms of molecular movement and energy

2. What does the strength of the intramolecular force have to do with melting point? Boiling point?

3. Define the terms saturated, supersaturated, and unsaturated solution

4. Describe the three types of solids. Include properties like hardness, melting point, conductivity, and what they are composed of.
    a. Ionic

    b. Metallic

    c. Covalent

5. What does adding a solid to a solution do to the boiling point? Freezing point?

Kinetics/Rate of reactions

1. Draw and endothermic and exothermic graph. Label the products, reactants, ΔH, and activation energy?

2. What does a catalyst do to a reaction?

3. How can you increase the rate of a reaction?

Equilibrium

1. What is the K expression for the following reactions?
   a. A (g) + 2B (g) ←→ D (g)   b. 3X (g) ←→ W (g) + 4Z (g)

2. For reaction (a) in question #4, what is K when [A]=0.3M, [B]=0.22M, and [D]= 0.7M

3. The [] in [A] stand for what? What are the units? What does the double arrow stand for?

4. What does it mean when K>1? K<1?

5. Think about LeChatelier's principle. What factors can shift the equilibrium of an expression?

6. For the following reaction: A + 2B ←→ D + heat, how would the following changes shift the equilibrium? Towards the products or the reactants?
   a. Increase in [A]   d. Increase in pressure
   b. Decrease in temperature   e. Decrease [B]
   c. Decrease in volume   f. Adding a catalyst

Acids/Bases: *you will be given all acid and base formulas*

1. How can you distinguish between acids and bases? Discuss in terms of chemical formula, properties, and pH.
   a. Acids

   b. Bases

2. What happens when an acid reacts with a base?

3. What is the $[H^+]$ when the pH is 8.4?

4. What is the $[OH^-]$ when the pOH is 3.3?

5. What is the pH when $[H^+]=1.2 \times 10^{-6}$ M?

6. What is the pOH when $[OH^-]=2.5 \times 10^{-9}$ M?

7. What is the pH of 0.5M H_2CO_3?

8. What is an acid and its conjugate base? Give an example.

Electrochemistry

1. What is the oxidation state for each element in the following molecules and compounds
   a. MgS
   c. CH_4

   b. O_2
   d. $LiNO_3$

2. Write the half reactions for: Ag + Cl_2 → AgCl

3. Understand how the activity series works

4. What is occurring with electrons in a redox reactions

5. What do the following statements stand for
   a. OIL RIG
   b. RED CAT
   c. AN OX

   GOOD LUCK ON YOUR FINAL EXAM!!!!