

BRING TO CLASS ON EXAM DAY: Scan-Tron Form 883, #2 pencil, and eraser

Material Covered on Exam:

Chemistry: assigned reading for Unit 3

Lab Manual: Experiments 5- 9

Exercises 6- 9

A. REVIEW

Be able to recognize from their formulas: acids, bases, salts, and covalent compounds.

B. WATER

1. Know the structural properties of water: shape and polarity of H₂O molecule, hydrogen bonding in liquid water.
2. Know why water is such a good solvent.

C. SOLUTIONS

1. Solubility

- a. Know the factors that affect solubility.
- b. Know the factors that affect rate of dissolving.
- c. Given the solubilities of a substance at various temperatures, determine if a given solution of the substance is saturated or unsaturated.
- d. Know the difference between saturated and unsaturated solutions.
- e. Know the colligative properties of solutions - how will the following be affected by the presence of solute: vapor pressure, boiling point, freezing point, and osmotic pressure.

2. Concentrations of Solutions

- a. Define and know the applications of the terms used to give a quantitative measure of concentration: percent, parts per million, molarity, molality, and normality.
- b. Calculations involving molarity:
 - (1) Given grams of solute, molar mass of solute and volume of solution, calculate the molarity of the solution.
 - (2) Given the molar mass of the solute, calculate the grams of solute required to prepare a given volume of a solution of given molarity.
- c. Calculations involving percent:
 - (1) Given the amount of solute and the amount of solvent or solution, calculate the concentration of the solution in percent.
 - (2) Calculate the amount of solute required to prepare a given amount of a solution of a given percent concentration.

3. Solute Particles Present in Solutions

- a. Tell what solute particles (ions and/or molecules) are present in an aqueous solution of a given compound. To do this you must first be able to recognize from its formula the class of compounds to which it belongs.
- b. Be able to distinguish between strong, weak, and nonelectrolytes.

4. Acids and Bases, pH, Buffers
 - a. Know the characteristic properties of acids and bases.
 - b. Know Arrhenius and Brønsted-Lowry theories of acids and bases.
 - c. Know what a neutralization reaction is.
 - d. pH
 - (1) Know the pH of pure water and the definition of neutral solution.
 - (2) Given the concentration of a solution of a strong acid or base, determine the theoretical pH.
 - e. Buffers
 - (1) Know what a buffer is and what it does.
 - (2) For a given buffer system identify the particle that reacts with added H^+ (strong acid) and the particle that reacts with added OH^- (strong base).
 - (3) For a given pair of compounds, determine whether their aqueous solution would form a buffer.

E. REACTIONS

1. Know the factors that affect the course of a chemical reaction (collision theory).
2. Know the factors that affect reaction rate.
3. Given the equation for a reaction, recognize whether it is combination, decomposition, single replacement or double replacement.
4. Given the equation for a reaction, determine whether it is balanced or not.
5. For a given reaction that is at equilibrium, determine the effect of change of concentration or temperature on the position of equilibrium.
6. Given the relative activities of metals or nonmetals involved in a single replacement reaction, determine if the reaction will occur or not.
7. For a given double replacement reaction, be able to determine if the reaction will go to completion.

F. VOCABULARY

1. buffer
2. electrolyte
3. solubility
4. electrolysis
5. equilibrium
6. exothermic
7. endothermic
8. surface tension
9. vapor pressure
10. hydrate
11. catalyst
12. deliquescent
13. efflorescent
14. activation energy
15. colloid

