Chemistry 11
Practice test #2

- 31 multiple choice at 2.5 pts. each
- Two problems involving molarity and titration at 10.5 pts with work
- 3 equations at 4 pts. each

EQUATIONS

1. Study examples of DD reactions
2. Study examples of SD reactions
3. Study examples of combustion reactions

NOTE: You should know how to do the steps below in the following order:

- Write equations using correct formulas (use word equation before translating it to chemical formulas)
- Balance equations. The coefficients represent the # of moles or molecules
- Then write the net ionic (ionic and then net ionic if you prefer). You will be graded for net ionic only so write the net ionic as your final step clearly.
- Note that combustion reactions do not have a net ionic equation.

STOICHIOMETRY

1. Determine the mass (in g) of 0.250 moles of CaCO₃.

2. a. Determine the mass in mg of 5.12 x 10²³ molecules of ammonium carbonate.
   b. How many moles of chlorine atoms are contained in 1.00 mole of BaCl₂?

3. What is meant by theoretical yield and actual yield?
   NOTE: the maximum amount of product that can be formed in a chemical reaction is the theoretical yield. The amount of product produced in an experiment is the actual yield.

4. When solutions of AgNO₃ and NaCl react, the balanced molecular equation is:
   AgNO₃(aq) + NaCl(aq) ➔ AgCl(s) + NaNO₃(aq)

   A. How much AgCl is produced when 3.10 g of AgNO₃ and 3.10 g of NaCl react?
   B. What is the % yield of Ag₂O if the actual yield is 1.98 g?

GAS LAWS

2. At constant temperature the pressure on a 6.0 liter sample of gas is changed from 2.0 atm to 760 torr. What is the new volume of the gas sample?

3. A 250.0 mL sample of oxygen gas was collected at 21°C and 785 mm Hg. The next day, the temperature rose to 37°C and the pressure was 770 mm Hg. What is the new volume of the gas?

4. A sample of hydrogen gas has a volume of 8.56 L at a temperature of 0 °C and a pressure of 1.5 atm. Calculate the moles of hydrogen gas present in this gas sample.

5. Conditions of STP: **At STP (Standard Temperature and Pressure):** At 0 °C and 1 atm, 1 mol ideal gas = 22.4 L

6. When a 3.0 L balloon is heated from 25 °C to 100 °C, its volume increases. What is the new volume of the gas after it has been heated?

7. Postulates of the Kinetic Molecular Theory of gases

8. Gases behave ideally under what conditions: Under conditions of low pressure and high temperature. This is when the molecules of gases do not tend to stick to one another.

**INTERMOLECULAR FORCES and PROPERTIES OF LIQUIDS**

1. How does vapor pressure, surface tension, and boiling point correlate with intermolecular forces of attraction?

2. How does vapor pressure, surface tension, and boiling point correlate with each other?

3. What are the three types of intermolecular forces? Which is the strongest and which is the weakest?

4. What type of forces of attraction are ionic and covalent bonds?

5. Which intermolecular force found in CH₂I₂ is the strongest?

6. Arrange the following in the order of increasing intermolecular forces of attraction:

   A. CH₄ < HCl < NH₃ < C₂H₆ < Cl₂
   B. C₂H₆ < CH₄ < Cl₂ < HCl < NH₃
   C. HCl < Cl₂ < NH₃ < CH₄ < C₂H₆
   D. NH₃ < HCl < C₂H₆ < CH₄ < Cl₂
   E. Cl₂ < CH₄ < C₂H₆ < HCl < NH₃
7. Given the following boiling points: CHCl$_3$ (61°C), CHBr$_3$ (150 °C), and water (100 °C), which liquid is the MOST volatile?

APPLICATION TO BLOOD PRESSURE

1. What is systolic and diastolic blood pressure? Read the #s associated with normal, pre-hypertension, Stage 1 and stage2 hypertension. What is the recommended treatment?

SOLUTIONS

1. What is the % (w/v) of a salt solution prepared by dissolving 35.0 g of NaCl in 115 ml of the solution?

2. A topical antibiotic is 1.0% (w/v) Clindamycin. How many grams of Clindamycin are in 60.0 mL of the 1.0% (w/v) solution?

3. A 0.50 L bottle of wine contains 60 mL of ethanol. What is the percent composition (v/v) of ethanol in this aqueous solution?

4. Of the following, which would be most immiscible in CCl$_4$ (l)?
   A. NH$_3$
   B. CH$_3$CH$_2$CH$_2$CH$_2$CH$_2$CH$_2$CH$_3$
   C. CO$_2$
   D. I$_2$
   E. SO$_3$

5. Which of the following is expected to be least soluble in water?
   A. HOCH$_2$CH$_2$OH
   B. CH$_3$OH
   C. CH$_3$CH$_2$CH$_2$CH$_2$CH$_3$
   D. MgCl$_2$
   E. CH$_3$COOH

6. What affect does dilution have on:
   • volume of a solution?
   • On the concentration of the solution?
   • On the moles of solute in the solution?
7. An 8.00 M solution HCl of unknown volume is diluted to make 5.50 L of a 1.00 M solution.
   A. Determine the volume of the 8.00 M solution needed for the dilution.
   B. How much water must be added to the 8.00 M solution in order to make the dilution?

8. How do you prepare 500 mL of 0.123 M NaCl. You have available solid NaCl.

**ACIDS and BASES**

1. What are strong and weak electrolytes? Give some examples of these.
2. What are examples of strong acids and bases?
3. What are some examples of weak acids and bases?

**pH and pOH**

1. Know the three equations namely:
   - $\text{pH} = -\log[H^+]$
   - $\text{pOH} = -\log[OH^-]$
   - $\text{pH} + \text{pOH} = 14$

2. A solution has a $[H^+]$ of $2.0 \times 10^{-6}$ M. What is its pOH?

**BUFFERS**

What is a buffer solution? Review examples of buffers on page 28 and in problem #36.

**TITRATION**

1. What is the difference between end point and equivalence point in a titration experiment?

2. In a particular titration experiment a 20.0 mL sample of an unknown diprotic acid required 25.0 mL of 0.100 $M$ NaOH for the end point to be reached. What is the concentration of the acid?