Chemistry Term 2 Review

Topics:

- Chemical Quantities
  - Moles
  - Molar Mass
  - Percent composition
  - Empirical formula
  - Molecular formula
- Ionic Compounds
  - Identification
  - Properties
  - Ionic Bond
  - Polyatomic Ions
  - Naming Rules
    - Transition Metals
  - Formula Writing
    - Balanced Charges
- Covalent Compounds
  - Identification
  - Properties
  - Covalent Bond
  - Naming Rules
    - Prefixes
  - Formula Writing
- Bonding
  - Lewis Dot Structures
  - Molecular shapes
  - Polarity
  - Intermolecular forces
    - Ionic forces
    - Dipole forces
    - Dispersion forces
    - Hydrogen bonds
- Equations and reactions
  - Balancing equations
  - Completing the equation
- Reaction Types
  - Synthesis/Combination
  - Decomposition
  - Single Replacement
  - Double Replacement
  - Combustion
- Stoichiometry
  - Calculations
    - Mass-to-Mass
    - Mass-to-Volume
    - Volume-to-Volume
  - Percent Yield
    - Actual Yield
    - Theoretical Yield
  - Limiting & Excess Reagents

Solve the following problems:

1. Naming: $LiNO_3$, Mg_3N_2, $CoCO_3$, $Ca(ClO_4)_2$, NiS_2, N_3O_5, P_2Cl_6, S_3Br_4, N_3I_7, C_2Cl_4, $NaC_2H_3O_2$, Li_2SO_3, $Fe(OH)_3$, NaOH, $Ba(OH)_2$

2. Formula Writing: Aluminum Chloride, Cesium Carbonate, Beryllium Chromate, Iron (III) Nitrate, Nickel (IV) Cyanide, Copper (II) Phosphate, Disulfur Tetroxide, Nitrogen Monoxide, Tricarbon Hexafluoride, Triphosphorous Heptafluoride, Nitrogen Disulfide, Hydrogen fluoride, Hydrogen selenide, Beryllium Hydroxide, Hydrogen phosphate, Hydrogen nitrite, Iron (II) Hydroxide, Hydrogen sulfate

3. During an experiment, 137.3 g of barium nitride are measured into a beaker. How many moles of barium nitride are in the beaker?

4. When preparing to conduct a lab, a student is instructed to obtain 3.36×10^{-3} moles of disulfur tetrachloride. How many grams of disulfur tetrachloride will the student need to obtain?

5. A balloon is filled with 18.21 g of calcium phosphate. How many molecules of calcium phosphate are contained in the balloon?

6. Determine the percent composition of:
   a. Sodium sulfate
   b. Carbon tetrachloride
   c. Hydrogen phosphate

7. If a 5.00 g sample of copper reacts with nitrogen, 5.37 g of a compound containing copper and nitrogen is produced.
   a. Determine the percent composition of this compound.
   b. Determine the empirical formula of this compound.
   c. Name this compound.

8. Nicotine (which is very, very bad for you) is 74.02% carbon, 8.71% hydrogen and 17.27% nitrogen and has a molar mass of 162.26 g/mol. Determine the empirical and molecular formulas. Make sure you put a box around BOTH formulas! And don't smoke. Or vape.

9. A compound is known to contain only iron and fluorine. If 10.21 g of the compound are measured and found to contain 6.07 g of iron, what is the name of the compound?

10. Draw the Lewis dot structure for the following compounds. What is its geometry (molecular shape)? Do you think this would be polar molecule? Why or why not? What are the intermolecular forces that hold the molecules together?
    a. Ammonia (NH_3)
    b. Oxygen difluoride
    c. Silicon tetrachloride
    d. Carbon dioxide
    e. Hydrogen iodide

11. Put the following compounds in order from highest melting point to lowest. Explain your order: Phosphorus trihydride, calcium chloride, silicon dioxide, and hydrogen fluoride.

12. Write complete, balanced equations for the following reactions, then identify which type of reaction it is:
    a. Calcium reacts with fluorine
    b. Butane, C_4H_{10}, combusts
    c. Aluminum reacts with silver (I) nitrate
    d. Sodium chloride decomposes into its elements
    e. Chromium (III) bromide reacts with ammonium phosphate
    f. Hydrogen sulfate reacts with potassium hydroxide

13. Calcium nitrate reacts with sodium phosphate.
    a. Write the balanced equation.
    b. How many grams of calcium phosphate can be prepared from the mixing of 33.50 g of sodium phosphate with excess calcium nitrate?

14. When 7.85 g of strontium chloride are mixed with excess tin (III) nitrate in a lab, 6.86 g of tin (III) chloride are produced. What is the percent yield of tin (III) chloride in this lab? (Hint: write the equation first)

15. During an experiment, 26.8 g of sodium nitride solution are combined with excess cobalt (II) nitrate. If the percent yield of cobalt (II) nitride is determined to be 85.61%, what was the actual yield of cobalt (II) nitride (in g)? (Hint: write the equation first)

16. When 18.43 g of potassium carbonate and 12.36 g of iron (III) nitrate are combined, a reaction takes place. (Hint: write the equation first)
    a. What is the limiting reagent?
    b. How many grams of iron (III) carbonate are produced?
    c. What mass of the excess reagent is left over?

17. During an experiment, 7.536 g of sodium phosphate are mixed with 12.12 g of magnesium nitrate. (Hint: write the equation first)
    a. What is the limiting reagent?
    b. If 5.01 g of magnesium phosphate are formed, what is the percent yield in this reaction?

18. A student combines 2.94 g strontium hydroxide with 5.07 g hydrogen bromide. (Hint: write the equation first)
    a. What is the limiting reagent?
    b. How many grams of the salt produced by this reaction can be formed?
    c. What mass of the excess reagent will be left over?