WODSS SCIENCE Name: _____

SCH 4CI Date: _____

Review: Quantities in Chemical Reactions

Test Helps: Periodic table, calculator, nomenclature reference sheet

Test Topics

1. For every problem, **you must have a therefore statement and correct units**.
2. **Avogadro's number**: _____. What does it mean?
   _____
3. Atomic mass / molecular mass / formula unit mass (units - ____). What does it mean?
   _____
4. **Molar mass** (units - _____). What does it mean?
   _____
5. What is a **mole**? _____
   _____
6. Convert between mass, moles, and number of particles (follow graphic organizer).
7. Find the **percent composition** of a compound, when given either the molecular formula of the compound OR when given the masses of each element in the compound.
8. Finding the Empirical and Molecular formula
9. **Stoichiometry:** _____
   _____
10. **Mole Ratio:** _____
11. Stoichiometry Problems – solve these using the second graphic organizer
    a. Finding the **theoretical yield:** _____
    _____
12. Calculating **percent yield** =
13. Explain why a percent yield won't always be 100%.

<u>Review Questions:</u>

1. What is Avogadro's number and what does it mean?
2. How many atoms does a 2.6 mol sample of silver (Ag) have?
3. A necklace contains 0.0342 mol of silver (Ag).
   a) How many grams of silver are in the necklace?
   b) How many atoms of silver are there in the necklace?
4. Find the molecular mass and molar mass of carbon dioxide.
5. Find the mass of 7.38×10^{21} formula units of $Pb_3(PO_4)_2$.
6. What is the percent composition of H_2O_2?
7. What is the percent composition of a sample that contains 3.45g of sodium and 5.33g of chlorine gas?
8. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

9. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

10. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound?

11. Write the molecular formulas of the following compounds:
    a. A compound with an empirical formula of C_2OH_4 and a molar mass of 88 grams per mole.
    b. A compound with an empirical formula of C_4H_4O and a molar mass of 136 grams per mole.
    c. A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole.

12. How many grams of oxygen are required to react with 9.7 g of magnesium to produce magnesium oxide? Balanced equation: $2\ Mg_{(s)} + O_{2(g)} \rightarrow 2\ MgO_{(s)}$

13. Hydrogen and chlorine gases react to form hydrogen chloride gas according to the following reaction:

$$H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$$

    a) If 2 moles of hydrogen react with excess of chlorine, what is the limiting reactant?

    b) How many moles of hydrogen chloride will form?

14. Table salt, $NaCl_{(s)}$, can be formed by the reaction of sodium metal and chlorine gas:

$$2\ Na_{(s)} + Cl_{2(g)} \rightarrow 2\ NaCl_{(s)}$$

    a) If 45.98g of sodium and excess of chlorine are reacted together

    b) How many moles of salt are produced?

    c) What mass of salt is produced?

15. Sugar ($C_6H_{12}O_6$) will decompose into ethanol (C_2H_5OH) and carbon dioxide over time according to the following reaction:

$$C_6H_{12}O_{6(s)} \rightarrow 2\ C_2H_5OH_{(l)} + 2\ CO_{2(g)}$$

    a) What is the theoretical yield of ethanol available from 10.0 g of sugar?

    b) An experiment done in the lab produces 0.66 g of ethanol from 10.0g of sugar. What is the percent yield?

ANSWERS: **2**. 1.6×10^{24} atoms **3** a) 3.69 g b) 2.06×10^{22} atoms
4. Molecular mass = 44.01u Molar mass = 44.01 g/mol **5.** 9.98 g **6**. % O = 94.1% H = 5.9%
7. % Na = 39.3 % % Cl = 60.7 % **8.** C_3H_3O **9.** $C_6H_6O_2$ **10.** PCl_3 **11.** a) $C_4O_2H_8$ b) $C_8H_8O_2$
c) $C_2F_2Br_2O_2$ **12.** 6.4 g **13.** a) Hydrogen is LR b) 4 mol HCl **14.** a) Na is LR b) 2 mol NaCl
c) 116.88g of NaCl **15.** a) 5.1 g b) 13%