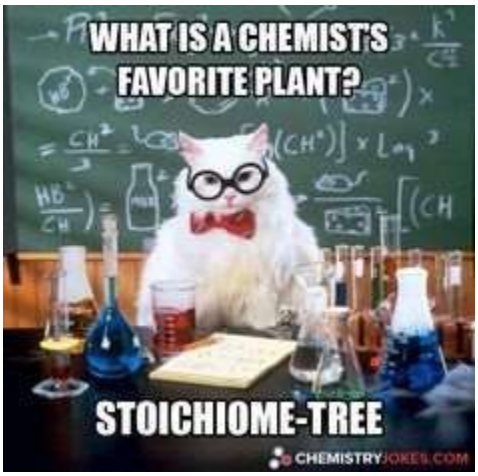

1. Name each of the following compounds:
    a. $Mg_3(PO_4)_2$
    b. $Al_2(SO_4)_3$
    c. CuI
    d. CuI_2
    e. H_2SO_4
    f. $NaHCO_3$
    g. $Fe(NO_3)_3$
    h. $TiBr_3$

2. Write the formulas for the following compounds:
    a. Ammonium hydroxide
    b. Acetic acid
    c. Chromium(III) carbonate
    d. Chromium (VI) phosphate
    e. Hypobromous acid
    f. Vanadium (IV) carbonate

3. Why is that in the above cases some answers have the roman numeral (II) or (III) in the name?

4. Given equal masses of each of the following, which contains the greatest mass of phosphorus?
    a. phosphorus pentachloride
    b. iron(III) phosphide
    c. magnesium phosphide
    d. sodium phosphate
    e. barium phosphate

5. Hemoglobin is the protein in the blood that transports oxygen gas throughout our circulatory system.
    a. It is 0.347% Fe by mass and each hemoglobin molecule contains four iron atoms. Calculate the molar mass of hemoglobin. (3.92)

b. If the average adult has 5.0 L of blood, a milliliter of which contains 5×10^9 erythrocytes, each containing 2.8×10^8 molecules of hemoglobin, calculate the mass of hemoglobin in the average adult.

6. A metal reacts with water to form the hydroxide of the metal ion along with hydrogen gas. If 4.61 g of water is required to react with exactly 10.0 g of a metal, what is the identity of the metal?
   a. Li
   b. Na
   c. K
   d. Ca
   e. Ba

7. Tetraphenylporphyrin is composed of only C, H, and N atoms. Experiments reveal that tetraphenylporphyrin is 85.96% C and 9.12% N by mass. What is the empirical formula of tetraphenylporphyrin?
    a. C_7HN_5
    b. $C_{22}H_{15}N_2$
    c. $C_{11}H_8N$
    d. $C_{11}H_{15}N$
    e. C_7H_5N

8. DDT, an insecticide, harmful to fish, birds, and humans, is produced by the following reaction: (3.86)

$$2C_6H_5Cl + C_2HCOCl_3 \rightarrow C_{14}H_9Cl_5 + H_2O$$

Chlorobenzene Chloral DDT

In a government lab, 1142 g of chlorobenzene is reacted with 485 grams of chloral.

    a. What mass of DDT is formed, assuming 100%?

    b. What is the limiting reactant? Which is in excess?

    c. What mass of the excess reactant is left over?

d. If the actual yield of DDT is 200.0 g, what is the percent yield?

9. Ethane (C_2H_6) reacts with oxygen gas to produce carbon dioxide gas and water. Suppose you react 100.0 g of ethane with 100.0 g of oxygen gas. Determine the mass of left-over reactant.
    a. 6.044 g
    b. 71.43 g
    c. 73.15 g
    d. 86.58 g
    e. No limiting reactant

10. A 10.00-g sample of copper (Cu) sits in the air for a period of time. Since copper is a transition metal, the products can be copper(I) oxide and copper(II) oxide. The mass of the "copper oxide" that has formed is 11.43 g. Which of the following best describes the product?

a) The product is a mixture of copper(I) oxide and copper(II) oxide, and there is more copper(I) oxide by mass.
b) The product is a mixture of copper(I) oxide and copper(II) oxide, and there is more copper(II) oxide by mass.
c) The product is pure copper(I) oxide.
d) The product is pure copper(II) oxide.
e) The product is a 50-50% by mass mixture of copper(I) oxide and copper(II) oxide.

11. Theobromine, the compound responsible for chocolate's irresistible aroma, is made up of carbon, hydrogen, oxygen, and nitrogen. Combustion of 0.7843 g of theobromine yielded 1.341 g of CO_2 and 0.3137 g of H_2O. A complementary study for nitrogen required the digestion of 1.589 g of theobromine, generating 0.6010 g of dry ammonia gas. What is the empirical formula of theobromine?