

Put your answers to the following questions on a separate piece of paper. Be sure to show your work when necessary

1. Write the name for each of the following compounds

- a. LiOH b. $\text{Al}(\text{NO}_3)_3$ c. PbCl_2 d. SF_6 e. CaHCO_3 f. N_2O_5

2. Write the formulas that correspond to each of these names

- a. Calcium perchlorate b. Ammonium phosphate c. Phosphorus pentachloride d. Aluminum oxalate
e. Chromium(III)phosphate f. Chlorine dioxide g. Stannic fluoride h. Scandium sulfate

3. Write balanced chemical equations for these reactions, be sure to include all subscripts.

- a. Copper metal reacts with nitric acid to produce cupric nitrate, nitrogen monoxide, and water
b. Magnesium oxide reacts with silicon to produce magnesium and silicon dioxide
c. Aluminum metal reacts with sulfuric acid to produce aluminum sulfate and hydrogen gas
d. Ferrous chloride reacts with chlorine gas to produce ferric chloride
e. Potassium chlorate decomposes into potassium chloride and oxygen gas

4. Write balanced chemical equations by predicting products. Be sure to include all subscripts

- a. Magnesium metal reacts with a solution of Nickel(II) chloride
b. Platinum(IV) chloride undergoes decomposition
c. Hydrogen gas and bromine gas react
d. Ethanol ($\text{C}_2\text{H}_5\text{OH}$) reacts with oxygen gas with heat
e. Barium metal is placed in water
f. Chromium(III) oxide is reacted with water
g. Plumbous nitrate solution is mixed with aluminum sulfate solution
h. Solid potassium carbonate is reacted with sulfuric acid

5. Write the molecular, ionic, net ionic, and half reactions for the following reactions

- a. Aluminum metal reacts with a solution of hydrochloric acid
b. Sodium metals reacts with oxygen

6. Solve for the following

- a. The mass of 5.75 mol of butane (C_4H_{10})
b. The moles of oxygen atoms in 1.25 moles of Calcium nitrate
c. The mass of sodium atoms in 1.6×10^{-3} mol of Sodium sulfate
d. The mass of 8.50 L of Carbon dioxide at STP
e. The number of molecules in 3.55 g of aspirin ($\text{C}_9\text{H}_8\text{O}_4$)
f. The number of moles of 40 lb of Treflan (a herbicide), $\text{C}_{13}\text{H}_{16}\text{N}_2\text{O}_4\text{F}$. (1 lb = 454 g)

7. Find the percent composition for the following

- a. Aluminum in Aluminum iodide
b. Carbon in Propylene (C_3H_6)
c. Nitrogen in Ammonium nitrate
d. Oxygen the mineral Malachite ($\text{Cu}_2(\text{OH})_2\text{CO}_3$)
e. Water in Cupric sulfate pentahydrate

8. Determine the empirical formula for the following compounds

- 15.8% carbon and 84.2% sulfur
- 40.0% carbon, 6.7% hydrogen, and 53.5% oxygen
- 28.7% K, 1.5% H, 22.8% P, and 47.0% O
- 18.5% Na, 25.8% S, 19.3% O (not counting the oxygen atoms in water), and 36.4% water
- 69.24 % Ga and 30.76% P

9. Determine the empirical and molecular formulas for the following

- A compound that has a mass of 30.0 amu and contains 80.0% C and 20.0% H
- A compound that has a mass of 92.02 g/mol that contains 30.4% N and 69.6% O
- Caffeine which contains 49.5% C, 5.15% H, 28.9% N, and 16.5 % O. The molar mass is 195 g
- A compound that contains 27.2% N, 3.9% H, and 68.9% Cl and has a molar mass of 51.5 g

10. Using the UNBALANCED chemical equation: $\text{Ga} + \text{HCl} \rightarrow \text{GaCl}_3 + \text{H}_2$. Solve for the following
** Assume excess of the other reactant

- The moles of Gallium chloride that are produced from 2.5 moles of Ga
- The mass of gallium atoms needed to react with 5.6 moles of HCl
- Grams of Gallium chloride produced from 1.00×10^{-2} moles of HCl.
- The liters of hydrogen gas produced (at STP) from 18.75 grams of Gallium metal
- The mass of hydrogen molecules from 4.50×10^{24} atoms of gallium metal

11. Using the UNBALANCED chemical equation: $\text{K}_2\text{CO}_3 + \text{HNO}_3 \rightarrow \text{KNO}_3 + \text{CO}_2 + \text{H}_2\text{O}$. Solve for the following

- The moles of water produced from 4.5 moles of potassium carbonate and 6.0 moles of nitric acid
- Grams of potassium nitrate produced from 25.5 g of K_2CO_3 and 12.4 g of nitric acid
- The mass of K_2CO_3 needed to form 5.85 L of carbon dioxide at STP.

12. Using the reaction between Calcium hydroxide and acetic acid. Solve for the following

- The moles of acetic acid needed to react with 15.25 g of Calcium hydroxide
- The mass of calcium acetate produced from 15.25 g of Calcium hydroxide and 40.2 g of acetic acid
- The molecules of water produced from 4.5 moles of Calcium hydroxide and 255.5 g of acetic acid

13. Solve for the following percent yield problems

- A student, during an ethanol preparation reaction, isolated only 25 g of ethanol instead of the 81 g that should have been produced.
- The decomposition of potassium chlorate gives potassium chloride and oxygen gas. If 2.00 g of KClO_3 gave 0.720 g of oxygen, what is the percent yield for this reaction
- Benzene (C_6H_6) reacts with bromine to produce bromobenzene ($\text{C}_6\text{H}_5\text{Br}$) and hydrogen bromide. What is the theoretical yield of bromobenzene in this reaction when 30.0 g of benzene reacts with 65.0 g of bromine? If the actual yield of bromobenzene was 56.7 g, what was the percentage yield?