

1. Draw the Lewis Dot structures for each of the following: (5 pts)

a. Al

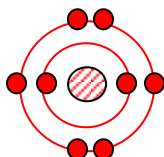


b. I

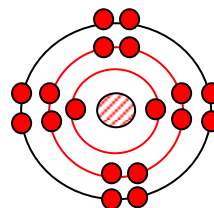


2. Using the Bohr model of an atom, draw the Electron Dot Structure for the following: (5 pts)

a. O

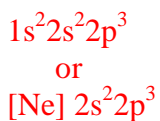


b. Ar

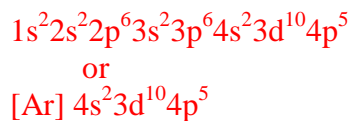


3. Write the electron configurations for the following: (5 pts)

a. N



b. Br



4. Name the following compounds: (5 pts)

a. CuS

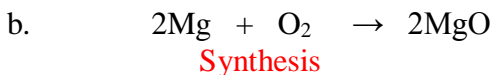
Copper(II) Sulfide  
or  
Cupric Sulfide

b. NaHCO<sub>3</sub>

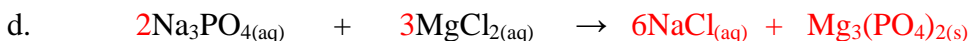
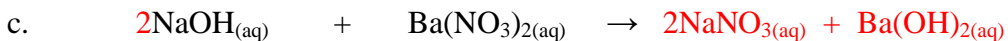
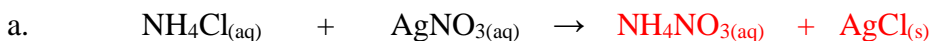
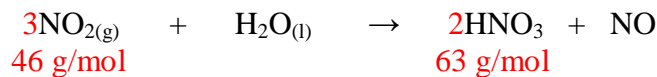
Sodium Bicarbonate

5. Balance the following reactions: (10 pts)



6. Classify the following reactions: (10 pts)7. Complete and balance the following double displacement precipitation reactions and include phase labels, (s), (l), (g), or (aq): (20 pts)

Soluble	Except	Insoluble	Except
$\text{Na}^+, \text{K}^+, \text{Li}^+, \text{NH}_4^+$	None	$\text{CO}_3^{2-}$	Group 1A, $\text{NH}_4^+$
$\text{NO}_3^-$	None	$\text{PO}_4^{3-}$	Group 1A, $\text{NH}_4^+$
$\text{Cl}^-, \text{Br}^-, \text{I}^-$	$\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}^{2+}$	$\text{S}^{2-}$	Group 1A, $\text{NH}_4^+$
$\text{SO}_4^{2-}$	$\text{Ca}^{2+}, \text{Ag}^+, \text{Pb}^{2+}, \text{Ba}^{2+}$	$\text{OH}^-$	Group 1A, $\text{Ca}^{2+}, \text{Ba}^{2+}$

8. When nitrogen dioxide,  $\text{NO}_2$ , from the exhaust of a car combines with water vapor in air it forms nitric acid,  $\text{HNO}_3$ , which causes acid rain. How many grams of  $\text{HNO}_3$  are produced when 53.2 g of  $\text{NO}_2$  reacts? (10 pts)

$$53.2 \text{ g NO}_2 \times \frac{\text{mol}}{46 \text{ g}} \times \frac{2 \text{ mol HNO}_3}{3 \text{ mol NO}_2} \times \frac{63 \text{ g}}{\text{mol}} = 48.6 \text{ g HNO}_3$$

9. Calculate the following: (10 pts) (Avogadro's Number =  $6.02 \times 10^{23}$  atoms per mole)

a. moles in 15.3 grams of B

$$15.3 \text{ g} \times \frac{\text{mol}}{10.8 \text{ g}} = \mathbf{1.42 \text{ mol}}$$

b. grams in  $1.83 \times 10^{-4}$  moles  $\text{CH}_4$

$$1.84 \times 10^{-4} \text{ mol} \times \frac{16 \text{ g}}{\text{mol}} = \mathbf{2.94 \times 10^{-3} \text{ g}}$$

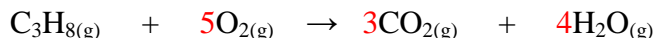
c. molar mass of  $\text{H}_2\text{SO}_4$

$$\mathbf{98 \frac{\text{g}}{\text{mol}}}$$

d. molecules in 1.64 moles  $\text{N}_2$

$$1.64 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ molecules}}{\text{mol}} = \mathbf{9.87 \times 10^{23} \text{ molecules}}$$

10. Propane gas,  $\text{C}_3\text{H}_8$ , a fuel used for camp stoves, reacts with  $\text{O}_2$  to produce carbon dioxide and water. How many grams of  $\text{O}_2$  are required to react with 22.8 g of  $\text{C}_3\text{H}_8$ ? (10 pts)



$$22.8 \text{ g } \text{C}_3\text{H}_8 \times \frac{\text{mol}}{44 \text{ g}} \times \frac{5 \text{ mol } \text{O}_2}{1 \text{ mol } \text{C}_3\text{H}_8} \times \frac{32 \text{ g}}{\text{mol}} = \mathbf{82.9 \text{ g } \text{O}_2}$$

11. If the molar mass for an unknown compound is 280 g/mol and the % composition is 85.63 % C, and 14.37 % H, determine both the empirical formula and the molecular formula. (10 pts)

Assume a 100 g sample:

Divide by smaller number

$$85.63 \text{ g C} \times \frac{\text{mol}}{12 \text{ g}} = 7.14 \text{ mol C} \div 7.14 \text{ mol} = 1$$

$$14.37 \text{ g H} \times \frac{\text{mol}}{1 \text{ g}} = 14.37 \text{ mol H} \div 7.14 \text{ mol} = 2$$

Empirical Formula:

$\text{CH}_2$  empirical mass = 14g/mol

Molecular Formula:

$$\frac{\text{Molecular Mass}}{\text{Empirical Mass}} = \frac{280}{14} = 20 \quad \mathbf{C_{20}H_{40}}$$

12. (Extra Credit) List the following in decreasing (L to R) atomic radii. (5 pts)

N, Ca, Cl, Fr, Rb

$\text{Fr} > \text{Rb} > \text{Ca} > \text{N} > \text{Cl}$