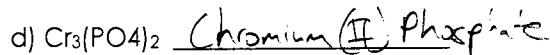
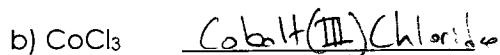
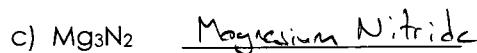
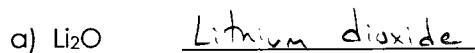


Review Package #1

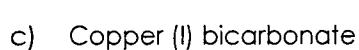
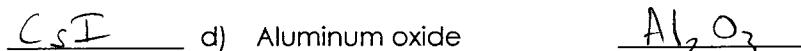
1) Write the chemical formulae resulting from the combination of the following ions.



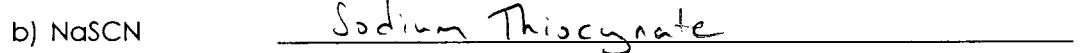
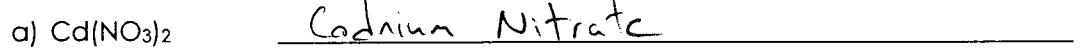
2) Write the correct name for each of the following ionic compounds.



3) Write the correct formula for each of the following ionic compounds.

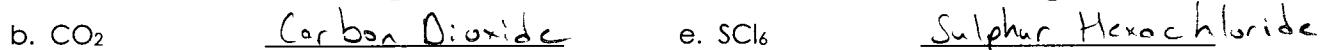


4) Write the correct name for each of the following ionic hydrates.



Molecular Compounds:

1. Write the correct name for each of the following molecular compounds.

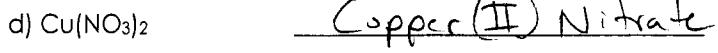
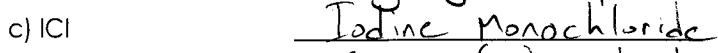
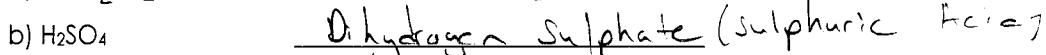


2. Write the correct formula for each of the following molecular compounds



Mixed Naming:

3. Write the correct formula for each of the following molecular compounds:



The Mole:

Make the following conversions, clearly showing your steps. Include proper units in all of your work and in your answer.

a) 133.44 grams of PCl_5 = ? moles $\text{MM} \text{ PCl}_5 = 208.5 \text{ g/mol}$

$$\text{? moles } \text{PCl}_5 = 133.44 \text{ g } \text{PCl}_5 \times \frac{1 \text{ mol}}{208.5 \text{ g}} = 0.6400 \text{ mol}$$

Answer 0.6400 mol

b) 0.00256 moles of $\text{Li}_2\text{Cr}_2\text{O}_7$ = ? grams $\text{MM Li}_2\text{Cr}_2\text{O}_7 = 229.88 \text{ g/mol}$

$$\text{? g } \text{Li}_2\text{Cr}_2\text{O}_7 = 0.00256 \text{ mol} \times \frac{229.88 \text{ g}}{1 \text{ mol}} = 0.588 \text{ g}$$

Answer 0.588 g

c) 170.24 L of NO_2 at STP = ? moles $1 \text{ mol} = 22.4 \text{ L}$

$$\text{? moles } \text{NO}_2 = 170.24 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 7.60 \text{ mol } \text{NO}_2$$

Answer 7.60 mol NO₂

d) 570.625 g of PCl_3 gas = ? L (STP) $\text{MM} = 137.5 \text{ g/mol}$

$$\text{? L} = 570.625 \text{ g } \text{PCl}_3 \times \frac{1 \text{ mol}}{137.5 \text{ g}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 92.96 \text{ L} = 93.0 \text{ L}$$

Answer 93.0 L

e) 1030.4 mL of C_2H_6 gas at STP = ? g $\text{MM} = 30.0 \text{ g/mol}$

$$\text{? g } \text{C}_2\text{H}_6 = 1030.4 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{30.0 \text{ g}}{1 \text{ mol}} = 1.38 \text{ g}$$

Answer 1.38 g

f) 5.00 kg of nitrogen gas = ? L (STP) $\text{N}_2 = 28.0 \text{ g/mol}$

$$\text{? L } \text{N}_2 = 5.00 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol}}{28.0 \text{ g}} \times \frac{22.4 \text{ L}}{1 \text{ mol}}$$

Answer $4.00 \times 10^3 \text{ g}$

$$g) 0.5696 \text{ kg of } \text{CH}_4\text{(g)} = ? \text{ mL} \quad MM = 16.0 \text{ g/mol}$$

$$? \text{ mL } \text{CH}_4 = 0.5696 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol}}{16.0 \text{ g}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} \times \frac{1000 \text{ mL}}{1 \text{ L}} =$$

Answer $7.97 \times 10^5 \text{ mL}$

2. The density of liquid ethanol ($\text{C}_2\text{H}_5\text{OH}$) is 0.790 g/mL. Calculate the number of molecules in a 35.0 mL sample of liquid ethanol. (NOTE: You CAN'T use 22.4 L/mol since this is NOT a gas at STP!)

$$MM = 46.0 \text{ g/mol}$$

$$? \text{ molecules } \text{C}_2\text{H}_5\text{OH} = 35.0 \text{ mL} \times 0.790 \text{ g/mL} \times \frac{1 \text{ mol}}{46.0 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molec}}{1 \text{ mol}} = 3.62 \times 10^{23} \text{ molec}$$

Answer $3.62 \times 10^{23} \text{ molec}$

3. A 100.0 mL sample of liquid mercury contains 6.78 moles. Calculate the density of liquid mercury from this data.

$$MM = 200.59 \text{ g/mol}$$

$$? \text{ mol } \text{Hg} = 6.78 \text{ mol} \times \frac{200.59 \text{ g}}{1 \text{ mol}} = 1360.0 \text{ g}$$

$$\rho = \frac{\text{g}}{\text{L}} = \frac{1360.0 \text{ g}}{0.1000 \text{ L}} = 1.36 \times 10^4 \text{ g/L} \quad \text{Answer } \underline{1.36 \times 10^4 \text{ g/L}}$$

4. Calculate the density of $\text{PCl}_3\text{(g)}$ at STP.

$$MM = 137.5 \text{ g/mol}$$

$$? \text{ Density} = \frac{137.5 \text{ g}}{1 \text{ mol}} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 6.14 \text{ g/L}$$

Answer 6.14 g/L

5. a) The density of a gas at STP is 4.955 g/L. Calculate the molar mass of this gas.

$$? \text{ MM} = \frac{4.955 \text{ g}}{1 \text{ L}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 111 \text{ g/L}$$

b) The gas is an oxide of selenium. Determine the molecular formula.



$$\begin{array}{rcl} 79.0 & 32.0 & \rightarrow 111 \text{ g} \end{array} \quad \text{Answer } \underline{\text{SeO}_2}$$

6. Find the percent composition (% by mass of each element) in the following compound: $\text{Sr}_3(\text{PO}_4)_2$. Show your work.

$$\% \text{ Sr} = \frac{262.8 \text{ g/mol}}{452.8 \text{ g/mol}} \times 100\% = 58.0\%$$

$$\% \text{ P} = \frac{62.0 \text{ g/mol}}{452.8 \text{ g/mol}} = 13.7\%$$

$$\% \text{ O} = \frac{128.0 \text{ g/mol}}{452.8 \text{ g/mol}} = 28.3\%$$

Answer 58.0% Sr, 13.7% P, 28.3% O

7. A compound was analyzed and the following results were obtained:
Molar mass: 270.4 g/mol

Mass of sample: 162.24 g K_2SO_4

Mass of potassium: 46.92 g

Mass of sulphur: 38.52 g

Mass of oxygen: the remainder of the sample is oxygen

a) Determine the mass of oxygen in the sample.

Answer 76.8 g

b) Determine the empirical formula for this compound.

$$\text{P}_{\text{mol O}} = 76.8 \text{ g} \times \frac{1 \text{ mol}}{16.0 \text{ g}} = 4.8 \text{ mol} : 4$$

$$\text{P}_{\text{mol K}} = 46.92 \text{ g} \times \frac{1 \text{ mol}}{39.1 \text{ g}} = 1.2 \text{ mol} : 1$$

$$\text{P}_{\text{mol S}} = 38.52 \text{ g} \times \frac{1 \text{ mol}}{32.1 \text{ g}} = 1.27 \text{ mol} : 1$$

Answer: Empirical Formula: K_2SO_4
 $\text{MM} = 135.2 \text{ g/mol}$

c) Determine the molecular formula for this compound.

$$\frac{\text{molecular mass}}{\text{empirical mass}} = \frac{270.4 \text{ g/mol}}{135.2 \text{ g/mol}} = 2$$

Answer: Molecular Formula: $\text{K}_2\text{S}_2\text{O}_8$

8. 123.11 g of zinc nitrate, $\text{Zn}(\text{NO}_3)_2$ are dissolved in enough water to form 650.0 mL of solution. Calculate the $[\text{Zn}(\text{NO}_3)_2]$. Include proper units in your work and in your answers.

$$\text{MM} = 165.3 \text{ g/mol}$$

$$\text{? mol } \text{Zn}(\text{NO}_3)_2 = 123.11 \text{ g} \times \frac{1 \text{ mol}}{165.4 \text{ g}} = 0.7444 \text{ mol}$$

$$C = \frac{n}{V} = \frac{0.7444 \text{ mol}}{0.6500 \text{ L}} = 1.145 \text{ M}$$

Answer 1.145 M

9. Calculate the mass of potassium sulphite (K_2SO_3) needed to make 800.0 mL of a 0.200 M solution of K_2SO_3 . Include proper units in your work and in your answers.

$$\text{MM} = 158.3 \text{ g/mol}$$

$$\text{? g } \text{K}_2\text{SO}_3 = 0.8000 \text{ L} \times \frac{0.200 \text{ mol}}{\text{L}} \times \frac{158.3 \text{ g}}{\text{mol}} = 25.3 \text{ g}$$

Answer 25.3 g

10. What volume of 2.50 M Li_2CO_3 would need to be evaporated in order to obtain 47.232 g of solid Li_2CO_3 ? Include proper units in your work and in your answers.

$$\text{MM} = 73.8 \text{ g/mol}$$

$$\text{? L } \text{Li}_2\text{CO}_3 = 47.232 \text{ g} \times \frac{1 \text{ mol}}{73.8 \text{ g}} \times \frac{1 \text{ L}}{2.50 \text{ mol}} = 0.256 \text{ L}$$

Answer 0.256 L

11. 150.0 mL of water are added to 400.0 mL of 0.45 M HNO_3 . Calculate the final $[\text{HNO}_3]$. Include proper units in your work and in your answers.

$$C_1 = 0.45 \text{ M}$$

$$V_1 = 400.0 \text{ mL}$$

$$V_2 = 550.0 \text{ mL}$$

$$C_2 = ?$$

$$C_2 = C_1 \cdot \frac{V_1}{V_2}$$

$$= 0.45 \text{ M} \cdot \frac{400.0 \text{ mL}}{550.0 \text{ mL}} = 0.36 \text{ M}$$

Answer 0.36 M

12. What volume of water needs to be added to 150.0 mL of 4.00 M H₂SO₄ in order to bring the concentration down to 2.50 M? Include proper units in your work and in your answers.

$$V_1 = 150.0 \text{ mL}$$

$$C_1 = 4.00 \text{ M}$$

$$C_2 = 2.50 \text{ M}$$

$$V_2 = ?$$

$$V_2 = V_1 \cdot \frac{C_1}{C_2}$$

$$V_2 = 150.0 \text{ mL} \cdot \frac{4.00 \text{ M}}{2.50 \text{ M}} = 240 \text{ mL}$$

added 90 mL

Answer 90.0 mL

13. Give directions on how to make 5.00 L of 0.020 M Ca(ClO)₂ using solid Ca(ClO)₂ and water. Include proper units in your work and in your answers.

$$\text{MM} = 143.08 \text{ g/mol}$$

$$\text{? g Ca(ClO)}_2 = 5.00 \text{ L} \times \frac{0.020 \text{ mol}}{1 \text{ L}} \times \frac{143.08 \text{ g}}{1 \text{ mol}} = 14.3 \text{ g}$$
$$= 14.0 \text{ g}$$

① weigh out 14g

② add 14g to a graduated cylinder

③ fill cylinder to 5.00 L