

Chemistry
Chapter 10 – Practice I

Name KEY
Date _____

Use your notes, practice examples & your seat partner to complete this practice worksheet. Remember to show all work!

I. Molar Mass – calculate the molar mass of the following compounds.

1. sugar, $C_{12}H_{22}O_{11}$ $342.34g$

3. $K_3[Fe(CN)_6]$ $329.27g$

2. gold $196.97g$

4. caffeine, $C_8H_{10}N_4O_2$ $194.22g$

II. Mole Conversions – use the mole conversions to solve for the given quantities.

5. How many molecules are there in 6.8 moles of carbon monoxide gas?

$$\frac{6.8 \text{ mol CO}}{1} \times \frac{6.02 \times 10^{23} \text{ molec. CO}}{1 \text{ mol CO}} = 4.1 \times 10^{24} \text{ molec CO}$$

6. How many atoms are in 20.0 g Ca?

$$\frac{20.0 \text{ g Ca}}{1} \times \frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}} \times \frac{6.02 \times 10^{23} \text{ atoms Ca}}{1 \text{ mol Ca}} = 3.00 \times 10^{23} \text{ atoms Ca}$$

7. 0.002 grams of bromine gas will be how many liters?

$$\frac{0.002 \text{ g Br}_2}{1} \times \frac{1 \text{ mol}}{159.8 \text{ g Br}_2} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 2.8 \times 10^{-4} \text{ L}$$

8. How many grams of $Al(OH)_3$ are in 6.75×10^{23} formula units?

$$\frac{6.75 \times 10^{23} \text{ form u}}{1} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ form u}} \times \frac{78.01 \text{ g } Al(OH)_3}{1 \text{ mol}} = 87.5 \text{ g } Al(OH)_3$$

9. How many moles of O_2 gas are in 75 L at STP?

$$\frac{75 \text{ L } O_2}{1} \times \frac{1 \text{ mol}}{22.4 \text{ L } O_2} = 3.3 \text{ mol } O_2$$

III. Percent Composition – calculate the % of each element in the following compounds.

10. PbS, lead (II) sulfide

Pb: $207.2g \times 1 = 207.2g$

S: $1 \times 32.07 = 32.07$

$239.27g$

$$\%Pb = \frac{207.2}{239.27} \times 100 = 86.60\% Pb$$

$$\%O = \frac{32.07}{239.27} \times 100 = 13.40\% O$$

11. C_6H_5OH , phenol

(an organic compound used in some cleaners)

C: $6 \times 12.01g = 72.06g$

H: $6 \times 1.01g = 6.06g$

O: $1 \times 16g = 16g$

$94.12g$

$$\%C = \frac{72.06}{94.12} \times 100 = 76.56\% C$$

$$\%H = \frac{6.06}{94.12} \times 100 = 6.44\% H$$

$$\%O = \frac{16}{94.12} \times 100 = 17.00\% O$$

12. $Al_2(CO_3)_3$

Al: $2 \times 26.98g = 53.96g$

C: $3 \times 12.01g = 36.03g$

O: $9 \times 16g = 144g$

$233.99g$

$$\%Al = \frac{53.96}{233.99} \times 100 = 23.06\% Al$$

$$\%C = \frac{36.03}{233.99} \times 100 = 15.40\% C$$

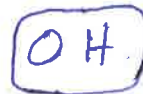
$$\%O = \frac{144}{233.99} \times 100 = 61.54\% O$$

IV. Empirical Formulas – use the given percentages of each element to calculate the empirical formula of the following compounds.

13. Determine the empirical formula of a compound containing 94.1% O, and 5.9% H

$$\text{O: } \frac{94.1 \text{ g O}}{16 \text{ g}} \Bigg| \frac{1 \text{ mol}}{16 \text{ g}} = 5.88 \text{ mol} / 5.84 \text{ mol} = 1$$

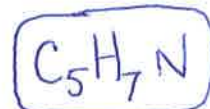
$$\text{H: } \frac{5.9 \text{ g H}}{1.01 \text{ g}} \Bigg| \frac{1 \text{ mol}}{1.01 \text{ g}} = 5.84 \text{ mol} / 5.84 \text{ mol} = 1$$



14. Determine the empirical formula of nicotine containing 74.0% C, 8.65 % H and 17.35 % N.

$$\text{C: } \frac{74.0 \text{ g C}}{12.01 \text{ g}} \Bigg| \frac{1 \text{ mol}}{12.01 \text{ g}} = 6.16 \text{ mol} / 1.24 \text{ mol} = 4.96 \Rightarrow 5$$

$$\text{H: } \frac{8.65 \text{ g H}}{1.01 \text{ g}} \Bigg| \frac{1 \text{ mol}}{1.01 \text{ g}} = 8.56 \text{ mol} / 1.24 \text{ mol} = 6.90 \Rightarrow 7$$



$$\text{N: } \frac{17.35 \text{ g N}}{14.01 \text{ g}} \Bigg| \frac{1 \text{ mol}}{14.01 \text{ g}} = 1.24 \text{ mol} / 1.24 \text{ mol} = 1$$