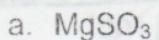


On-level Key

Moles – Stoichiometry Review

atomic mass from the Periodic Table

1. Find the molar masses for:

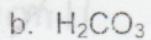


$$\text{Mg: } 1(24.31) = 24.31$$

$$\text{S: } 1(32.07) = 32.07$$

$$\text{O: } 3(16.00) = 48.00$$

$$104.38 \text{ g/mol}$$

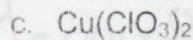


$$\text{H: } 2(1.01) = 2.02$$

$$\text{C: } 1(12.01) = 12.01$$

$$\text{O: } 3(16.00) = 48.00$$

$$62.03 \text{ g/mol}$$



$$\text{Cu: } 1(63.55) = 63.55$$

$$\text{Cl: } 2(35.45) = 70.90$$

$$\text{O: } 6(16.00) = 96.00$$

$$230.45 \text{ g/mol}$$

2. Mole Relationships ?

- a. How many moles are in 45.8L of O_3 gas at STP?

GIVEN

$$\frac{45.8 \text{ L O}_3}{22.4 \text{ L}} = 2.04 \text{ mol O}_3$$

use the
mole map!

- b. Convert 0.92 mol of Fe(OH)_3 to formula units.

GIVEN

$$\frac{0.92 \text{ mol Fe(OH)}_3}{1 \text{ mol}} \times \frac{23 \text{ f. units}}{6.02 \times 10^{23} \text{ f. units}} = 5.5 \times 10^{23} \text{ formula units Fe(OH)}_3$$

Molar Mass

$$\text{Ca: } 1(40.08) = 40.08$$

$$\text{F: } 2(19.00) = 38.00$$

$$78.08 \text{ g}$$

- c. Convert 14.0g of CaF_2 to moles.

GIVEN

$$\frac{14.0 \text{ g CaF}_2}{78.08 \text{ g}} = 0.179 \text{ mol CaF}_2$$

- d. What is the mass, in grams of 16.44L of CO_2 gas at STP?

GIVEN

Molar Mass

$$\text{C: } 1(12.01) = 12.01$$

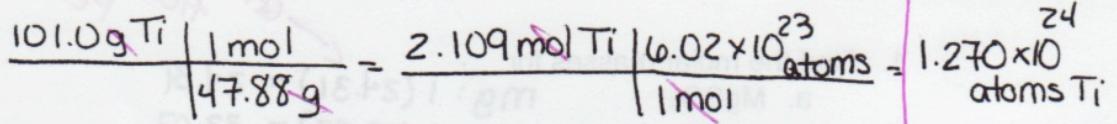
$$\text{O: } 2(16.00) = 32.00$$

$$44.01 \text{ g}$$

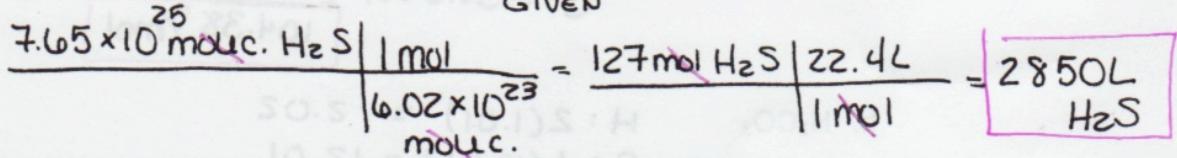
$$\frac{16.44 \text{ L CO}_2}{22.4 \text{ L}} = \frac{0.7339 \text{ mol}}{1 \text{ mol}} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 32.30 \text{ g CO}_2$$

$$\% \text{ element} = \frac{\text{mass element}}{\text{molar mass}} \times 100$$

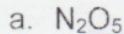
e. How many atoms are in 101.0g of Ti?



f. What is the volume of 7.65×10^{25} molecules of H_2S ?



3. Find the % of each element in the following substances:

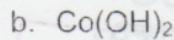


$$\text{N: } 2(14.01) = 28.02$$

$$\% \text{ N} = \frac{28.02}{108.02} \times 100 = 25.94\%$$

$$\text{O: } 5(16.00) = \frac{80.00}{108.02 \text{ mol}}$$

$$\% \text{ O} = \frac{80.00}{108.02} \times 100 = 74.06\%$$



$$\text{Co: } 1(58.93) = 58.93$$

$$\% \text{ Co} = \frac{58.93}{92.95} \times 100 = 63.40\%$$

$$\text{O: } 2(16.00) = 32.00$$

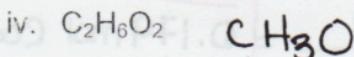
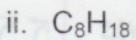
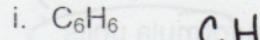
$$\% \text{ O} = \frac{32.00}{92.95} \times 100 = 34.43\%$$

$$\text{H: } 2(1.01) = \frac{2.02}{92.95 \text{ mol}}$$

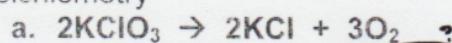
$$\% \text{ H} = \frac{2.02}{92.95} \times 100 = 2.17\%$$

4. Empirical/Molecular Formulas

a. Write the empirical formula for these molecular formulas:



5. Stoichiometry

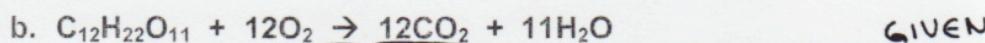


i. How many moles of O_2 are produced from 6.00 moles of KClO_3 ? GIVEN

$$\frac{6.00 \text{ mol KClO}_3}{2 \text{ mol KClO}_3} \left| \begin{array}{c} 3 \text{ mol O}_2 \\ \hline 2 \text{ mol KClO}_3 \end{array} \right| = 9.00 \text{ mol O}_2$$

ii. How many moles of KCl are produced along side of 0.75 moles of O_2 ? GIVEN

$$\frac{0.75 \text{ mol O}_2}{3 \text{ mol O}_2} \left| \begin{array}{c} 2 \text{ mol KCl} \\ \hline 3 \text{ mol O}_2 \end{array} \right| = 0.50 \text{ mol KCl}$$

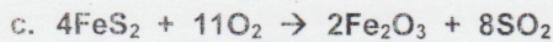


i. How many moles of CO_2 are produced from 1,711.70g of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$? ?

$$\frac{1711.70 \text{ g C}_{12}\text{H}_{22}\text{O}_{11}}{342.34 \text{ g/mol}} \left| \begin{array}{c} 1 \text{ mol} \\ \hline 342.34 \text{ g} \end{array} \right| = \frac{5.00000 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11}}{1 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11}} \left| \begin{array}{c} 12 \text{ mol CO}_2 \\ \hline 1 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11} \end{array} \right| = 60.0000 \text{ mol CO}_2$$

ii. What is the mass, in grams, of H_2O produced from the reaction of 288.0g of O_2 with excess sugar? GIVEN

$$\frac{288.0 \text{ g O}_2}{32.00 \text{ g}} \left| \begin{array}{c} 1 \text{ mol} \\ \hline 32.00 \text{ g} \end{array} \right| = \frac{9.000 \text{ mol O}_2}{12 \text{ mol O}_2} \left| \begin{array}{c} 11 \text{ mol H}_2\text{O} \\ \hline 12 \text{ mol O}_2 \end{array} \right| = \frac{8.25 \text{ mol H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \left| \begin{array}{c} 18.02 \text{ g} \\ \hline 1.00 \text{ mol} \end{array} \right| = 148.79 \text{ g H}_2\text{O}$$



i. When 319.4g of FeS_2 reacts with 17.41g of O_2 , how many moles of SO_2 are formed? GIVENS

$$\frac{319.4 \text{ g FeS}_2}{119.99 \text{ g}} \left| \begin{array}{c} 1 \text{ mol} \\ \hline 119.99 \text{ g} \end{array} \right| = \frac{2.662 \text{ mol FeS}_2}{4 \text{ mol FeS}_2} \left| \begin{array}{c} 8 \text{ mol SO}_2 \\ \hline 4 \text{ mol FeS}_2 \end{array} \right| = 5.324 \text{ mol SO}_2$$

$$\frac{17.41 \text{ g O}_2}{32.00 \text{ g}} \left| \begin{array}{c} 1 \text{ mol} \\ \hline 32.00 \text{ g} \end{array} \right| = \frac{0.5441 \text{ mol O}_2}{11 \text{ mol O}_2} \left| \begin{array}{c} 8 \text{ mol SO}_2 \\ \hline 11 \text{ mol O}_2 \end{array} \right| = 0.3957 \text{ mol SO}_2$$

ii. What is the limiting reactant?

The Limiting Reactant is O_2 b/c it produced the smallest amount of SO_2 .

iii. What is the mass of SO_2 produced by the limiting reactant?

$$\frac{0.3957 \text{ mol SO}_2}{1 \text{ mol}} \left| \begin{array}{c} 64.07 \text{ g} \\ \hline 1 \text{ mol} \end{array} \right| = 25.35 \text{ g SO}_2$$

Molar Mass

$$\text{C}(2(12.01)) = 144.12$$

$$\text{H}:2(1.01) = 22.22$$

$$\text{O}:11(16.00) = 176.00$$

$$\frac{342.34 \text{ g}}{\text{mol}}$$

Molar Mass

$$\text{O}:2(16.00)$$

$$= 32.00 \frac{\text{g}}{\text{mol}}$$

H_2O

$$14:2(1.01) = 2.02$$

$$\text{O}:1(16.00) = 16.00$$

$$18.02$$

Molar Mass

FeS_2

$$\text{Fe}:1(55.85) = 55.85$$

$$\text{S}:2(32.07) = 64.14$$

$$\frac{119.99}{}$$

SO_2

$$\text{S}:1(32.07) = 32.07$$

$$\text{O}:2(16.00) = \frac{32.00}{64.07}$$

$$\frac{64.07}{}$$