

Worksheet - Molar Calculations

$$\textcircled{13} \quad 1000. \text{ g Br}_2 \times \frac{1 \text{ mol Br}_2}{159.80 \text{ g Br}_2} = \boxed{6.26 \text{ mol Br}_2} \quad \text{1.00 kg}$$

$$\text{Br}_2 \rightarrow (2 \times 79.90) = 159.80 \text{ g/mol}$$

$$\textcircled{12} \quad 80.0 \text{ mol CaSO}_4 \times \frac{136.14 \text{ g CaSO}_4}{1 \text{ mol CaSO}_4} = \boxed{10900 \text{ g CaSO}_4}$$

$$\text{CaSO}_4 \rightarrow (1 \times 40.08) + (1 \times 32.06) + (4 \times 16.00) \\ = 136.14 \text{ g/mol}$$

$$\textcircled{5} \quad 8.60 \times 10^{27} \text{ molecules CO}_2 \times \frac{1 \text{ mol CO}_2}{6.02 \times 10^{23} \text{ molecules CO}_2} \\ = \boxed{14300 \text{ mol CO}_2}$$

$$\textcircled{3} \quad 9.00 \text{ mol C}_6\text{H}_{12}\text{O}_6 \times \frac{6.02 \times 10^{23} \text{ molecules C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} \times \\ \frac{24 \text{ atoms}}{1 \text{ molecules C}_6\text{H}_{12}\text{O}_6}$$

$$= \boxed{1.30 \times 10^{26} \text{ atoms}}$$

Molar calculations worksheet

1. 8.97×10^3 mol
2. 1.49×10^{25} atoms
3. 1.30×10^{26} atoms
4. 46.01 g/mol
5. 14 300 mol
6. 342.34 g/mol
7. 159.70 g/mol
8. 4.24×10^{24} molecules
9. 1.79×10^{25} atoms
10. 643 g
11. 0.266 mol
12. 10 900 g
13. 6.26 mol

Percent Composition

The relative amounts of element in a compound are expressed as the percent composition (by mass) for each element within the compound.

Ex. K_2CrO_4

K - 40.3%

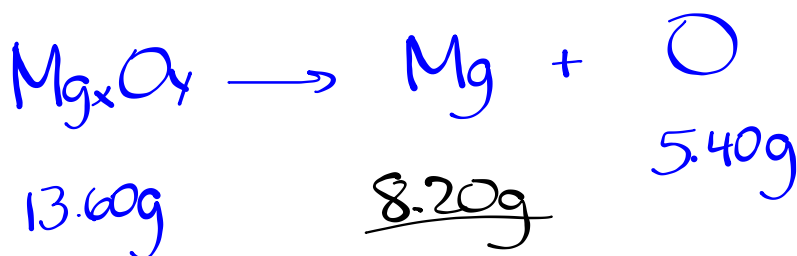
Cr - 26.8%

O - 32.9%

~~2~~ ~~1~~
~~4~~

Percent Composition from Mass Data

When a 13.60 g sample containing only magnesium and oxygen is decomposed, 5.40 g of oxygen is obtained. What is the percent composition of this compound?



$$\% \text{Mg} = \frac{\text{mass Mg}}{\text{mass MgO}} \times 100\%$$

$$\% \text{Mg} = \frac{8.20\text{g}}{13.60\text{g}} \times 100\%$$

$$\% \text{Mg} = 60.3\%$$

$$\% \text{O} = \frac{\text{mass O}}{\text{mass MgO}} \times 100\%$$

$$\% \text{O} = \frac{5.40\text{g}}{13.60\text{g}} \times 100\%$$

$$\% \text{O} = 39.7\%$$

Percent Composition from the Chemical Formula

Ex. Na_2CO_3

$$\hookrightarrow (2 \times 22.99) + (1 \times 12.01) + (3 \times 16.00) \\ = 105.99 \text{ g/mol}$$

$$\% \text{Na} = \frac{(2 \times 22.99) \text{ g/mol}}{105.99 \text{ g/mol}} \times 100\%$$

$$\% \text{Na} = 43.4\%$$

$$\% \text{C} = \frac{(1 \times 12.01) \text{ g/mol}}{105.99 \text{ g/mol}} \times 100\%$$

$$\% \text{C} = 11.3\%$$

$$\% \text{O} = \frac{(3 \times 16.00) \text{ g/mol}}{105.99 \text{ g/mol}} \times 100\%$$

$$\% \text{O} = 45.3\%$$

Calculate the percent composition of propane (C_3H_8).

$$C_3H_8 \rightarrow (3 \times 12.01) + (8 \times 1.01) = 44.11 \text{ g/mol}$$

$$\%C = \frac{(3 \times 12.01) \text{ g/mol}}{44.11 \text{ g/mol}} \times 100\%$$

$$\%H = \frac{(8 \times 1.01) \text{ g/mol}}{44.11 \text{ g/mol}} \times 100\%$$

$$\%C = 81.7\%$$

$$\%H = 18.3\%$$

Homework

p. 306 #32, 33

p. 307 #34, 35

Empirical Formulas

The empirical formula of a compound is the smallest whole-number ratio of the atoms in a compound.

Determining the Empirical Formula of a Compound

Ex. A compound is analyzed and found to contain 25.9% nitrogen and 74.1% oxygen. What is the empirical formula of the compound?

Molecular Formulas

The molecular is the same as the empirical formula of a compound or is a simple whole-number multiple of the empirical formula.

Determining the Molecular Formula of a Compound

Ex. Calculate the molecular formula of a compound whose molar mass is 60.0 g/mol and empirical formula is CH_4N .

Homework

p. 312 #40-46