Homework

p. 312 #37-46

(45) 58.8% C, 9.8% H, 31.4 % O

$$58.8\text{ g C} \times \frac{1\text{ mol C}}{12.01\text{ g C}} = \frac{4.896\text{ mol C}}{1.9625\text{ mol}} = 2.5$$

$$9.8\text{ g H} \times \frac{1\text{ mol H}}{1.01\text{ g H}} = \frac{9.703\text{ mol H}}{1.9625\text{ mol}} = 5$$

$$31.4\text{ g O} \times \frac{1\text{ mol O}}{16.00\text{ g O}} = \frac{1.9625\text{ mol O}}{1.9625\text{ mol}} = 1$$

$C_{4.896}H_{9.703}O_{1.9625}$

$C_{2.5}H_5O \longrightarrow \boxed{C_5H_{10}O_2}$

EMPIRICAL $C_5H_{10}O_2$ $\xrightarrow{\times 1}$ MOLECULAR $\boxed{C_5H_{10}O_2}$

$102.15\text{ g/mol} \xrightarrow{\times 1} 102\text{ g/mol}$

$(5 \times 12.01) + (10 \times 1.01) + (2 \times 16.00)$

Quiz Topics

- Avagadro's Number calculations
- Mole-Mass and Mole-Volume Calculations
- Percent Composition
- Empirical and Molecular Formulas

Section 10.1

1. 342.3 g/mol
2. **a.** 208.2 g/mol **b.** 352.0 g/mol
3. **a.** 158.0 g/mol **b.** 310.2 g/mol
4. 5.85 mol H_2O
5. 3.6×10^{23} atoms
6. 32.0 g

Section 10.2

1. **a.** 180.2 g/mol **c.** 96.2 g/mol
   b. 84.0 g/mol **d.** 153.2 g/mol
2. **a.** 1.8×10^{3} g
   b. 26 g
   c. 3.20×10^{-2} g
   d. 0.480 g or 4.80×10^{-1} g
   e. 1.43×10^{2} g
3. 1.87×10^{2} g
4. 204.1 g
5. **a.** 4.9×10^{-3} mol **d.** 1.98×10^{-5} mol
   b. 9.10×10^{-2} mol **e.** 1.97×10^{-5} mol
   c. 1.08×10^{-2} mol
6. 5.43 mol
7. 15.1 g
8. 59.6 L CH_4
9. 6.03 mol NH_3

Section 10.3

1. $\text{Percent C} = \dfrac{5.34 \text{ g C}}{52.84 \text{ g cpd}} \times 100 = 10.1\% \text{ C}$

   $\text{Percent H} = \dfrac{0.42 \text{ g H}}{52.84 \text{ g cpd}} \times 100 = 0.79\% \text{ H}$

   $\text{Percent Cl} = \dfrac{47.08 \text{ g Cl}}{52.84 \text{ g cpd}} \times 100 = 89.1\% \text{ Cl}$

2. Mass of Cl
   = total mass of compound − mass of Sn
   = 18.35 g of compound − 5.74 g Sn
   = 12.61 g Cl

   $\text{Percent of Sn} = \dfrac{5.74 \text{ g Sn}}{18.35 \text{ g cpd}} \times 100$

   = 31.3% Sn

   $\text{Percent of Cl} = \dfrac{12.61 \text{ g Cl}}{18.35 \text{ g cpd}} \times 100$

   = 68.7% Cl

3. $\text{Percent C} = \dfrac{3.907 \text{ g C}}{4.781 \text{ g cpd}} \times 100 = 81.7\% \text{ C}$

   $\text{Percent H} = \dfrac{0.874 \text{ g H}}{4.781 \text{ g cpd}} \times 100 = 18.3\% \text{ H}$

4. $\text{Percent C} = \dfrac{48.0 \text{ g C}}{158.1 \text{ g } Ca(C_2H_3O_2)_2} \times 100$

   = 30.4% C

   Mass C = 30.4% C × 65.3 g = 19.8 g
5. 13.2 g Al
6. 15.11 g Fe
7. **a.** CCl_4
   b. $CHCl_3$

Sample Problems

How many moles are in 9.80×10^{25} molecules of H_2O?

How many atoms are in 3.40 moles of CO_2?

How many moles are in 24.0 g of CH_4?

What volume of gas will 1.08 moles of O_2 occupy?

Calculate the percent composition of $C_{12}H_{22}O_{11}$.

A compound is made up of 2.06% H, 32.69% S, and 65.25% O. The molar mass of the compound if 196.16 g/mol. What is the empirical formula and molecular formula for the compound?

Quiz - Tomorrow