

Name: Key
Hour: _____ Date: _____

Chemistry: Molar Mass and Percentage Composition

Calculate the molar masses and percentage composition of each of the following compounds. Show your work and always include units.

1. $\text{Ca}_3\text{P}_2 = 192.3 \text{ amu}$
 $\frac{3(40.08 \text{ amu})}{3(40.08) + 2(30.97 \text{ amu})} = 66\% \text{ Ca}$
 $100 - 66 = 34\% \text{ P}$

2. $\text{Ca}(\text{OH})_2$
 $\frac{40.08 \text{ amu Ca}}{40.08 \text{ amu} + 2(16.00) + 2(1.01)} = 54\% \text{ Ca}$
 $\frac{2(16.00 \text{ amu O})}{74.1 \text{ amu}} = 43\% \text{ O}$
 $\frac{2(1.01 \text{ amu H})}{74.1} = 3\% \text{ H}$

3. Na_2SO_4
 $\frac{2(22.99 \text{ amu Na})}{2(22.99) + 32.07 + 4(16.00 \text{ amu O})} = 32\% \text{ Na}$
 $\frac{32.07 \text{ amu S}}{142.05 \text{ amu}} = 23\% \text{ S}$
 $\frac{4(16.00 \text{ amu O})}{142.05 \text{ amu}} = 45\% \text{ O}$

4. CaSO_4
 $\frac{40.08 \text{ amu Ca}}{40.08 + 32.07 + 4(16.00 \text{ amu O})} = 29\% \text{ Ca}$
 $\frac{32.07 \text{ amu S}}{136.15 \text{ amu}} = 24\% \text{ S}$
 $\frac{4(16.00 \text{ amu O})}{136.15 \text{ amu}} = 47\% \text{ O}$

5. $(\text{NH}_4)_2\text{SO}_4$
 $\frac{2 \times 14.01 \text{ amu N}}{2(14.01) + 8(1.01) + 32.07 + 4(16.00 \text{ amu O})} = 21\% \text{ N}$
 $\frac{8(1.01 \text{ amu H})}{132.17 \text{ amu}} = 6\% \text{ H}$
 $\frac{32.07 \text{ amu S}}{132.17 \text{ amu}} = 24\% \text{ S}$
 $\frac{4(16.00 \text{ amu O})}{132.17 \text{ amu}} = 48\% \text{ O}$

6. $\text{Zn}_3(\text{PO}_4)_2$
 $\frac{3(65.39 \text{ amu Zn})}{3(65.39) + 2(30.97) + 8(16.00 \text{ amu O})} = 51\% \text{ Zn}$
 $\frac{2(30.97 \text{ amu P})}{386.11 \text{ amu}} = 16\% \text{ P}$
 $\frac{8(16.00 \text{ amu O})}{386.11 \text{ amu}} = 33\% \text{ O}$

7. $\text{Mg}(\text{NO}_3)_2$
 $\frac{24.31 \text{ amu Mg}}{(24.31) + 2(14.01) + 6(16.00 \text{ amu O})} = 16\% \text{ Mg}$
 $\frac{2(14.01 \text{ amu N})}{148.33 \text{ amu}} = 19\% \text{ N}$
 $\frac{6(16.00 \text{ amu O})}{148.33 \text{ amu}} = 65\% \text{ O}$

8. $\text{KCl} = 74.55 \text{ amu}$
 $\frac{39.10 \text{ amu K}}{39.10 + 35.45 \text{ amu}} = 52\% \text{ K}$
 $100 - 52 = 48\% \text{ Cl}$

Answers:

1. 182.3 g, 66.0% Ca, 34.0% P
2. 74.1 g, 54.1% Ca, 43.2% O, 2.7% H
3. 142.1 g, 32.4% Na, 22.6% S, 45.0% O
4. 136.2 g, 29.4% Ca, 23.6% S, 47.0% O

5. 132.1 g, 21.2% N, 6.1% H, 24.3% S, 48.4% O
6. 386.2 g, 50.8% Zn, 16.1% P, 33.1% O
7. 116.3 g, 20.9% Mg, 24.1% N, 55.0% O
8. 74.6 g, 52.4% K, 47.6% Cl