

AP CHEMISTRY

TOPIC 1: CHEMICAL FOUNDATIONS, PART D

EXAMPLES

Day 5:

- Atomic Masses
 - The mole
 - Molar mass
-

- 1) Element "X" consists of 33.10% of an isotope with a mass of 22.0 amu, 8.60% of an isotope with a mass of 24.0 amu, 20.70% of an isotope with a mass of 25.0 amu, 16.50% of an isotope with a mass of 27.0 amu, and 21.10% of an isotope with a mass of 30.0 amu. Calculate the average atomic mass.

Answer:

$$\begin{array}{r r r r r} 0.3310 & \times & 22.0 & = & 7.282 \text{ amu} \\ 0.0860 & \times & 24.0 & = & 2.064 \text{ amu} \\ 0.2070 & \times & 25.0 & = & 5.175 \text{ amu} \\ 0.1650 & \times & 27.0 & = & 4.455 \text{ amu} \\ 0.2110 & \times & 30.0 & = & 6.330 \text{ amu} \end{array}$$

$$\underline{\underline{25.306 \text{ amu}}}$$

- 2) Calculate the molar mass for tin(IV) phosphate

Answer:

$$\text{Sn}_3(\text{PO}_4)_4 : 3 (118.71 \text{ g/mol}) + 4 (30.97 \text{ g/mol}) + 16 (16.00 \text{ g/mol}) = 736.01 \text{ g/mol}$$

- 3) Calculate the number of milligrams for 550 atoms of zinc.

Answer: **Atoms** → **Moles** → **grams** → **milligrams** (must follow these steps)

$$\frac{550 \text{ atoms Zn}}{1} \times \frac{1 \text{ mol Zn}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{65.39 \text{ g}}{1 \text{ mol Zn}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 6.0 \times 10^{-17} \text{ mg} \quad (2 \text{ sig figs})$$

- 4) Calculate the number of oxygen atoms in a 75.3 kilogram sample of lithium sulfate.

Answer: **Kilograms** → **Grams** → **Moles** → **Molecules** → **Atoms** (must follow these steps)

$$\frac{75.3 \text{ kg Li}_2\text{SO}_4}{1 \text{ kg}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol Li}_2\text{SO}_4}{109.94 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol Li}_2\text{SO}_4} \times \frac{4 \text{ atoms oxygen}}{1 \text{ molecule Li}_2\text{SO}_4} = 1.65 \times 10^{27} \text{ atoms O}$$