

Abundance of Isotopes

Chem Worksheet 4-3

1. Argon ~ 40

The average atomic mass of Ar is 39.948.
 Ar ~ 40 is closest to the average atomic mass.

$$\begin{aligned}
 2. \quad & (0.6917)(62.9296 \text{ amu}) + (0.3083)(64.9278 \text{ amu}) = \\
 & 43.53 \text{ amu} + 20.02 \text{ amu} = \\
 & \quad \quad \quad \boxed{63.55 \text{ amu}}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & (27.9769 \text{ amu})(0.922297) + (28.9765 \text{ amu})(0.046832) + (29.9738 \text{ amu})(0.030872) \\
 & 25.8030 \text{ amu} + 1.35703 \text{ amu} + 0.925351 \text{ amu} \\
 & \quad \quad \quad \boxed{28.0854 \text{ amu}}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & 68.9256 \text{ amu}(0.60108) + 70.9247 \text{ amu}(0.39892) \\
 & 41.430 \text{ amu} + 28.293 \text{ amu} \\
 & \quad \quad \quad \boxed{69.723 \text{ amu}}
 \end{aligned}$$

$$\begin{array}{rcl}
 5. & \text{Unknown mass} & 100 - 50.69 = 49.31\% \\
 & \downarrow & \downarrow \\
 & (78.918 \text{ amu})(0.5069) + (x)(0.4931) = 79.904 \text{ amu} \\
 & 40.00 \text{ amu} + (x)(0.4931) = 79.904 \text{ amu} \\
 & - 40.00 \text{ amu} & \sim 40.00 \text{ amu}
 \end{array}$$

$$\begin{array}{r}
 (x)(0.4931) = 39.90 \text{ amu} \\
 \hline
 0.4931 \quad 0.4931
 \end{array}$$

$$\boxed{x = 80.92 \text{ amu}}$$

$$\begin{aligned}
 & 2. (203.973 \text{ amu})(0.014) + (205.974 \text{ amu})(0.241) + (206.976 \text{ amu})(0.721) + (207.977 \text{ amu})(0.524) \\
 & \quad 2.86 \text{ amu} + 49.6 \text{ amu} + 45.7 \text{ amu} + 109 \text{ amu} \\
 & \quad \quad \quad \text{207 amu}
 \end{aligned}$$

$$7. (120.904 \text{ amu})(x) + 122.904 \text{ amu}(y) = 121.75$$

$$\begin{array}{r}
 \swarrow \text{\% abundance Sb-121} \\
 - (120.904)(x) \quad - 120.904 \\
 \swarrow \text{\% abundance Sb-123} \\
 \quad \quad \quad \quad \quad - 122.904
 \end{array}$$

$$2y = 0.846$$

$$y = 0.423$$

Convert to % = 42.3%

* % abundance must add up to 100%

$$100 - 42.3 = 57.7\% = x$$

$$\text{Sb-121} = \% \text{ abundance } 57.7\%$$

$$\text{Sb-123} = \% \text{ abundance } 42.3\%$$