

Isotopes and Calculating Average Atomic Mass

Example: A sample of cesium is 75% ^{133}Cs , 20% ^{132}Cs , and 5% ^{134}Cs .

What is its average atomic mass?

Answer: $0.75 \times 133 = 99.75$

$$0.20 \times 132 = 26.4$$

$$0.05 \times 134 = 6.7$$

$$\text{Total} = 132.85 \text{ amu (atomic mass unit)}$$

Practice: Determine the average atomic mass of the following mixture of isotopes.

1. 80% ^{127}I , 17% ^{126}I , 3% ^{128}I

$$\begin{array}{r} 0.80 \times 127 = 101.6 \\ 0.17 \times 126 = 21.42 + \\ 0.03 \times 128 = 3.84 \\ \hline 126.86 \text{ amu} \end{array}$$

3. 95% ^{14}N , 3% ^{15}N , 2% ^{16}N

$$\begin{array}{r} 0.95 \times 14 = 13.3 \\ 0.03 \times 15 = 0.45 + \\ 0.02 \times 16 = 0.32 \\ \hline 14.07 \text{ amu} \end{array}$$

2. 15% ^{55}Fe , 85% ^{56}Fe

$$\begin{array}{r} 0.15 \times 55 = 8.25 + \\ 0.85 \times 56 = 47.6 \\ \hline = 55.85 \text{ amu} \end{array}$$

4. 98% ^{12}C , 2% ^{14}C

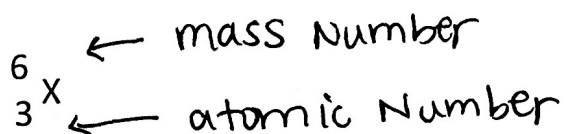
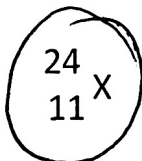
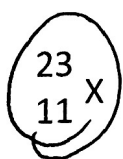
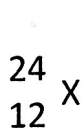
$$\begin{array}{r} 0.98 \times 12 = 11.76 + \\ 0.02 \times 14 = 0.28 \\ \hline = 12.04 \text{ amu} \end{array}$$

~~te 55.85 amu~~

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Conclusion: Answer the following questions about isotopes.

5. Circle the symbols that represent isotopes of the same element.



6. Answer the following questions about isotopes.

a. In what ways are isotopes of the same element similar?

- ① same # p⁺ ② same atomic #
③ same # e⁻ ④ chemically alike

b. In what ways are isotopes of the same element different?

- ① different # n⁰ ② different mass