

NAME Key**Average Atomic Mass Worksheet: show all work.**

1) Rubidium is a soft, silvery-white metal that has two common isotopes, ^{85}Rb and ^{87}Rb . If the abundance of ^{85}Rb is 72.2% and the abundance of ^{87}Rb is 27.8%, what is the average atomic mass of rubidium?

$$(85)(0.722) + (87)(0.278)$$

$$61.37 + 24.186 = 85.556 \rightarrow \boxed{86 \text{ amu}}$$

2) Uranium is used in nuclear reactors and is a rare element on earth. Uranium has three common isotopes. If the abundance of ^{234}U is 0.01%, the abundance of ^{235}U is 0.71%, and the abundance of ^{238}U is 99.28%, what is the average atomic mass of uranium?

$$(234)(0.0001) = 0.0234$$

$$(235)(0.0071) = 1.6685$$

$$(238)(0.9928) = 236.2864$$

$$\hline 237.9833$$

↓

$$\boxed{238 \text{ amu}}$$



3) Titanium has five common isotopes: ^{46}Ti (8.0%), ^{47}Ti (7.8%), ^{48}Ti (73.4%), ^{49}Ti (5.5%), ^{50}Ti (5.3%). What is the average atomic mass of titanium?



$$(46)(0.08) + (47)(0.078) + (48)(0.734) + (49)(0.055) + (50)(0.053)$$

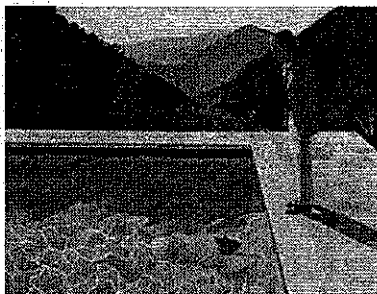
$$3.68 + 3.666 + 35.232 + 2.695 + 2.65$$

$$47.923 \rightarrow \boxed{48 \text{ amu}}$$

4) Why is the mass in amu of a carbon-12 atom reported as 12.011 in the periodic table of the elements?

Carbon has multiple isotopes. While carbon-12 is the most abundant, we need to account for the other (larger) isotopes.

5) Naturally occurring chlorine that is put in pools is 75.53 percent ^{35}Cl (mass = 34.969 amu) and 24.47 percent ^{37}Cl (mass = 36.966 amu). Calculate the average atomic mass.



$$(34.969)(0.7553) + (36.966)(0.2447)$$

$$26.412 \quad + \quad 9.0455$$

$$\boxed{35.456 \text{ amu}}$$

6) Copper used in electric wires comes in two flavors (isotopes): ^{63}Cu and ^{65}Cu . ^{63}Cu has an atomic mass of 62.9298 amu and an abundance of 69.09%. The other isotope, ^{65}Cu , has an abundance of 30.91%. The average atomic mass between these two isotopes is 63.546 amu. Calculate the actual atomic mass of ^{65}Cu .

$$(62.9298)(0.6909) + (x)(0.3091) = 63.546$$

$$\begin{array}{r} 43.478 \\ - 43.478 \\ \hline \end{array} + 0.3091x = 63.546$$

$$\begin{array}{r} - 43.478 \\ \hline \end{array}$$

$$\frac{0.3091x}{0.3091} = \frac{20.068}{0.3091}$$

$$x = \boxed{64.924 \text{ amu}}$$

7) Magnesium consists of three naturally occurring isotopes. The percent abundance of these isotopes is as follows: ^{24}Mg (78.70%), ^{25}Mg (10.13%), and ^{26}Mg (11.7%). The average atomic mass of the three isotopes is 24.3050 amu. If the atomic mass of ^{25}Mg is 24.98584 amu, and ^{26}Mg is 25.98259 amu, calculate the actual atomic mass of ^{24}Mg .

$$(x)(0.7870) + (24.98584)(0.1013) + (25.98259)(0.117) = 24.3050$$

$$0.7870x + 2.531 + 3.0399 = 24.3050$$

$$x = \boxed{23.8044 \text{ amu}}$$

8) Complete the table

Isotope	Mass (amu)	Relative Abundance (%)
Neon-20	19.992	90.51
Neon-21	20.994	$100 - (90.51 + 9.22) = 0.27\%$
Neon-22	22.002	9.22
Avg. Atomic Mass = 20.180		Total %: 100%

$$(19.992)(0.9051) + (20.994)(0.0027) + (x)(0.0922) = 20.180$$

$$18.0948 + 0.0566838 + 0.0922x = 20.180$$

$$x = \boxed{22.002 \text{ amu}}$$