

Isotope Practice

1. Here are three isotopes of an element: $^{12}_6\text{C}$ $^{13}_6\text{C}$ $^{14}_6\text{C}$
- The element is: Carbon
 - The number 6 refers to the # of protons / atomic #
 - The numbers 12, 13, and 14 refer to the Mass #'s / atomic mass
 - How many protons and neutrons are in the first isotope? 6, 6
 - How many protons and neutrons are in the second isotope? 6, 7
 - How many protons and neutrons are in the third isotope? 6, 8

2. Complete the following chart:

Isotope name	atomic #	mass #	# of protons	# of neutrons	# of electrons
Potassium-37	19	37	19	18	19
Oxygen-17	8	17	8	9	8
uranium-235	92	235	92	143	92
uranium-238	92	238	92	146	92
boron-10	5	10	5	5	5
boron-11	5	11	5	6	5

DIRECTIONS: For the following problems, show your work! Be thorough.

3. Naturally occurring europium (Eu) consists of two isotopes with a mass of 151 and 153. Europium-151 has an abundance of 48.03% and Europium-153 has an abundance of 51.97%. What is the atomic mass of europium?

$$\begin{aligned} 0.5197 \cdot 153 &= 79.51 \\ 0.4803 \cdot 151 &= 72.52 \end{aligned} \quad \left. \vphantom{\begin{aligned} 0.5197 \cdot 153 \\ 0.4803 \cdot 151 \end{aligned}} \right\} = \boxed{152.04 \text{ Amu}}$$

4. Strontium consists of four isotopes with masses of 84 (abundance 0.50%), 86 (abundance of 9.9%), 87 (abundance of 7.0%), and 88 (abundance of 82.6%). Calculate the atomic mass of strontium.

$$0.005 \cdot 84 + 0.099 \cdot 86 + 0.070 \cdot 87 + 0.826 \cdot 88 = \boxed{87.712 \text{ Amu}}$$

5. 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?

$$46 \cdot 0.08 + 47 \cdot 0.078 + 48 \cdot 0.734 + 49 \cdot 0.055 + 50 \cdot 0.053 = \boxed{47.923 \text{ Amu}}$$

6. Calculate the atomic mass of copper if copper-63 is 69.17% abundant and copper-65 is 30.83% abundant.

$$63 \cdot .6917 + 65 \cdot .3083 = 63.62 \text{ Amu}$$

7. Boron exists in two isotopes, boron-10 and boron-11. Based on the atomic mass, which isotope should be more abundant?

10.811
↳ closer to 11
Boron 11

8. Lithium-6 is 4% abundant and lithium-7 is 96% abundant. What is the average mass of lithium?

$$6.96 \text{ Amu}$$

9. Iodine is 80% ^{127}I , 17% ^{126}I , and 3% ^{128}I . Calculate the average atomic mass of iodine.

$$126.86 \text{ Amu}$$

10. The natural abundance for boron isotopes is 19.9% ^{10}B and 80.1% ^{11}B . Calculate boron's atomic mass.

$$10.801 \text{ Amu}$$

11. Hydrogen is 99% ^1H , 0.8% ^2H , and 0.2% ^3H . Calculate its average atomic mass.

$$1.036 \text{ Amu}$$

12. Rubidium is a soft, silvery-white metal that has two common isotopes, ^{85}Rb and ^{87}Rb . If the abundance of ^{85}Rb is 80.2% and the abundance of ^{87}Rb is 19.8%, what is the average atomic mass of rubidium?

$$85.396 \text{ Amu}$$

13. What is the atomic mass of hafnium if, out of every 100 atoms, 5 have a mass of 176, 19 have a mass of 177, 27 have a mass of 178, 14 have a mass of 179, and 35 have a mass of 180.0?

5% 19% 27% 14% 35%

$$178.55 \text{ Amu}$$