

Average Atomic Mass & Isotopes

(Honors Chemistry)

1. If you have carbon with an atomic mass of 13.00 how many neutrons would you have? Write the name and the symbol for this isotope using shorthand notation.



2. Write the correct symbol for oxygen-17 using shorthand notation. How many electrons, protons and neutrons does this atom contain?



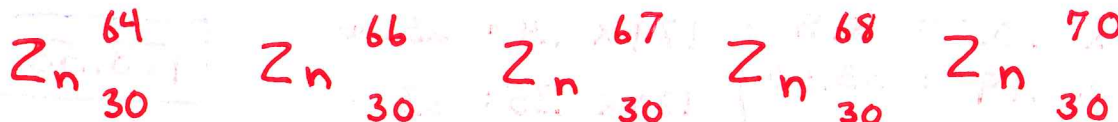
3. Write the symbol for three different isotopes of hydrogen using shorthand notation.



4. Chlorine has 2 different isotopes. One contains 18 neutrons and the other contains 20 neutrons. Write the symbol for both of these isotopes using shorthand notation.



5. Zinc has five different isotopes. The masses of each are as follows: 63.929, 65.926, 66.927, 67.925, and 69.925. Using shorthand notation, write the symbol for all 5 isotopes.



6. Rubidium has two common isotopes, Rubidium-85 and Rubidium-87. If the abundance of Rubidium-85 is 72.2% and the abundance of Rubidium-87 is 27.8%, what is the average atomic mass of rubidium?

$$85 \times .722 = 61.370$$

$$87 \times .278 = 24.186$$

85.556 amu

7. Uranium has three common isotopes. If the abundance of Uranium-234 is 0.01%, the abundance of Uranium-235 is 0.71%, and the abundance of Uranium-238 is 99.28%, what is the average atomic mass of uranium?

$$234 \times .0001 = .0234$$

$$235 \times .0071 = 1.669$$

$$238 \times .9928 = 236.286$$

237.978 amu

8. Titanium has five common isotopes: Titanium-46 (8.0%), Titanium-47 (7.8%), Titanium-48 (73.4%), Titanium-49 (5.5%), and Titanium-50 (5.3%). What is the average atomic mass of titanium?

$$\left. \begin{array}{l} 46 \times .08 = 3.680 \\ 47 \times .078 = 3.666 \\ 48 \times .734 = 35.232 \end{array} \right\} \begin{array}{l} 49 \times .055 = 2.695 \\ 50 \times .053 = 2.650 \end{array}$$

47.923 amu

9. Explain why atoms have different isotopes. In other words, how is it that helium can exist in three different forms?

Neutrons stabilize the nucleus. Since there are different ways to stabilize a nucleus, there are different isotopes.

10. What is average atomic mass of Lithium if 7.42% exists as Lithium-6 and 92.58% exists as lithium-7?

$$\begin{array}{l} 6 \times .0742 = .445 \\ 7 \times .9258 = 6.481 \end{array}$$

6.926 amu

11. Magnesium has three naturally occurring isotopes. 78.70% of Magnesium atoms exist as Magnesium-24, 10.03% exist as Magnesium-25, and 11.17% exist as Magnesium-26. What is the average atomic mass of Magnesium?

$$\begin{array}{l} 24 \times .787 = 18.888 \\ 25 \times .1003 = 2.508 \\ 26 \times .1117 = 2.904 \end{array}$$

24.299 amu

12. Neon has two major isotopes, Neon-20 and Neon-22. Out of every 250 neon atoms, 225 will be Neon-20 and 25 will be Neon-22. What is the average atomic mass of Neon?

$$\begin{array}{l} 20 \times .9 = 18 \\ 22 \times .1 = 2.2 \end{array}$$

20.200 amu

13. What is the atomic mass of Hafnium if out of every 200 atoms, 10 have mass 176.00 g/mol, 38 have mass 177.00 g/mol, 54 have mass 178.00 g/mol, 28 have mass 179.00 g/mol, and 70 have mass 180.00 g/mol?

$$\left. \begin{array}{l} 176 \times .05 = 8.8 \\ 177 \times .19 = 33.63 \\ 178 \times .27 = 48.06 \end{array} \right\} \begin{array}{l} 179 \times .14 = 25.06 \\ 180 \times .35 = 63 \end{array}$$

178.55 amu

14. In a sample of 200 Chlorine atoms, it is found that 151 are chlorine-35 and 49 are chlorine-37. What is the average atomic mass of Chlorine?

$$\begin{array}{l} 35 \times .755 = 26.425 \\ 37 \times .245 = 9.065 \end{array}$$

35.490 amu

15. Without doing any math, are there more Bromine-79 atoms or more Bromine-80 atoms on earth? (Hint: look at the periodic table.)

Bromine - 80

The average atomic mass is 79.904, which means there are far more Bromine-80 atoms than Bromine-79 atoms since 79.904 is much closer to 80.