

The Structure of the Atom

1. Use the periodic table to complete the following table.

Element	Atomic Number	Protons	Electrons
a. Li			
b.			87
c.	93		
d. Hg			80
e.	81		
f.	75		
g. B			

2. Give the number of protons, electrons, and neutrons in each of the following atoms.

- a. $^{108}_{47}\text{Au}$
 b. $^{40}_{20}\text{Ca}$
 c. $^{23}_{11}\text{Na}$

3. Name each isotope, and write it in symbolic notation.

- a. atomic number 26; mass number 56
 b. atomic number 29; mass number 64
 c. atomic number 17; mass number 37

4. How many protons, electrons, and neutrons are in each of the following isotopes?

- a. uranium-235
 b. hydrogen-3
 c. silicon-29

5. How many neutrons does europium-151 have? What is the isotope's mass number?

6. How many more neutrons does thorium-230 have than protons? How many electrons does thorium-230 have?

7. Show that the mass number and the number of protons are conserved in the following nuclear equation: $^{234}_{92}\text{U} \rightarrow ^{230}_{90}\text{Th} + ^4_2\text{He}$.

8. Give the mass number of each isotope.

- a. Be with 5 neutrons
 b. Ga with 39 neutrons
 c. Si with 16 neutrons
 d. Ti with 26 neutrons

9. Give the atomic number of each isotope.

- a. magnesium-25
 b. bromine-79
 c. antimony-121

10. Neon has two isotopes: neon-10 and neon-12.

- a. Which isotope has the greater mass?
 b. Which has more neutrons?
 c. Which has more protons?
 d. Which has more electrons?

11. Use the table below to calculate the atomic mass of element X. Then use the periodic table to identify the element. Show all your work.

Isotope	Mass (amu)	Percent Abundance
^{16}X	15.995	99.762
^{17}X	16.999	0.038
^{18}X	17.999	0.20

12. Magnesium has three isotopes. Magnesium-24 has a percent abundance of 78.99%. Magnesium-26 has a percent abundance of 11.01%. What is the percent abundance of magnesium-25? Assume that there are no other magnesium isotopes.

13. Calculate the atomic mass of iridium. Iridium has two isotopes. Iridium-191 has a mass of 191.0 amu and a percent abundance of 37.58%. Iridium-191 has a mass of 193.0 amu and a percent abundance of 62.42%. Show all your work.

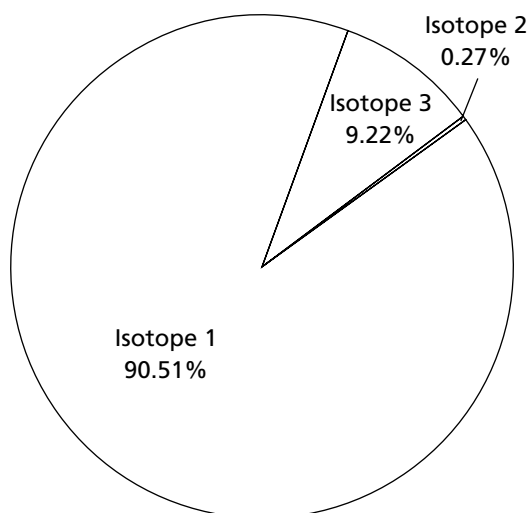
14. An element has three naturally occurring isotopes.

Isotope 1 has a mass of 19.992 amu.

Isotope 2 has a mass of 20.994 amu.

Isotope 3 has a mass of 21.991 amu.

The pie graph shows the relative abundance of each isotope.



- Calculate the atomic mass of the element.
- Identify the element, using the periodic table.

15. An element has three naturally occurring isotopes. Information about each isotope is summarized below.

Isotope	Mass (amu)	Percent Abundance
Isotope 1	23.985	78.10
Isotope 2	24.946	10.13
Isotope 3	25.983	11.17

- Find the atomic mass of this element. Show all your work.
 - Identify the element, using the periodic table.
 - Write each isotope in symbolic notation.
- 16.** The isotope carbon-14 can be used to determine the ages of objects that were once living, such as wood, bones, and fossils. While alive, living things take in all the isotopes of carbon, including carbon-14. Carbon-14 undergoes radioactive decay continuously. After an organism dies, the carbon-14 in its body continues to decay. However, its body no longer takes in new carbon-14. Thus, by measuring how much carbon-14 a once-living object contains and comparing it with the amount of carbon-14 in a currently living thing, you can determine the age of the object.
- In terms of subatomic structure, how does carbon-14 differ from carbon-12 and carbon-13?
 - How is carbon-14 like carbon-12 and carbon-13?
 - Carbon-14 emits a beta particle as it decays. What atom does carbon-14 decay to?
 - Write an equation to represent the decay of carbon-14.