

## Atomic Structure

- List the principles of Dalton's atomic theory that are still considered true. What is the one principle that is no longer true?
- List the three subatomic particles, their charge, symbol, and where they are located within an atom.
- Describe the two parts of an atom.
  - What subatomic particle(s) make up the mass of the atom?
  - What subatomic particle(s) make up the volume of an atom?
- Define the difference between atomic mass and mass number.
- For each of the following scientists, tell what they contributed to the model of the atom:
  - Democritus
  - Dalton
  - Thomson
  - Rutherford
  - Bohr
  - Schrodinger
- What were the two main conclusions of Rutherford's experiment?
- What is an isotope?
- Using your periodic table determine the following information about the element Cadmium:
  - atomic #
  - atomic mass
  - # of protons
  - # of electrons
  - mass number
  - # of neutrons
- Using your periodic table determine the following information about the element Plutonium (Pu):
  - atomic #
  - atomic mass
  - # of protons
  - # of electrons
  - mass number
  - # of neutrons
- Here are three isotopes of an element:  $^{12}\text{C}$        $^{13}\text{C}$        $^{14}\text{C}$ 
  - The element is: \_\_\_\_\_
  - How many protons does this element have? \_\_\_\_\_
  - The numbers 12, 13, and 14 refer to the \_\_\_\_\_
  - How many neutrons are in the first isotope? \_\_\_\_\_
  - How many neutrons are in the second isotope? \_\_\_\_\_
  - How many neutrons are in the third isotope? \_\_\_\_\_

Complete the following chart:

Isotope name	Average atomic #	mass #	# of protons	# of neutrons	# of electrons
Potassium-37	2a.	2b.	2c.	2d.	2e.
Oxygen-17	3a.	3b.	3c.	3d.	3e.
uranium-235	4a.	4b.	4c.	4d.	4e.
uranium-238	5a.	5b.	5c.	5d.	5e.
boron-10	6a.	6b.	6c.	6d.	6e.
boron-11	7a.	7b.	7c.	7d.	7e.

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

- 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?
- Boron exists in two isotopes, boron-10 and boron-11. Based on the atomic mass for Boron, which isotope should be more abundant?
- Lithium-6 is 4.00% abundant and lithium-7 is 96.00% abundant. What is the average mass of lithium?
- Iodine is 80.0%  $^{127}\text{I}$ , 17.00%  $^{126}\text{I}$ , and 3.0%  $^{128}\text{I}$ . Calculate the average atomic mass of iodine.
- 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?
- Strontium consists of four isotopes with masses of 84 (abundance 0.500%), 86 (abundance of 9.90%), 87 (abundance of 7.00%), and 88 (abundance of 82.6%). Calculate the atomic mass of strontium.
- Gallium occurs in nature as a mixture of two isotopes. They are Ga-69 with an abundance of 60.108% and a mass of 68.926 amu and Ga-71 with a mass of 70.925 amu. Calculate the average atomic mass of Gallium.
- Give the average atomic mass for nitrogen which has two isotopes: nitrogen – 14 with a mass of 14.00 a.m.u. and a relative abundance of 99.63% and nitrogen – 15 with a mass of 15.00 a.m.u.
- HONORS ONLY: Give the relative abundance of the two isotopes of neon when neon – 20 has a mass of 20.0 and neon – 22 has a mass of 22.00 a.m.u.

17. HONORS ONLY: Find the relative percentages of chlorine, if it is made of Cl-35 and Cl-37.
18. HONORS ONLY: Antimony, Sb, has two stable isotopes:  $^{121}\text{Sb}$ , 120.904g, and  $^{123}\text{Sb}$ , 122.904g. What are the relative abundances of these isotopes? From the periodic table the average atomic mass of antimony is 121.760g.
19. HONORS ONLY: Silver has two isotopes,  $^{107}\text{Ag}$  and  $^{109}\text{Ag}$ . Their isotopic masses are 106.9051g and 108.9047g, respectively. The average atomic mass of Ag, from the periodic table, is 107.868g. Calculate the abundances.