

Atomic Structure

“Protons give an atom its identity,
electrons its personality.”
— Bill Bryson



Name: _____

Student ID: _____

Date: _____

1. Represent each of the following particles with isotopic notation.

a. Carbon-12

b. Carbon-14

c. Nitrogen-14

d. What is similar about the particles in A and B above? What is different?

e. What is similar about the particles in B and C above? What is different?

f. Which of the three particles above has the most electrons? How many electrons does it have?

2. Write the last name of each chemist below who first hypothesized the corresponding model (theory) for matter.

a. _____ Atoms (he called them atomos).

b. _____ Elements.

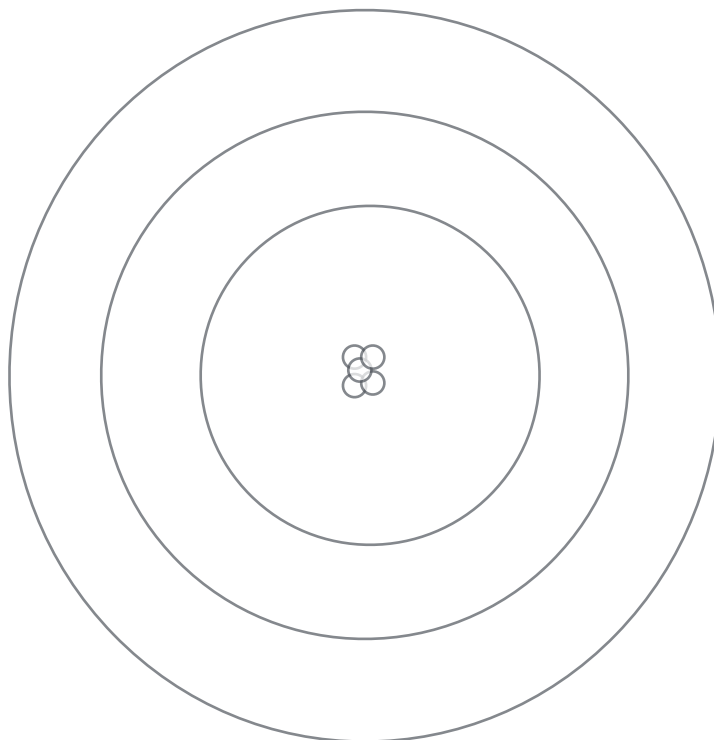
c. _____ Ions.

d. _____ Electrons.

e. _____ Nucleus.

3. Write the symbol for each element described below.
- _____ The second period halogen.
 - _____ The Alkali Earth with the smallest atomic radius.
 - _____ Element number 14 (element with atomic number 14).
 - _____ The second period noble gas.
 - _____ The first metal in group 1.
 - _____ An element that reacts like chlorine, but has a smaller atomic radius.
 - _____ A third period element with properties similar to oxygen.
4. Show how many total neutrons, electrons, and protons are in each particle below.
- ${}^{64}_{29}\text{Cu}$ _____ n _____ e _____ p
 - ${}^{40}_{12}\text{Mg}$ _____ n _____ e _____ p
 - ${}^{26}_{12}\text{Mg}^{2+}$ _____ n _____ e _____ p
 - ${}^{37}_{17}\text{Cl}$ _____ n _____ e _____ p
 - ${}^{35}_{17}\text{Cl}$ _____ n _____ e _____ p
 - ${}^{35}_{17}\text{Cl}^{1-}$ _____ n _____ e _____ p
5. Predict what ion is most likely to form from each element below. Write the symbol of that ion (example: Be^{2+}).
- _____ Sodium
 - _____ Bromine
 - _____ Phosphorus
 - _____ Magnesium
 - _____ Calcium
 - _____ Oxygen
 - _____ Lithium
 - _____ Sulfur
6. For each set of elements below, circle the one with the greatest atomic radius.
- Al F Ca
 - F C Li
 - K Li Cs
 - Si Al S
 - Po O Br
 - Al Na Mg

7. A neutral phosphorus atom has 15 electrons that exist in three shells. The arrangement of electrons in these shells is 2, 8, 5. Draw an X for each electron on the shells below to represent each of the 15 electrons in phosphorus, indicating how many electrons will be found in the first, second, and third shell.



8. Write the electron arrangement for each of the following.
- What is the electron arrangement for a neutral sulfur atom? _____
 - What is the electron arrangement for a neutral calcium atom? _____
 - What is the electron arrangement for a sulfide ion (S^{2-})? _____

9. Write the Lewis dot symbol for a neutral atom of each element below.

a. Sodium

d. Phosphorus

g. Oxygen

b. Neon

e. Magnesium

h. Lithium

c. Bromine

f. Calcium

i. Sulfur

10. Write the Lewis dot symbol for each ion below.

a. Sodium ion

b. Bromide ion

c. Magnesium ion

11. For each set of elements below, circle the one with the greatest ionization energy (the energy needed to pull off an electron).

a. F C Li

d. Al Na Mg

b. K Li Cs

e. Al F Ca

c. Si Al S

f. Po O Br

12. Write the name of each family that best fits the description below.

a. This family of elements all form 2- ions. _____

b. This family of elements all have 2 valence electrons. _____

c. This family is found in group 1A. _____

d. The Lewis symbols for this family is drawn with seven dots. _____

e. There are almost no compounds formed from this family. _____