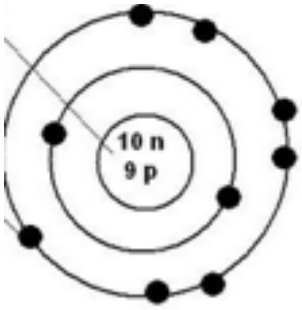
Name: _____ Date: _____

Do Now: Use the two images on the left to answer the questions and draw a Lewis Structure of F on the right.



1. Is F a metal or non-metal?

2. Write the **electron configuration** for an atom of F.

3. How many **valence electrons** does an atom of F have?
_____

4. How many **electron shells** does an atom of F have?
_____

5. How many electrons does this atom of F need to add to have a full **valence shell** (to satisfy the **octet rule**)? _____

6. Draw a **Lewis Structure** for an atom of Fluorine (F) in the space below.

Periodic Trends - What trends in electron configuration do we see on the periodic table?

1. How many valence electrons do the elements in group 1 have? _____
2. How many valence electrons do the elements in group 2 have? _____
3. How many valence electrons do the elements in group 17 have? _____
4. Do the elements in period 2 all of the same number of valence electrons? _____
5. Do the elements in group 2 and 13 have the same number of valence electrons? _____

Using your new knowledge of valence electrons, answer the following question:

"Describe the trends in electron configuration across the periodic table"

Answer using: at least 4 sentence and at least 4 chemistry vocabulary words.

_____

_____

_____

_____

_____

_____

_____

Ground vs. Excited States: Draw a diagram of an electron moving to a high energy state for a carbon atom.

1. What is the electron configuration for carbon? _____
2. How many electrons does carbon have? _____
3. How many electron shells does carbon have? _____
4. If one electron jumped up in a high energy state, how many electron shells would carbon have temporarily? _____
5. How many electrons would be in this excited energy state? _____
6. How many electrons would be left in the 2nd shell if there was one in an excited state? __
7. What would the electron configuration be for the excited energy state? _____

Practice Ground vs. Excited State Questions:

1. Which electron configuration represents the electrons of an atom of Fluorine in an excited state?
(a) 2-7 (b) 2-8
(c) 2-7-1 (d) 2-6-1

2. Which electron configuration could represent an atom of N-14 with an electron in the **excited state**?
(a) 2-5 (b) 2-6
(c) 2-5-1 (d) 2-4-1

Write *one* electron configuration for an atom of silicon in an excited state.

Base your answer(s) to the following question(s) on the electron configuration table shown.

Element	Electron Configuration
X	2-8-8-2
Y	2-8-7-3
Z	2-8-8

Which electron configuration represents the excited state of a calcium atom?

Noble Gases and Ions

Atoms are **stable** (meaning that they do not experience chemical reactions with other atoms) when they have a **full valence shell**. The first electron shell only holds two electrons, so Hydrogen and Helium can only have two electrons in their valence shell. All other elements have a valence shell that holds eight electrons. Atoms will gain or lose electrons to develop a full **valence shell**.

A full valence shell with eight electrons is called an "**Octet.**"

When an atom gains or loses an electron, it develops a **charge**, and is called an **ion**. An **ion** has a positive or negative charge because it has an unequal number of protons and electrons. For example, if Lithium loses its only **valence electron**, it has 2 electrons and 3 protons. Since it has one more proton than electrons, the Lithium ion has a charge of +1.

Noble gases do not form ions because they have a full valence shell. When atoms gain or lose electrons to gain a full valence shell, their new electron configuration is the same as the electron configuration of a noble gas. For example, Potassium (K) has the electron configuration of 2-8-8-1. When it loses its valence electron, its new electron configuration is the same as the noble gas Argon (Ar): 2-8-8.

Cations: Positively-Charged Ions

Metals are found on the left side of the periodic table. Since they might have only 1, 2, or 3 valence electrons, they will lose them to form a complete valence shell. Since metals lose electrons, their ions have a positive charge. When atoms form ions with a positive charge, they are called **cations**. To remember this think of the letter "**t**" in the word **cation** as being a + sign.

Anions: Negatively-Charged Ions

Non-metals are found on the right side of the periodic table. Since they might have 5, 6, or 7 valence electrons, they usually gain electrons to form a complete valence shell. Since non-metals gain electrons, their ions have a positive charge. When atoms form ions with a positive charge, they are called **anions**.

1. How many electrons can Hydrogen and Helium hold in their valence shell?

2. How many electrons do all other elements have in their valence shell?

3. What is the total charge of an atom with 8 protons and 10 electrons?

4. Explain**, in terms of subatomic particles**, why ions have a charge.

5. (a) What is the electron configuration of a neutral Magnesium (Mg) atom?

(b) After Mg loses two electrons, it has the electron configuration of which noble gas?

(1) Ar (2) Kr

(3) Ne (4) Xe

6. Chlorine atoms have an electron configuration of 2-8-7. What is the charge of a chlorine anion after gaining one electron?