Name: _____

Period: _____

Metals, Non-Metals and Valence Electrons

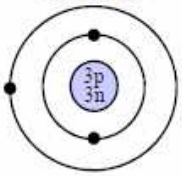
Valence Electrons

Valence Electrons are the *outermost* electrons in an atom. Each group (column) has the same number of valence electrons. Only valence electrons are involved in chemical bonding.

Hydrogen 1

1 valence electron

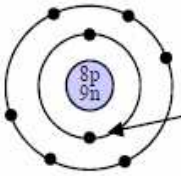
Lithium 6



1 valence electron

Hydrogen and Lithium are both in Group 1A—both have 1 valence electrons.

Oxygen 17

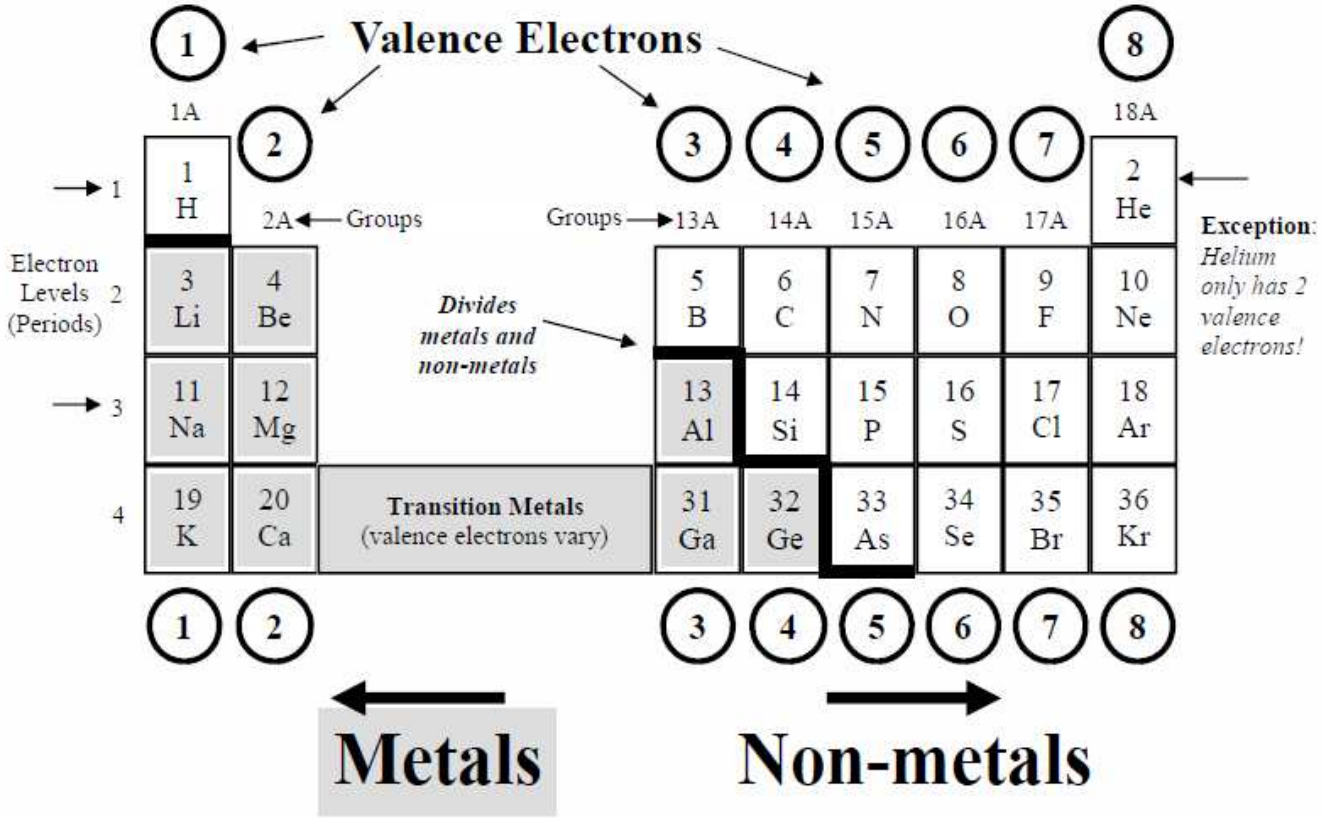


Inner electrons are NOT valence electrons

6 valence electrons

Octet Rule – Atom are more stable that have a full shell of electrons. For most atoms 8 valence electrons is full (octed = 8). For H and He this number is 2. Atoms want to have 8 valence electrons. "If I 8, I full." Only elements in Group 18A have a full octet (8 valence electrons) naturally. All other elements will lose, gain, or share to reach 8 electrons.

Elements with the same valence electrons have similar reactivity, so they tend to react the same.



Metals and Nonmetals

Metals are on the left side of the periodic table. Non-metals are on the right side. Metals and non-metals have different properties and bond differently, making different kinds of compounds.

Metals or Non-metal?

Calcium (Ca): <u>metal</u> (left side)

Bromine (Br): <u>non-metal</u> (right side)

Going Farther

Along the separation line are the *semimetals* or *metalloids*: Boron (B), Silicon (Si), Germanium (Ge), Arsenic (As), Antimony (Sb). These have properties of both metals and non-metals.

1. Octet Rule	A. Elements found on the right side of the periodic table.
2. Metals	B. Elements found on the left side of the periodic table.
3. Valence electrons	C. Says that atoms tend to be more stable with eight valence electrons.
4. Non-metals	D. Electrons in the outermost electron level. Involved in chemical bonding.

How many valence electrons?

Calcium (*Ca*) ___2___. Hydrogen (____) _____

Potassium (____)_____ Helium (____) _____

Oxygen (____) _____ Aluminum(____) _____

Argon (____) _____ Sodium (____) _____

Boron (____) _____ Nitrogen (____) _____

Metal or Non-metal?

__M__ Aluminum (*Al*) ____ Iron (___)

____ Oxygen (___) ____ Fluorine (___)

____ Gold (___) ____ Tin (___)

____ Nitrogen (___) ____ Lithium (___)

____ Bromine (___) ____ Chromium (___)

____ Krypton (___) ____ Lead (___)

Connect the element on the left with the element on the right that has similar reactivity.

Chlorine	Beryllium
Phosphorous	Potassium
Magnesium	Iodine
Sodium	Aluminum
Boron	Oxygen
Sulfur	Nitrogen

Elements with the same # of _____ have the same reactivity.

7 protons and 10 electrons. *Neutral atom or ion?*

15 protons and 15 electrons. *Neutral atom or ion?*

35 protons and 37 electrons. *Neutral atom or ion?*

Give the element abbreviation and charge.

5 protons and 2 electrons: Element: __B__ Charge: __+3__.

16 protons and 18 electrons: Element: ___ Charge: _____.

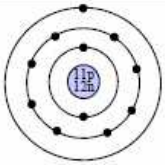
35 protons and 36 electrons: Element: ___ Charge: _____.

Are these elements isotopes of one another?
Element A: 12 protons; 11 electrons; 13 neutrons.
Element B: 13 protons; 12 electrons; 13 neutrons.

Are these elements isotopes of one another?
Element A: 14 protons; 15 electrons; 13 neutrons.
Element B: 14 protons; 14 electrons; 15 neutrons.

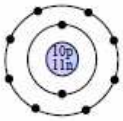
Are these elements isotopes of one another?
Element A: 12 protons; 11 electrons; 13 neutrons.
Element B: 12 protons; 12 electrons; 13 neutrons.

Are these elements isotopes of one another?
Element A: 18 protons; 18 electrons; 18 neutrons.
Element B: 18 protons; 18 electrons; 19 neutrons.



Element: _____
# of neutrons: _____
Mass #: _____
# of electrons: _____
# of valence electrons: ____
It is an ion? _____

Element: _____
# of neutrons: _____
Mass #: _____
# of electrons: _____
# of valence electrons: ____
It is an ion? _____



Element: _____
# of neutrons: _____
Mass #: _____
# of electrons: _____
# of valence electrons: ____
It is an ion? _____

Sulfur (S) is in row __3__. Sulfur has __2__ complete electron levels and __6__ valence electrons in level __3__.

Magnesium (____) is in row ____. Magnesium has _____ complete electron levels and _____ valence electrons in level _____.

Carbon (____) is in row ____. Carbon has _____ complete electron levels and _____ valence electrons in level _____.

Potassium (___) is in row ____. Potassium has ____ complete electron levels and _____ valence electrons in level _____.

Argon (____) is in row ____. Argon has _____ complete electron levels and _____ valence electrons in level _____.

1. Label the Group Numbers (#1-18)
2. Label the Period Numbers
3. Write Atomic Numbers 1-18
4. Color the metals-blue, nonmetals-red, and metalloids-yellow
5. Name the following groups: Alkali Metals, Alkaline Metals, Halogens, and Noble Gases