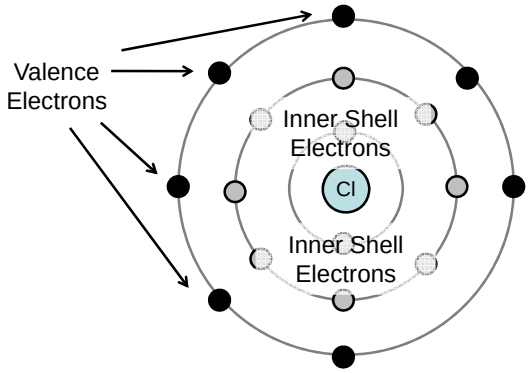
## Electron Layers

**Valence Electrons** – electrons that are on the outermost layer of the atom. These are responsible for chemical reactions

**Inner-shell Electron** – electrons that are on the inner layers of an atom. These are buried below the outer layer and do not interact with other atoms.

1

## Electron Layers




2

## Determining the Number Valence Electrons by Group

Valence electrons are added only from the main group elements (s and p blocks)

The transition metals will all usually only have 2 valence electrons.

| Group | 1 | 2 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|
| Valence | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Config. | Li | Be | B | C | N | O | F | Ne |

3

## Valence Electrons

**Octet Rule** – Atoms want to have 8 valence electrons around them.

The chemical properties of an element are caused by the number of valence electrons

Atoms perform chemical reactions to have 8 electrons around them. Valence electrons are available to be lost, gained, or shared in the formation of a chemical compound.

4

## Valence and Chemical Reactivity

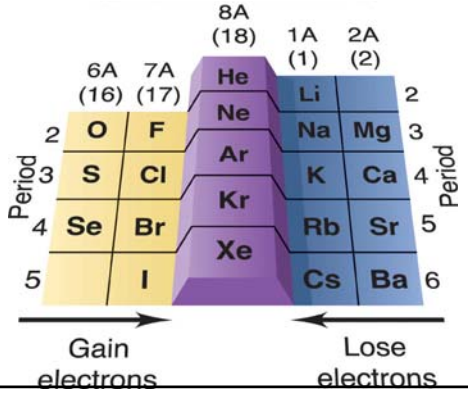
Noble gases have 8 valence electrons around them. This causes them to be very stable and they do not react with anything.

Halogens (group 17) are highly reactive because they have 7 valence electrons. They only need one electron to have an octet and will do anything to gain one more.

Alkali metals (group 1) are highly reactive because they only have 1 valence electron. They will do whatever they can to lose it. This will leave them with an octet from inner electrons.

5

## Everyone wants to be like a Noble Gas




6

## Ions

**ion** – atom or group of bonded atoms having a positive or negative charge. A charge is formed from unequal amounts of protons and electrons in an atom.

**ionization** – Any process that results in the formation of an ion

7

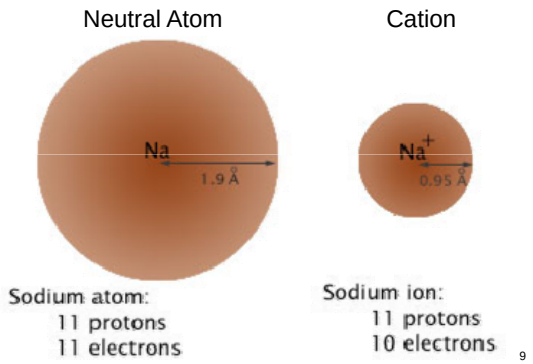
## Positive Ions – The Cation

**A positive ion is made from losing electrons**

**Cation**
–positive ion (ex. $Li^+$, $Ca^{2+}$)
–has more protons than electrons
–often seen with metals

8

The positive ion has more protons than electrons




9

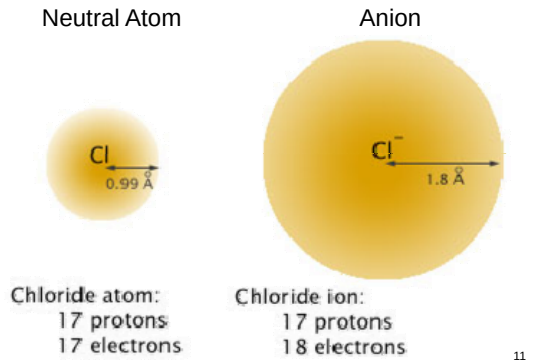
## Negative Ions – The anion

**An negative ion made from gaining electrons**

**Anion**
–negative ion (ex. $Cl^-$, $O^{2-}$)
–has more electrons than protons
–often seen with nonmetals

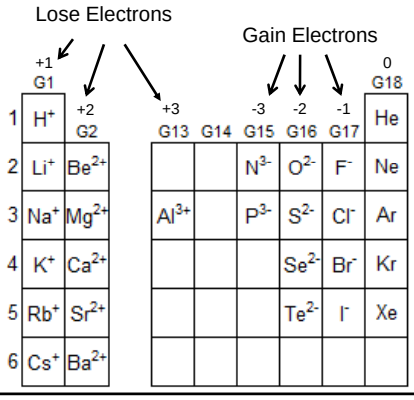
10

The negative ion has more electrons than protons




11

## Common Ions




12