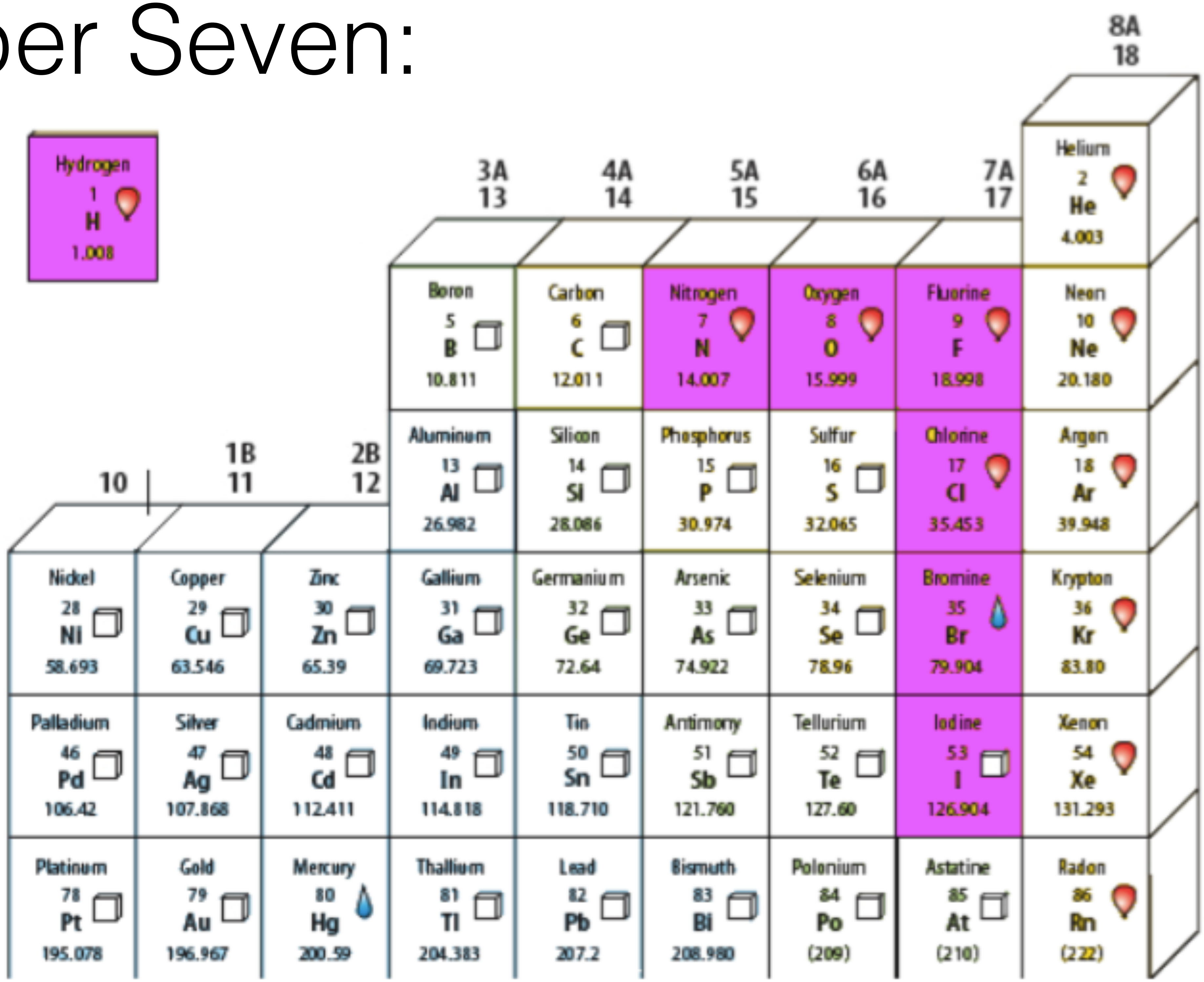
Diatomic elements:

Elements found in nature as pairs of atoms (two identical atoms bonded together).

You need to know all seven:

H_2 N_2 O_2 F_2 Cl_2 Br_2 I_2

They’re also known as the Super Seven:



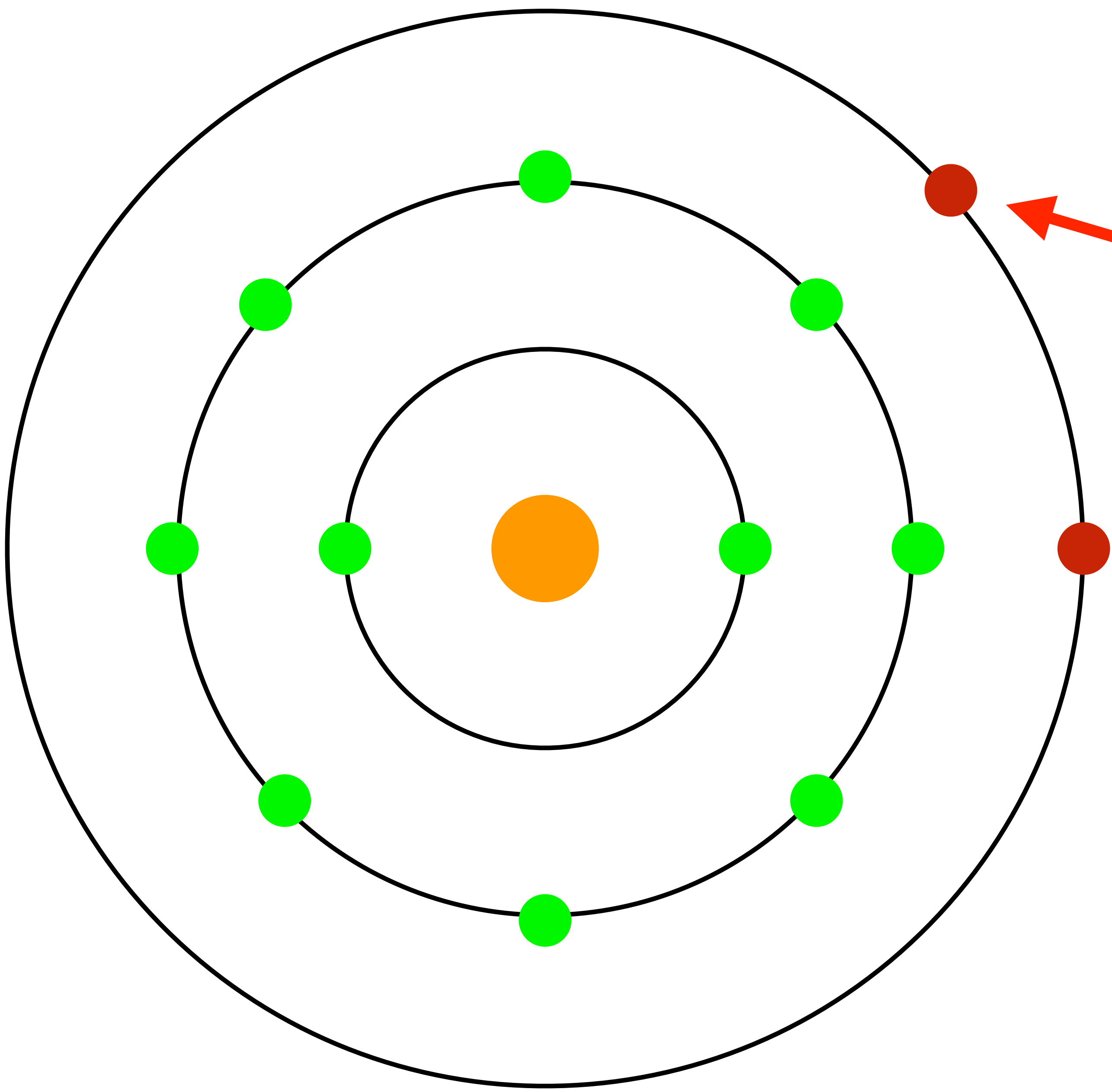
Valence electrons:

- The electrons of an atom found in the outermost s and p sublevels
- Maximum number of valence e^- = 8
- Responsible for the chemical properties of the elements
- All elements in a family have the same number of valence e^-

Draw this diagram:

$1s^2 2s^2 2p^6 \underline{3s^2}$

$_{12}\mathbf{Mg}$

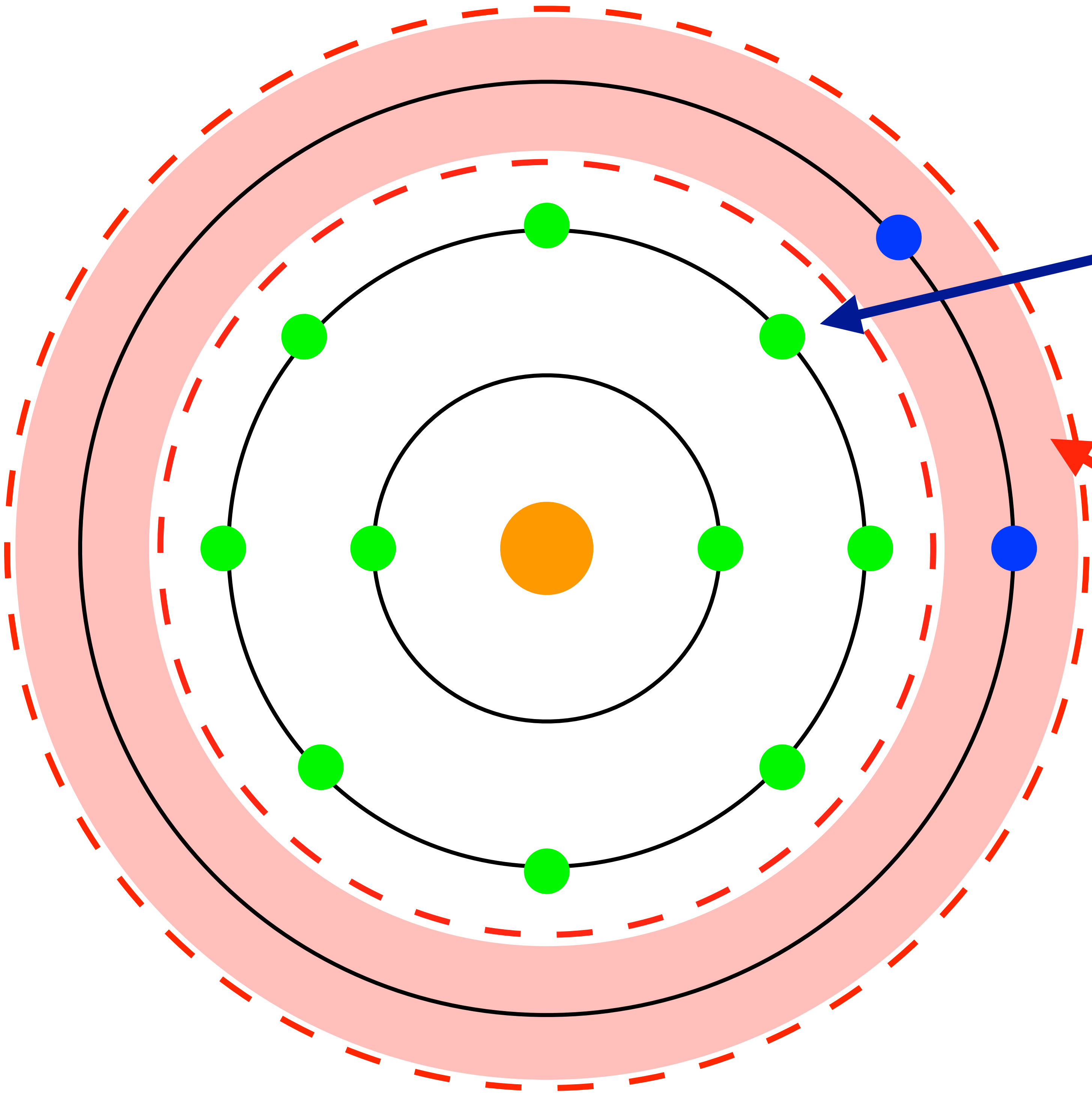


Valence Electrons

(electrons in the *highest* energy level)

Add to your diagram:

$1s^2 2s^2 2p^6 3s^2$



Core Electrons

(Interior electrons)

Valence Shell

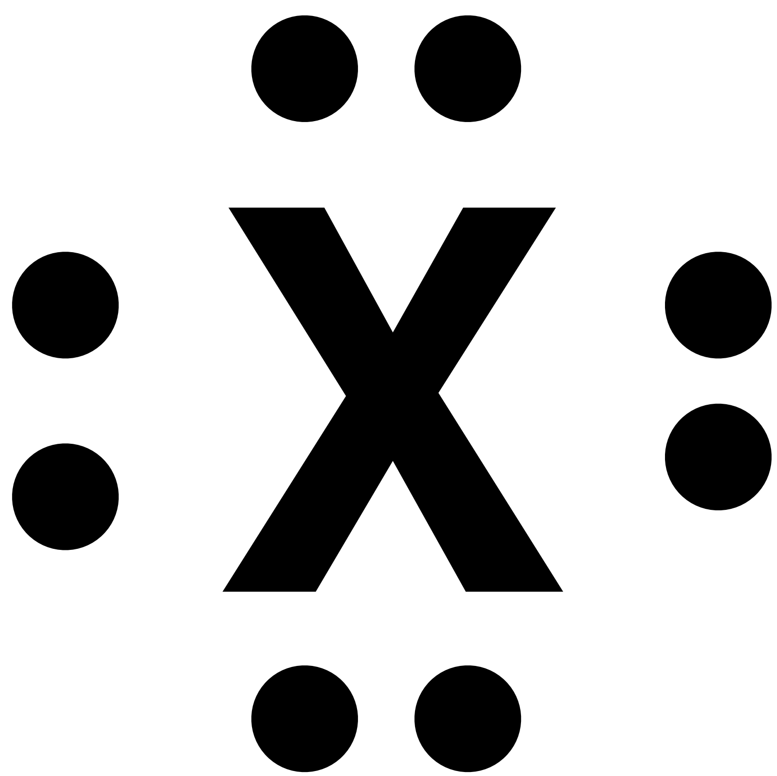
The region of space occupied by the valence e^-

The group numbers 1A-8A indicates the number of valence electrons:

Group 1A = 1 valence e^-
Group 2A = 2 valence e^-
Group 3A = 3 valence e^-
etc.

Note: Transition elements all have only 2 valence e^-

Electron dot notation: the use of dots to represent the valence e^- around an atom.

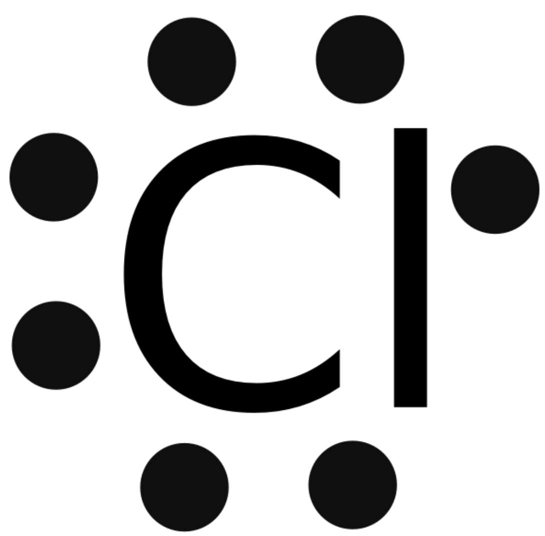


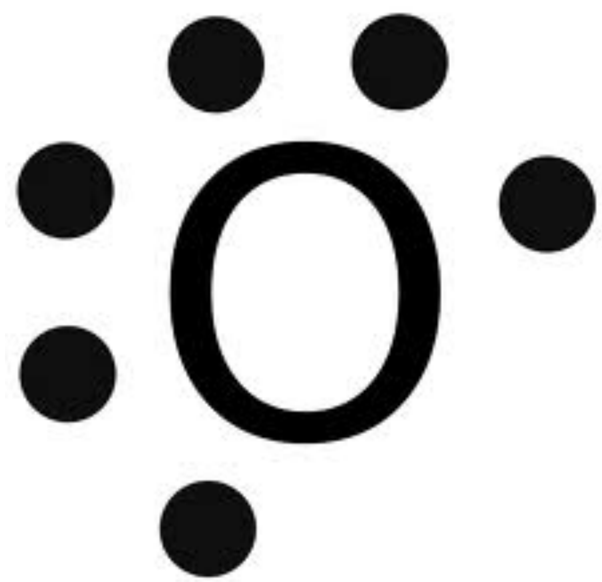
One dot on each side before adding the second

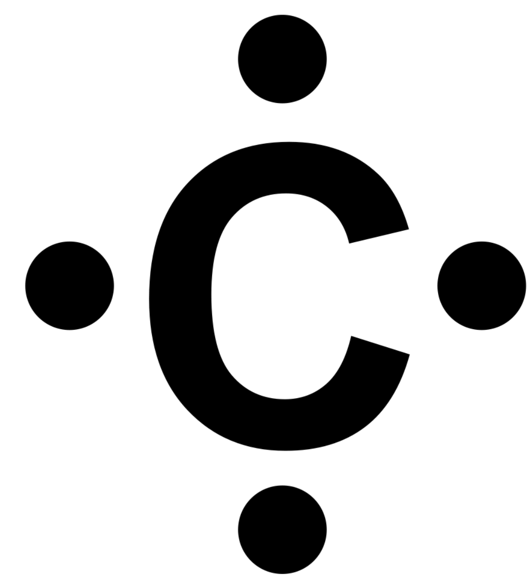
(≈ Hund's rule)

Practice

Chlorine	Oxygen	Carbon
7 valence e^-	6 valence e^-	4 valence e^-



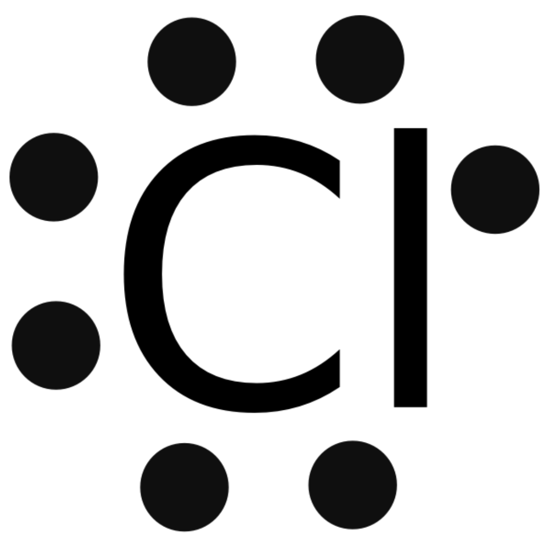




Practice

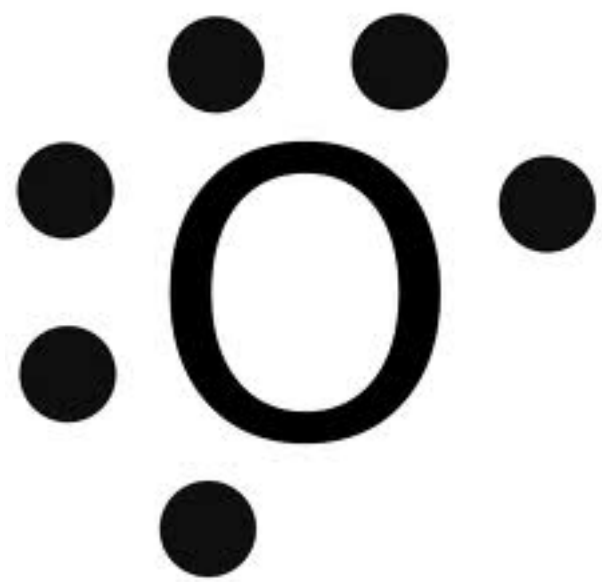
Chlorine

7 valence e^-



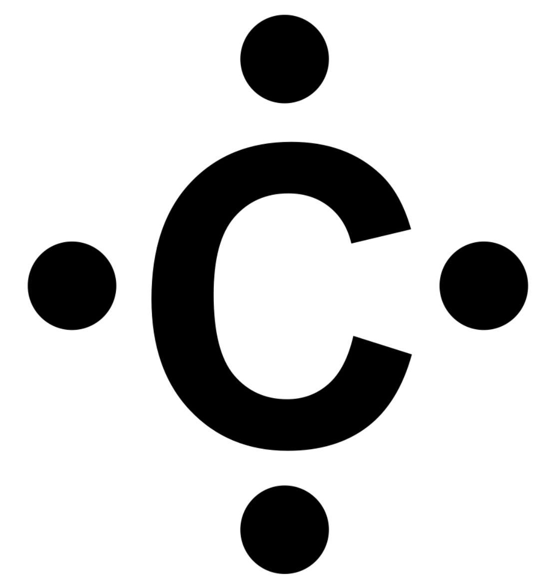
Oxygen

6 valence e^-



Carbon

4 valence e^-



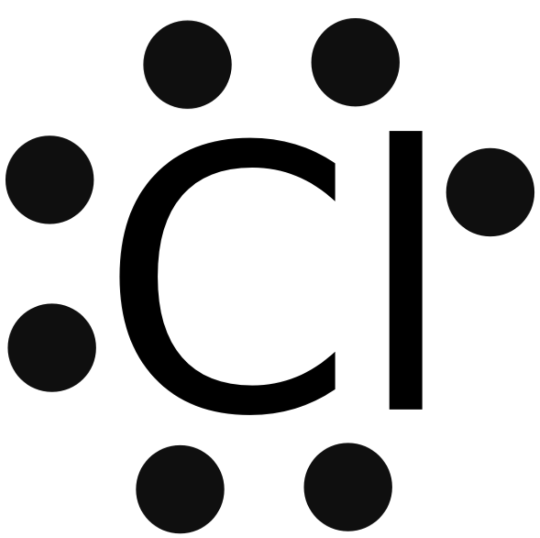
Valence electron configuration:

Only the highest level s and p electrons

Examples:

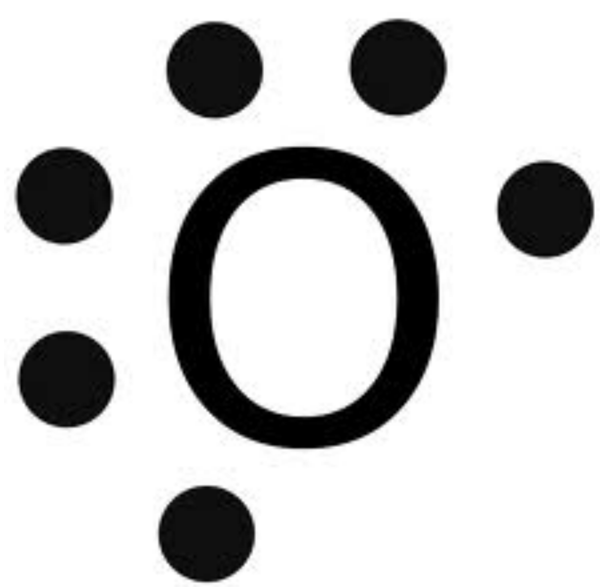
chlorine:

$3s^2 3p^5$



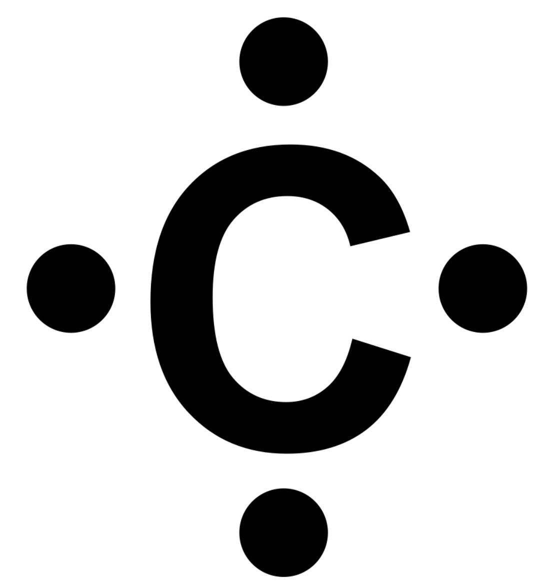
oxygen:

$2s^2 2p^4$



carbon:

$2s^2 2p^2$



The Octet Rule:

Atoms tend to lose, gain, or share electrons in order to obtain the configuration of a noble gas (called a “stable octet”)

Note: Noble gases have a very stable, low energy electron configuration.

This is why they are so unreactive! 😎

Ionic charge:

- Metals: *lose* valence e$^-$ and become *positive* ions ("cations")
- Nonmetals: *gain* e$^-$ and become *negative* ions ("anions")

Ionic charge by location on the periodic table:

Group	Charge
1A	+1
2A	+2
3A	+3
4A (C)	-4
5A (N,P)	-3
6A (O,S,Se)	-2
7A	-1
8A	0