Lewis Structures Intro Lesson

Things Bond with Valence Electrons

- Valence electrons - on the **outside**
  - What another atom can see when they "bump into" each other to bond.
- You have to know the # of valence electrons for **EACH** atom in the molecule.
  - From the periodic table pattern of groups 1A, 2A, 3A…etc.
    - Li = 1
    - Be = 2
    - N = 5

The Octet "Rule"

- Most atoms want to have 8 electrons
- Is broken a LOT!

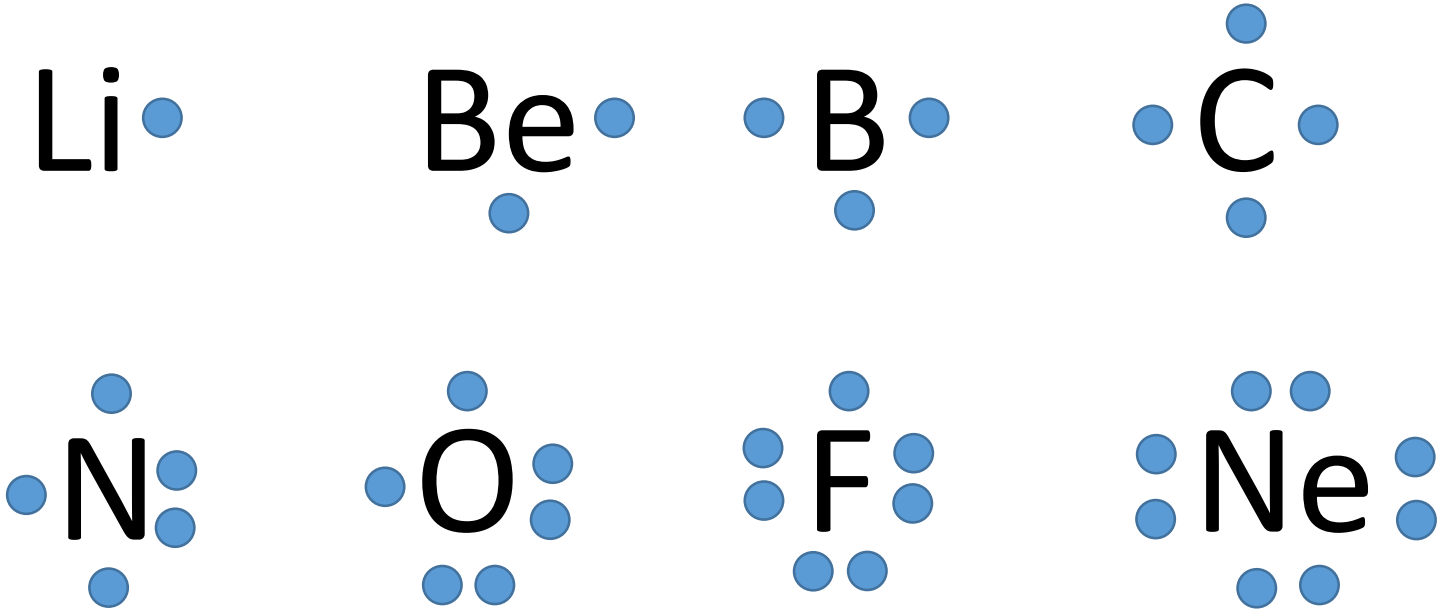
COMMON EXCEPTIONS

Element	**H**	**B**	**P**	**S**
# of ve- it is happy with	**2**	**6**	**10**	**12**

More than 8 is called an "expanded octet"

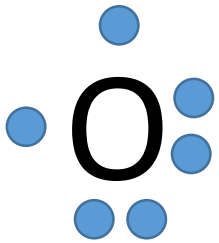
Single Atoms

Each dot is a valence electron!

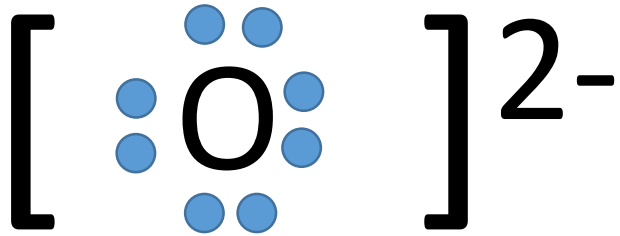


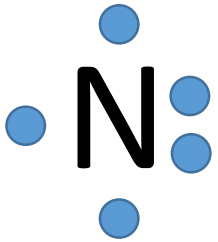
Ions - Anions

Adjust the # of valence e^- because of the charge!

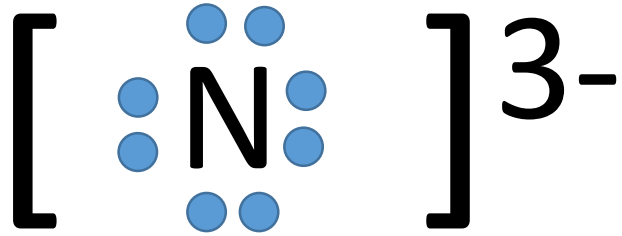


6 ve- versus 8 ve-





5 ve- versus 8 ve-



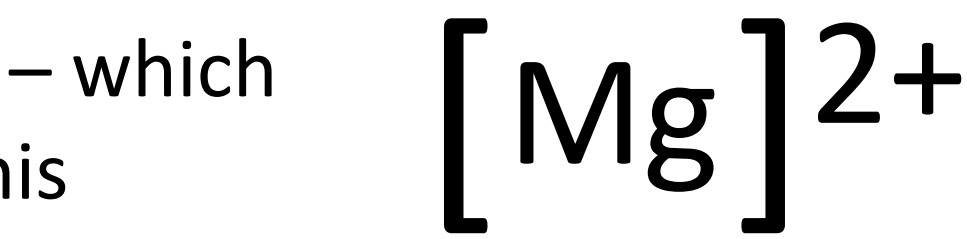
Draw square brackets and the charge when drawing an ion!

Ions - Cations

When atoms lose all their valence electrons, they drop down to the previous level which <u>already</u> is a full shell. ***HOWEVER*** – when we draw our structures we want to draw the <u>ORIGINAL</u> valence shell – which is <u>now empty</u>! We do this because **we want to show how it changed** more than what it looks like now.

Adjust the # of valence electrons because of the charge!!!!

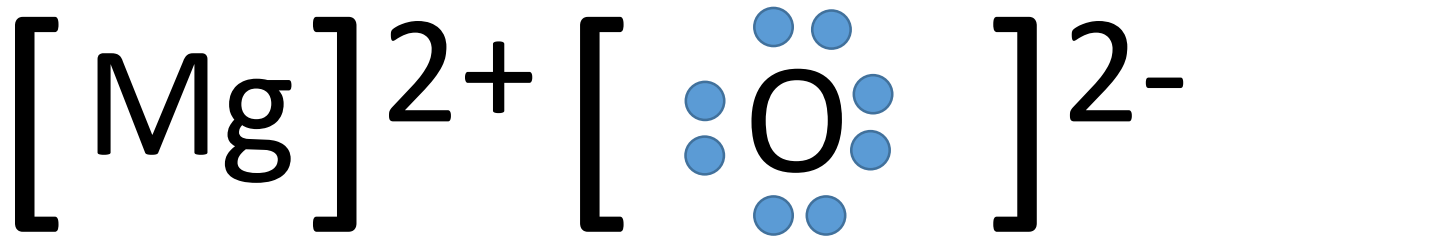
2 ve- in original valence shell



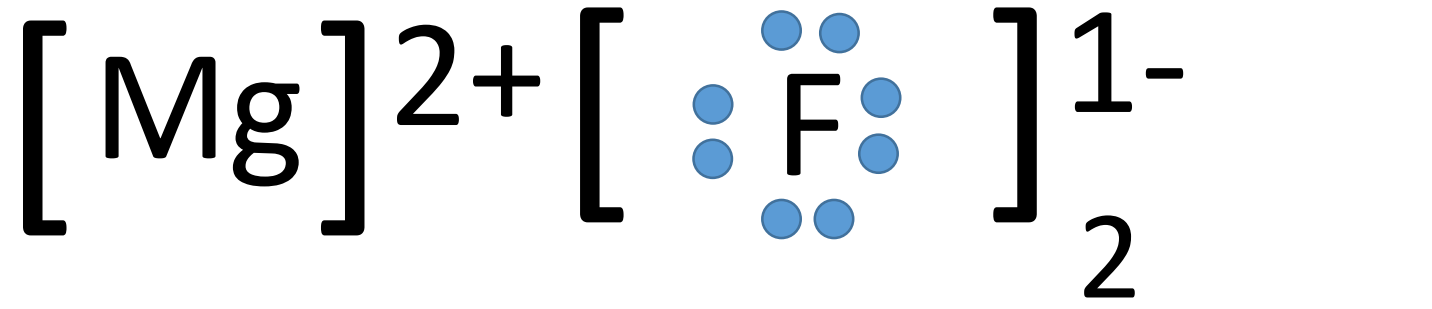
0 ve- in *original* valence shell

Ionic Compounds

Super easy! Just draw the cation and anion next to each other. Done!



More than one of a particular ion? Then just add a subscript outside the brackets!



Covalent Molecules

Covalent molecules will share electrons – they each donate one (or more) to a shared bond. **Do NOT just randomly throw dots all over your paper!!!!**
No "guessing and checking" allowed!
Follow a **systematic set of steps** so you never make mistakes!

STEPS

1) **Count & sum ve-**
2) **Place your atoms**
3) **Bond all atoms w/ a single bond**
4) **Give all atoms a full shell**
5) **Re-count the ve- you used**
6) **Used too few? Put extra on the central atom**
7) **Used to many ve-? Then try double or triple bonds to fix if needed**

Covalent Molecules

Knowing where to place your atoms can be hard. There are some guidelines to follow but they can be broken often. You always draw the best structure possible. It may not be great, but you can only do the best you can do!

PLACEMENT "RULES"

1) Hydrogen *always* goes on the outside of the molecule

- **it is a "dead end"**
- **it "terminates" the molecule**
- **it "caps off" the molecule**
- **Because it can only make 1 bond**

H	H	O	***no!***
H	O	H	***yes!***

Covalent Molecules

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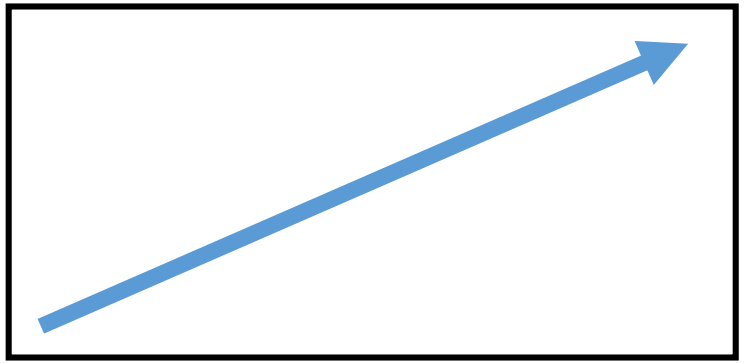
PLACEMENT "RULES"

2) The *least* electronegative atom goes in the inside/center

- except for hydrogen!



Covalent Molecules

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PLACEMENT "RULES"

3) Symmetry is good!

- When possible!

Fine but not great

Better! Symmetrical!

Lesson will continue in class

I show you how to draw covalent molecules using the basics you learned here. Make sure you know this stuff!

YouTube Links to Lessons

Part A – Intro
https://youtu.be/CrXC36JqHKE

Part B – Single Bonds
https://youtu.be/xJV71CCTNqc

Part C – Double/Triple Bonds
https://youtu.be/TSmMySJMV7M