

Periodic Table Part 2

Lewis Notation

- Dots are used to show the number of valence electrons an element has.
- All elements in the same group have the same Lewis notation.
- The group # = # v.e. = # of dots
- Exception: Helium in group VIIIA only has 2 dots
- Dots are put in the 4 compass points (N, E, S and W).
- You cannot double up on a compass point until each point has a dot. **No compass points should have more than 2 dots.**

I	II	III	IV	V	VI	VII	0
H •							He •• * 8
Li •	• Be •	• B •	• C •	• N •	• O •	• F •	• Ne ••
Na •	• Mg •	• Al •	• Si •	• P •	• S •	• Cl •	• Ar ••
K •	• Ca •	• Ga •	• Ge •	• As •	• Se •	• Br •	• Kr ••
Rb •	• Sr •	• In •	• Sn •	• Sb •	• Te •	• I •	• Xe ••
Cs •	• Ba •	• Tl •	• Pb •	• Bi •	• Po •	• At •	• Rn ••

Metal
 Metalloid
 Nonmetal

Incorrect:



*** Normally, atoms are neutral (# protons= # electrons).**

(Protons are positive, electrons are negative so the charges cancel each other out and atom is neutral)

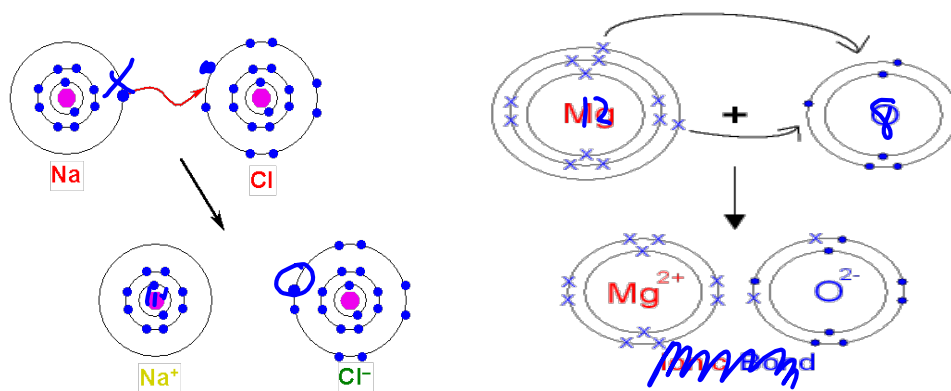
Atoms of most elements tend to bond with other elements to form molecules.

They then become more stable because the orbit furthest from the nucleus is complete (like that of the noble gases).

Ions

Def: an atom that has become electrically charged (no longer neutral)

- They are positively or negatively charged.
- They become charged by **gaining or losing electrons**.
- all elements in the same family have the same ion charge.



When an element donates or accepts electrons they will form a compound and become stable.

When an ion is formed, **the # of protons is unchanged** which preserves the nature of the element. ****Only the # of electrons change****

- Atoms react to achieve noble configuration (become stable because they have a full outer shell)
 - Atoms can give away electrons (metals) or gain electrons (non-metals)
 - If an atom gives away electrons, it becomes positively charged (more protons than electrons)
 - If an atom gains electrons, it becomes negatively charged (more electrons than protons)

Tendencies to lose/gain electrons

The group # helps us determine whether the element tends to lose or gain electrons!!

Ionic Charge (Valence #)

- Groups 1, 2, 3, 4 form + ions (+1, +2, +3, +4) **because they give away electrons to become stable**
- Groups 5, 6, 7 form - ions (-3, -2, -1) **because they gain electrons to become stable** (8 - group number = ionic charge)
- Group 8 does not form ions, they do not react! This is because their orbit is already full and stable with 8 electrons.

Metals:

- Groups 1, 2 and 3 on the periodic table
- Metals lose electrons to non metals and form positive (+) ions.

Group 1	Group 2	Group 3
loses 1e ⁻	loses 2e ⁻	loses 3e ⁻
Charge? +1	+2	+3
Why? loses 1 e ⁻ to a non metal and has one more proton than electrons	loses 2 e ⁻ to a non metal and has 2 more protons than electrons	loses 3 e ⁻ to a non metal (has 3 more protons than electrons)

Non-Metals:

- Groups 4-8 on the periodic table.
- Non-metals gain electrons from metals and form negative (-) ions.
*group 4 exception .

Group 4	Group 5	Group 6	Group 7
loses 4 or gains 4	gains 3	gains 2	gains 1
Charge? (+/-4)	(-3)	(-2)	(-1)
Why? gains or loses 4e ⁻	gains 3 e- from metal 3 more e ⁻	gains 2 e- from metal 2 more e ⁻	gains 1 e- from metal 1 more e ⁻

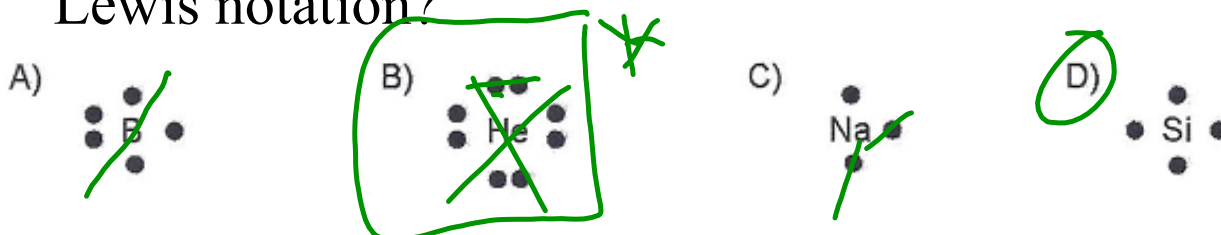
Group 8

Does not form ions. Why?

Because their orbits are full and are therefore already a stable atom.

Past exam questions

1. Which atom is correctly represented with the Lewis notation?



2. During ionization, an atom can become a positive ion. How does an atom become a positive ion?

- ~~A) It gains one or more electrons~~
- B) It loses one or more electrons
- ~~C) It gains one or more protons~~
- ~~D) It loses one or more protons~~

3. If a fluorine (F) atom becomes a negative ion, what will be the distribution of the charges carried by this ion?

- A) 8 positive charges and 9 negative charges
- B) 9 positive charges and 8 negative charges
- C) 9 positive charges and 10 negative charges
- D) 10 positive charges and 9 negative charges

