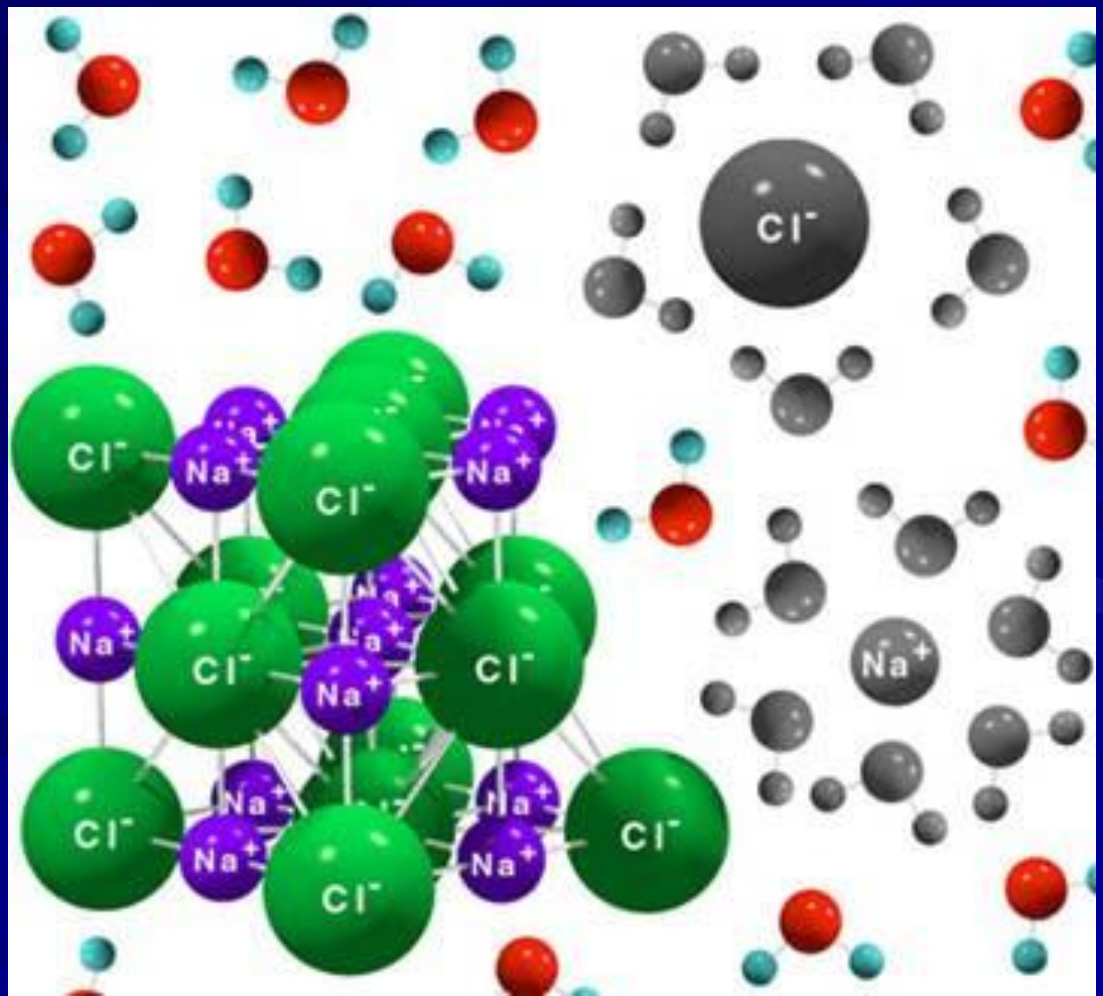
# IONS AND ELECTROLYTES

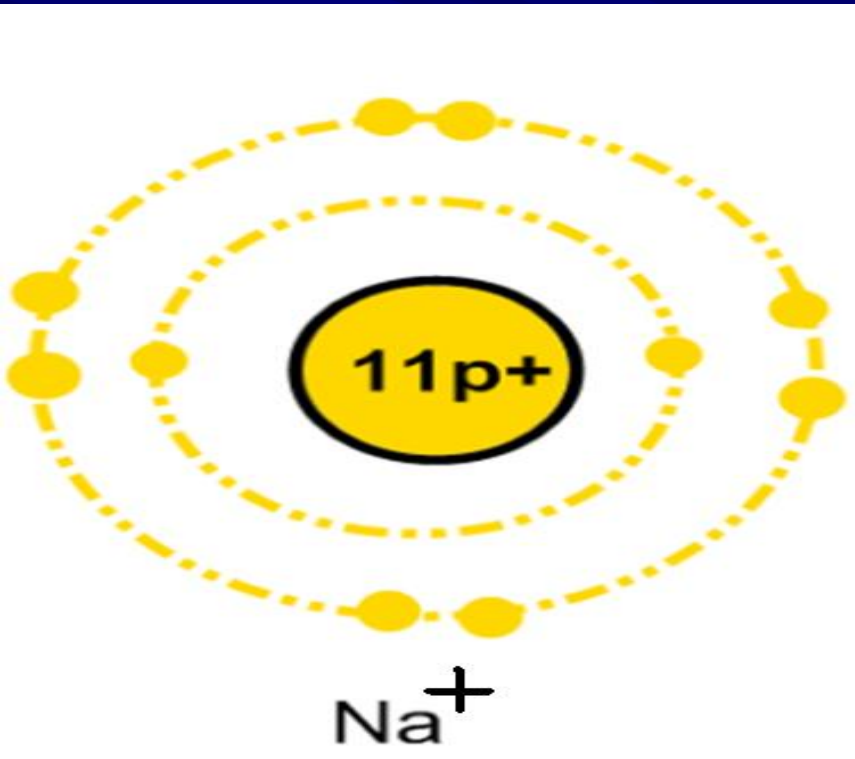


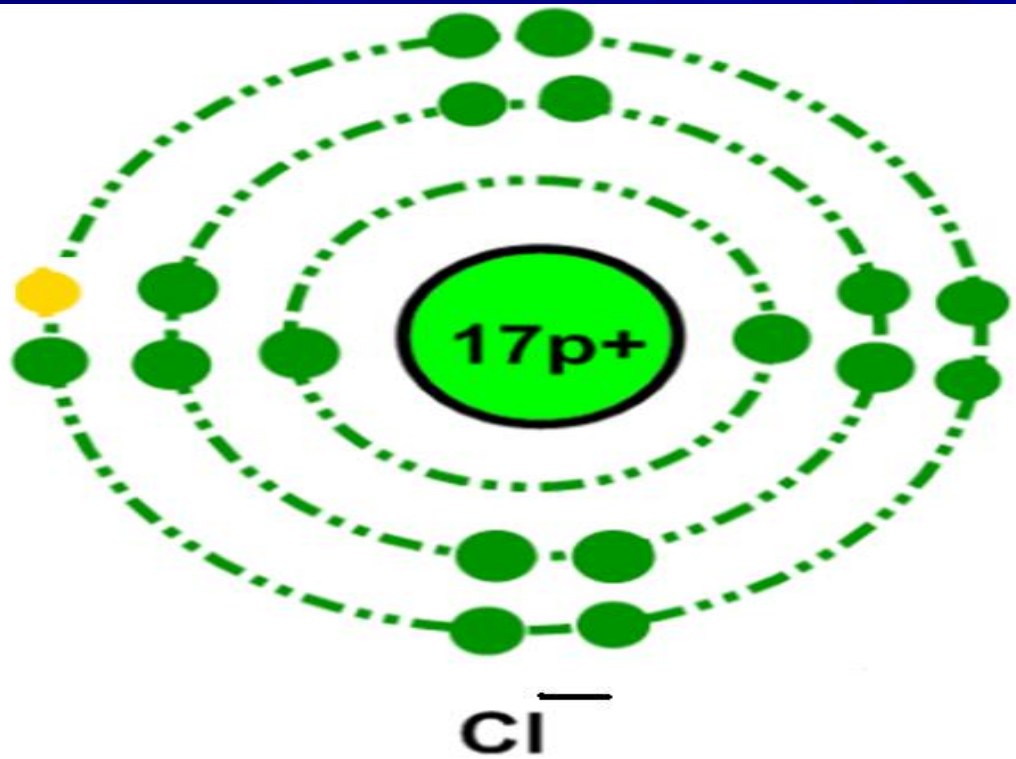
# CHEMICAL STABILITY

- Atoms are chemically stable if they have 8 electrons on the last energy level.
- Exceptions: H, He, Li, Be, B.  These atoms are chemically stable if they have 2 electrons on the last shell.

# CHEMICAL STABILITY

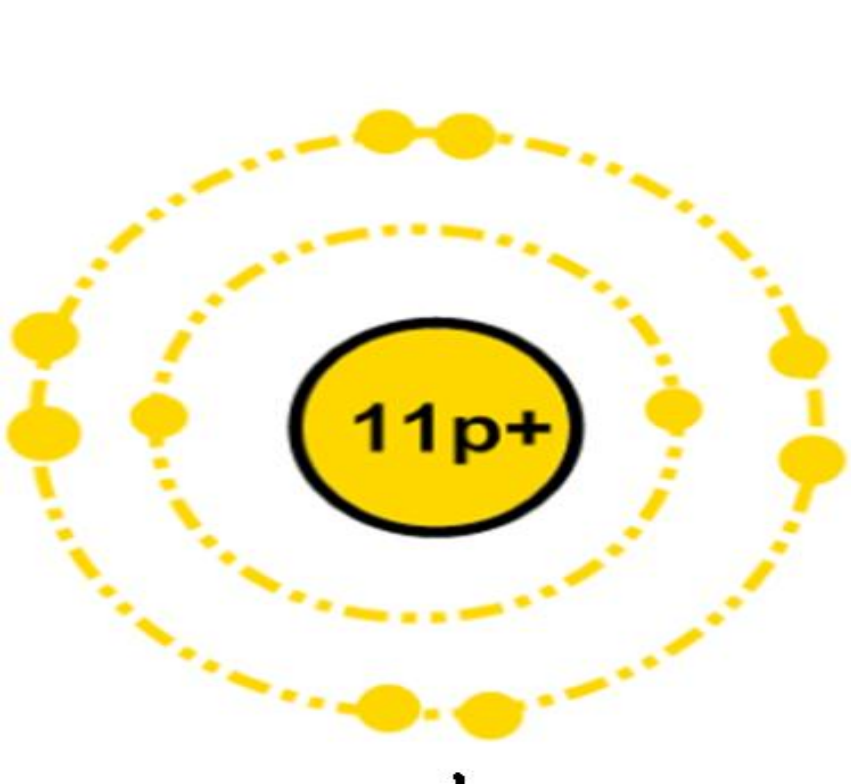
- To become chemically stable, in chemical reactions atoms either loose or gain electrons in order to be left with the right amount on the last shell.

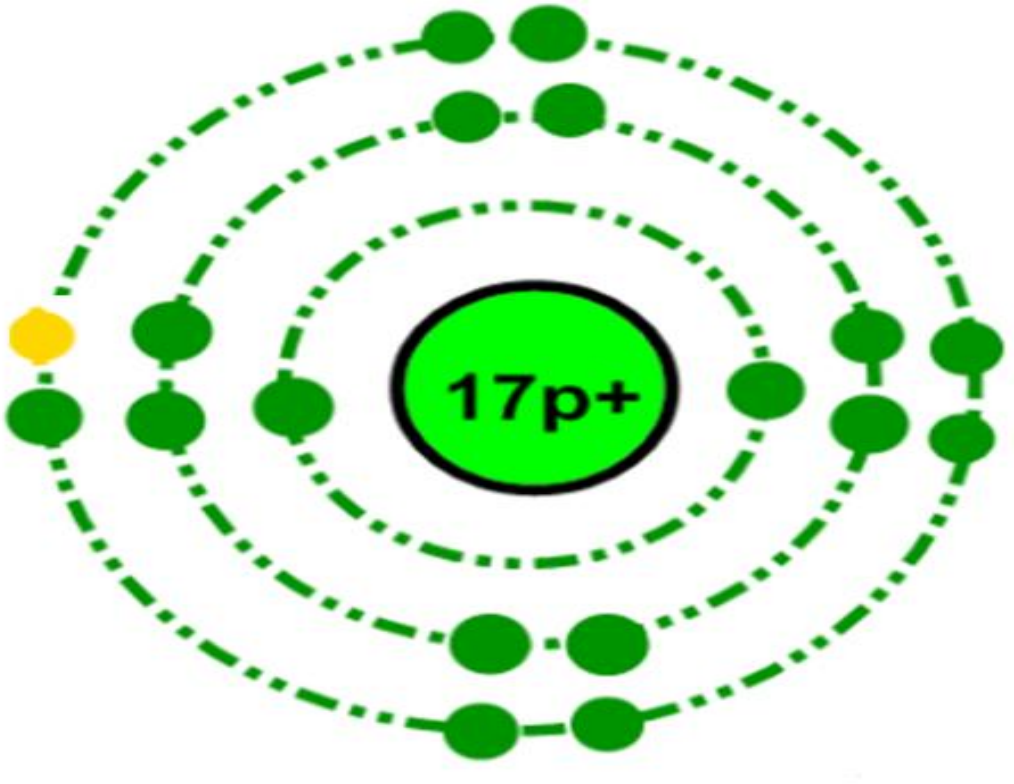


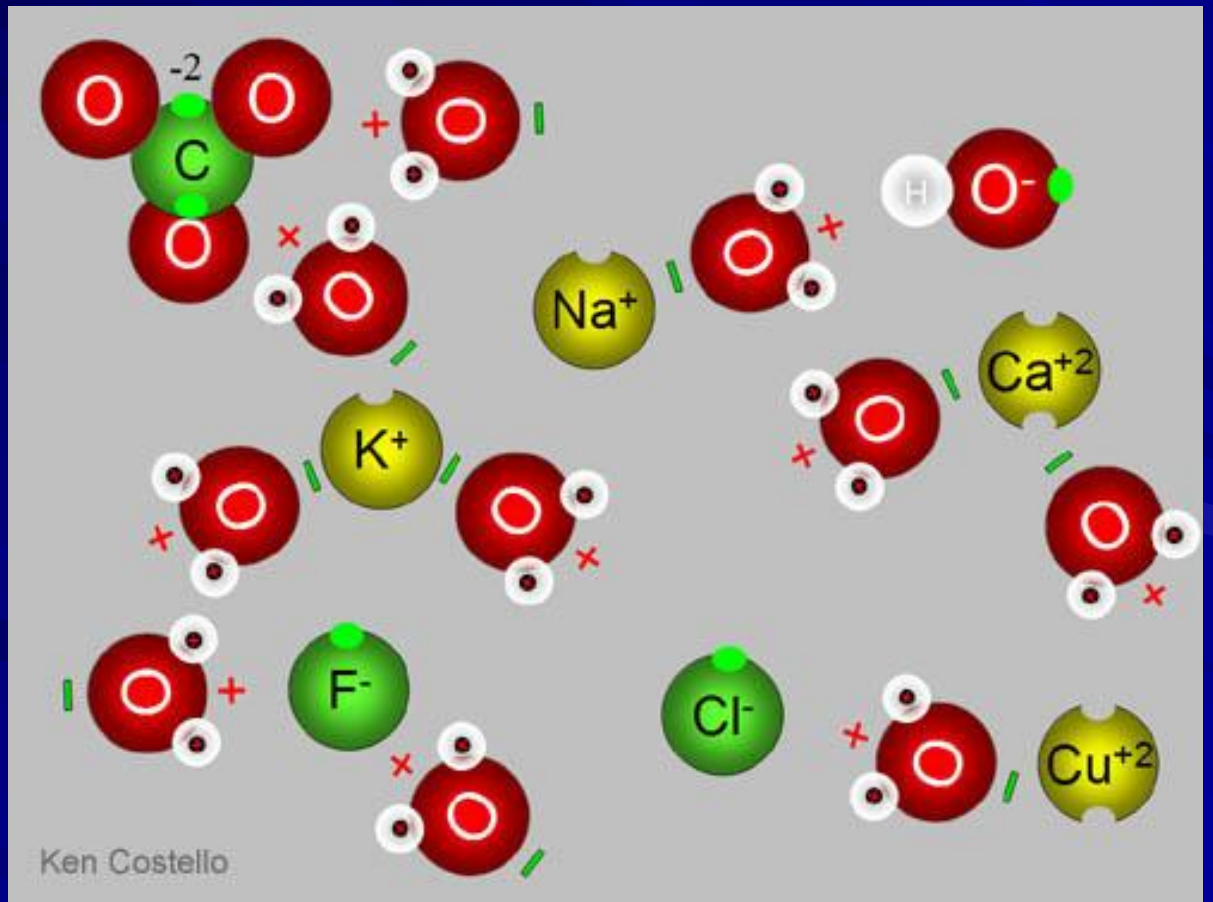
# CHEMICAL STABILITY

- Metals lose electrons and become positively charged.
- Non metals gain electrons and become negatively charged.



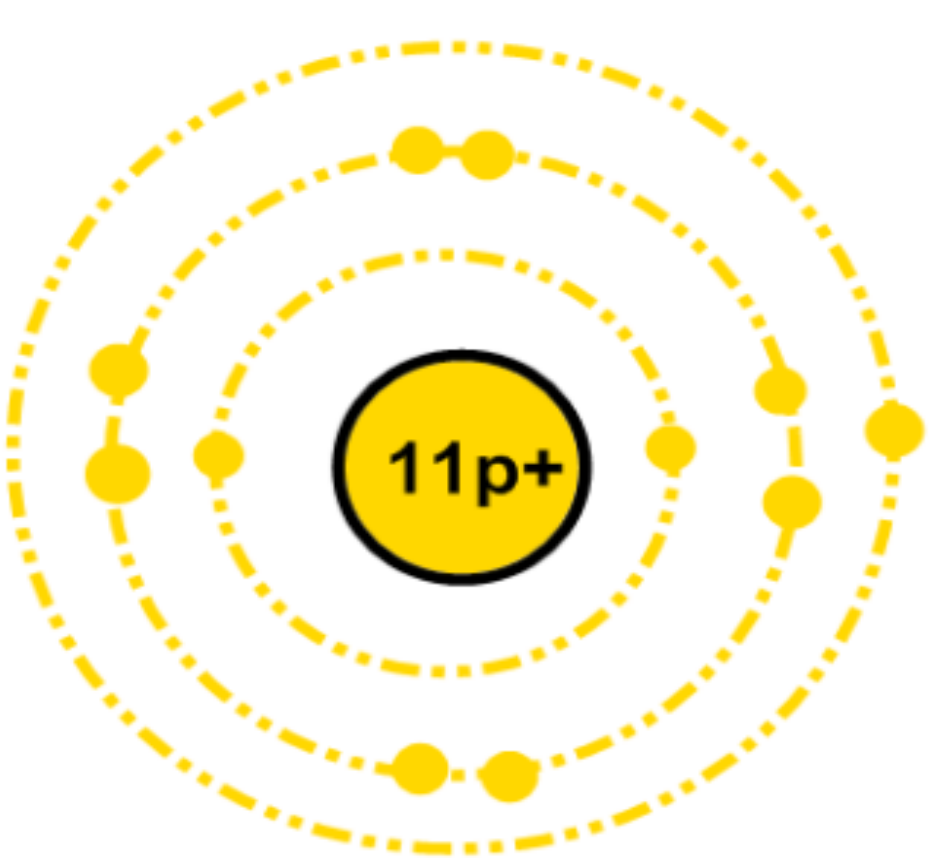



- ***Ions*** are particles that ***lost*** or ***gained*** one or more electrons. As a result, the carry ***positive*** or ***negative*** charges.

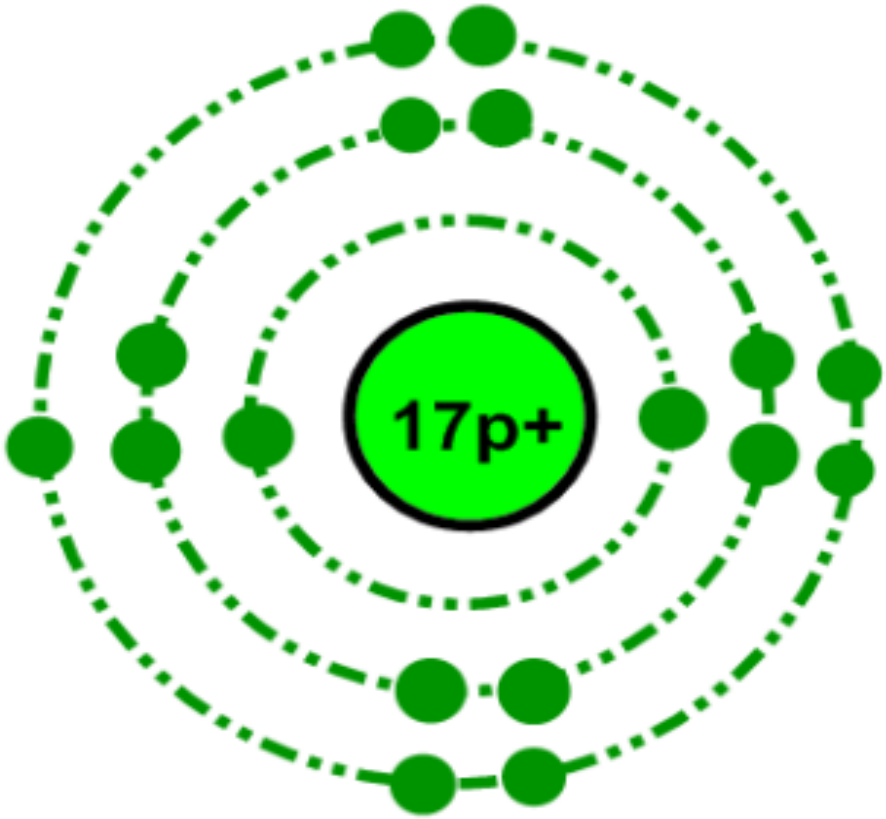


- EXAMPLE: The Sodium chloride molecule (kitchen salt).

**RUTHERFORD –BOHR DIAGRAMS OF SODIUM AND CHLORINE ATOMS IN NEUTRAL STATE**

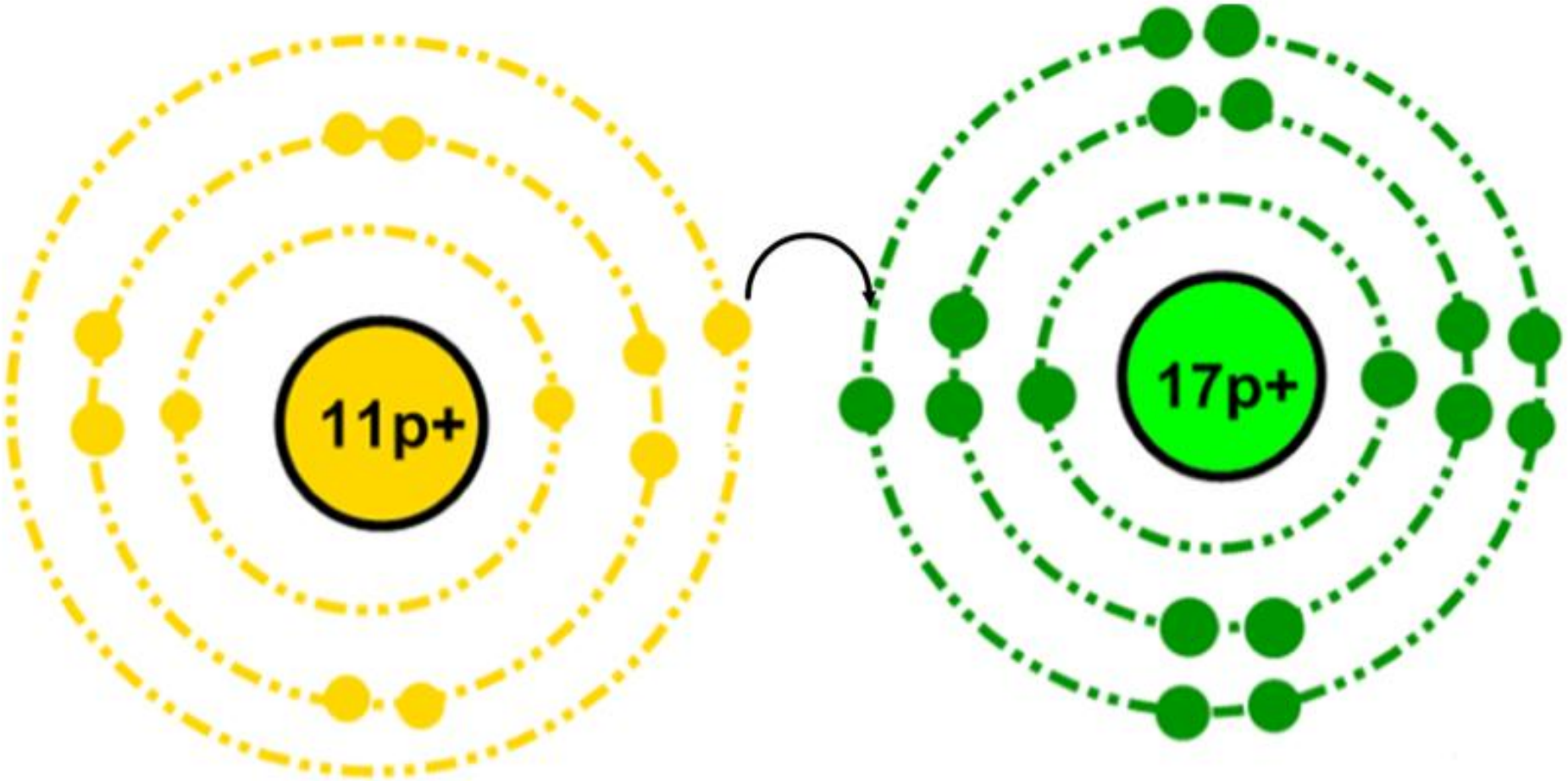



Na

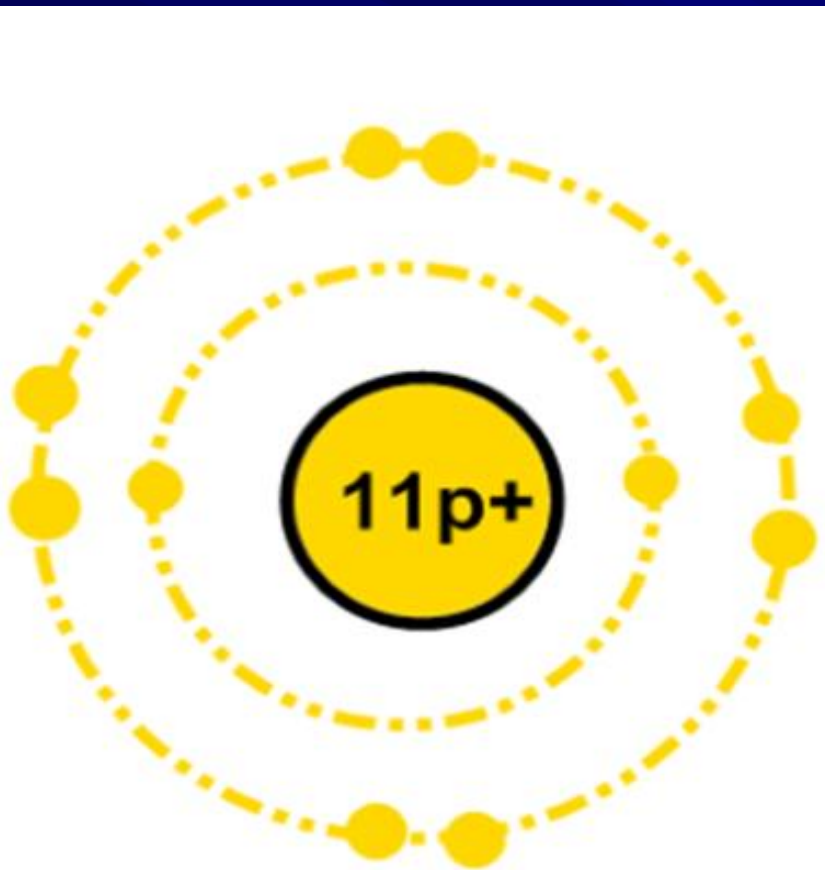



Cl

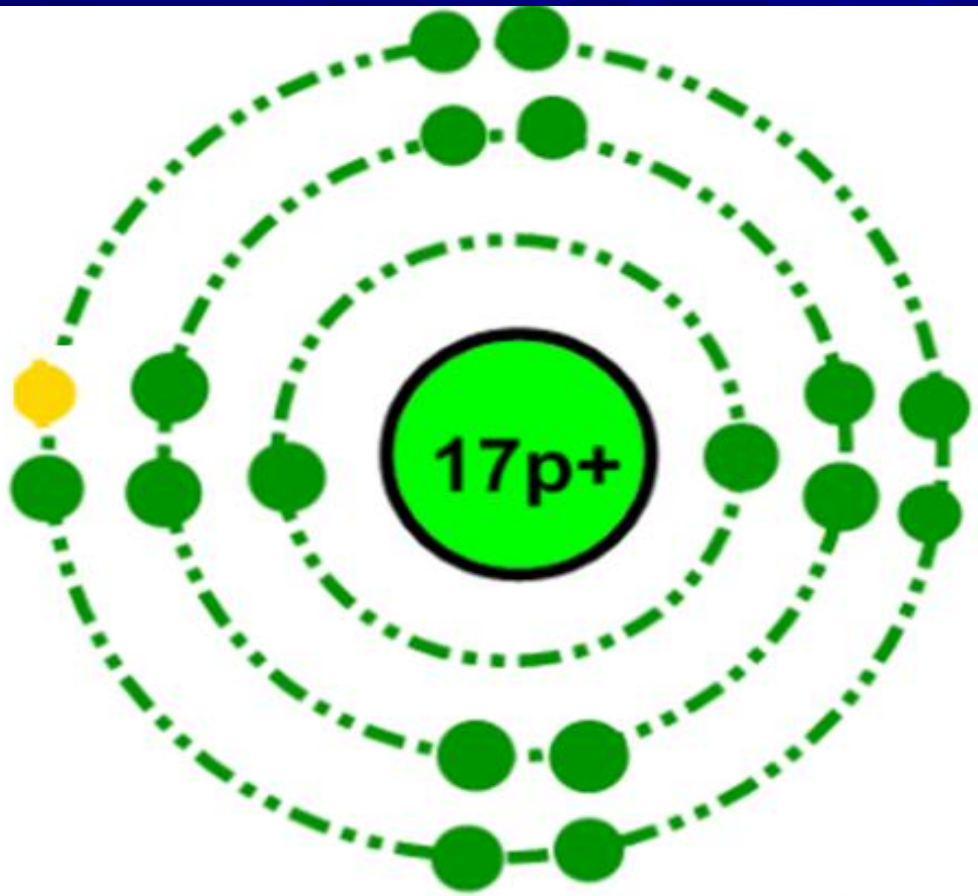
- In order to become chemically stable, sodium donates one electron to chlorine.



- This way sodium is going to be left with 8 electrons on the last shell and become chemically stable.

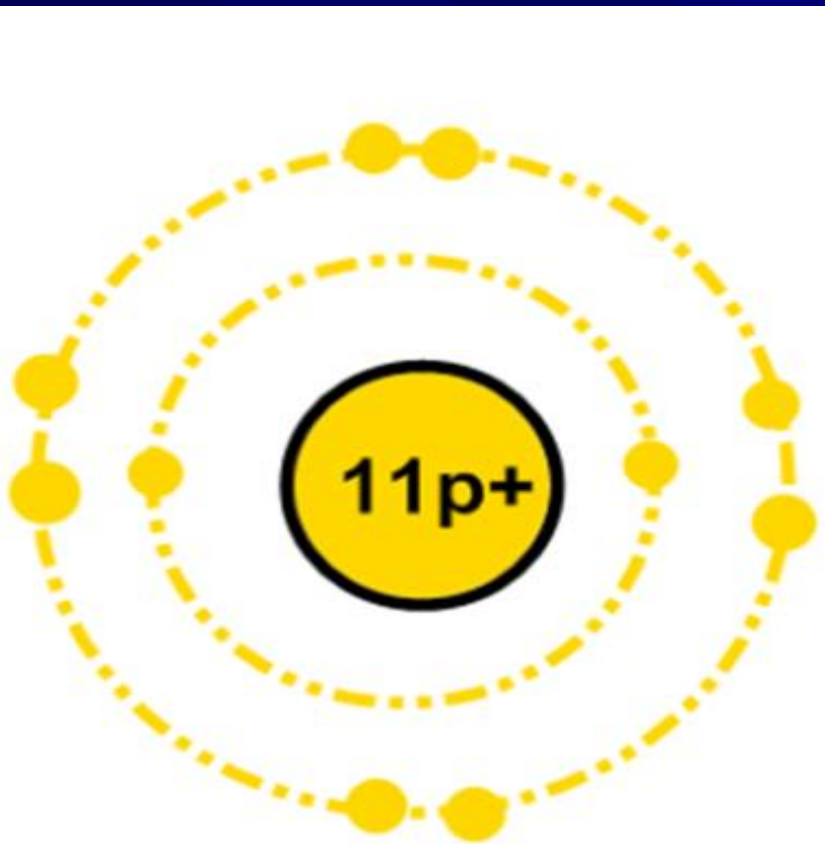



Na

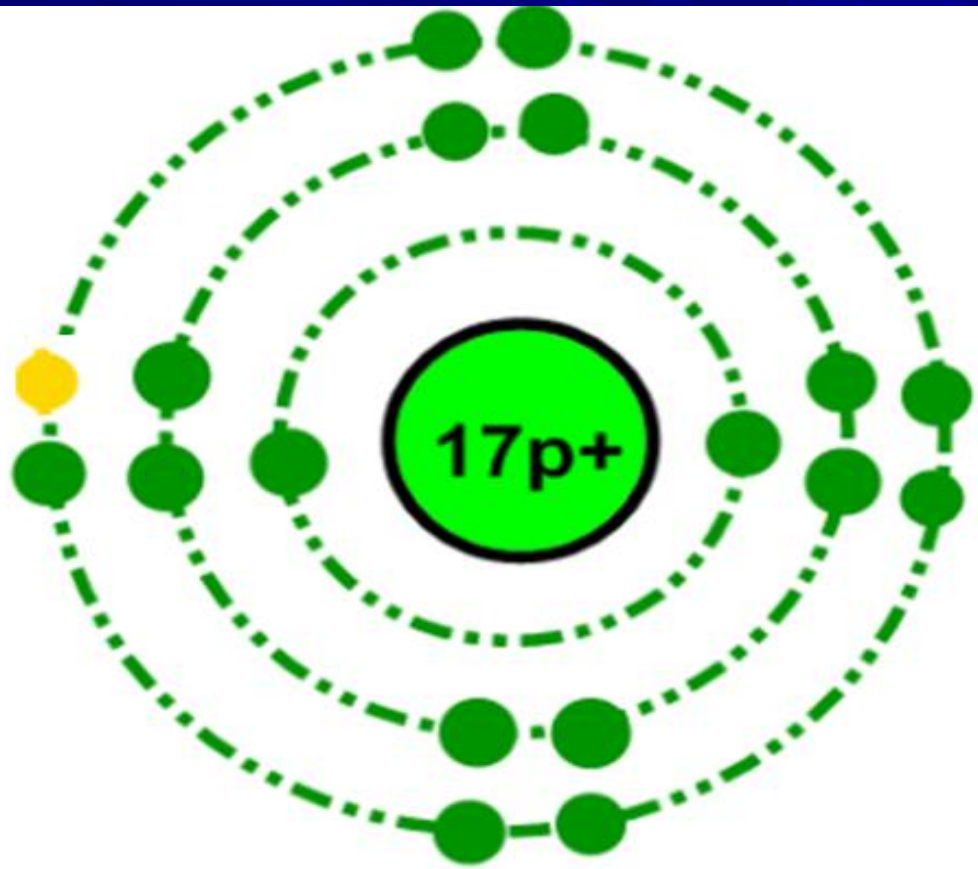



Cl

- Chlorine, by accepting that electron will have also 8 electrons on the last shell and become chemically stable as well.




Na

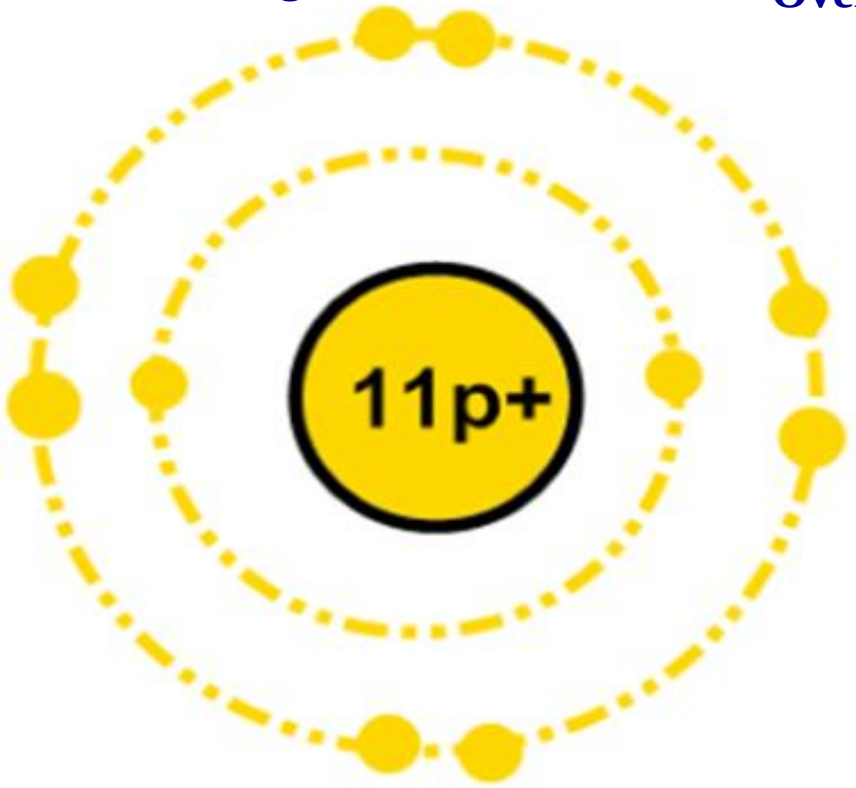



Cl

# But the electron balance is changed.

**Na : 11p+, 10 e-**

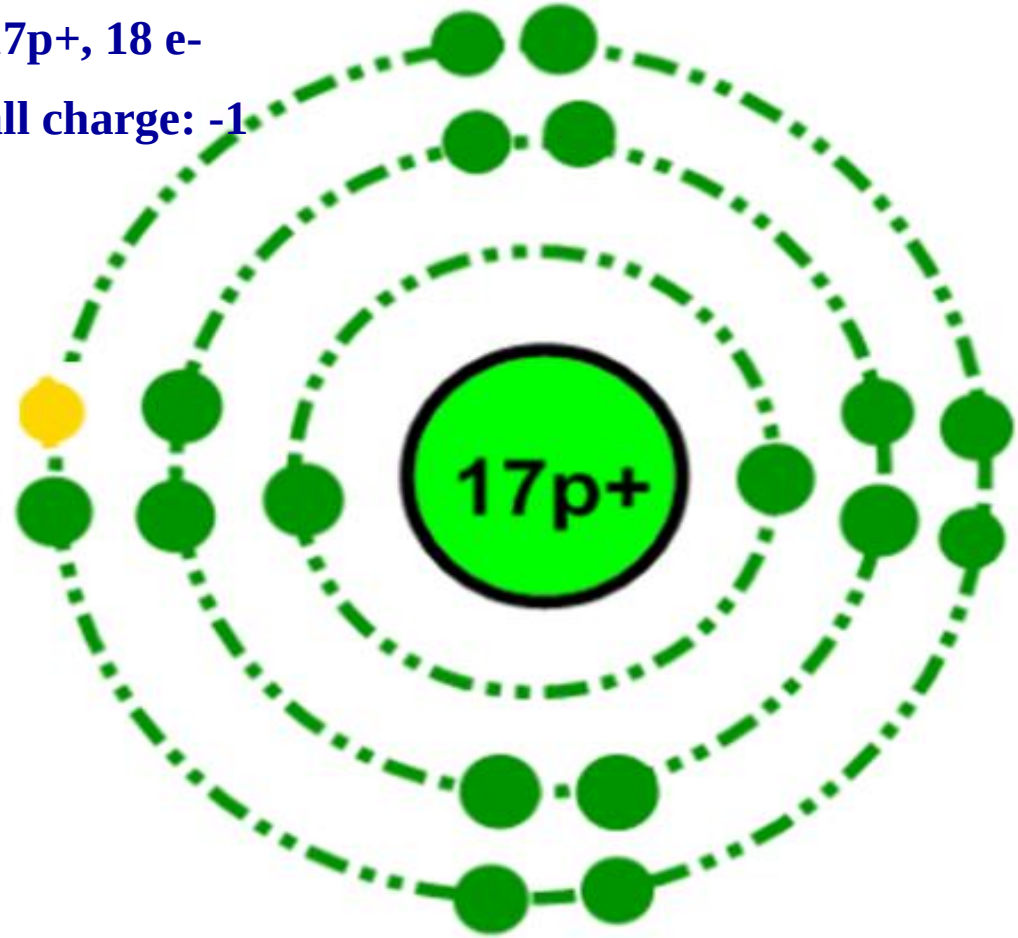
**Overall charge: +1**




$Na^+$ **Becomes a positive ion**

**Cl : 17p+, 18 e-**

**Overall charge: -1**

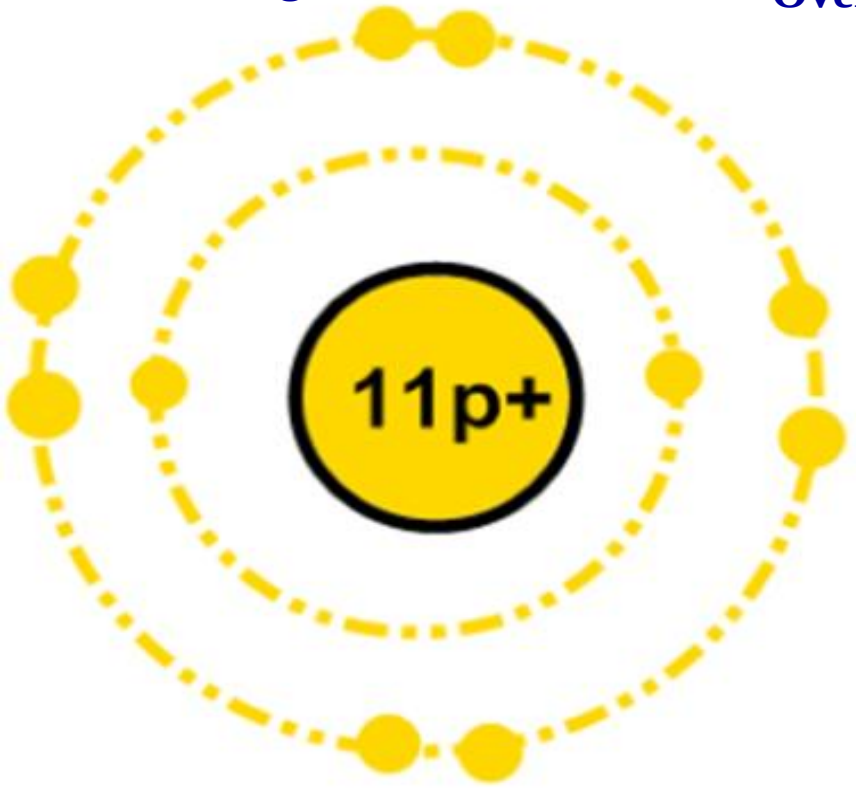



$Cl^-$ **Becomes a negative ion**

- By losing an electron , sodium will have one extra proton and will become a positive ion.

**Na : 11p+, 10 e-**

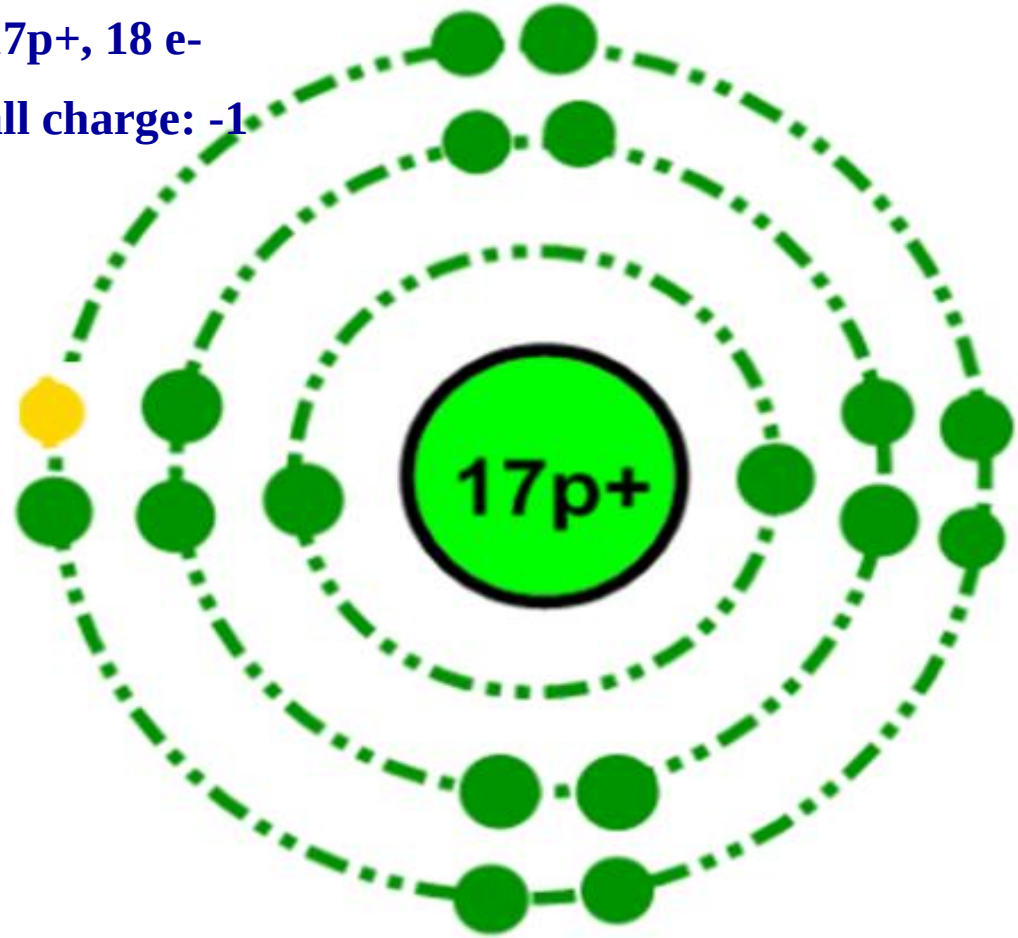
**Overall charge: +1**




$Na^+$ **Becomes a positive ion**

**Cl : 17p+, 18 e-**

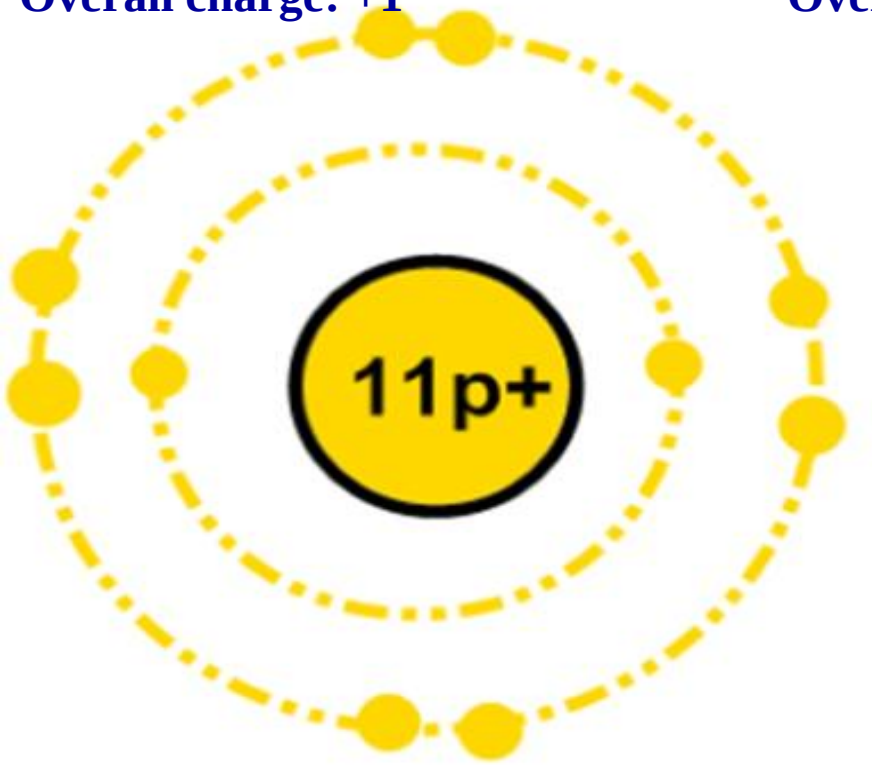
**Overall charge: -1**




$Cl^-$ **Becomes a negative ion**

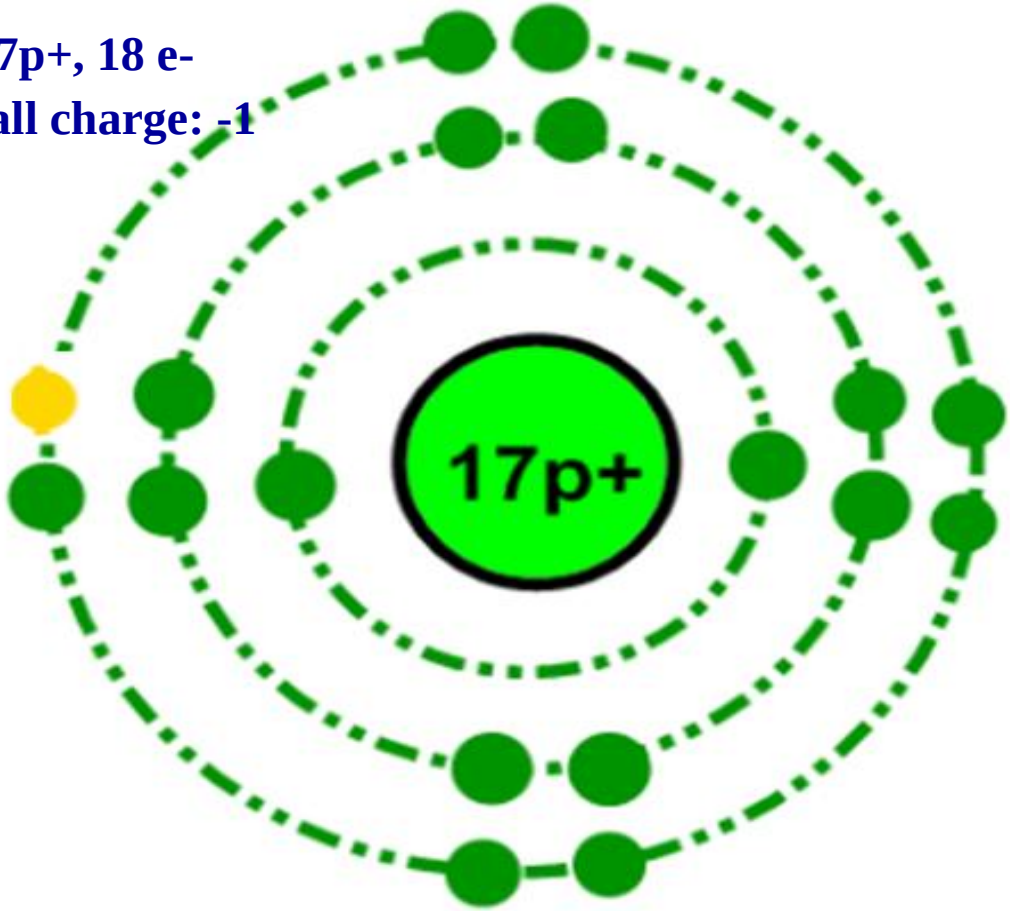
- Chlorine , by gaining an electron on will have one less proton and will become a negative ion.

**Na : 11p+, 10 e-**
**Overall charge: +1**



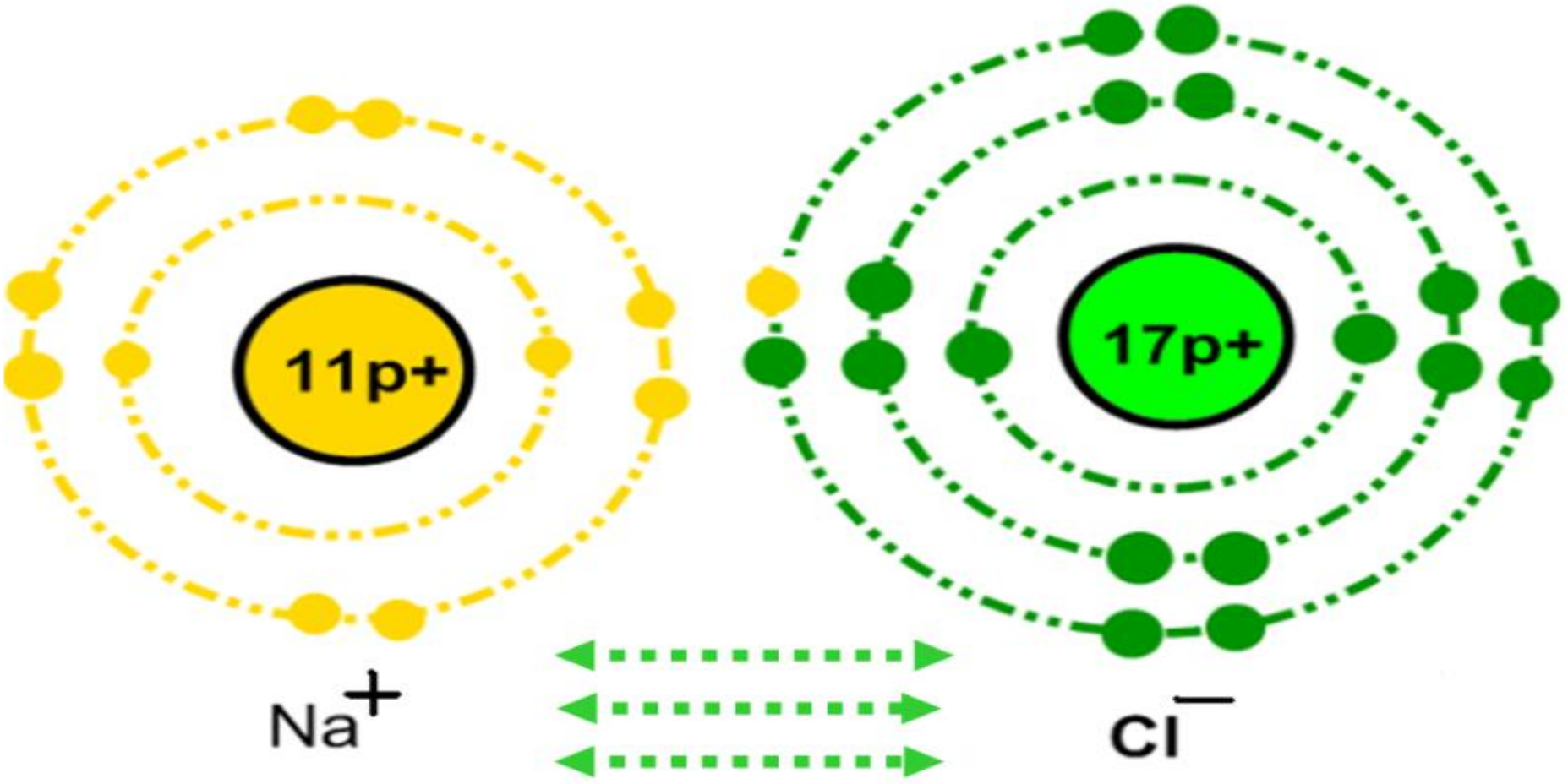

$Na^+$ **Becomes a positive ion**

**Cl : 17p+, 18 e-**
**Overall charge: -1**



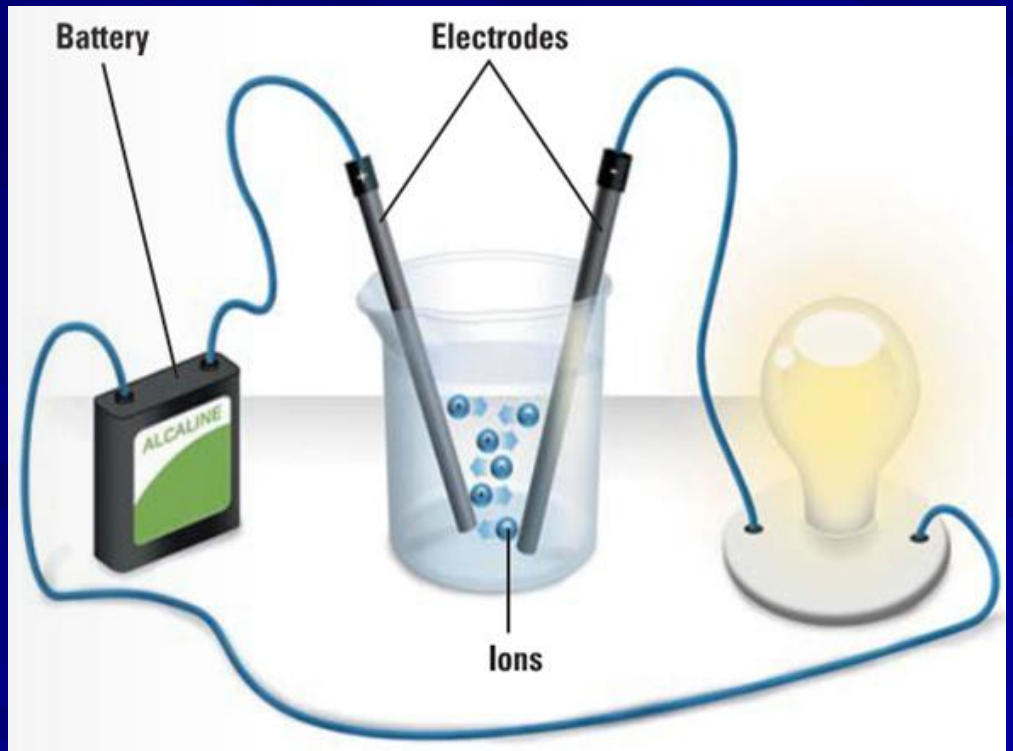

$Cl^-$ **Becomes a negative ion**

The NaCl molecule is held together by electrostatic attraction between these two ions with different charges.

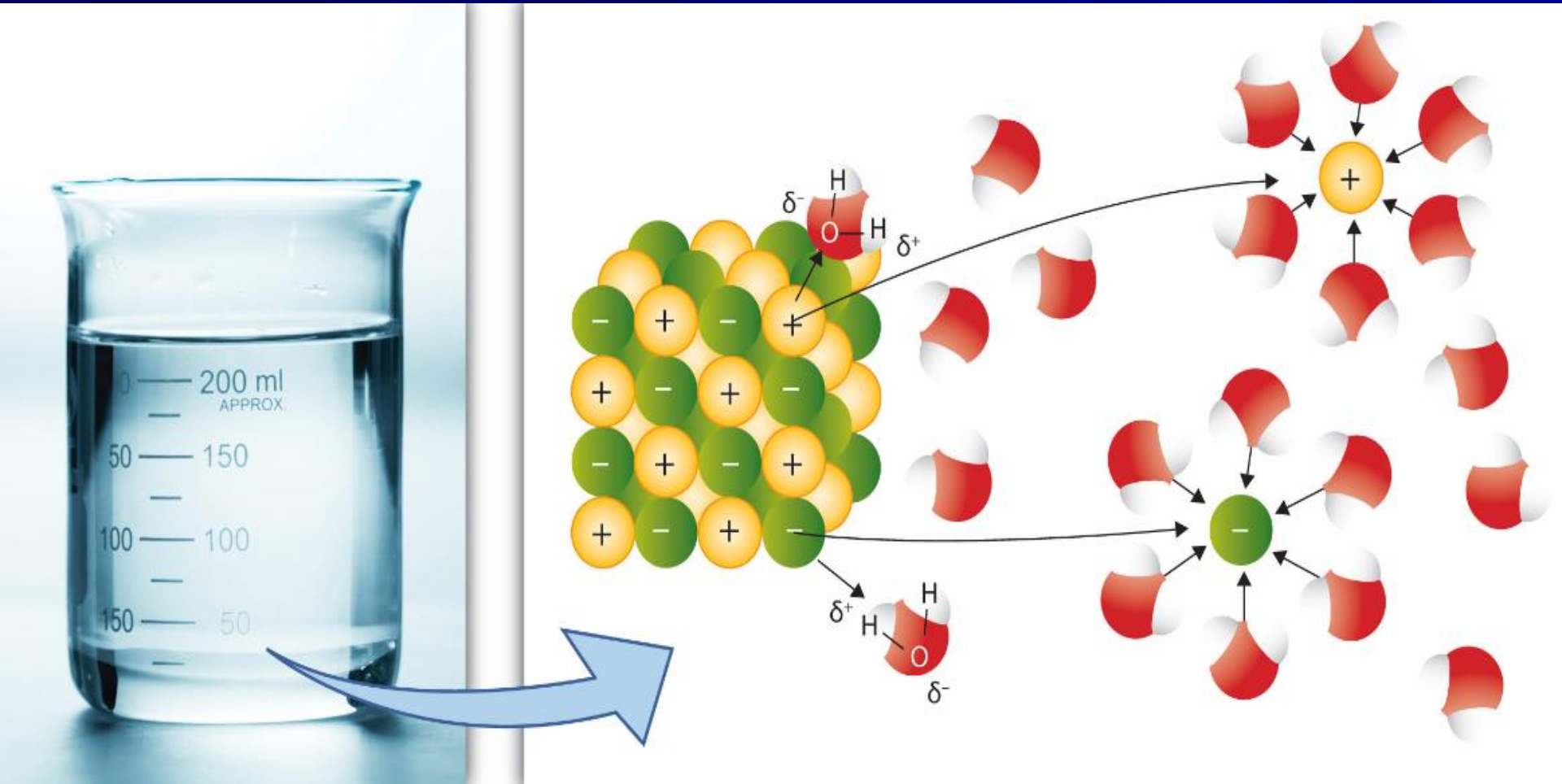


# Electrolytes

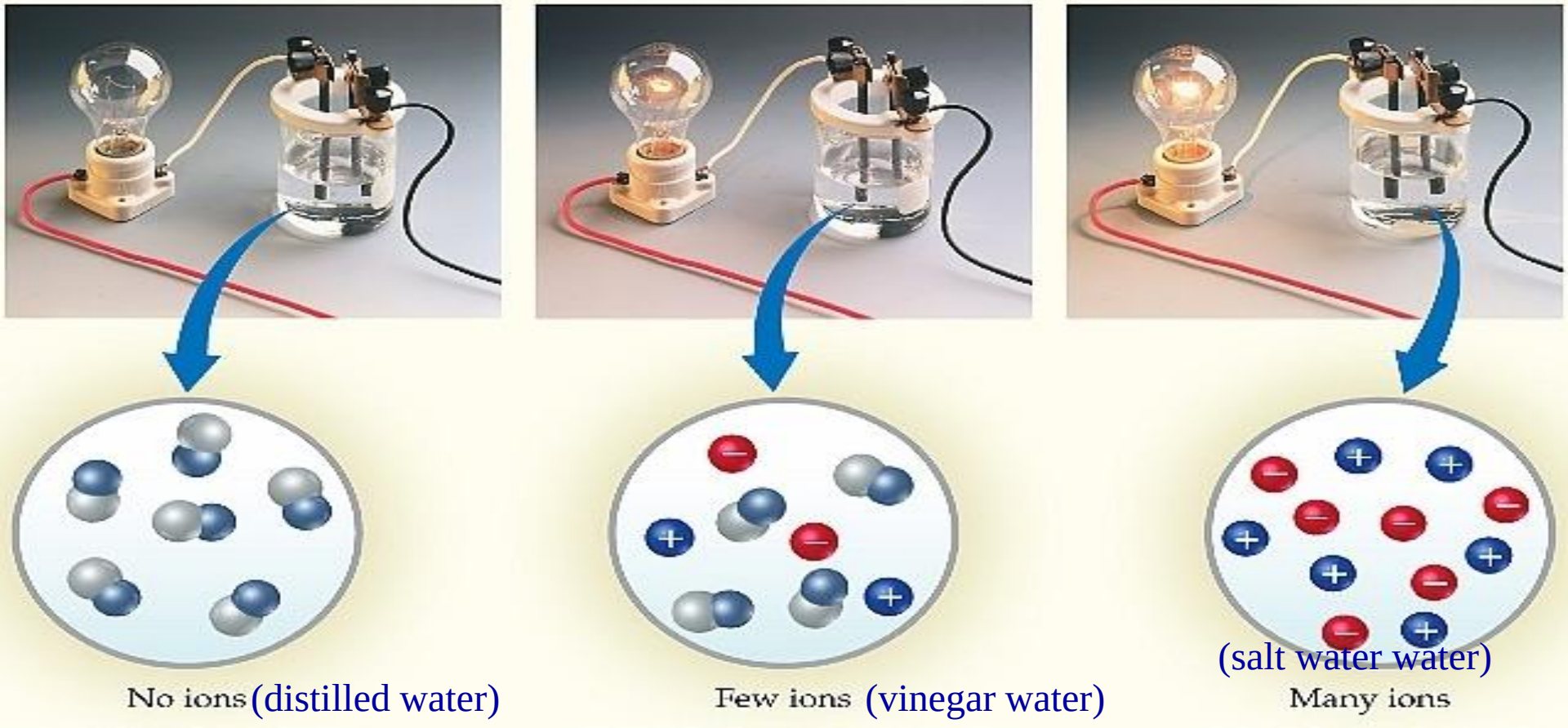
- Electrolytes are substances which enable ***electrical conductivity*** when dissolved in water, because they release ***positive*** and ***negative*** ions.



- The process by which a substance dissociates into ***positive*** and ***negative*** ions *(when dissolved in water)* is called ***electrolytic dissociation*** or “electrolysis”.

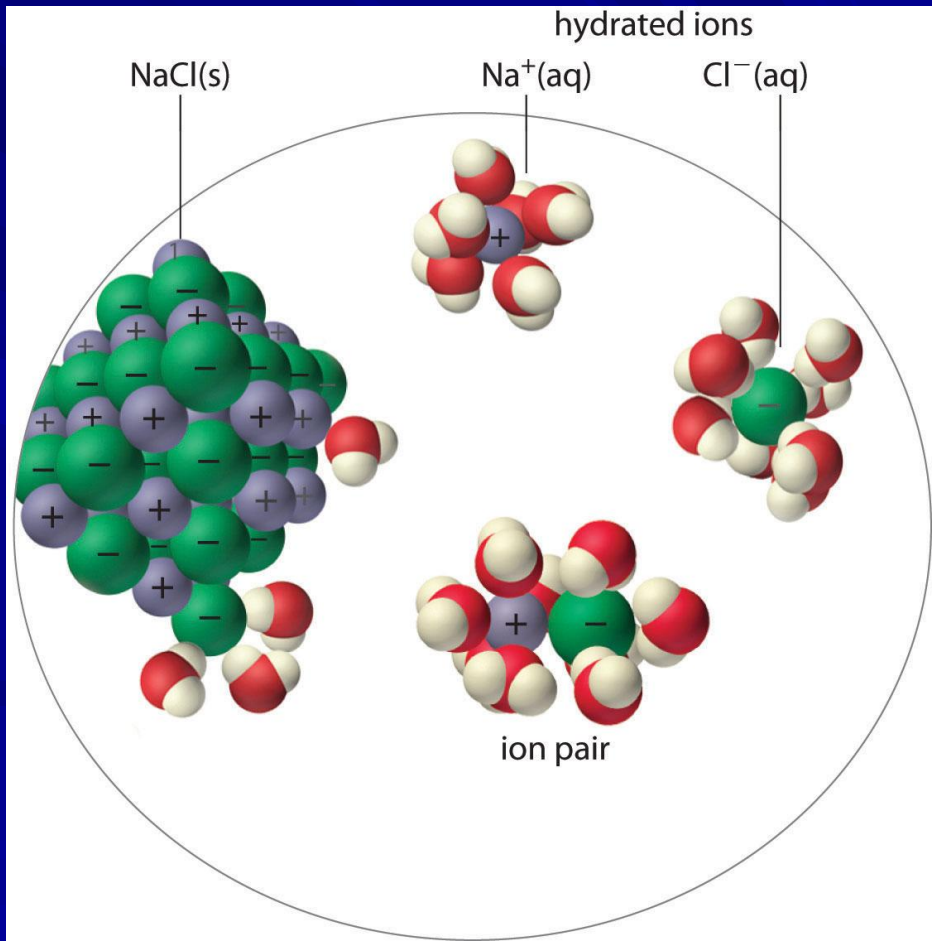


- The ions liberated by electrolytic dissociation (like Na+ and Cl-) enable a current to pass between the two electrodes inserted into the solution.



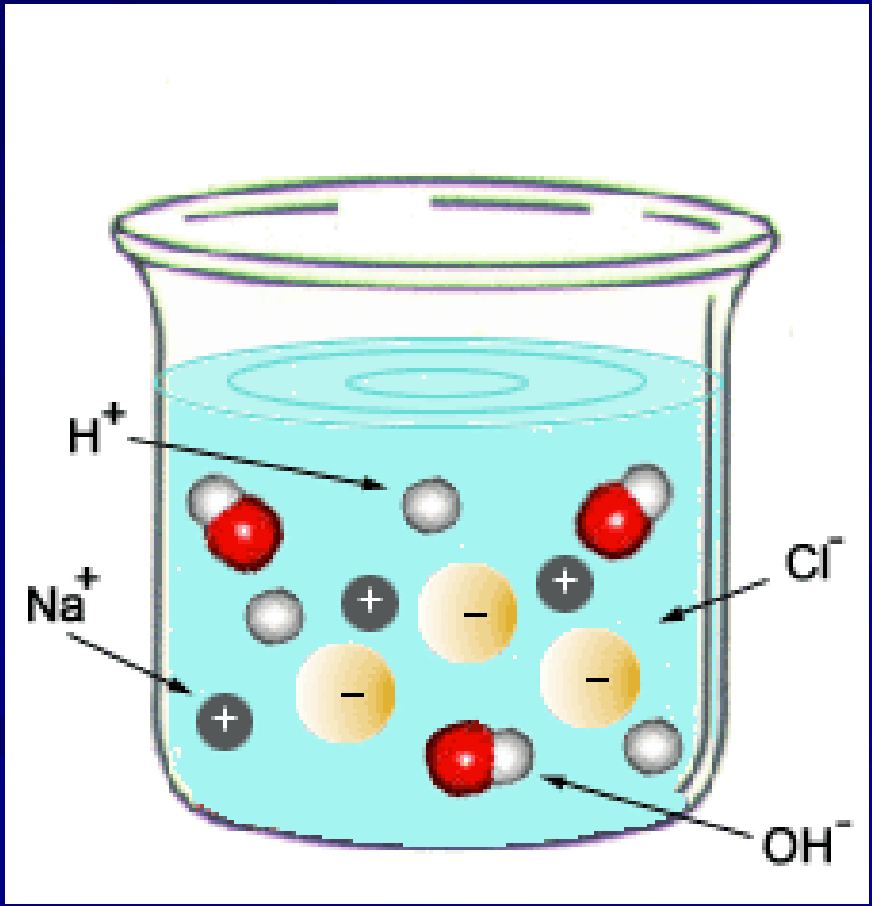
- When ***acids***, ***bases*** and ***salts*** are dissolved in water, they become ***electrolytes*** with particular characteristics.

  - Click on the picture to play the video.



- Therefore,  acids, salts and bases are the only chemicals that form electrolytes.

- Because they have ions in their composition acids, salts and bases are also called "***ionic compounds***".



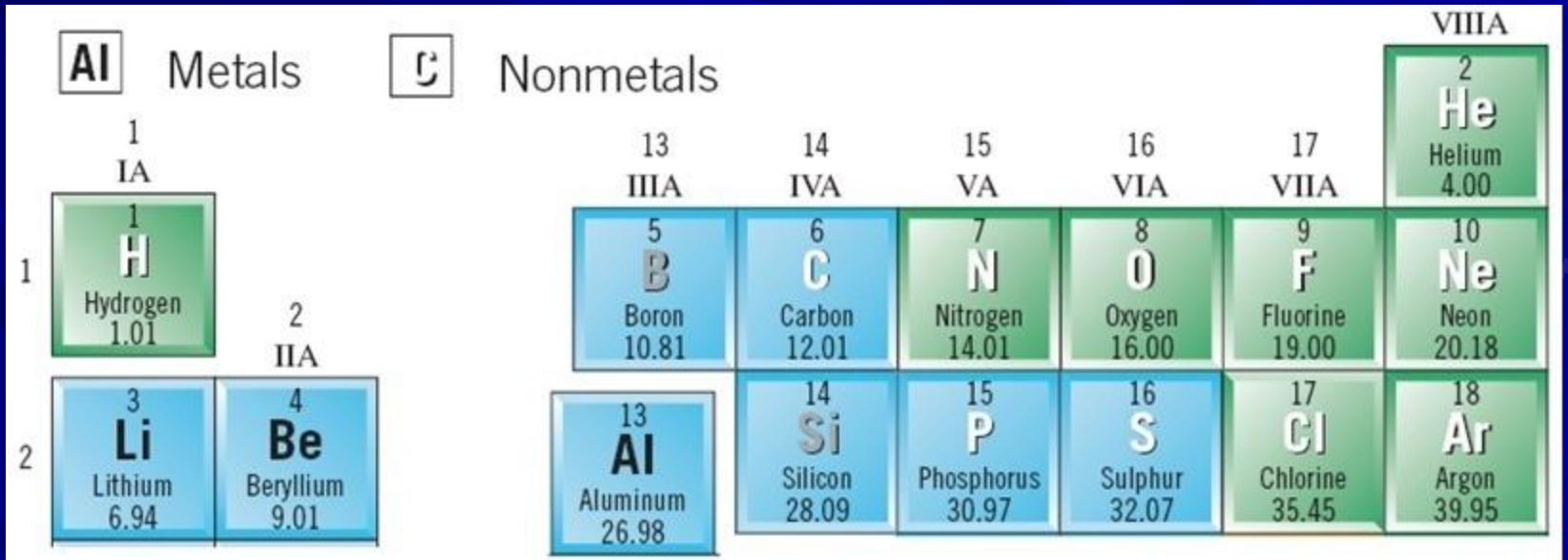
# CHARACTERISTICS OF ACIDS

- Acids are chemical substances that ***release*** *H+* ions in aqueous solutions(when dissolved in water).
- They ***neutralize*** bases.
- Their *pH < 7.*
- Acids ***turn blue litmus paper red.***

- The formula for acids is:

H - Nonmetal

- **Ex: HCl**



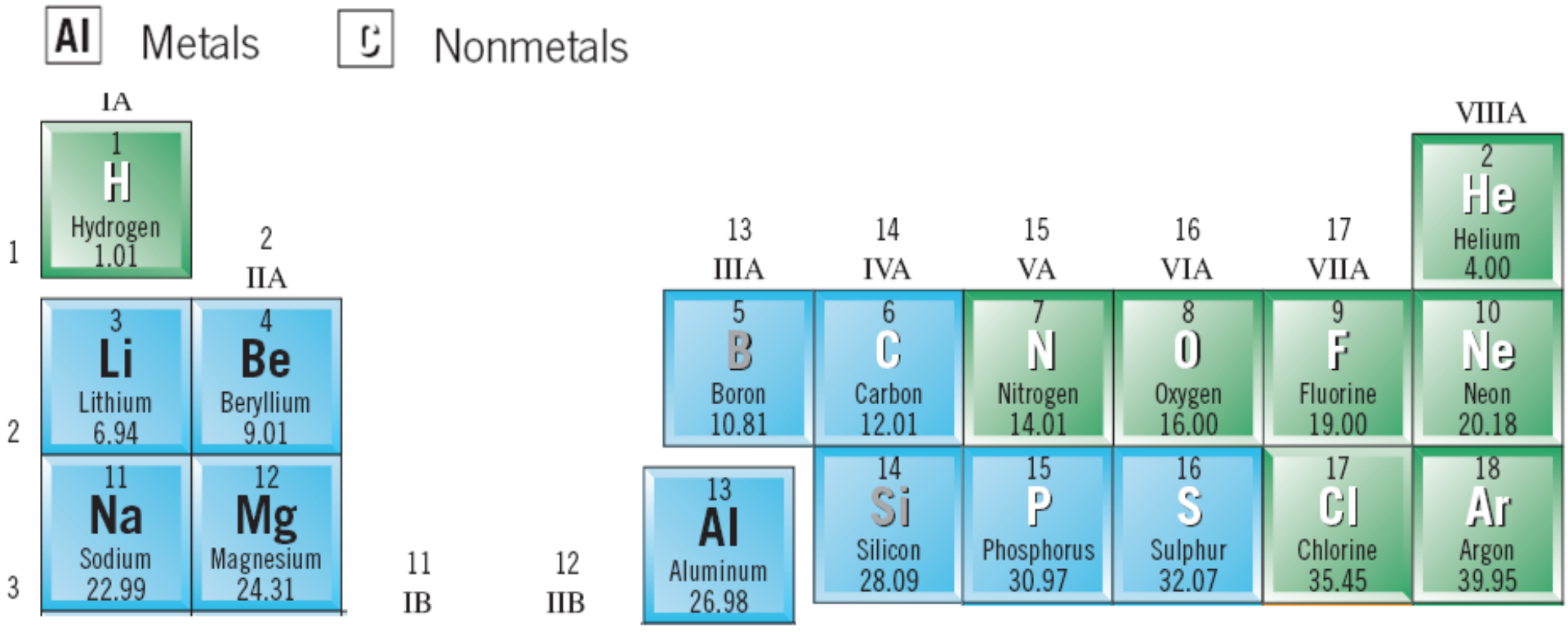
# CHARACTERISTICS OF BASES

- Bases are substances that ***release $OH^-$ ions*** in aqueous solutions.
- They ***neutralize*** acids.
- Their ***$pH > 7$.***
- Bases turn ***red litmus paper blue.***

- **The formula for bases is:**

Metal – OH

**Ex: NaOH**



# CHARACTERISTICS OF SALTS

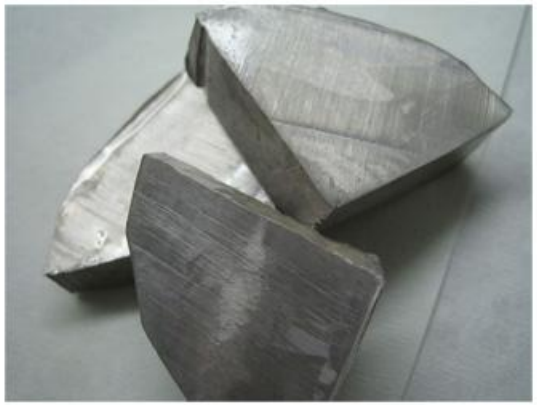
- Salts are chemical substances that release ***metal*** and ***non-metal*** ions other than $H^+$ and $OH^-$ in aqueous solutions.
- They are ***one of the products*** of an acid-base neutralization.
- Their ***pH is variable.***
- Their reaction to the litmus paper

is also variable, ***according to their pH.***

- The formula for salts is:

Metal - Nonmetal

**Ex: NaCl**



sodium metal

+

chlorine gas

→

table salt

# THE END

You are amazing!

Thank You