Electrons on the Move!

- The goal of every atom is to become stable like the Noble Gases. Typically 8 e^- in outer shell
  exception: He with 2 / Hydrogen wants 2 or 0
- There are three ways this can be accomplished:
  - Lose electrons / donate electrons
  - Gain electrons
  - Share electrons

Remember Valence Electrons?

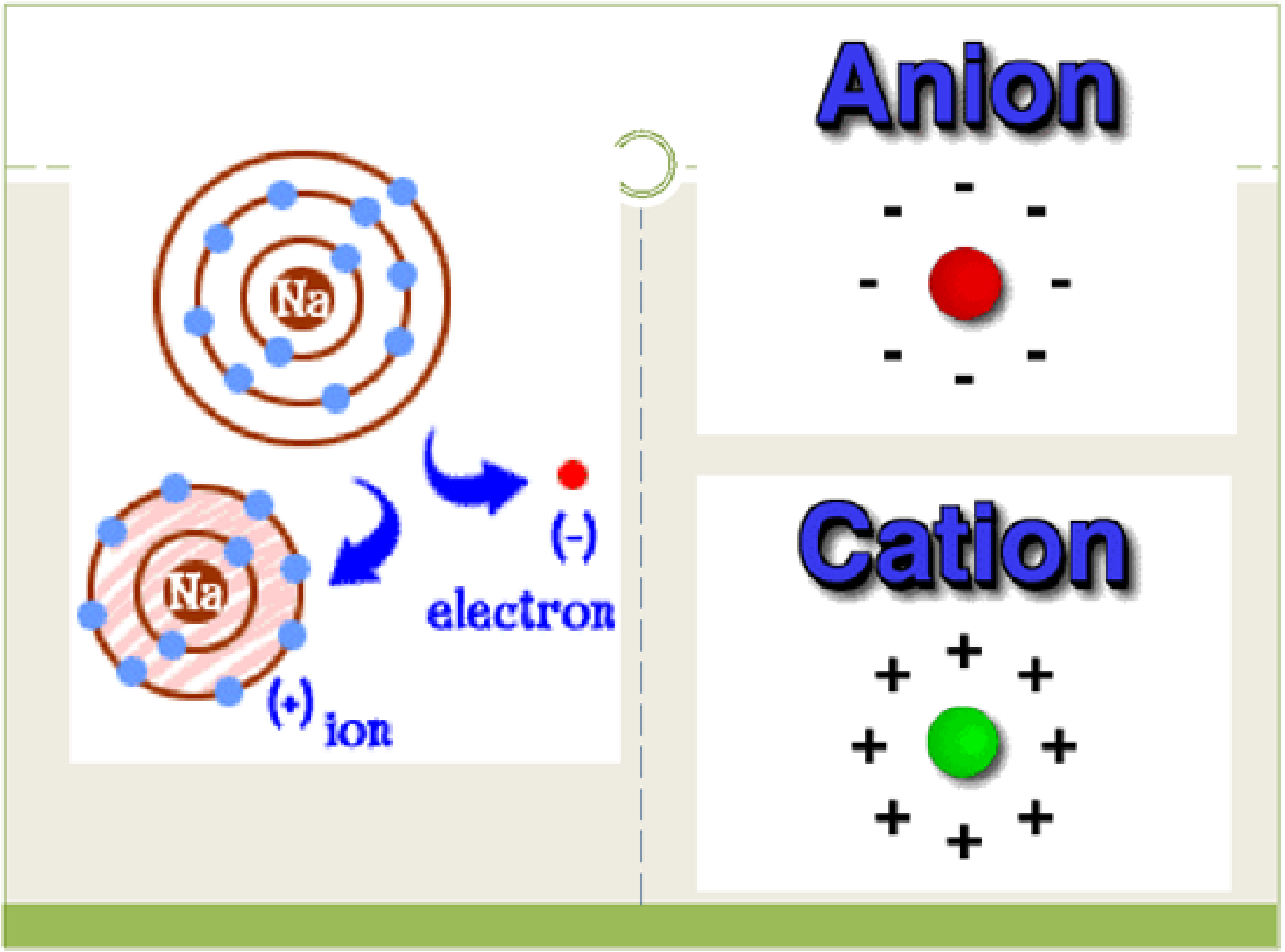
- What are they?
  - Electrons on the last shell or energy level of the atom
- How many valence electrons around each of these elements?
  - Na $1e^-$
  - S $6e^-$
  - Br $7e^-$
  - Ne $8e^-$

Ions

- Ions are an atom or a group of atoms that have a positive or negative charge.
- An ion is formed when atoms **lose** or **gain** electrons
  - There are two types:

1. **Cation** – a positively charged atom caused by a neutral atom **losing** one or more electrons
2. **Anion**: a negatively charged atom caused by a neutral atom **gaining** one or several electrons.

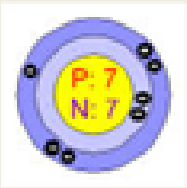
- Metals form cations because they lose electrons easily. Therefore their charge is positive.
  - How many electrons will the following metals lose?
    - Na → 1 valence e^- → loses $1e^-$
    - Mg loses $2e^-$
    - B loses $3e^-$
- Non metals form anions because they gain electrons. Therefore their charge is negative.
  - How many electrons will the following non-metals gain?
    - N → 5 valence e^- → gains $3e^-$
    - O gains $2e^-$
    - F gains $1e^-$
    - Ne neither gains or loses e^-
- After losing or gaining electrons, their valence shell is full and therefore stable.


Anion
Na
Na
(-)
electron
(+) ion
Cation

- Ex: N

  is a non-metal and in group 15, therefore it has to gain 3 electrons to become the anion N^{3-} .

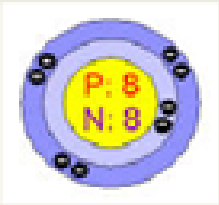
N^{3-}



- Ex: O

  is a non-metal in group 16, therefore it has to gain 2 electrons to become stable. It will become the anion O^{2-} .

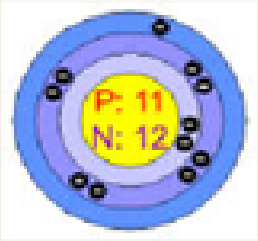
O^{2-}



- Ex: Na

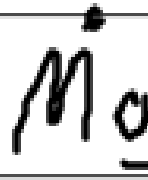
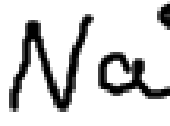
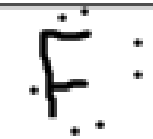
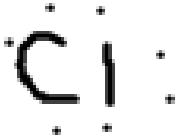
  is a metal in group 1, therefore it has to lose 1 electron to become stable. It will become the cation Na^{+}.

Na^{+}



To Do:

- Animation: What are ions?
- Notes: Ions
- Practice Sheets (x2)

Symbol	Lewis Diagram	Lose or gain electrons?	How many do they lose or gain?	Resulting charge?	Symbol of the new ion	Cation or anion?
Mg		Lose	$2e^-$	2+	Mg^{2+}	cation
Na		lose	1 é	1+	Na^+	cation
F		gains	$1e^-$	1−	F^-	anion
O		gains	2 é	2^-	O^{2-}	anion
Cl		gain	1	1-	Cl^-	anion
Li		lose	$1e^-$	+	Li^+	cation
S		gain	2e	2-	S^{2-}	anion
Ne		—	—	—	—	—

1. How many valence electrons, and how many shells (energy levels) do each of the following elements have?

a) Fluorine b) sodium c) carbon

Complete the Bohr-Rutherford diagram to prove your answer.

2. Which element is found in:

Group	Period	Element?
1	2	
17	4	
15	3	

3. Name the group and the period of the following elements:

a) C b) Sr c) Al