

Subatomic Particles

Inner and Valence Electrons (e⁻)

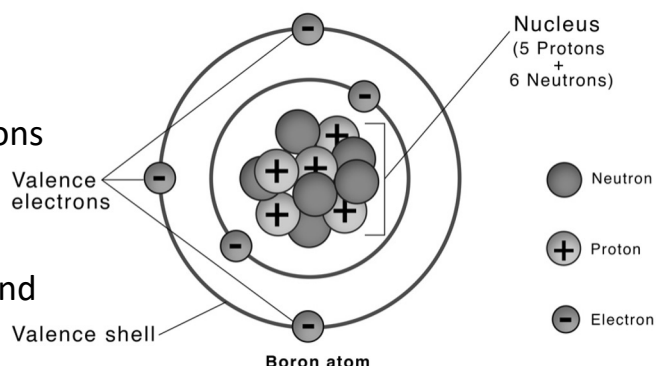
Electrons contain different roles within the atom

Inner (*Shell*) Electrons

Provide repulsive force (- to -)
helping protect valence electrons

Valence (*Outer*) Electrons

Electrons that communicate
(*transferred or shared*) and bond
(*connect*) with other atoms



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Subatomic Particles

Counting Valence Electrons (e⁻) [*Representative Groups*]

Valence Electrons are based on group on the table

Group	Name	Val e ⁻	Group		Val e ⁻
1A (1)	Alkali Metals	1	5A (15)	Pnictogens	5
2A (2)	Alkali Earth Metals	2	6A (16)	Chalcogens	6
3A (13)	Earth Metals	3	7A (17)	Halogens	7
4A (14)	Carbon Group	4	8A (18)	Noble Gases	8

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Subatomic Particles

Octet Rule

Atoms are the most stable when they have 0 or 8 valence electrons.

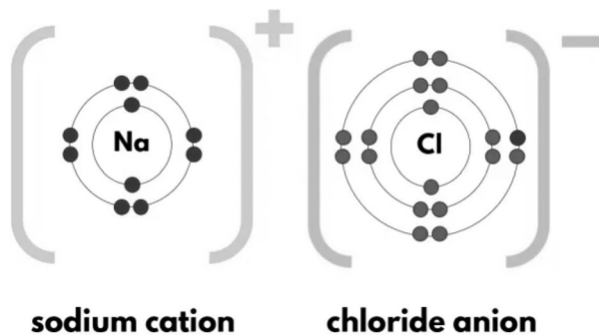
Ion – Atom that has lost or gained e^- to fulfil the octet rule

Sodium (Na)
loses $1e^-$ to
form a **cation**

$1 \text{ val } e^- \rightarrow$

$0 \text{ val } e^-$

Cation = + Ion



Chlorine (Cl)
gains $1e^-$ to
form an **anion**

$7 \text{ val } e^- \rightarrow$

$8 \text{ val } e^-$

Anion = - Ion

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Valence Electron and Ion Structure

The following chart displays the basic atomic structure including the valence electrons and charges for atoms and ions of representative (1A – 8A) elements

Group Number	1A 1	2A 2	1B – 10B 3 - 12	3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
Valance Electrons (e^-)	1	2	2	3	4	5	6	7	8
Atom Type	Alkali Metals	Alkali Earth Metals	Trans. Metals	Earth Metals	Carbon Group	Picogens	Chalcogen	Halogens	Noble Gases
Ion Charge	+1	+2	Var.	+3	+4	-3	-2	-1	0
Lose e^- Gain e^-	Lose 1	Lose 2	Var.	Lose 3	Lose 4	Gain 3	Gain 2	Gain 1	Gain 0
Ion Valence Electrons (e^-)	0	0	0	0	0	8	8	8	8

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