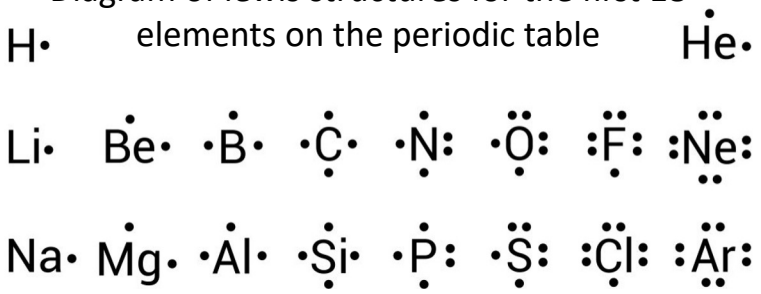
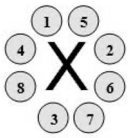
Lewis Dot Structures

Lewis Dot Structures are representations of valence e^- for atoms

Diagram of lewis structures for the first 18 elements on the periodic table



In the atomic structure, electrons always fill one electron per suborbital (side), then pair



Valance e^- by periodic groups

Group	Val e^-	Group	Val e^-
1A	1	5A	5
2A	2	6A	6
3A	3	7A	7
4A	4	8A	8

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Subatomic Particles

Octet Rule

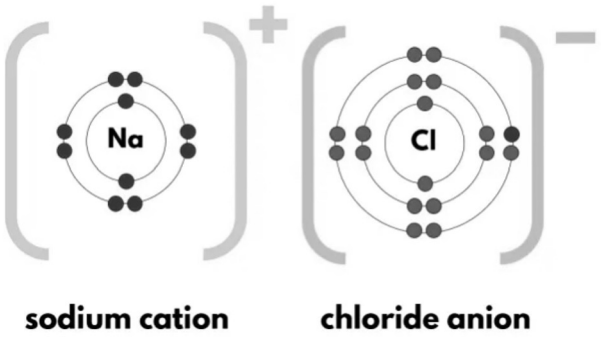
Atoms are the most stable when they have 0 or 8 valence electrons.

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

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

1 val e^- → 0 val e^-

Cation = + Ion



sodium cation chloride anion

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

7 val e^- → 8 val e^-

Anion = - Ion

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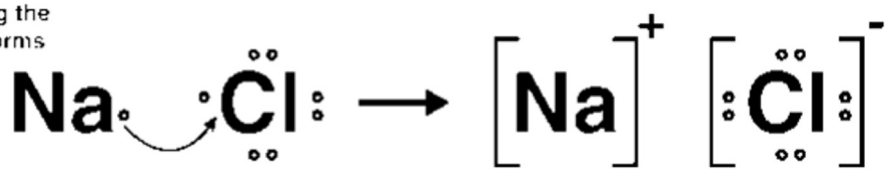
Subatomic Particles

Ion Charge

Charge of an ion is based on the group on the periodic table

Cation (+ ion): Ions formed due to losing electrons (*metals*)
Anion (- ion): Ions formed due to gaining electrons (*non-metals*)

Na atom releasing the one electron to forms Na^+ cation ion.



Metal	Non-Metal	Cation	Anion
1 val e^-	7 val e^-	0 val e^-	8 val e^-

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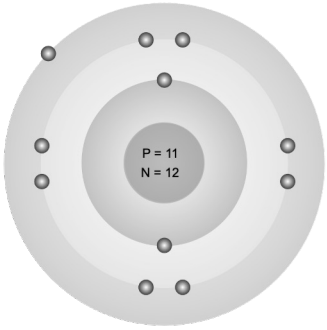
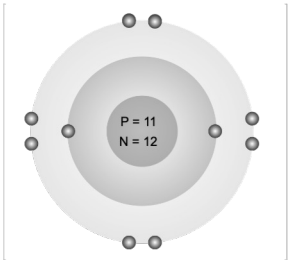
Subatomic Particles

Charges of Ions– Cations (Lose e^-)



Na Atom



Na^+ Ion

Neutral Atom
Sodium (*Metal*)
$11p^+ + 11e^- = 0$
No Charge - Neutral

Cation (*Lose 1e*$^-$)
Sodium Ion (*Cation*)
$11p^+ + 10e^- = +1$
+1 Charge - Cation

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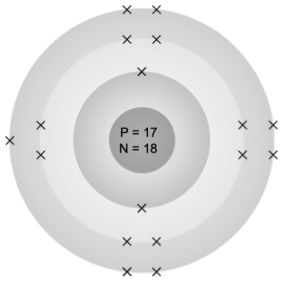
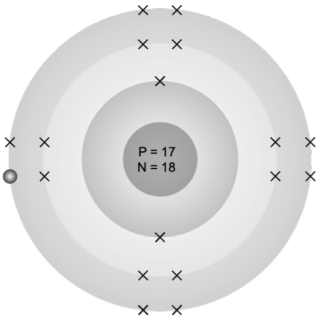
Subatomic Particles

Charges of Ions– Anions (Gain e^-)



Cl Atom



Cl^- Ion

Neutral Atom

Chlorine (*non-metal*)

$17p^+ + 17e^- = 0$

No Charge - Neutral

Cation (*gain 1e⁻*)

Chlorine Ion (*anion*)

$17p^+ + 18e^- = -1$

-1 Charge - Anion

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Ion Charge Data Table

Group	Element Type	Valence e^-	Ion Type	Lose or Gain #e^-	Ion Charge (+ or -)
1A (1)	Metal	1	Cation (+)	Lose $1e^-$	+1
2A (2)	Metal	2	Cation (+)	Lose $2e^-$	+2
3A (13)	Metal	3	Cation (+)	Lose $3e^-$	+3
5A (15)	Non-Metal	5	Anion (-)	Gain $3e^-$	-3
6A (16)	Non-Metal	6	Anion (-)	Gain $2e^-$	-2
7A (17)	Non-Metal	7	Anion (-)	Gain $1e^-$	-1

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