

Subatomic Particles

Octet Rule

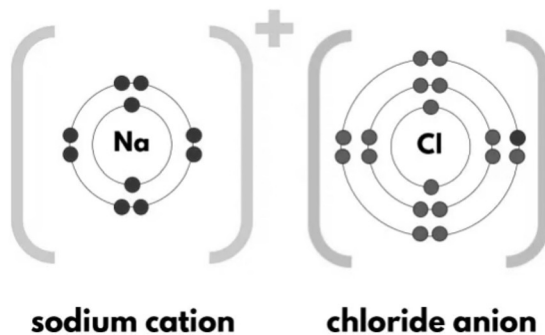
Atoms are the most stable when they have 0 or 8 valence electrons.

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

$7 \text{ val } e^- \rightarrow$
 $8 \text{ val } e^-$

Anion = - Ion

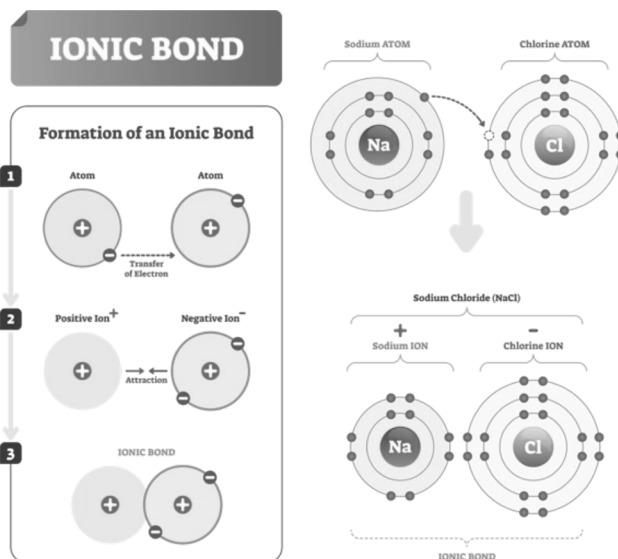
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Ionic Bonding

From Ions to Ionic Bonds

Ionic Bonds are the connection between to atoms due to the transfer of electrons between a metal (+ ion) and a non-metal (- ion)

Ionization energy is the energy required to split apart two atoms into individual ions. The + and - ions give ionic bonds a very high ionization energy.

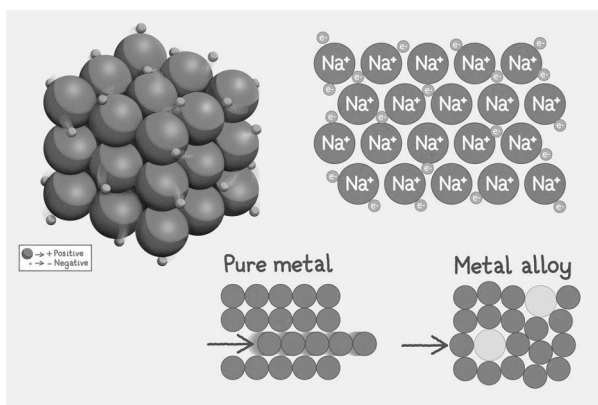


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Metallic Bonding

Metallic Bonding is the process of positive ions (*cations, metals*) being held strongly together due to a group of *negative free electrons* (-) between atoms.

The free electrons form an **electrostatic force** (*strong connection between ions*) due to the positive ion (+ *metal ions*) and the negative electrons.



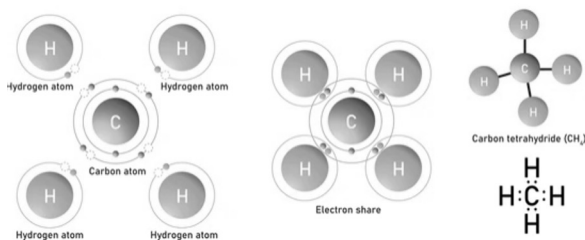
An **alloy** is a metal mixture where a different metal (*yellow in the diagram above*) that sits in the middle of other metal atoms.

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Covalent Bonding

Covalent Bonding is the process of two non-metals **sharing electrons** to allow both atoms to obey the *octet rule* part of the time within the atomic structure

Atoms that desire to obtain electrons is an atom's **electronegativity**. With non-metals high electronegativity requires atoms to share electrons to obey the *octet rule*



Covalent bonds can occur anytime there is a single electron available to share between electrons. In the example above, each hydrogen in CH_4 (*carbon tetrahydride*) is attached to carbon with a single covalent bond (*sharing of 2 electrons*)

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