

1 OCTET RULE

Atoms tend to **gain**, **lose** or **share** electrons to achieve a full outer shell of **8** electrons (octet), which is more **stable**.

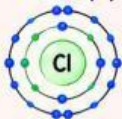
Examples

Sodium (Na)



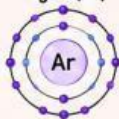
Loses **1** electron to achieve octet (**2, 8**).

Chlorine (Cl)



Gains **1** electron to achieve octet (**2, 8, 8**).

Argon (Ar)



Already has a full outer shell and is **stable**.

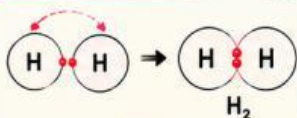
3 COVALENT BONDING

A covalent bond is the **strong** bond formed by the **sharing** of one or more pairs of **electrons** between **two** atoms.

Atoms share electrons to achieve a stable octet (or duet for H).

Example: H₂ molecule

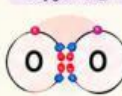
Text



Each H shares **1** electron. They share a **pair** of electrons to achieve a stable **duet** (**2**).

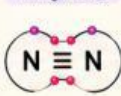
Other examples

Oxygen (O₂)



Two bond

Nitrogen (N₂)



Three bond

Water (H₂O)



Two bonds

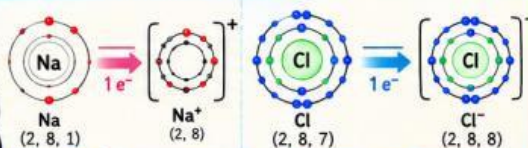
Properties of covalent compounds

- Usually have **low** melting and **low** boiling points.
- Usually **do not** conduct electricity.
- Usually **insoluble** in water (except some, e.g. sugar).
- Many are **gases**, **liquids** or **soft** solids.

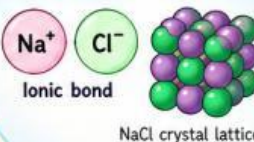
2 IONIC BONDING

An ionic bond is the **strong** bond formed by the complete **transfer** of one or more electrons from a **metal** atom to a **non-metal** atom.

Example: Formation of NaCl



Result



Properties

- High **melting** and **boiling** points.
- Brittle** and brittle.
- Conduct electricity in **molten** state or in **aqueous** solution, not in **solid** state.
- Usually **soluble** in water.

Word Bank

transfer, electrostatic attraction, non-metal, high, low, molecules, ions, lose, gain, share, 8, stable, metal, covalent, non-metal atoms, soluble, insoluble, molten, aqueous, solid, single, double, triple