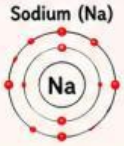
CHEMICAL BONDING

1 OCTET RULE

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

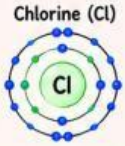
Examples

Sodium (Na)



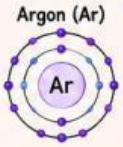
Loses ( ) electron to achieve octet (2 , 8).

Chlorine (Cl)



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

Argon (Ar)

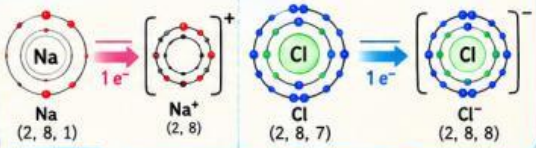


Already has a full outer shell and is ( ).

2 IONIC BONDING

An ionic bond is the ( ) between oppositely charged ( ) formed by the complete transfer of one or more electrons from a ( ) atom to a ( ) atom.

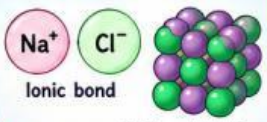
Example: Formation of NaCl



Na (2, 8, 1) → Na⁺ (2, 8)

Cl (2, 8, 7) → Cl⁻ (2, 8, 8)

Result



Ionic bond

NaCl crystal lattice

Properties

- High ( ) and boiling points.
- ( ) and brittle.
- Conduct electricity in ( ) state or in ( ) solution, not in ( ) state.
- Usually ( ) in water.

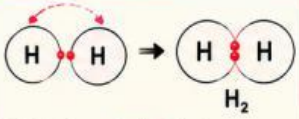
3 COVALENT BONDING

A covalent bond is the ( ) bond formed by the ( ) of one or more pairs of ( ) between ( ) atoms.

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

Example: H_2 molecule

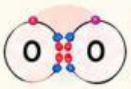
Text



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

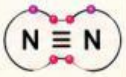
Other examples

Oxygen (O_2)



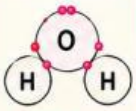
( ) bond

Nitrogen (N_2)



( ) bond

Water (H_2O)



( ) bonds

Properties of covalent compounds

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

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	