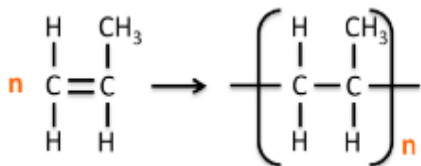


# C2 Knowledge Organiser – 4.2.1 – Bonding and properties



## 1 Polymers

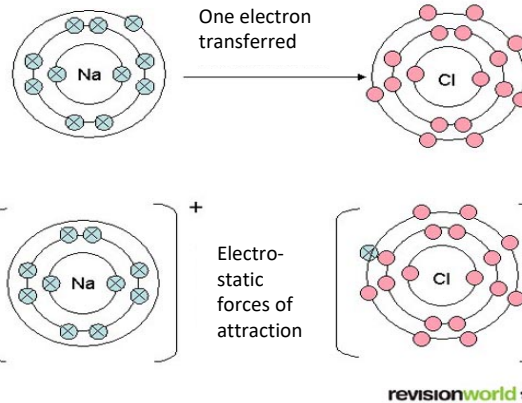
- Covalent bonding
- **Monomer** – Single unit
- **Polymer** – lots of monomers joined together



1

## 2 Ionic bonding

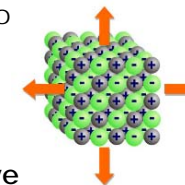
- Metal and non-metal
- **Transfer of electrons**
- Metal → Loses electrons forms positive ion
- Non-metal → Gains electrons forms negative ion
- **Electrostatic forces of attraction**



2

## 3 Ionic compounds

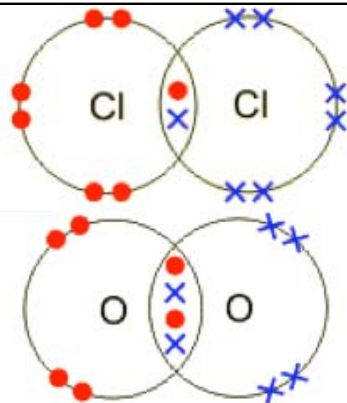
- Ionic lattice
- **Strong electrostatic forces** of attraction between oppositely charged ions
- **High melting point**
- Lots of **energy** to break bonds
- **Conducts when molten or dissolved**
- **Ions free to move**



3

## 4 Covalent structures

- 2 non-metals
- **Share electrons**
- **Venn diagram – dot and cross in the overlap**
- One shared pair = single bond
- Two shared pairs = Double bond
- Number of dots/crosses must add up to the group number



4

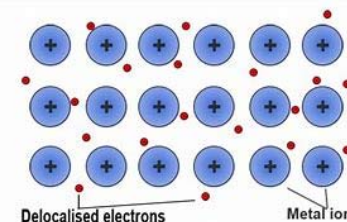
## 5 Covalent compounds

- Simple molecule
- **Weak intermolecular forces** of attraction between molecules
- **Low boiling point**
- **Little energy required to break**
- **Doesn't conduct electricity**
- No free electrons

5

## 6 Metallic bonding

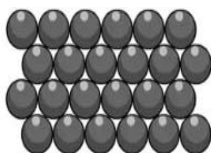
- **Delocalised electrons**
- **Free to carry a charge**
- Conducts thermal energy transferred by free electrons



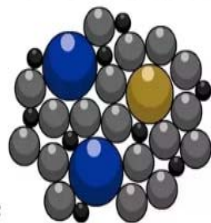
6

## 7 Alloys

- **Pure metal**
- layers
- slide



- **Alloys** – 2 metals
- Layers distorted
- Can't slide



7

## 8 Nanoparticles

- Tiny particles (1-100nm).
- Able to penetrate biological tissues.
- **High surface area to volume ration so are good catalysts.**
- Concern about safety because not much is known about effects on body.

8

Diamond	Graphite	Graphene	Fullerene
4 strong covalent bonds	3 strong covalent bonds	One layer of graphite	Hexagonal ring of carbon atoms
High melting point – lots of energy to break	Lubricant – Layers of atoms slide over each other	3 strong covalent bonds	Buckminsterfullerene (C <sub>60</sub> )
Very hard - Used for drill bits	Delocalised electron – carries a charge	Delocalised electron – carries a charge	Carbon nanotubes - cylindrical
Does not conduct electricity	Conducts electricity	Conducts electricity	Used for nanotechnology