Chemistry

Allotropes of carbon

Allotropes are different forms of same element with different properties

Karbonn has three main allotropes

Diamond graphite and C60

Diamond

- **Each carbon bonded to four carbons it is has very strong covalent**
- **it is used in cutting tools because it is the hardest natural substan**
- **it has high melting in boiling points because strong bonds needs lots of energy to break**
- **they are good heat conductors**
- **they does not conduct electricity because they have no free electrons**
- **the Are insoluble in all solvents**

Graphite

- **Each carbon bonded to three carbons and their free D localised electrons**
- **atoms arranged in layer of hexagons with weak forces between layers**
- **soft and slippery and they are used in pencils and lubricants**

- they can conduct electricity due to free electron
- they have high melting point
- they have low density
- they are insoluble in all solvent

Buckminsterfullerene (C60)

- It has spherical structure means 20 hexagons and 12 Pentagon
- each carbon bonded to three carbon
- week forces between molecules which means low melting point and their soft
- they are used in lubricants catalyst and drug delivery
- they can conduct electricity less than graphic

Covalent Bonding

Covelent bond

Covalent bond means sharing of electrons between two non metals

Atoms share Electrons to get a full outer shell and stable like noble gases

Single bond

One pair of shared electrons example is H2

Double bond

Two pair shared such as carbon dioxide CO_2

Triple bond

three pair shared such as N_2

Strong electrostatic attraction between nuclear and share electrons

Dot and cross diagram

Show outer shell electrons only

Example NH_3 ammonia

Nitrogen shares one electron with each of 3 hydrogen and it will make 3 single bond

Properties of simple covalent bond

- **Low melting and boiling points it means they has week intermolecular forces and their very easy to break**
- **they do not conduct electricity means they have no free electrons or charge**
- **liquid soft solids at room temperature**
- **example is h2, o2. CO_2. ch2 and H_2O**

Ionic compound

Definition

An ionic compound is made only for ionic bonds means electrostatic attraction between positive and negative ions

Ionic lattice Structure

Ions form joint lattice
opposite to charge and sit next to each other for maximum attraction

Models of ionic compound

2D space filling model

- shows arrangement in one layer
- doesn't show Next Layer

3D space filling model

- it shows bigger section of lattice
- misleading sticks look like bonds but in reality attraction works in all direction

Properties of ionic compound

- They are hard brittle and can break easily under force

- they have very high melting and boiling point and they have very strong electrostatic attraction lots of energy
- they are soluble in water and not in non polar solvent like petrol
- Solid they cannot conduct electric city
- molten or dissolved conducts solids cannot conduct
- they density is very high and there very hard but brittle

Finding ionic compound formula

Look at the charges, total mass will be zero

example potassium oxide

potassium has a charge of +1 and it is in group

oxygen has a charge of -2 and it is in the group 6

K and O

K20

Ions

Bonding structure and Properties of matter

Giant covalent structures

Atoms or group with charge form from gaining or losing of electron

Metal loses electron so it will get positive ions known as cations

If metal gains electrons it will get negative ions known as anions

Metallic bonding

- **Metals have positive ions in a sea of De localised electrons**
- **strong bonds means high melting point and boiling point**
- **it can conduct electricity and heat**
- **they are malleable means layer slides**
- **Structure of a metal**
- **atoms arranged in Layers**
- **outer electrons become d localised**
- **the rest of atom becomes a positive ion**
- **metallic bonding is equals to attraction between metals ions and D localised electron**

properties of the metal

- **They are good conductors of electricity and heat it means Delocalized electrons can move and carry charge and energy**

- they are malleable and ductile means layers of lons can slide over each time
- they are solid at room temperature
- alloys are hard than pure metal
- pure metal is soft

States of matter

Kinetic particle theory

it explain how particles are arranged move and their energy in solids liquids and gases

solids

- In solids particles are tightly packed
- they vibrate in place
- there is strong force of attraction
- it they has fixed shape and volume
- they have lowest energy state

Liquids

- Particles are closed but free randomly
- they have fixed volume no fix shape and if we put the liquid in the container it will take it shape
- weaker forces then solids

Gas

- Particles are far apart
- They move freely and fast
- No need no fix shape or volume and they fit in the container

- **They have the weakest forces and highest energy**

Changes of States

- **melting means solid is converting to liquid**
- **freezing means liquid is converting to solid**
- **boiling means liquid is converting to gas**
- **condensation means gas is converting to liquid**
- **sublimation means solid is converting to gas**
- **deposition means gas is converting to solid**