Covalent model3 giant

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Allotrope: different structural forms of the same element - this leads to the element have different chemical and physical properties.

- occur when an element can exist in different crystalline forms such as in diamond, graphite, graphene, silicon, silicon dioxide, fullerenes these are also called as giant covalent structure

Allotrope of some element is the giant structure, these material strong covalent bonds join atoms together with other atoms of the same type to make giant structure rather than little group

Properties

- Strong attraction between the atom (attraction between nuclei and electron)
    - Normally Insoluble

Silicon and C Allotrope

- Have multiple allotropic forms - most stable SiO_2
    - SiO_2
        - Tetrahedral coordination are covalent bonded with four oxygen atoms around a central Si atom
        - High MP and BP, insoluble.
        - Play rule in construction, glass manufacturing
    - Silicon
        - Diamond cubic crystal structure
        - Low electrical conductivity but conduct electricity - semiconductor - the electron are not strongly held likely it is in diamond
    - Allotrope of carbon
        - Each carbon atom is covalently bonded to four other carbons in a tetrahedral geometry.
- Crystalline silicon -
    - structure similar to diamond
    - Cubic lattice

Graphite - special case

- Carbon each joined to 3 other with strong bonds to make hexagonal sheets of atom, and each sheet of atoms are joined to other sheet by weak bonds
- As the c only bonded to 3 other, the extra electron in cloud are delocalized between layer - therefore they conduct electricity
- Strong bond between atom means high BP and MP
- Weak bond between the layer means its soft and slippery as the layer slide over each other easily.

Graphite - properties

- High melting point
- Conduct electricity
- Insoluble in both polar and non-polar solvent as they unable to form intermolecular bonds
- Weak bond between the layers means it is soft and slippery.

Graphene

- Single layer of graphite
- High tensile strength
- High MP and BP
- Conduct electricity

Properties of molecule
Electrical conductivity
Molecule are generally not electrically conductive as they do not have charged particle present

MP and BP
Comparatively (with ion and metallic) weaker intermolecular force being overcome - less energy need

Solubility
Depends on the molecule
Generally, polar molecules dissolve in polar solvent, non-polar molecule dissolve in non-polar solvent
Solubility of some polar molecule decrease as the size of the molecule increase, as the polar part of the molecule become relatively small compared to the sized of the overall molecule.

(covalent bond can not break in the water) (therefore covalent network structure are generally insoluble in solvent)