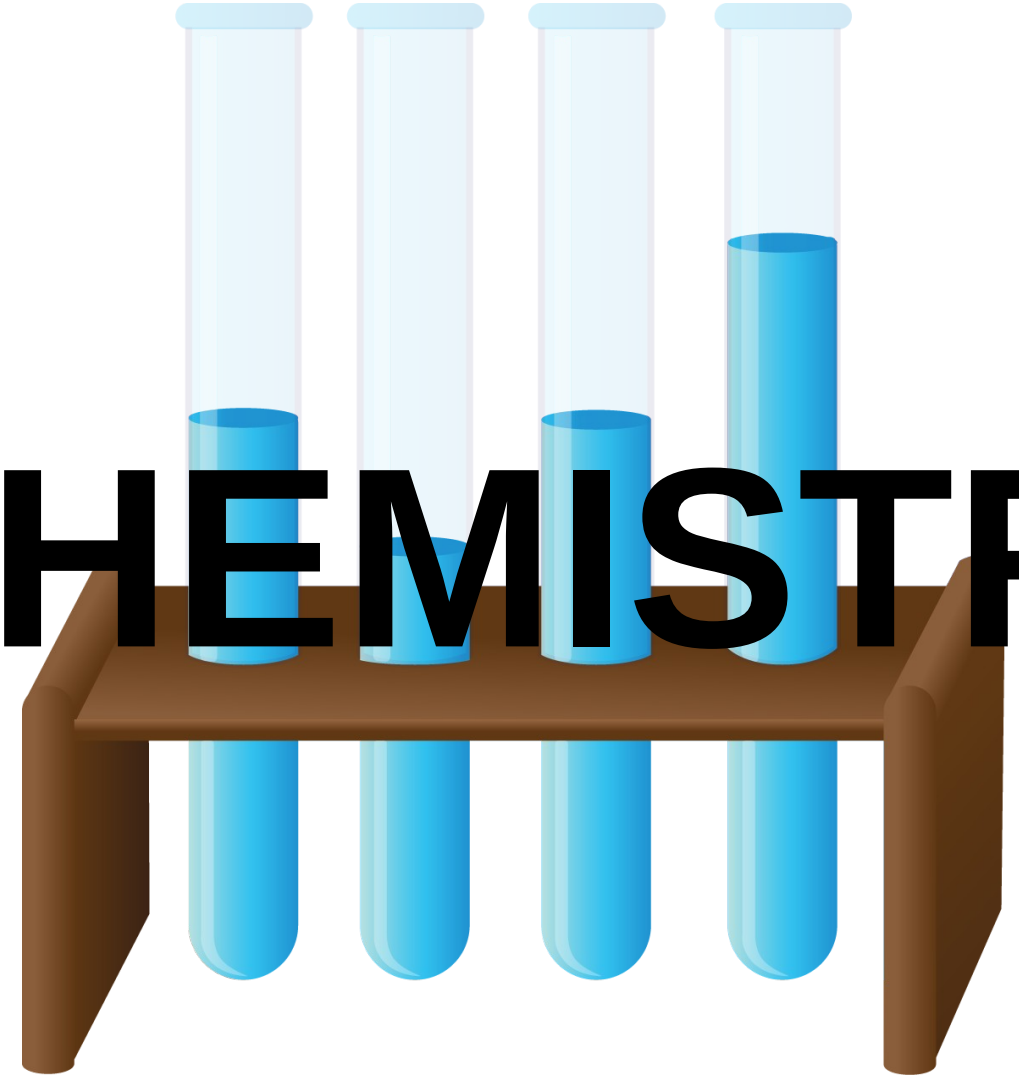
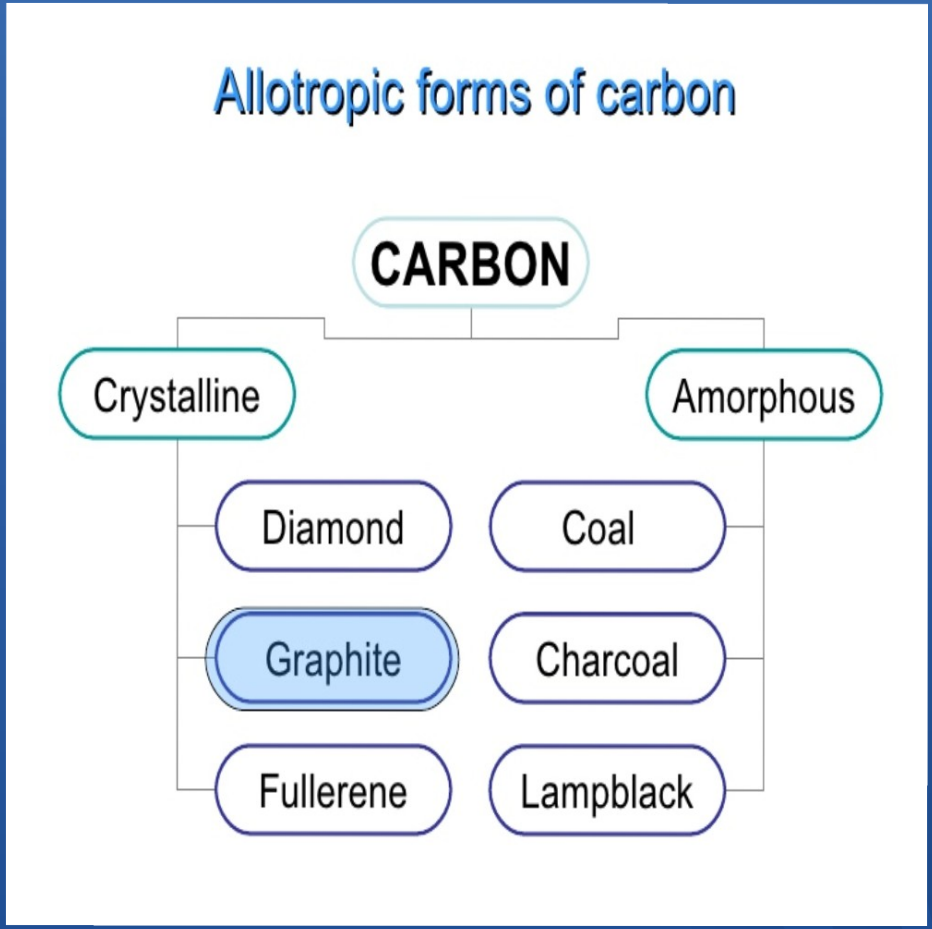
CHEMISTRY



Grade VIII
Vajahat akka

Allotropes of Carbon

The various physical forms in which an element can exist are called allotropes of the elements.



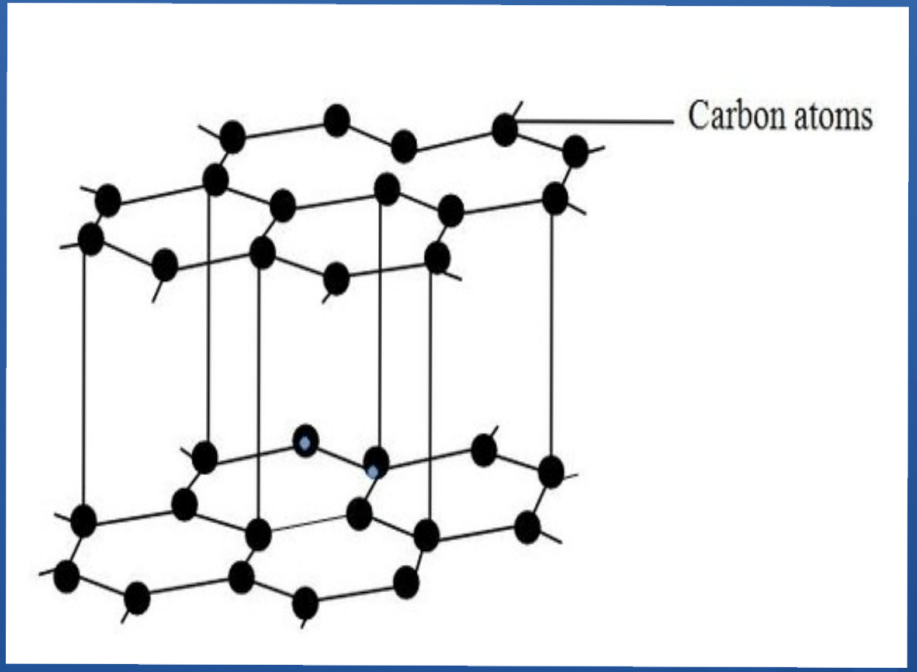
Structure of Graphite

- Each carbon atom is linked with three neighbouring carbon atoms, thus forming a flat hexagonal arrangement of atoms.

- These hexagonal groupings of carbon atoms are arranged as layers or sheets piled one on top of the other.

- These layers are held together by weak forces such that they can slide over one another.

- That is why graphite is soft and slippery and can be used as a lubricant in machines and in pencil leads.



Properties of Graphite

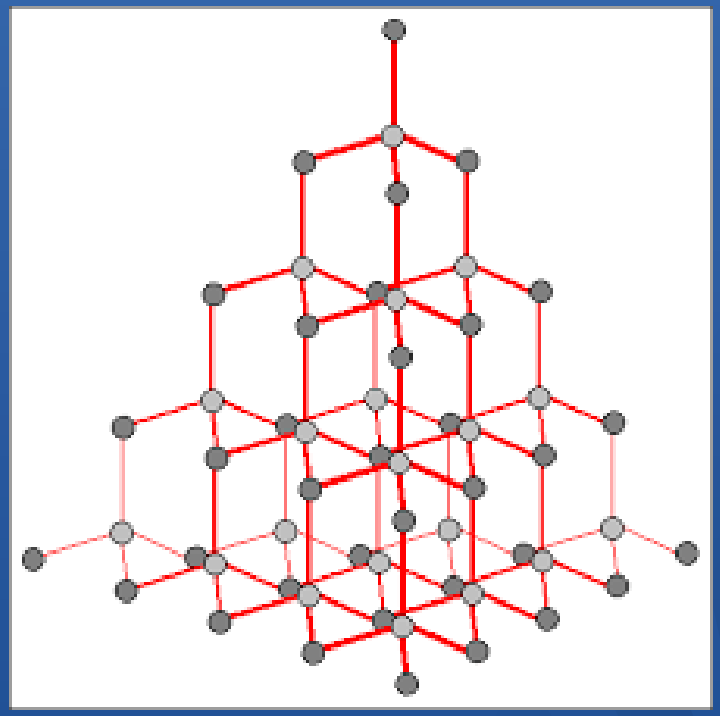
- Greyish black
- Opaque with metallic lustre
- Melting point $3700^{0}C$
- Soft and greasy to touch
- Leaves a black mark on paper

Uses of Graphite

- Lubricant
- Making electrodes
- Making crucibles for melting metals
- Making pencils
- Making carbon brushes for electric motors
- For making artificial diamond
- Used in nuclear reactors as moderator to slow down the speed of neutrons

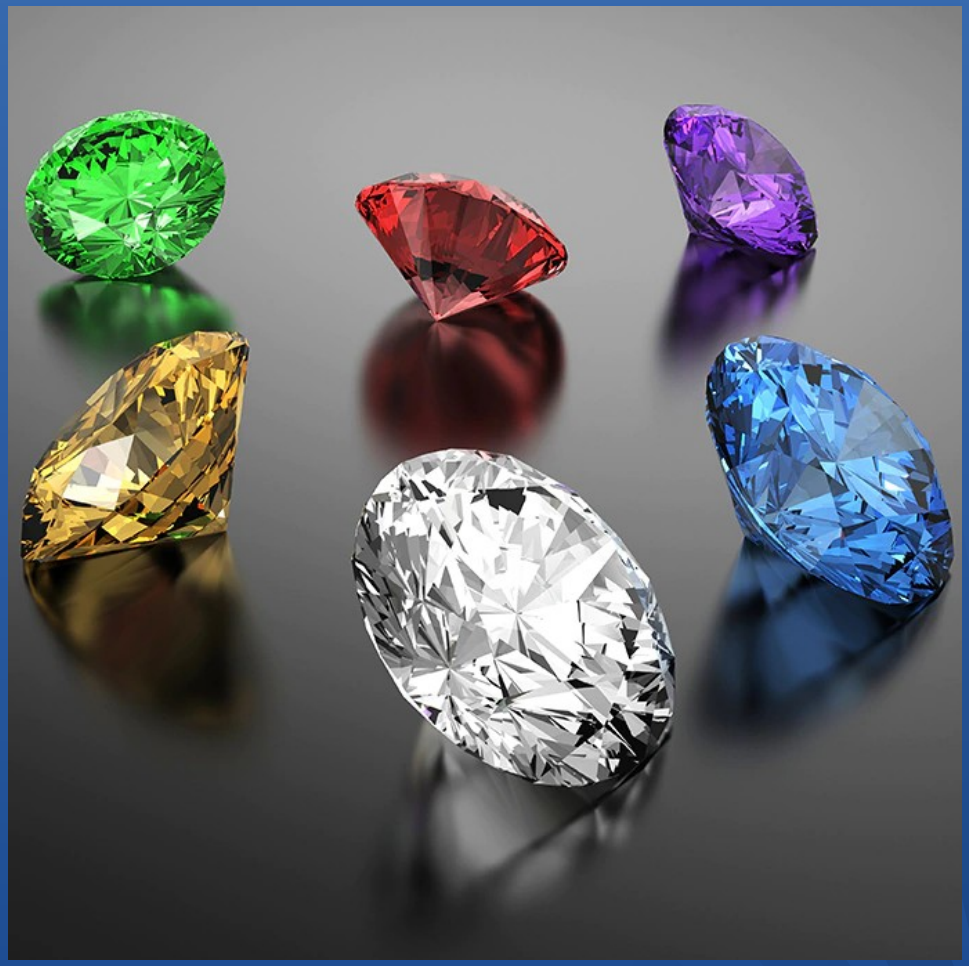
Structure of Diamond

- A diamond is a giant molecule. The number of valence electrons in a carbon atom is four.
- Each carbon atom is linked with four neighbouring carbon atoms, thus forming a rigid tetrahedral structure.
- It is this strong bonding that makes diamond the hardest naturally occuring substance.
- Since they have no free or mobile electrons, diamonds do not conduct electricity.
- The basic tetrahedral unit of a diamond crystal is repeated infinitely forming a three dimensional molecule.
- The shape of the crystal is octahedral.



Properties of Diamond

- Pure diamond is transparent and colourless
- Impurities impart colour to diamonds
- Hardest naturally occurring substance.
- Black diamonds are hardest of all
- Insoluble in any solvent
- Bad conductor of electricity
- Prolonged heating can change it into graphite



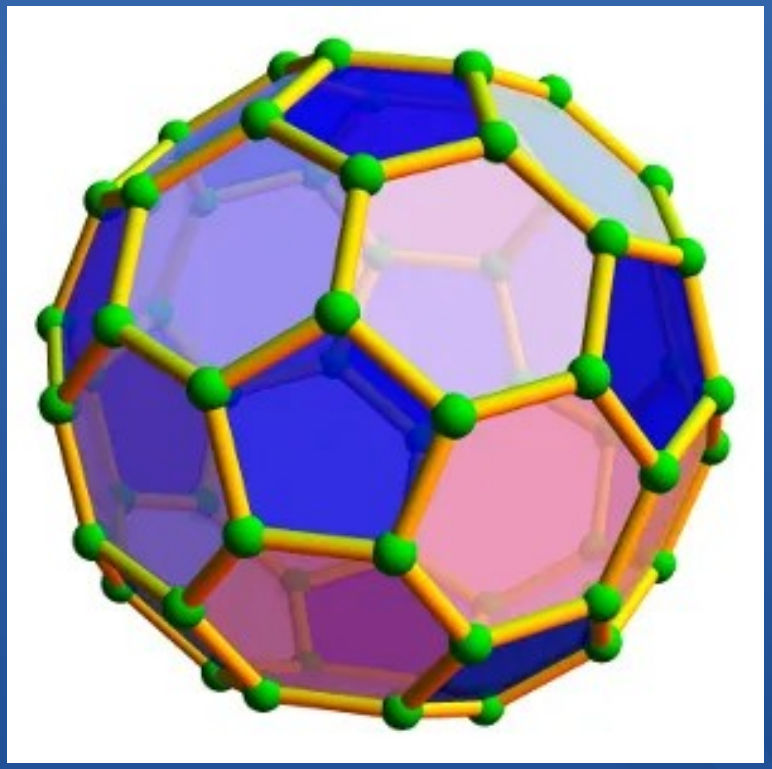
Uses of Diamond

Pure diamond is used in jewellery as a gem. Impure diamond is used

- for cutting and drilling rocks, glass or other diamonds
- as tip heads in deep boring drills
- as bearing in watches
- as needles for long-playing record palyers
- for making radiation-proof windows for space satellites

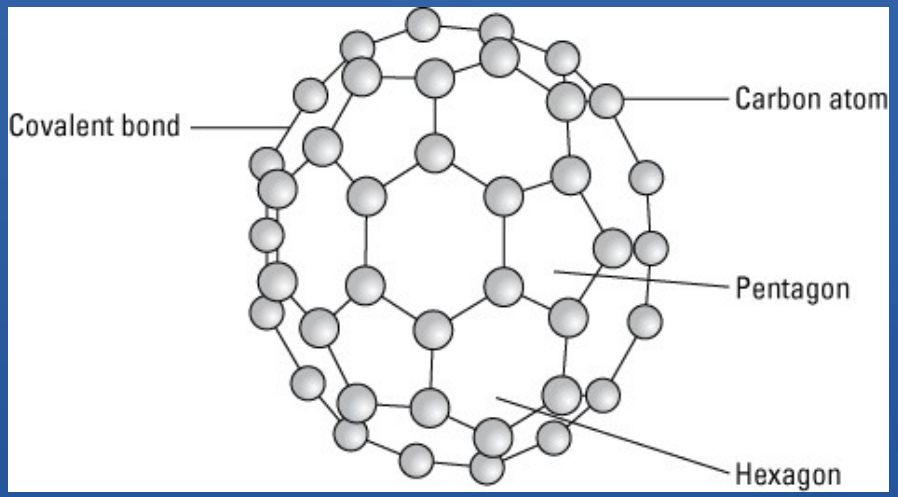
Fullerenes

Fullerenes are the third crystalline form of carbon. Though they were discovered only recently, they have been found to exist in interstellar dust as well as in the geological formations of the earth.



Structure of Buckminsterfullerene

- In fullerenes, many carbon atoms are held together in a cage-like structure.
- The number of carbon atoms vary between 30-900.
- In the most common fullerene, called buckminsterfullerene or buckyball, 60 carbon atoms are arranged in a spherical structure.
- Buckminsterfullerene is denoted as C_{60}.
- It is named after Richard Buckminster Fuller, an American architect.
- The structure has hexagons and pentagons, just as there are in a football.



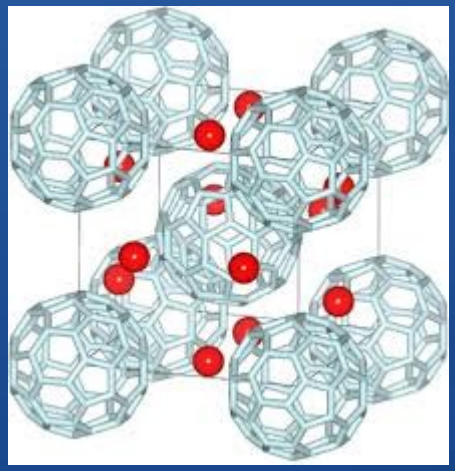
Fullerenes

Properties

- Colour vary according to the number of carbon atoms present in them
- Soluble in organic solvents
- On heating upto $1000^{0}C$, their cage like structure breaks.

Uses

- They act as insulators
- Some of the compounds of fullerenes are used as superconductors.



Questions ?

1. Why is graphite a good conductor of electricity but not diamond?
2. Why is diamond very hard?
3. Give three differences between diamond and graphite.
4. Give two uses each of graphite and diamond.
5. What are fullerenes? Name the most common fullerene.