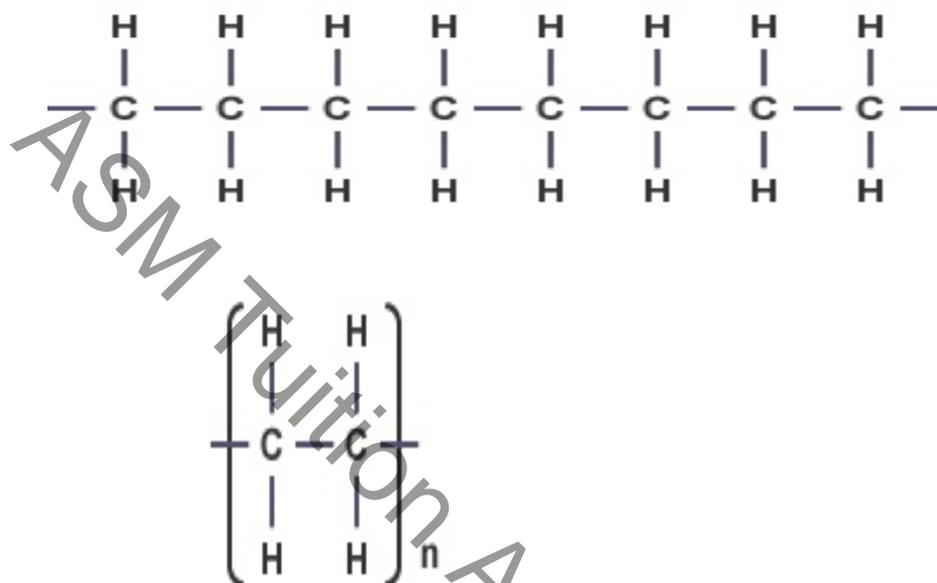


Polymers

➤ **Definition:**

Polymers have very large molecules. The atoms in a polymer molecule are joined together by strong covalent bonds in long chains.

- There are variable numbers of atoms in the chains of a given polymer.
- One example of a polymer is poly(ethene).



Where as n showed the number of repeating unit and $-$ shown the bond to next repeating units.

Properties of polymers

- The intermolecular forces between polymer molecules are strong compared to the intermolecular forces between small molecules.
- polymers melt at higher temperatures than substances with small molecules.
- They are solids at room temperature.

Giant covalent structures

- Giant covalent structures contain very many atoms, each joined to adjacent atoms by covalent bonds.
- The atoms are usually arranged into giant regular lattices – extremely strong structures because of the many bonds involved.
- The graphic shows the molecular structure of **graphite diamond and Silicone oxide** (two allotropes of carbon).

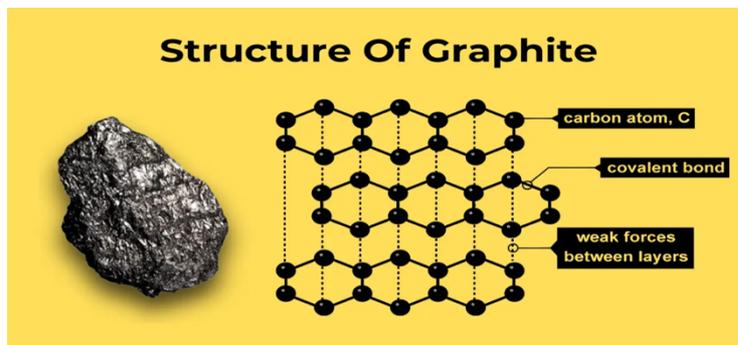
Properties of Giant covalent structure

- **Composition:** Giant covalent structures are made up of many covalent bonds between atoms.
- **Melting and Boiling points:** They have **high melting points** because it takes a lot of energy to break the strong covalent bonds between the atoms.
- **Conductivity:** They **cannot conduct electricity** because they have no overall charge. Graphite is an exception to this as it has one unbounded electron that can conduct charge.
- **Solubility:** They are also **insoluble** since the attractions between the atoms in the structure and water are not strong enough to overcome the covalent bonds.

Examples:

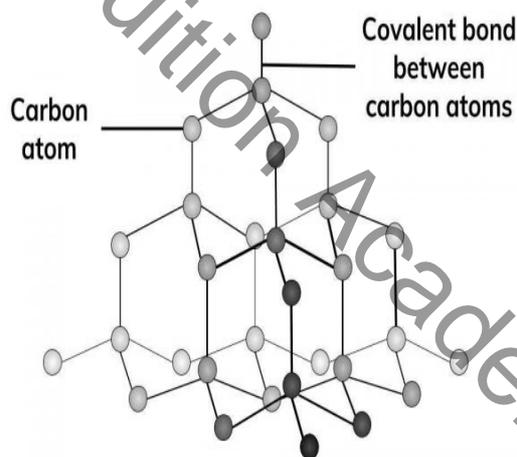
1- Graphite

- Graphite is a form of **carbon** in which the carbon atoms form covalent bonds with **three** other carbon atoms.
- **Uses:** It is used in pencils, and as a lubricant.
- **Conductivity:** Graphite conducts electricity due to the ‘spare’ electrons being delocalized between the layers. This conductivity makes graphite useful as electrodes for electrolysis.
- **High melting and boiling point:** graphite still has a very high melting and boiling point because the **strong covalent bonds** that hold the carbon atoms together in the layers **require a lot of heat energy to break**.



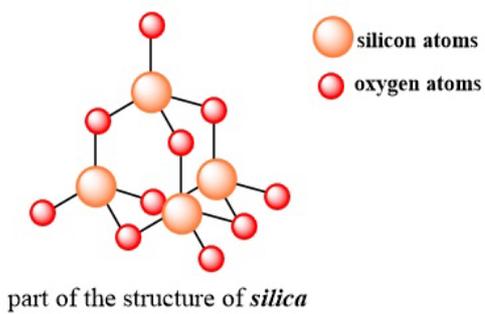
2- Diamond

- ▶ Diamond is a form of carbon in which each **carbon** atom is joined to **four** other carbon atoms, forming a giant covalent structure.
- ▶ diamond is **very hard**
- ▶ **Melting points:** it has a high melting point. That's why it is used in cutting tools.
- ▶ **Conductivity:** It does not conduct electricity as there are no delocalized electrons in the structure.



3- Silicon Dioxide:

- ▶ Sometime called Silica which is found in **sand**, has a similar structure to diamond
- ▶ Its properties are similar to diamond.
- ▶ It is hard ,
- ▶ Melting points: it has high melting point,
- ▶ It contains **silicon** and **oxygen** atoms, instead of carbon atoms.



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