

Cambridge IGCSE Chemistry

Topic 3: atoms, elements and compounds

Macromolecules

Notes

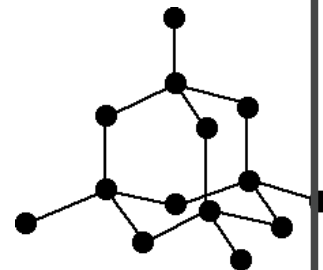




Describe the giant covalent structures of graphite and diamond

Diamond

- In diamond (right), each carbon is joined to 4 other carbons covalently.
 - It's very hard, has a very high melting point and does not conduct electricity.



Graphite

- In graphite, each carbon is covalently bonded to 3 other carbons, forming layers of hexagonal rings, which have no covalent bonds between the layers.
 - The layers can slide over each other due to no covalent bonds between the layers, but weak intermolecular forces. Meaning that graphite is soft and slippery.
- One electron from each carbon atom is delocalised.
 - This makes graphite similar to metals, because of its delocalised electrons.
 - It can conduct electricity – unlike Diamond.

(Extended only) Describe the macromolecular structure of silicon(IV) oxide (silicon dioxide)

- Each silicon atom is covalently bonded to 4 oxygen atoms
- Each oxygen atom is covalently bonded to 2 silicon atoms
- Therefore, the formula is SiO_2 . This is the empirical formula, which is used for all giant molecules, because there are too many atoms to give the molecular formula

Relate their structures to their uses, e.g. graphite as a lubricant and a conductor, and diamond in cutting tools

- Graphite
 - Lubricant – layers slide over each other
 - Conductor – can conduct electricity
- Diamond
 - Cutting tools – very hard due to rigid structure





(Extended only) Describe the similarity in properties between diamond and silicon(IV) oxide, related to their structures

- Similar properties:
 - Very hard
 - Very high melting and boiling points
 - Insoluble in water
 - Does not conduct electricity
- These are due to the strong covalent bonds that hold the atoms in a rigid structure

