ALLOTROPY

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PREREQUISITE

- Knowledge of p-block elements
- Properties and bonding in p-block elements

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RECAP

- Properties of group 13 elements
- Preparation and properties of boron hydride

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LEARNING OUTCOMES

- Knowledge of allotropy
- Knowledge of allotrope of carbon

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ALLOTROPE DEFINITION

- Allotropy or allotropism is the property of some chemical elements to exist in two or more different forms, known as allotropes of these elements.
- Allotropes are different structural modifications of an element.

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DIAMOND

- Each carbon atom is bonded to 4 others to form a giant covalent network or lattice •

- Is bond is of the same length and equally strong so the carbon atoms are sp3 hybridized
- As all the electrons are localised (fixed in position), diamond is exceptionally hard and it does not conduct electricity

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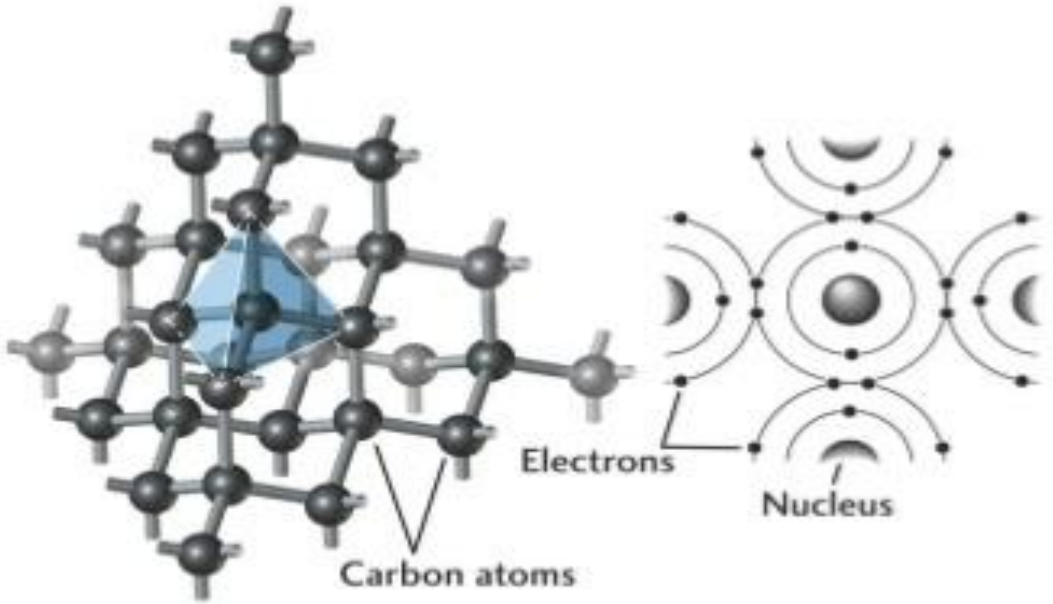
DIAMOND



Each carbon atom is bonded to 4 others to form a giant covalent network or lattice

PROPERTIES OF DIAMOND

- Very high melting point
- Doesn’t conduct electricity
- Good conductor of heat.
- Very hard.
- Fluorescence under UV light and X-ray.

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GRAPHITE

- Each carbon atom is bonded to 3 other carbon atoms to give layers of hexagonal rings
- As each bond is the same, the carbon atoms are sp2 hybridised
- The remaining p orbital electron is delocalised to form weak bonds between the layers
- The covalent layer lattice has all sigma bonds

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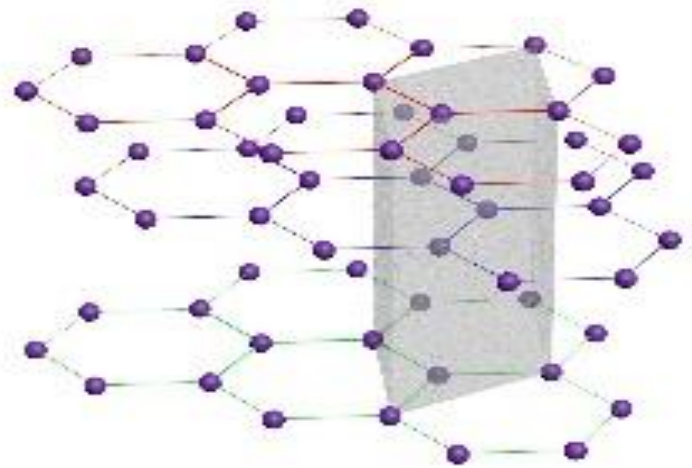
GRAPHITE



Each carbon atom is bonded to 3 other carbon atoms to give layers of hexagonal rings

PROPERTIES OF GRAPHITE

- Because of the layers, graphite is an excellent lubricant as the layers can slide over each other
- Graphite is also a good conductor of electricity because of the delocalised electrons e.g. carbon rods, lead pencils

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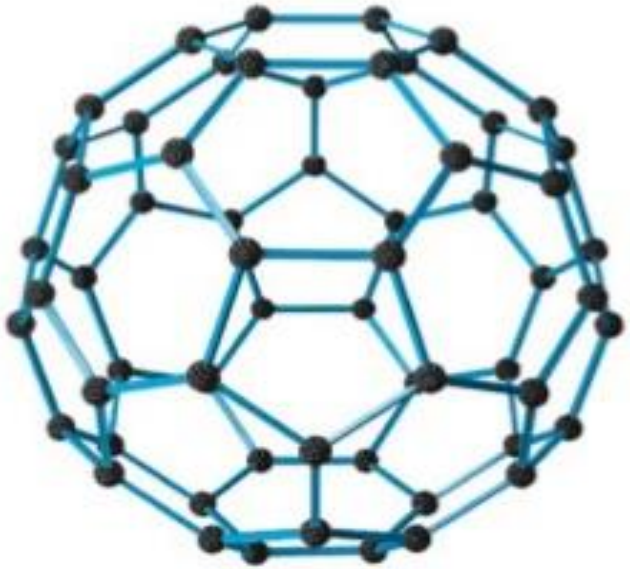
BUCKMINSTERFULLERENE



- Like in graphite, each carbon atom is bonded to 3 others

BUCKMINSTERFULLERENE •

- Is one member of a family of spherical carbon molecules sometimes called “buckyballs”
- Has the formula C60
- The C atoms are arranged in hexagons and pentagons to give a geodesic spherical structure similar to a football

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