

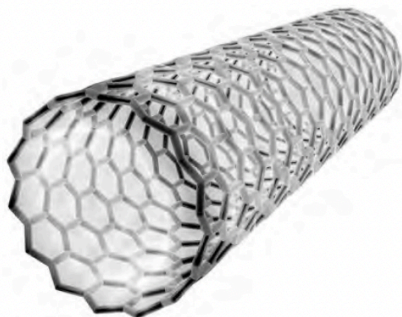
(Structure and bonding in carbon (diamond, graphite, graphene, fullerenes, nanotubes))

Q1. (2019)

This question is about materials and their properties.

Figure 13 shows a carbon nanotube.

Figure 13



The structure and bonding in a carbon nanotube are similar to graphene.

Carbon nanotubes are used in electronics because they conduct electricity.

Explain why carbon nanotubes conduct electricity.

[2 marks]

Q2. (2021)

This question is about carbon and its compounds.

Fullerenes are molecules of carbon atoms.

The first fullerene to be discovered was Buckminsterfullerene (C_{60}).

What shape is a Buckminsterfullerene molecule?

[1 mark]

Q3. (2021)

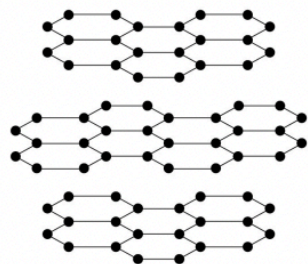
Give **one** use of a fullerene.

[1 mark]

Q4. (2021)

Figure 15 represents the structure of graphite.

Figure 15



Explain why graphite is:

- a good electrical conductor
- soft and slippery.

You should answer in terms of structure and bonding.

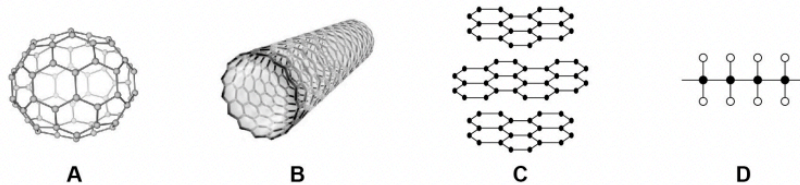
[6 marks]

Q5.a) (2022)

This question is about carbon and compounds of carbon.

Figure 9 shows diagrams that represent different structures.

Figure 9



Which diagram represents graphite?

[1 mark]

Tick (✓) **one** box.

A ☐ B ☐ C ☐ D ☐

Q5.b) (2022)

Which diagram represents poly(ethene)?

[1 mark]

Tick (✓) **one** box.

A ☐

B ☐

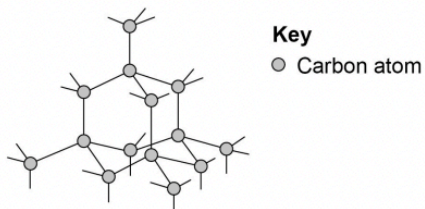
C ☐

D ☐

Q6.a) (2022)

Figure 10 represents the structure of diamond.

Figure 10



How many covalent bonds does each carbon atom form in diamond?

[1 mark]

Q6.b) (2022)

Which is a property of diamond?

[1 mark]

Tick (✓) **one** box.

Conducts electricity

☐

Low melting point

☐

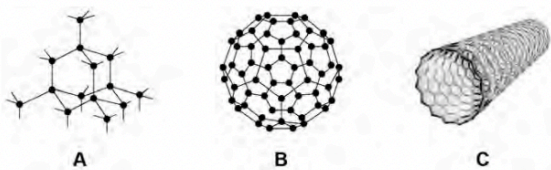
Very hard

☐

Q7.(2023)

0 3 . 4 Figure 2 shows diagrams that represent different forms of carbon.

Figure 2



Which diagram in Figure 2 represents Buckminsterfullerene?

[1 mark]

Tick (✓) **one** box.

A ☐

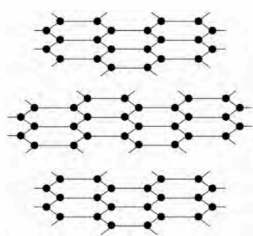
B ☐

C ☐

Q8.(2023)

Figure 3 represents part of the structure of graphite.

Figure 3



Draw **one** line from each property of graphite to the structural feature that is the reason for that property.

[2 marks]

Property	Structural feature
Graphite conducts electricity.	Graphite has hexagonal rings of carbon atoms.
Graphite is soft.	The bonds between carbon atoms in the layers are strong.
	There are no covalent bonds between layers of atoms.
	There are delocalised electrons in graphite.

Q9.(2024)

Buckminsterfullerene (C_{60}) is a form of carbon.

Buckminsterfullerene was the first fullerene to be discovered.

What is the shape of a buckminsterfullerene molecule?

[1 mark]

Tick (✓) **one** box.

Cubic

☐

Cylindrical

☐

Spherical

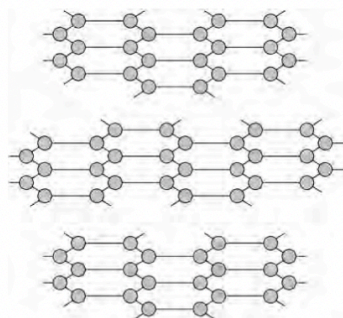
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Q10.(2024)

Graphite is a form of carbon.

Figure 11 represents the structure of graphite.

Figure 11



Key

● = carbon atom

How many covalent bonds does each carbon atom form in graphite?

[1 mark]

Tick (✓) **one** box.

1

☐

2

☐

3

☐

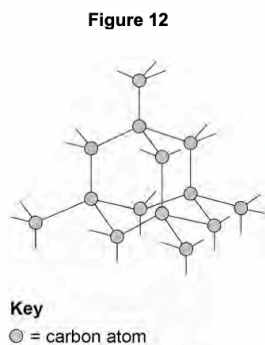
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Q11.(2024)

Diamond is another form of carbon.

Figure 12 represents the structure of diamond.



Describe the structure and bonding in diamond.

[3 marks]
