

# 2.3 Structure & Bonding of Carbon

## Question Paper

Course	AQA GCSE Chemistry
Section	2. Bonds, Structure & Properties of Matter
Topic	2.3 Structure & Bonding of Carbon
Difficulty	Hard

Time Allowed	50
Score	/39
Percentage	/100

### Question 1a

This question is about the bonding and structure of diamond.

State **two** uses of diamonds.

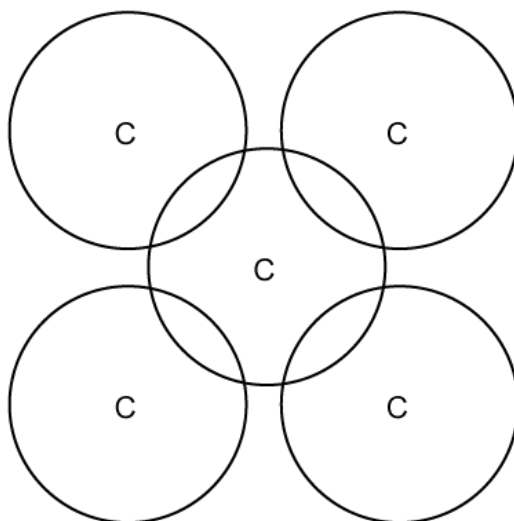
[2 marks]

### Question 1b

**Figure 1** shows the outer electron shells of carbon atoms in a lattice structure of diamond.

Using dots, add electrons to the diagram to represent the bonding arrangement.

**Figure 1**



[3 marks]

**Question 1c**

Explain why diamond has a high melting point.

[4 marks]

**Question 2a**

This question is about allotropes of carbon.

Graphite and graphene are both allotropes of carbon.

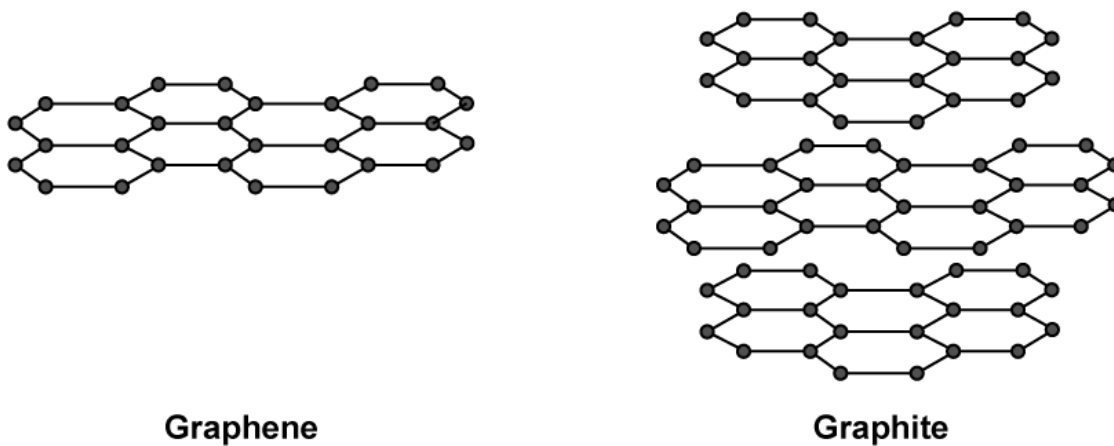
What is meant by an allotrope?

[2 marks]

### Question 2b

The structures of graphite and graphene are shown in **Figure 1**.

Figure 1



Compare graphite and graphene in terms of their bonding and structure.

[4 marks]

### Question 2c

Explain why graphite can be used as a lubricant.

[3 marks]

**Question 2d**

Diamond is another allotrope of carbon.

Give **two** properties that are different to that of graphite.

[2 marks]

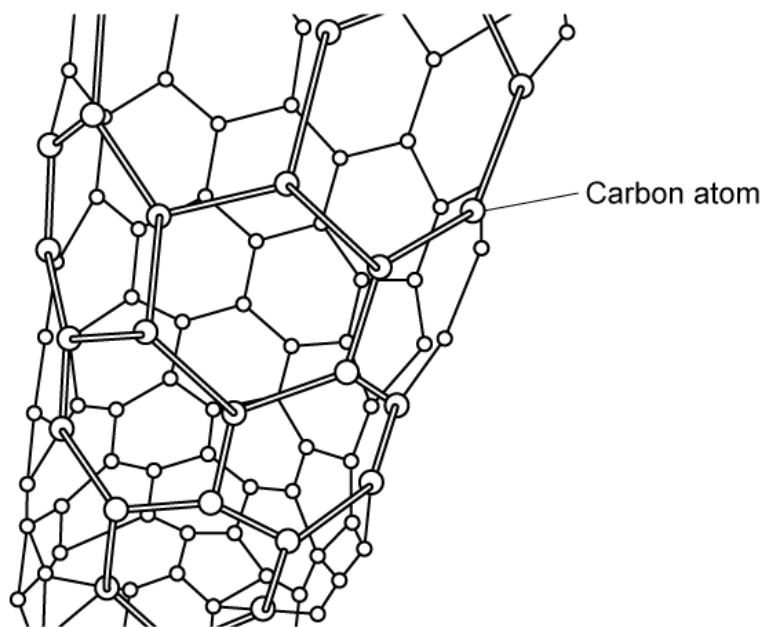
### Question 3a

This question is about fullerenes.

Fullerenes can form nanotubes which consist of tiny carbon cylinders.

A carbon nanotube is shown in **Figure 1**.

Figure 1



Explain the properties of carbon nanotubes.

Answer in terms of structure and bonding.

[6 marks]

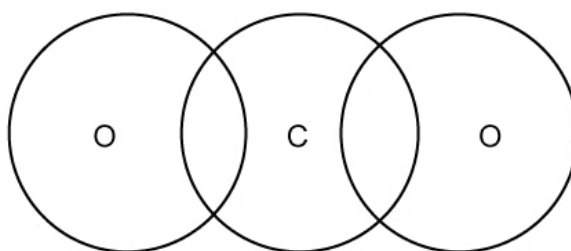
### Question 3b

Carbon can react with oxygen to form carbon dioxide.

Complete the dot and cross diagram in **Figure 2** to show the bonding in this molecule.

Show the outer electrons only.

Figure 2



[2 marks]

### Question 3c

Explain why carbon dioxide cannot conduct electricity.

[2 marks]

### Question 4a

This question is about the properties and bonding in allotropes of carbon.

Substance **X** is an allotrope of carbon and has the following properties and uses:

- It is strong
- It is a good conductor of electricity
- It is used to overlay monitor screens to make them touchscreen

Identify substance **X**.

Explain your answer.

[2 marks]

### Question 4b

Buckminsterfullerene is another allotrope of carbon.

Explain why this substance can be used as a lubricant.

[2 marks]



**Question 4c**

Fullerenes are also used as catalysts and in electronics.

Suggest why they can be used for these applications.

catalysts: \_\_\_\_\_ (1)

electronics: \_\_\_\_\_ (2)

[3 marks]

**Question 4d**

Explain how a catalyst increases the rate of a reaction.

[2 marks]