

Allotropes of carbon

Learning objectives

- 1 Describe the bonding in different allotropes of carbon.
- 2 Explain how the structure and bonding of allotropes of carbon leads to their different properties.

Introduction

Carbon is one of the most versatile elements in the periodic table. It is one of the 'elements of life' present in all living things. Carbon is so special that it has a whole branch of chemistry dedicated to it, this is called organic chemistry.

In this activity, you will look at the structure and bonding of carbon as an element where it forms different macromolecular structures. Different structural forms of the same element are called allotropes.

Instructions

1. Stick the structure strip in the margin of your exercise book/paper.
2. Follow the prompts to write a summary of the bonding in carbon. You might need to use a textbook, revision guide or website to help. Take care to write in full sentences, describing the question within your answer and using appropriate keywords.
3. When you have finished the structure strip you should have a good knowledge of the different allotropes of carbon. Now, tackle the question below to apply your knowledge to a new context.

Keywords

You may wish to use some of the following words in your responses:

Allotrope, bonding, conductivity, covalent, delocalised, giant, intermolecular, lattice, macromolecular.

Follow-up question

Diamond drill bits are used in lots of applications including drilling porcelain, stone and concrete.

- (a) State which property of diamond makes it useful for this purpose.
- (b) Explain how the structure and bonding in diamond leads to this property.

Structure strip Bonding in carbon	Structure strip Bonding in carbon	Structure strip Bonding in carbon	Structure strip Bonding in carbon	Structure strip Bonding in carbon
Copy the atomic symbol for carbon. State the number of each subatomic particle in a carbon atom and its electron configuration.	Copy the atomic symbol for carbon. State the number of each subatomic particle in a carbon atom and its electron configuration.	Copy the atomic symbol for carbon. State the number of each subatomic particle in a carbon atom and its electron configuration.	Copy the atomic symbol for carbon. State the number of each subatomic particle in a carbon atom and its electron configuration.	Copy the atomic symbol for carbon. State the number of each subatomic particle in a carbon atom and its electron configuration.
Explain how carbon forms up to four covalent bonds per atom.	Explain how carbon forms up to four covalent bonds per atom.	Explain how carbon forms up to four covalent bonds per atom.	Explain how carbon forms up to four covalent bonds per atom.	Explain how carbon forms up to four covalent bonds per atom.
Describe the structure of diamond and its key features. State which properties of diamond come from each bonding feature.	Describe the structure of diamond and its key features. State which properties of diamond come from each bonding feature.	Describe the structure of diamond and its key features. State which properties of diamond come from each bonding feature.	Describe the structure of diamond and its key features. State which properties of diamond come from each bonding feature.	Describe the structure of diamond and its key features. State which properties of diamond come from each bonding feature.>
Describe the structure of graphite and its key features. State which properties of graphite come from each bonding feature.	Describe the structure of graphite and its key features. State which properties of graphite come from each bonding feature.	Describe the structure of graphite and its key features. State which properties of graphite come from each bonding feature.	Describe the structure of graphite and its key features. State which properties of graphite come from each bonding feature.	Describe the structure of graphite and its key features. State which properties of graphite come from each bonding feature.
Explain how the structures of graphene and graphite are related.	Explain how the structures of graphene and graphite are related.	Explain how the structures of graphene and graphite are related.	Explain how the structures of graphene and graphite are related.	Explain how the structures of graphene and graphite are related.
Briefly describe fullerenes and explain how they are different to other carbon structures.	Briefly describe fullerenes and explain how they are different to other carbon structures.	Briefly describe fullerenes and explain how they are different to other carbon structures.	Briefly describe fullerenes and explain how they are different to other carbon structures.	Briefly describe fullerenes and explain how they are different to other carbon structures.