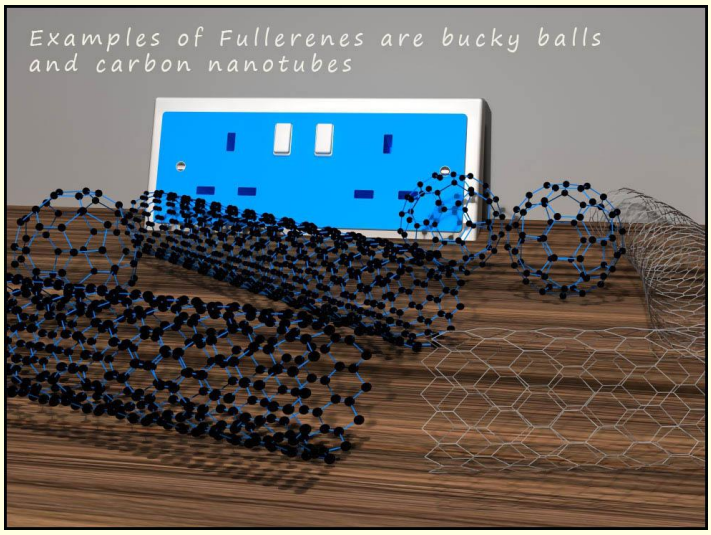
Answer all the questions below then check your answers.

1. Explain why some fullerenes are often referred to as "buckyballs."
2. What is the shape of a buckminsterfullerene molecule?
3. Name one type of fullerene other than buckminsterfullerene.
4. State one property of fullerenes related to their structure.



5. How are fullerenes different from graphite and diamond?
6. Why can some fullerenes conduct electricity?
7. Give two uses of fullerenes.
8. Describe the structure of buckminsterfullerene (C_{60}).
9. Fullerenes are a relatively new discovery. Suggest reasons why fullerenes can have uses that other forms of carbon do not.
10. Nanotubes are a type of fullerene. Describe the structure of a nanotube, explain how its structure makes it strong, and give two possible uses of nanotubes.

Answers

1. Explain why some fullerenes are often referred to as "buckyballs."

   Fullerenes, particularly C_{60} for example are often referred to as "buckyballs" because their structure resembles the geodesic dome designs of American architect Buckminster Fuller.

2. What is the shape of a buckminsterfullerene molecule?

   Buckminsterfullerene molecules are shaped like a football/soccer ball (a sphere) or long tubes, fullerenes consist of hollow shaped molecules and

3. Name one type of fullerene other than buckminsterfullerene.

   Nanotubes.

4. State one property of fullerenes related to their structure.

   They can be electrical conductors, lubricants, or very strong materials.

5. How are fullerenes different from graphite and diamond?

   Fullerenes have a different structure compared to graphite and diamond. Graphite consists of flat layers of carbon atoms arranged in hexagons, while diamond has a 3D lattice structure with each carbon atom bonded to four others in a tetrahedral arrangement. Fullerenes have a hollow, cage-like structures or structures that consist of long tubes of carbon atoms.

6. Why can some fullerenes conduct electricity?

   Some fullerenes have delocalised electrons (electrons that can move freely) within their structure, which allows them to carry an electrical current.

7. Give two uses of fullerenes.

   Common uses include:

   To deliver drugs within the body

   As lubricants

   To strengthen materials (e.g., in composites)

   In electronics (due to their conductivity)

8. Describe the structure of buckminsterfullerene (C_{60}).

   Buckminsterfullerene C_{60} consists of

   60 carbon atoms joined in rings of hexagons and pentagons arranged in a spherical structure

9. Fullerenes are a relatively new discovery. Suggest reasons why fullerenes can have uses that other forms of carbon do not.

   Unique shape: Their spherical or tube-like shape gives them special properties (e.g., ability to trap other molecules).

   Electrical conductivity: Some fullerenes can conduct electricity.

   Strength and reactivity: Fullerenes can be very strong yet also have the potential for chemical modification, making them versatile materials.

10. Nanotubes are a type of fullerene. Describe the structure of a nanotube, explain how its structure makes it strong, and give two possible uses of nanotubes.

    Structure: A nanotube is like a sheet of graphene rolled into a cylinder. It consists of carbon atoms arranged in a hexagonal pattern.

Strength: Each carbon atom is bonded to 3 others by strong covalent bonds. This hexagonal arrangement within the tube structure creates incredible strength.

Uses:

Strengthening materials: Nanotubes can be added to composites to create lightweight yet very strong materials.

Electronics: Due to their electrical conductivity, nanotubes have potential for uses in tiny circuits and electronics.