

# Structure and Properties of Materials

## Question Paper

Level	O Level
Subject	Chemistry
Exam Board	Cambridge International Examinations
Topic	The Particulate Nature of Matter
Sub-Topic	Structure and properties of materials
Booklet	Question Paper

**Time Allowed:** 32 minutes

**Score:** /27

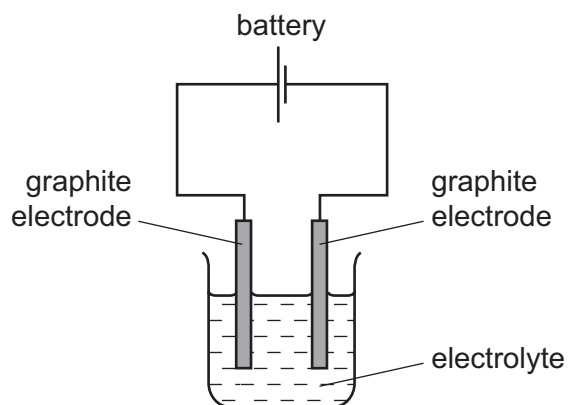
**Percentage:** /100

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- 1 Which statement shows that graphite and diamond are different forms of the element carbon?
  - A Both graphite and diamond have giant molecular structures.
  - B Complete combustion of equal masses of graphite and diamond produces equal masses of carbon dioxide and no other products.
  - C Graphite and diamond have different melting points.
  - D Graphite conducts electricity, whereas diamond does not.
  
- 2 Which is a compound?
  - A air
  - B carbon
  - C oxygen
  - D steam
  
- 3 Which statement about graphite is **not** correct?
  - A It burns to form carbon dioxide.
  - B It is a carbon compound.
  - C It is a giant molecular substance.
  - D It is used as a lubricant.
  
- 4 Which statement is **not** correct?
  - A Air is a mixture.
  - B Ammonia is a compound.
  - C Methane is a compound.
  - D Sea water is a compound.

- 5 Graphite is often used as the electrodes in the electrolysis of solutions.



Which particles are involved in the conduction of electricity by graphite?

- A electrons only
  - B negative ions only
  - C positive ions and electrons
  - D positive ions and negative ions
- 6 Both magnesium oxide,  $\text{MgO}$ , and aluminium oxide,  $\text{Al}_2\text{O}_3$ , are solids at room temperature,  $25^\circ\text{C}$ .  
 $\text{MgO}$  has a melting point of  $2852^\circ\text{C}$  and a boiling point of  $3600^\circ\text{C}$ .  
 $\text{Al}_2\text{O}_3$  has a melting point of  $2072^\circ\text{C}$  and a boiling point of  $2880^\circ\text{C}$ .  
Over which temperature range will both pure compounds conduct electricity?
- A 25 to  $2852^\circ\text{C}$
  - B 2072 to  $2852^\circ\text{C}$
  - C 2852 to  $2880^\circ\text{C}$
  - D 2880 to  $3600^\circ\text{C}$
- 7 Which statement most clearly indicates that diamond and graphite are forms of carbon?
- A Both are crystalline solids.
  - B Complete combustion of equal masses of both solids produces equal masses of carbon dioxide as the only product.
  - C Graphite conducts electricity whereas diamond is an insulator.
  - D Under suitable conditions graphite can be partially converted into diamond.

- 8 Which substance will **not** conduct electricity at room temperature and pressure?
- A dilute nitric acid
  - B graphite
  - C mercury
  - D sodium chloride
- 9 Element X does not conduct electricity and has a low melting point.
- Which could be element X?
- A carbon (graphite)
  - B iodine
  - C mercury
  - D sodium
- 10 Which of the following is **not** a mixture?
- A ethanol
  - B petrol
  - C steel
  - D tap water
- 11 Why do graphite and diamond have different physical properties?
- A Diamond has a giant molecular structure but graphite has not.
  - B Diamond occurs naturally but graphite is made artificially.
  - C Graphite is ionic whereas diamond is covalent.
  - D They contain carbon atoms covalently bonded to different numbers of other carbon atoms.

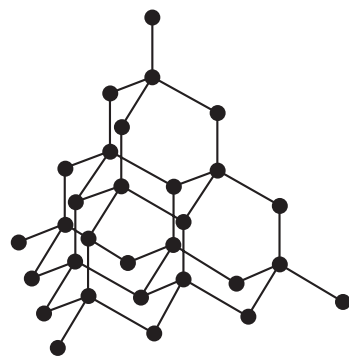
12 In which pair is each substance a mixture?

- A air and water
- B limewater and water
- C quicklime and limewater
- D sea water and air

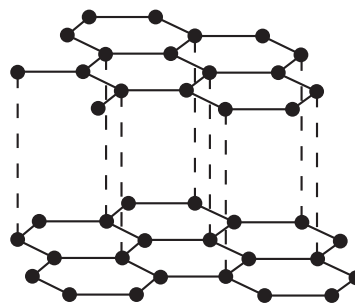
13 Which two substances are elements with a giant molecular structure?

- A diamond and graphite
- B diamond and sand
- C methane and iodine
- D methane and sand

14 The diagram shows the structures of diamond and graphite.



diamond



graphite

Which property do these substances have in common?

- A They are giant structures.
- B They can act as lubricants.
- C They can conduct electricity.
- D They contain only covalent bonds.

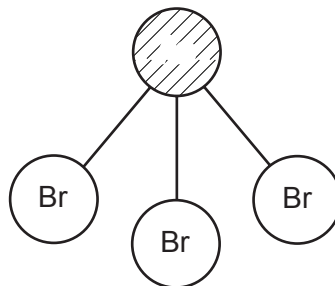
- 15 Which substance has a giant molecular structure at room temperature?
- A methane
  - B sand
  - C sodium chloride
  - D water
- 16 Which statement about diamond and graphite is correct?
- A Both diamond and graphite are used as abrasives.
  - B Diamond and graphite have different arrangements of carbon atoms.
  - C The carbon atoms in graphite have a different number of neutrons from those in diamond.
  - D The carbon atoms in both graphite and diamond have four covalent bonds.
- 17 Which statement explains why magnesium oxide has a very high melting point?
- A Magnesium atoms and oxygen atoms are joined by strong covalent bonds.
  - B The crystal lattice of magnesium oxide resembles that of diamond.
  - C The magnesium ions are strongly attracted to the oxide ions.
  - D The reaction between magnesium and oxygen is strongly exothermic.
- 18 In which pair of substances does each have a giant molecular structure?
- A diamond, iodine
  - B diamond, silica (sand)
  - C iodine, methane
  - D methane, silica (sand)
- 19 Which material has the highest melting point?
- A ammonia
  - B methane
  - C sodium chloride
  - D water

20 The table shows some properties of diamond and graphite.

For which property is the reason correct?

	property	reason
<b>A</b>	diamond cuts glass	the bonds in glass are stronger than those in diamond
<b>B</b>	diamond is a hard substance	there are many ionic bonds in diamond
<b>C</b>	graphite is a lubricant	there are weak bonds between graphite layers
<b>D</b>	graphite conducts electricity	graphite contains freely moving ions

21 A molecule of arsenic bromide,  $\text{AsBr}_3$ , has the structure shown.



Which properties could be correct for arsenic bromide?

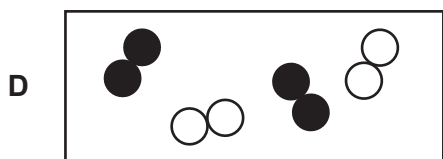
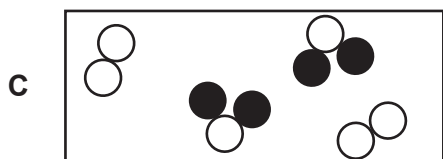
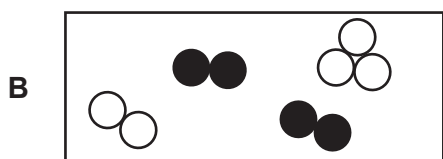
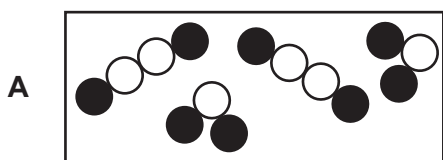
	melting point/ $^{\circ}\text{C}$	electrical conductivity at room temperature
<b>A</b>	28	does not conduct
<b>B</b>	39	conducts
<b>C</b>	650	conducts
<b>D</b>	755	does not conduct

22 At which temperature does a concentrated aqueous solution of sodium chloride begin to boil?

- A 96°C                      B 99°C                      C 100°C                      D 104°C

23 The symbols  and  represent atoms of different elements.

Which diagram shows a mixture of an element and a compound?

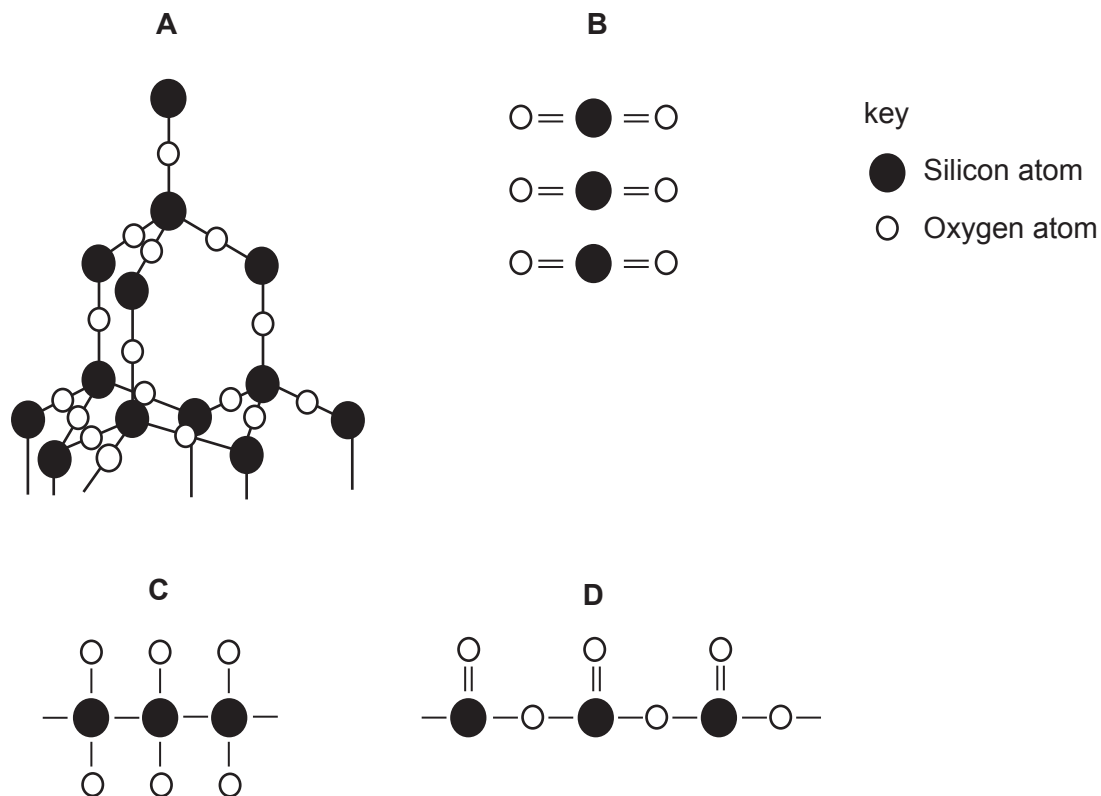


24 Which statement explains why sodium chloride, NaCl, has a lower melting point than magnesium oxide, MgO?

- A Sodium chloride is covalent but magnesium oxide is ionic.  
B Sodium is more reactive than magnesium.  
C The attraction between  $\text{Na}^+$  and  $\text{Cl}^-$  is weaker than that between  $\text{Mg}^{2+}$  and  $\text{O}^{2-}$ .  
D The melting point of sodium is lower than that of magnesium.



25 Which diagram represents the structure of sand,  $\text{SiO}_2$ ?



26 Which of the following is a compound?

- A air
- B carbon
- C oxygen
- D steam

27 For which of the following can graphite be used?

- A as an abrasive only
- B as an abrasive and as an electrode
- C as an electrode and as a lubricant
- D as a lubricant only