Questions

Q1.

Diamond, graphene and graphite are different forms of carbon.

One way in which diamond differs from graphene and graphite is that only diamond has

(1)

- ☒ **A** a high melting temperature
- ☒ **B** a precise molecular formula
- ☒ **C** poor electrical conductivity
- ☒ **D** a giant structure

(Total for question = 1 mark)

Q2.

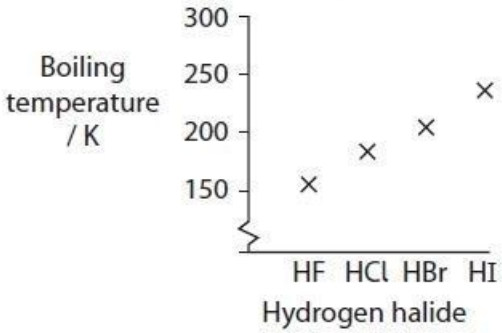
This question is about the elements in Group 7 of the Periodic Table and some of their compounds.

The hydrogen halides have the general formula HX, where X represents the symbol of the halogen.

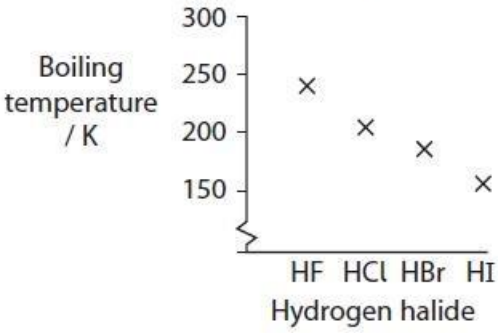
(i) Which diagram shows the trend in the boiling temperatures of the hydrogen halides?

(1)

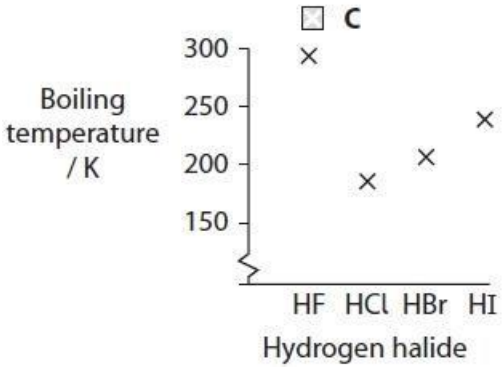
☒ **A**



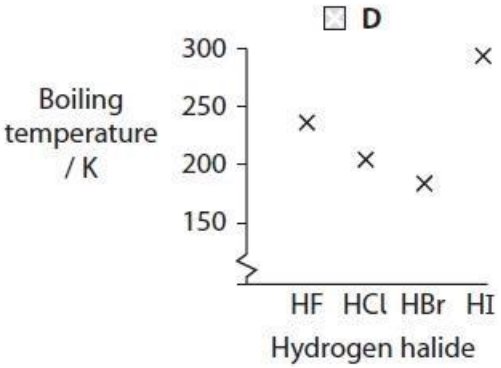
☒ **B**



☒ **C**



☒ **D**



(ii) What type of reaction occurs when ammonia gas reacts with hydrogen chloride gas?

(1)

☒ **A** acid-base
☒ **B** displacement
☒ **C** redox
☒ **D** substitution

(Total for question = 2 marks)

Q3.

Diamond, graphene and graphite are different forms of carbon.

The structural feature that graphene and graphite have in common is that the carbon atoms are arranged in

(1)

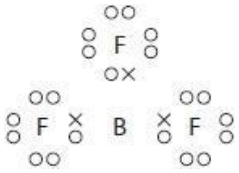
- ☒ **A** layers with each atom bonded to four others
- ☒ **B** hexagonal and pentagonal rings within a layer
- ☒ **C** hexagonal rings within a layer
- ☒ **D** a three-dimensional structure

(Total for question = 1 mark)

Q4.

This question is about covalent bonds.

The dot-and-cross diagram of BF_3 is



What is the bond angle in BF_3?

(1)

- ☒ **A** 90°
- ☒ **B** 107°
- ☒ **C** 109.5°
- ☒ **D** 120°

(Total for question = 1 mark)

Q5.

Which compound does **not** have hydrogen bonding between its molecules?

(1)

	Name of compound	Formula of compound
☐ **A**	fluoromethane	CH_3F
☐ **B**	hydrogen fluoride	HF
☐ **C**	hydrogen peroxide	H_2O_2
☐ **D**	methanol	CH_3OH

(Total for question = 1 mark)

Q6.

Which molecule has a linear shape?

(1)

☐ **A** H_2S

☐ **B** SO_2

☐ **C** CO_2

☐ **D** $CH_2{=}{=}CH_2$

(Total for question = 1 mark)

Q7.

Boric acid, H_3BO_3, is a weak acid with antiseptic properties.

Boric acid is a solid with melting temperature 171 °C.

What are the strongest interactions between the molecules in solid boric acid?

(1)

- ☐ **A** covalent bonds
- ☐ **B** hydrogen bonds
- ☐ **C** ionic bonds
- ☐ **D** London forces

(Total for question = 1 mark)

Q8.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about ionisation energies.

(i) Which equation represents the **second** ionisation of bromine?

(1)

- ☐ **A** $Br(g) + e^- \rightarrow Br^-(g)$
- ☐ **B** $Br^-(g) + e^- \rightarrow Br^{2-}(g)$
- ☐ **C** $Br(g) - 2e^- \rightarrow Br^{2+}(g)$
- ☐ **D** $Br^+(g) - e^- \rightarrow Br^{2+}(g)$

(ii) Which set of successive ionisation energies is most likely to be associated with the element boron?

(1)

- ☐ **A** 738, 1 451, 7 733, 10 541, 13 629
- ☐ **B** 801, 2 427, 3 660, 25 026, 32 828
- ☐ **C** 1 086, 2 353, 4 621, 6 223, 37 832
- ☐ **D** 1 402, 2 856, 4 578, 7 475, 9 445

(Total for question = 2 marks)

Q9.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

This is a question about atoms, isotopes and ions.

Which of the following pairs of ions is isoelectronic?

(1)

☐ **A** N^{3-} and Cl^{-}

☐ **B** O^{2-} and S^{2-}

☐ **C** Na^{+} and K^{+}

☐ **D** Na^{+} and Mg^{2+}

(Total for question = 1 mark)

Q10.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about atoms, molecules and ions.

Which of these isoelectronic ions has the largest ionic radius?

(1)

☐ **A** N^{3-}
☐ **B** O^{2-}
☐ **C** Na^{+}
☐ **D** Al^{3+}

(Total for question = 1 mark)

Q11.

This question is about structure and bonding.

Ionic bonding is the strong electrostatic attraction between

(1)

- ☒ **A** anions and cations
- ☒ **B** atoms and delocalised electrons
- ☒ **C** cations and delocalised electrons
- ☒ **D** two nuclei and a shared pair of electrons

(Total for question = 1 mark)

Q12.

This question is about structure and bonding.

The names of four substances are given.

Substance	Name
P	copper
Q	iodine
R	silicon(IV) oxide
S	sodium chloride

(i) Which of these substances exists at room temperature as a giant lattice of oppositely charged ions?

(1)

- ☒ **A** Substance **P**
- ☒ **B** Substance **Q**
- ☒ **C** Substance **R**
- ☒ **D** Substance **S**

(ii) Which of these substances has a high melting temperature, **and** conducts electricity when solid and when molten?

(1)

- ☒ **A** Substance **P**
- ☒ **B** Substance **Q**
- ☒ **C** Substance **R**
- ☒ **D** Substance **S**

(Total for question = 2 marks)

Q13.

Magnesium oxide has a very high melting temperature.
Which of the following is the best description of its structure and bonding?

(1)

- ☒ **A** giant ionic
- ☒ **B** giant metallic
- ☒ **C** giant covalent
- ☒ **D** simple covalent

(Total for question = 1 mark)

Q14.

Diamond, graphene and graphite are different forms of carbon.

The bond angles within a layer of graphene and a layer of graphite are

(1)

- ☒ **A** 90° and 109.5°
- ☒ **B** all 109.5°
- ☒ **C** 109.5° and 120°
- ☒ **D** all 120°

(Total for question = 1 mark)