

8: Which substance does **not** exist as a giant lattice?

- ☐ **A** silver (Ag)
- ☐ **B** sodium chloride (NaCl)
- ☐ **C** graphite (C)
- ☐ **D** buckminsterfullerene (C₆₀)

(Total for Question 8 = 1 mark)

6 This question is about electronic configurations.

(a) What is the electronic configuration of an atom of calcium?

(1)

- ☐ **A** [Ne] 3s¹
- ☐ **B** [Ar] 4s¹
- ☐ **C** [Ne] 3s²
- ☐ **D** [Ar] 4s²

(b) What is the electronic configuration of a Cr³⁺ ion?

(1)

- ☐ **A** [Ar] 3d²4s¹
- ☐ **B** [Ar] 3d³
- ☐ **C** [Ar] 3d⁴
- ☐ **D** [Ar] 3d⁵

(Total for Question 6 = 2 marks)

- 4 Two identical sealed flasks, containing different gases, are side by side. Each flask contains one gas, with the gases at the same temperature and pressure.

Flask **A** contains 4.0×10^{-3} mol of methane.

Flask **B** contains 160 mg of a different gas.

Which could be the gas in Flask **B**?

- ☐ **A** argon
- ☐ **B** carbon dioxide
- ☐ **C** helium
- ☐ **D** neon

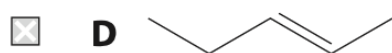
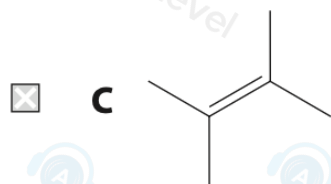
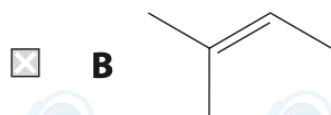
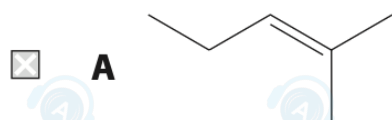
(Total for Question 4 = 1 mark)

- 4 Which diagram best represents the electron density map of sodium chloride?



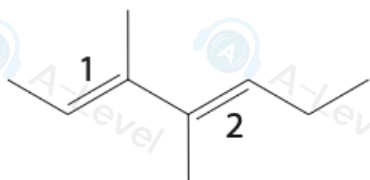
(Total for Question 4 = 1 mark)

18: Which molecule has a geometric isomer?



(Total for Question 18 = 1 mark)

16 The molecule shown has two double bonds.



Which is the correct identification for each double bond?

	Double bond 1	Double bond 2
☒ A	<i>E</i>	<i>E</i>
☒ B	<i>E</i>	<i>Z</i>
☒ C	<i>Z</i>	<i>E</i>
☒ D	<i>Z</i>	<i>Z</i>

(Total for Question 16 = 1 mark)

18 This question is about the elements in Period 2 of the Periodic Table.

(a) The first ionisation energies of some elements in Period 2 are shown.

Element	Li	Be	B	C	N	O	F	Ne
First ionisation energy / kJ mol^{-1}	520	900	801	1086	1402		1681	2081

(i) Explain the **general** trend in first ionisation energy across Period 2.

(2)

(ii) Predict a value for the first ionisation energy of oxygen.
Justify your answer.

(3)



(c) Beryllium reacts with chlorine to form beryllium chloride.

In the gas phase, beryllium chloride exists both as a simple molecule, BeCl_2 , and as a dimer, Be_2Cl_4 .

(i) Draw a dot-and-cross diagram of the molecule, BeCl_2 .

(1)

(ii) Explain the shape and bond angle in the molecule BeCl_2 .

(4)

Shape

Bond angle

Explanation

22 The density of an unknown gas is 0.656 g dm^{-3} at 20°C and $101\,000 \text{ Pa}$.

$[pV = nRT \quad R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}]$

(a) Calculate the molar mass of the unknown gas.

(5)

(b) The unknown gas is a hydrocarbon.

Give the name or formula for the unknown gas using your answer to (a).

(1)