Electrons, Bonding & Structure Multiple Choice

Question Paper 1

Level	A Level
Subject	Chemistry
Exam Board	OCR
Module	Foundations in Chemistry
Topic	Electrons, Bonding & Structure
Paper	Multiple Choice
Booklet	Question Paper 1

Time allowed: **18 minutes**

Score: **/13**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E
>85%	73%	60%	47%	34%	21%

Question 1

Which statement best explains why nitrogen has a larger first ionisation energy than oxygen?

A. N atoms have less repulsion between p-orbital electrons than O atoms.

B. N atoms have a smaller nuclear charge than O atoms.

C. N atoms lose an electron from the 2s subshell, while O atoms lose an electron from the 2p subshell.

D. N atoms have an odd number of electrons, while O atoms have an even number.

[1]

Question 2

Which molecule is **not** planar? **[1]**

A C_2H_4

B. C_2H_6

C. H_2CO

D. HCN

Question 3

Which element has induced dipole–dipole interactions (London forces) in its solid lattice? **[1]**

A. boron

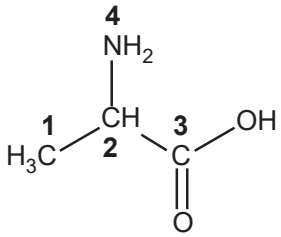
B. magnesium

C. silicon

D. sulfur

Question 4

Four atoms, **1–4**, are labelled in the structure below.



Which atom has a trigonal planar arrangement of bonds around it? **[1]**

A. Atom 1

B. Atom 2

C. Atom 3

D. Atom 4

Question 5

Which compound has polar molecules?

[1]

A. OCl_2

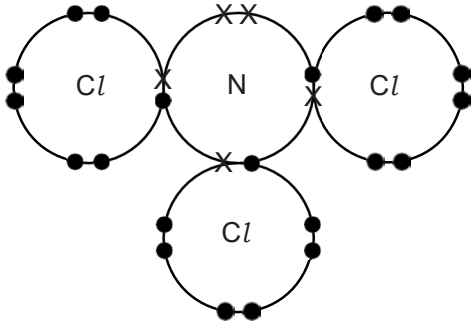
B. BCl_3

C. CCl_4

D. SCl_6

Question 6

A '*dot-and-cross*' diagram for nitrogen trichloride, NCl_3, is shown below.



Which row shows the correct shape and bond angle in a molecule of NCl_3? **[1]**

	Name of shape	Bond angle
A	Pyramidal	104.5°
B	Pyramidal	107°
C	Tetrahedral	107°
D	Trigonal planar	120°

What is the shape around the carbon atoms in graphene? **[1]**

A. linear

B. pyramidal

C. tetrahedral

D. trigonal planar

Question 8

Electron configurations for atoms of different elements are shown below.

Which electron configuration represents the element with the largest first ionisation energy?

[1]

A $1s^2 2s^2$

B $1s^2 2s^2 2p^4$

C $1s^2 2s^2 2p^6$

D $1s^2 2s^2 2p^6 3s^2$

Question 9

Which compound has non-polar molecules? **[1]**

A *E*-1,2-dichlorobut-2-ene

B *E*-2,3-dichlorobut-2-ene

C *Z*-2,3-dichlorobut-2-ene

D *Z*-1,4-dichlorobut-2-ene

Question 10

Which molecule is non-polar? **[1]**

A. SF_6

B. H_2S

C. PF_3

D. NH_3

Which substance contains hydrogen bonding in the liquid state?

[1]

A. $CH_3(CH_2)_4CH_3$

B. $CH_3(CH_2)_3CHFCH_3$

C. $CH_3(CH_2)_3COCH_3$

D. $CH_3(CH_2)_3CH(OH)CH_3$

The boiling point of hydrogen bromide is –67 ºC.
The boiling point of hydrogen iodide is –34 ºC.

The different boiling points can be explained in terms of the strength of bonds or interactions.

Which bonds or interactions are responsible for the higher boiling point of hydrogen iodide? **[1]**

A covalent bonds

B hydrogen bonds

C permanent dipole–dipole interactions

D induced dipole–dipole interactions

The boiling point of butan-1-ol is 118 °C. The boiling point of 2-methylpropan-2-ol is 82 °C.

Why is the boiling point of butan-1-ol higher than that of 2-methylpropan-2-ol? **[1]**

A butan-1-ol has stronger induced dipole–dipole interactions because it has more electrons

B butan-1-ol has stronger induced dipole–dipole interactions because it has a straight-chain structure

C butan-1-ol can form hydrogen bonds while 2-methylpropan-2-ol cannot

D butan-1-ol is more stable because it is a primary alcohol