



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

CHEMISTRY

BONDING

Level & Board	AQA (A-LEVEL)
TOPIC:	BONDING
PAPER TYPE:	QUESTION PAPER -2
TOTAL QUESTIONS	10
TOTAL MARKS	35

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Bonding

1. This question is about intermolecular forces.

(a) Give the meaning of the term electronegativity.

(1)

(b) Explain how permanent dipole-dipole forces arise between hydrogen chloride molecules.

(2)

(c) Complete the table by naming the shape of each molecule.

Place a tick (✓) in the final column if the molecule has a permanent dipole.

Molecule	Name of shape	Tick (✓) if molecule has a permanent dipole
CH ₃ Cl		
PH ₃		
BeCl ₂		
SiH ₄		

(4)

2. Which is the correct crystal structure for the substance named?
Substance Structure.

	Substance	Structure
A.	Iodine	Simple molecular
B.	Diamond	Ionic
C.	Sodium chloride	Giant covalent
D.	Graphite	Metallic

(Total 1 mark)

3. Which compound has the highest boiling point?

- A.** $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- B.** $\text{CH}_3\text{CH}_2\text{CHO}$
- C.** CH_3COCH_3
- D.** $\text{CH}_3\text{COOCH}_3$

(Total 1 mark)

4. This question is about structure and bonding.

(a) Draw a diagram to show the strongest type of interaction between two molecules of ethanol ($\text{C}_2\text{H}_5\text{OH}$) in the liquid phase. Include all lone pairs and partial charges in your diagram.

(3)

(b) Methoxymethane (CH_3OCH_3) is an isomer of ethanol.

The table shows the boiling points of ethanol and methoxymethane.

Compound	Boiling point / °C
ethanol	78
methoxymethane	-24

In terms of the intermolecular forces involved, explain the difference in boiling points.

(3)

(c) Draw the shape of the POCl_3 molecule and the shape of the ClF_4^- ion.

Name each shape.

In a POCl_3 molecule the oxygen atom is attached to the phosphorus atom by a double bond that uses two electrons from phosphorus.

Include any lone pairs of electrons that influence the shapes.

Suggest a value for the bond angle in ClF_4^-

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(5)

5. Which is not responsible for conduction of electricity?

- A. The sodium ions in molten sodium chloride
- B. The electrons between layers of carbon atoms in graphite
- C. The bonding electrons in a metal
- D. The lone pair electrons on water molecules

(Total 1 mark)

6. Which molecule does not have a permanent dipole?

- A. CH_3Br
- B. CH_2Br_2
- C. CHBr_3
- D. CBr_4

(Total 1 mark)

7. This question is about compounds that contain fluorine.

(a) Sodium fluoride contains sodium ions (Na^+) and fluoride ions (F^-).

Na^+ and F^- have the same electron configuration.

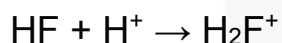
Explain why a fluoride ion is larger than a sodium ion.

(2)

(b) Explain, in terms of structure and bonding, why the melting point of sodium fluoride is high.

(2)

(c) The ion H_2F^+ is formed when hydrogen fluoride gains a proton as shown in the equation



Name the type of bond formed when HF reacts with H^+
Explain how this bond is formed.

(2)

(d) Fluoroantimonic acid contains two ions, SbF_6^- and H_2F^+

Draw the shape of the SbF_6^- ion and the shape of the H_2F^+ ion.

Include any lone pairs that influence the shape.

Name the shape of each ion.

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(4)

8. In which molecule are all the atoms in the same plane?

- A. CH_3CHO
- B. CH_3NH_2
- C. $\text{C}_6\text{H}_5\text{Cl}$
- D. $\text{C}_6\text{H}_5\text{CH}_3$

(Total 1 mark)

9. Which molecule has a permanent dipole?

- A. BF_3
- B. NH_3
- C. SiCl_4
- D. SO_3

(Total 1 mark)

10. Which polymer has hydrogen bonding between the polymer chains?

- A. Kevlar
- B. PVC
- C. poly(phenylethene)
- D. Terylene

(Total 1 mark)

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DR. ASHAR RANA
M.B.B.S / MS. CHEMISTRY



- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, Math's and Biology Tutor

CONTACT INFORMATION FOR CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
 - International Phone/WhatsApp: 00442081445350
 - Website: www.chemistryonlinetuition.com
 - Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK