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A' Level Chemistry

Year 1

Unit 3: Bonding (Shapes)

Summer Examination Revision Pack

The questions in this pack should be attempted **AFTER** completing all other revision.

Grade Accelerator

Recall Definitions
Drawing Diagrams
Using Equations
Drawing Graphs

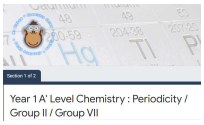
Quizlet

Quizlet Classes

Flashcard Based
Games
Tests & Quizzes
Keyword Spell Checker

Condensed Notes

Keywords & Definitions
Key Concepts
Application
Key Skills



Online Forms

Take Time to Answer
Use Paper & Calculator
Work It Out
Review Missed Marks

Use the 3 Wave Process when completing these revision packs.

1. Complete the questions without assistance
(Can't answer a question? Leave it and move on)
2. Use your notes to fill any gaps after step 1
3. Use the mark scheme to fill in any remaining gaps.

1. Having gaps after step 1 is normal, that's why we are doing revision!
2. If your notes don't help during step 2, they are not good enough!
(Change your note taking method and try to understand the problem)
3. If you don't understand why the mark scheme answer is correct, **see Andy.**

If you struggle with the questions in the pack, **STOP!** and complete some more revision.

If you come to a complete dead-end, **STOP!** and speak to **Andy** asap.

0 8 . 4 Sodium reacts with ammonia to form the compound $NaNH_2$ that contains the NH_2^- ion.

Draw the shape of the NH_2^- ion.
Include any lone pairs of electrons that influence the shape.

Predict the bond angle.
Justify your prediction.

[4 marks]

Shape

Bond angle _____

Justification _____

_____

_____

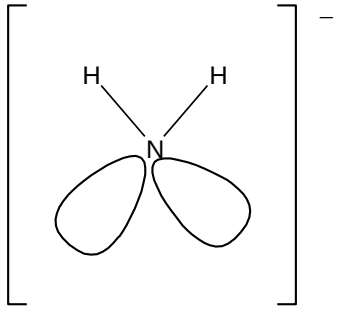
_____

_____

_____

17

Turn over for the next question

08.4	M1 	Ignore charge and brackets	1
	M2 104.5°	Allow 104-106	1
	M3 (4) electron pairs repel to be as far apart as possible		1
	M4 lp/lp repulsion> lp/bp repulsion (> bp/bp repulsion)	For M4 allow lone pairs repel more than bonding pairs Mark independently	1

Total			16

Do not write outside the box

0 8 This question is about structure and bonding.

0 8 . 1 Draw a diagram to show the strongest type of interaction between two molecules of ethanol (C_2H_5OH) in the liquid phase.

Include all lone pairs and partial charges in your diagram.

[3 marks]

0 8 . 2 Methoxymethane (CH_3OCH_3) is an isomer of ethanol.

Table 5 shows the boiling points of ethanol and methoxymethane.

Table 5

Compound	Boiling point / °C
ethanol	78
methoxymethane	–24

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

[3 marks]

Do not write outside the box

Extra space

0 8 . 3 Draw the shape of the $POCl_3$ molecule and the shape of the ClF_4^- ion.
Include any lone pairs of electrons that influence the shapes.

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

Name each shape.

Suggest a value for the bond angle in ClF_4^-

Shape of $POCl_3$ Shape of ClF_4^-

[5 marks]

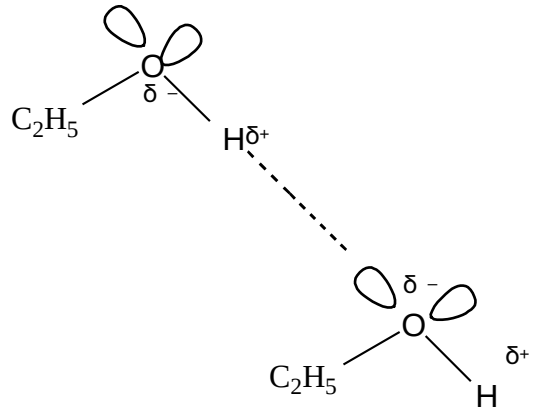
Name of shape of $POCl_3$

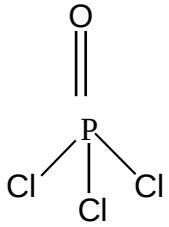
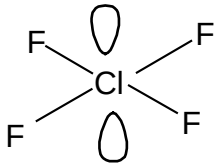
Name of shape of ClF_4^-

Bond angle in ClF_4^-

11

Turn over for the next question

Question	Answers	Additional Comments/Guidelines	Mark
08.1		**M1** two lone pairs on each O atom and δ+ and δ– on each H-O bond **M2** dotted/broken line shown between lone pair on one molecule and the correct H on another **M3** O·····H–O in straight line, dependent on M2 Ignore any partial charges on C–H or C–O bonds For straight line in **M3**, allow a deviation of up to 15° If a different molecule containing hydrogen bonding due to O–H bond drawn (e.g. methanol, water) or an incorrect attempt at the structure of ethanol, then maximum of 2 marks (i.e. only penalise if would score all three marks otherwise)	1 1 1
08.2	Hydrogen bonds (between ethanol molecules) (permanent) dipole-dipole OR van der Waals force (between methoxymethane molecules) Hydrogen bonds are stronger/est intermolecular force	 Allow vdW Allow more energy to break/overcome hydrogen bonding Allow converse arguments	1 1 1

08.3	  (distorted) Tetrahedral Square planar 90^o	$POCl_3$: allow any shape showing 1 double bond between P and O and 3 P-Cl bonds ClF_4^-: allow any shape showing 4 Cl-F bonds and 2 lone pairs	1 1 1 1 1