

Chemical Bonding

TOPICAL WORKSHEET

YOUR INSTRUCTOR



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NOTABLE STUDENT DISTINCTIONS

- ★ A Level - World Distinction
- ★ O Level - Top in Pakistan Distinction
- ★ iGCSE - Top in Pakistan Distinction
- ★ 5x Best Across 3 A Level Subjects

WHAT'S INSIDE

TOPICAL THEORY NOTES

EXAM-STYLE WORKSHEETS

MARKING SCHEMES

A complete, exam-focused revision pack for AS Chemistry (9701) - Chemical Bonding.

Hybridization Questions

Question 1

P, **Q** and **R** all have the molecular formula C_3H_6O . They are all structural isomers of each other.

P and **Q** each contain an oxygen atom bonded directly to a carbon atom that is sp^2 hybridised.
R contains an oxygen atom bonded directly to a carbon atom that is sp^3 hybridised.

(a) (i) Explain the meaning of the term *structural isomers*.

.....

 [2]

(ii) Explain how sp^2 and sp^3 hybridisation can occur in carbon atoms.

sp^2 hybridisation

 sp^3 hybridisation
 [2]

(iii) State the bond angles normally associated with each type of hybridisation in carbon atoms.

sp^2
 sp^3 [2]

Question	Answer	Marks
4(a)(i)	(molecules / isomers with) the same molecular formula / same number of atoms of each element	1
	different structural / displayed formulae / arrangement of bonds	1
4(a)(ii)	sp^2 overlap of (2)s with two (2)p (atomic) orbitals	1
	sp^3 overlap of (2)s with all three (2)p (atomic) orbitals	1
4(a)(iii)	$sp^2 = 116^\circ - 124^\circ$	1
	$sp^3 = 106^\circ - 112^\circ$	1

Question 2

- (ii) Draw a 'dot-and-cross' diagram to represent the bonding in the hydrogen cyanide molecule. Show the outer shell electrons only.

[1]

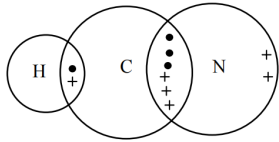
- (iii) State the hybridisation of the carbon and nitrogen atoms in hydrogen cyanide, and give the H-C-N bond angle.

hybridisation of C

hybridisation of N

H-C-N bond angle

[2]

3(a)(ii)		1
3(a)(iii)	C: sp and N: sp angle 180°	2

Question 3

- (b) (i) Draw the 'dot-and-cross' diagram of NH_2Cl . Show outer electrons only.

[1]

- (ii) State the hybridisation of the nitrogen atom and suggest the H-N-Cl bond angle in the NH_2Cl molecule.

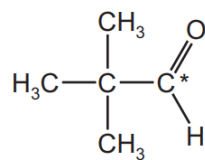
hybridisation of N

H-N-Cl bond angle

[1]

Question 4

- (ii) State the hybridisation of the carbon atom labelled with an asterisk, *.



..... [1]