



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMISTRY N4

27 MARCH 2018

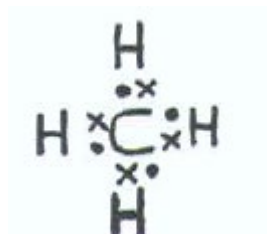
This marking guideline consists of 5 pages.

QUESTION 1

- 1.1 1.1.1 The Octet rule
 1.1.2 Bond length
 1.1.3 Dative covalent bond/Co-ordinate covalent bond
 1.1.4 Sidwick and Powell theory
 1.1.5 Polar covalent bond
(5 × 2) (10)
- 1.2 Polar molecule
 • The charge is unevenly distributed across the molecules✓
 • And a dipole moment is formed✓
 • HCl, H₂O, NH₃ and CH₃Cl✓ (Any ONE example)
- Nonpolar molecule
 • The charge is evenly distributed across the molecules✓
 • And no dipole moment formed✓
 • H₂, N₂, Cl₂, Br₂, O₂, CO₂, BF₃ and CH₄✓ (Any ONE example) (6)
- 1.3 1.3.1 MgO
 1.3.2 He
 1.3.3 Zn
 1.3.4 H₂O
 1.3.5 I₂
(5 × 1) (5)
- 1.4 • Sublimation energy
 • First ionisation energy
 • Dissociation energy
 • Electron affinity (4)
- [25]**

QUESTION 2

- 2.1 2.1.1 C_nH_{2n + 2} (2)
- 2.1.2 Methane (2)
- 2.1.3



TWO marks for correct shape and ONE mark for arranging dots correctly.✓✓

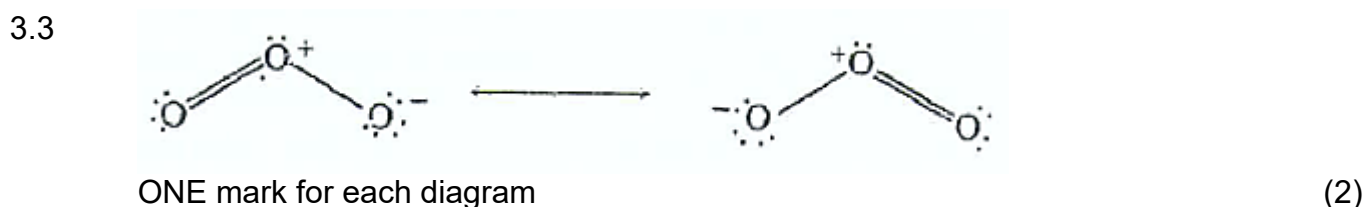
(3)

	2.1.4	Tetrahedral shape	(1)
	2.1.5	Four	(1)
	2.1.6	Yes; the carbon atom is surrounded by eight electrons.	(2)
	2.1.7	Nonpolar molecules	(1)
	2.1.8	Eight	(1)
2.2	2.2.1	Hydronium ion	(1)
	2.2.2	Covalent hydride	(1)
	2.2.3	Because it releases hydrogen ion	(2)
	2.2.4	$K_a = \frac{[H_3O^+][NO_3^-]}{[HNO_3]}$	(3)
	2.2.5	Big; HNO ₃ is a strong acid.	(2)
	2.2.6	• HNO₃ and NO₃⁻ • H₂O and H₃O⁺	(2)
	2.2.7	HNO ₃	(1)
[25]			

QUESTION 3

3.1 $2PbO_2 \xrightarrow{\Delta} 2PbO + O_2$ (3)

- 3.2
- Ozone will decompose into oxygen; it results in the liberation of heat✓ and releases an entropy.✓
 - The entropy of ozone is positive;✓ triatomic molecules will be broken into the simpler diatomic oxygen.✓ (Any 1 × 2) (2)



- 3.4
- 3.4.1
- MgO
 - CO₂
 - Giant molecules of silicon dioxide (Any ONE) (1)
- 3.4.2 Pb₃O₄ (1)

3.4.3	• H_2O_2 • $\text{Ba}^{2+} (\text{O}-\text{O})^{2-}$	(Any ONE)	(1)
3.4.4	C_3O_2		(1)
3.5	$\text{Ca}(\text{OH})_2\checkmark + 2\text{NH}_4\text{Cl}\checkmark \rightarrow \text{CaCl}_2\checkmark + 2\text{H}_2\text{O}\checkmark + 2\text{NH}_3\checkmark$		(5)
3.6	• Easily soluble in water. • Liquefiable gas with characteristic smell. • The solution turns red litmus paper blue.	(Any 2 × 1)	(2)
3.7	• Action of water on metals • Action of diluted acid on metals • Action of strong alkalis on zinc and aluminium • Hydrolysis of ionic hydride	(Any 3 × 1)	(3)
3.8	3.8.1 $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO}\checkmark + 6\text{H}_2\text{O}\checkmark$ 3.8.2 $2\text{NO}_2 + \text{H}_2\text{O} \rightarrow \text{HNO}_3\checkmark + \text{HNO}_2\checkmark$	(2 × 2)	(4)
			[25]

QUESTION 4

4.1	• Respiration of animals • Respiration and decay of vegetation • Combustion of fuel • Decomposition of dead animals		(4)
4.2	• In printer's ink • In shoe polish • Incorporated into rubber to make tyres		(3)
4.3	$\text{Ca}\checkmark + 2\text{C}\checkmark \rightarrow \text{CaC}_2\checkmark$		(3)
4.4	4.4.1 Interstitial carbide 4.4.2 Covalent hydride 4.4.3 Interstitial hydride 4.4.4 Covalent carbide 4.4.5 Ionic carbide		
			(5 × 1) (5)
4.5	• Chlorine gas/Cl_2 • Carbon disulphide/CS_2		(2)
4.6	4.6.1 Nitrous acid 4.6.2 Carbon suboxide 4.6.3 Dinitrogen tetroxide		
			(3 × 1) (3)



(5)
[25]

TOTAL: 100