



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMISTRY N4

8 April 2026

This marking guideline consists of 5 pages.

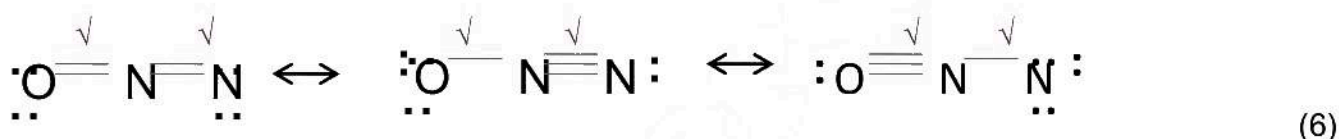
QUESTION 1

- | | |
|------|---|
| 1.1 | D |
| 1.2 | B |
| 1.3 | C |
| 1.4 | A |
| 1.5 | D |
| 1.6 | D |
| 1.7 | C |
| 1.8 | B |
| 1.9 | A |
| 1.10 | C |

(10 × 1) [10]

QUESTION 2

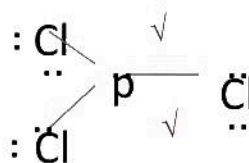
2.1 2.1.1



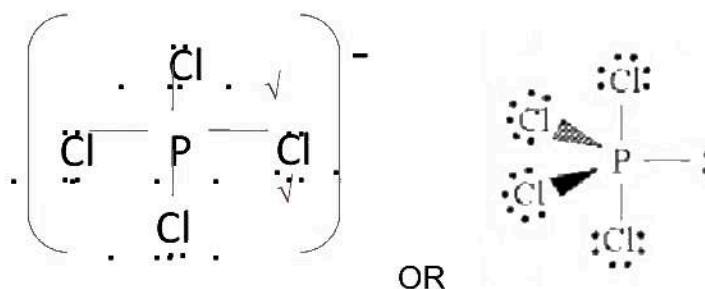
2.1.2 A pair of valence electrons that are not shared with another atom in a covalent bond. (1)

2.1.3 Weak Van der Waals forces (dipole-dipole✓ and London forces).✓
The molecule possesses permanent dipole moment due to electronegativity difference between N and O on a linear geometry.✓ (3)

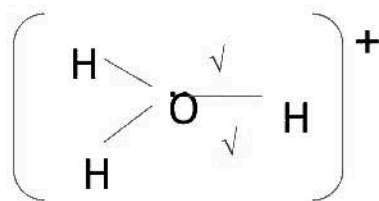
2.2 2.2.1 (i) PCl_3



(ii) PCl_4^-



(i) H_3O^+



(3 × 2) (6)

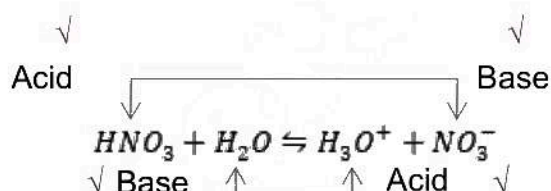
- 2.2.2 (i) Trigonal pyramid
(ii) See-saw or trigonal bipyramid
(iii) Trigonal pyramid (3)

2.2.3 (ii) ✓ Structure has five electron pairs around P. ✓ (2)

[21]

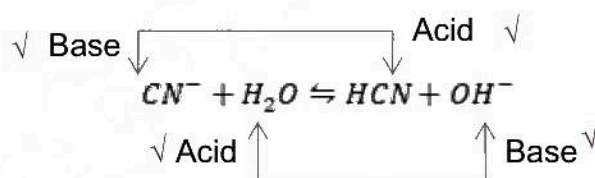
QUESTION 3

3.1 3.1.1



(½ mark each)

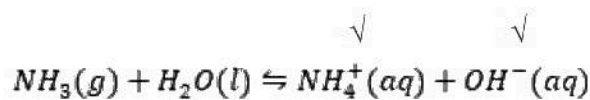
3.1.2



(½ mark each)

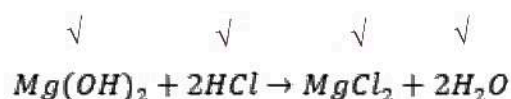
(2 × 2) (4)

3.2

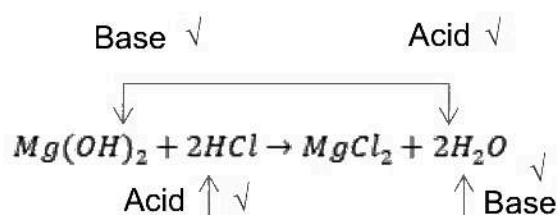


(2)

3.3 3.3.1



3.3.2



(2 × 2)

- 3.4 3.4.1 HF, ✓ acidity increases across a period (F is to the right of O) ✓ (2)
- 3.4.2 HSO₄, A bisulphate ion ✓ has two oxo groups compared to bisulphite that contains one. ✓ (2)
- 3.4.3 H₂S, ✓ as S is to the right of N, and acidity increases across ✓ and down a period, ✓ using O as a reference atom. (3)
- [17]**

QUESTION 4

- 4.1 N
4.2 I
4.3 O
4.4 A
4.5 J
4.6 C
4.7 G
4.8 K
4.9 F
4.10 P

(10 × 1) **[10]**

QUESTION 5

- 5.1 5.1.1 $2\text{NaNO}_3(s) \rightarrow 2\text{NaNO}_2(s) + \text{O}_2(g)$ ✓ ✓ (balancing)
(2 marks for the products and 1 mark for balancing) (3)
- 5.1.2 $\text{NaNO}_2(aq) + \text{HCl}(aq) \rightarrow \text{HNO}_2(aq) + \text{NaCl}(aq)$ ✓ (2)
- 5.2 $\text{NaNO}_3(aq) + \text{H}_2\text{SO}_4(l) \rightarrow \text{NaHSO}_4(aq) + \text{HNO}_3(l)$ ✓ (2)
- 5.3
- Natural gas desulfurization (to remove sulphur containing materials such H₂S) using activated carbon or zinc oxide
 - Catalytic steam reforming, where the cleansed natural gas is reacted with steam at about 540 °C to produce H₂ and CO₂ and minor CO gas
 - Carbon monoxide (CO) shift, where the CO is reacted with steam in an iron catalysed reaction to produce more H₂ and CO₂
 - Carbon dioxide (CO₂) removal is conducted by using two methods: monoethanolamine (C₂H₄NH₂OH) scrubbing, or hot solution of potassium carbonate
 - Methanation; Residual CO₂ in the synthesis gas is removed by catalytic methanation which is conducted over a nickel catalyst at temperatures of 400 to 600 °C
 - Ammonia synthesis. Here the Haber process is conducted using iron catalyst at elevated temperatures (about 550 °C) and pressures (250 atmospheres) to convert hydrogen and nitrogen (obtained by distilling air) to form ammonia

5.4	5.4.1	N ₂ O (Dinitrogen oxide)		
	5.4.2	NO (Nitrogen oxide)		
	5.4.3	N ₂ O ₃ (Dinitrogen trioxide)		
	5.4.4	N ₂ O ₄ (Dinitrogen tetroxide)		
	5.4.5	N ₂ O ₅ (Dinitrogen pentoxide)		
			(5 × 1)	(5)
5.5	Its ion;✓ the removed electron leaves a cation with one less shell where electrons are occupied.✓			(2)
5.6	Bromine atom;✓ the anion has an extra electron on the valence shell leading to greater electron-electron repulsion that increases the size of the anion.			(2)
5.7	The ability of an atom to attract a shared electron pair towards itself.			(1)
[23]				

QUESTION 6

6.1	CaSO ₄ ✓ and MgSO ₄ ✓			(2)
6.2	(a) Addition of washing soap (b) The ion exchange process			(2)
6.3	Sodium carbonate			(1)
6.4	(CH ₃) ₂ CHOH(l) ✓ + O ₂ (g) ✓ → (CH ₃) ₂ C=O(l) + ✓ H ₂ O ₂ (l)✓			(3)
6.5	It decomposes in the presence of light.✓ Finely divided metals can cause explosive decomposition.✓			(2)
6.6	H ⁺ (s) ✓ + H ₂ O(l) ✓ → OH ⁻ (aq) ✓ + H ₂ (g) ✓ (Half mark each)			(2)
6.7	Water, petroleum and natural gas.			(3)
6.8	• Manufacture of ammonia • Manufacture of hydrogen chloride • Manufacture of organic compounds • Manufacture of margarine • Extraction of metals from ores • Liquid hydrogen as a rocket fuel • Hydrogenation reactions			
			(Any 4 × 1)	(4)

[19]

TOTAL: 100