



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMISTRY N4

21 November 2025

This marking guideline consists of 5 pages.

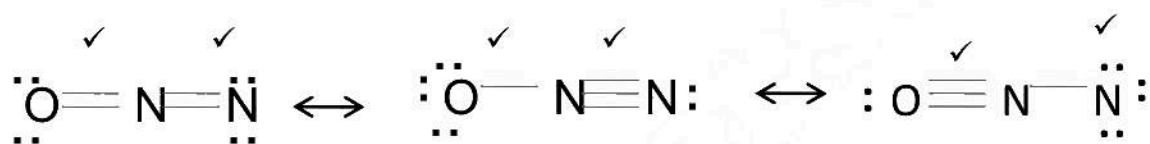
QUESTION 1: GENERAL

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

(10 × 1) [10]

QUESTION 2: CHEMICAL BONDING AND CHEMICAL GEOMETRY

2.1 2.1.1

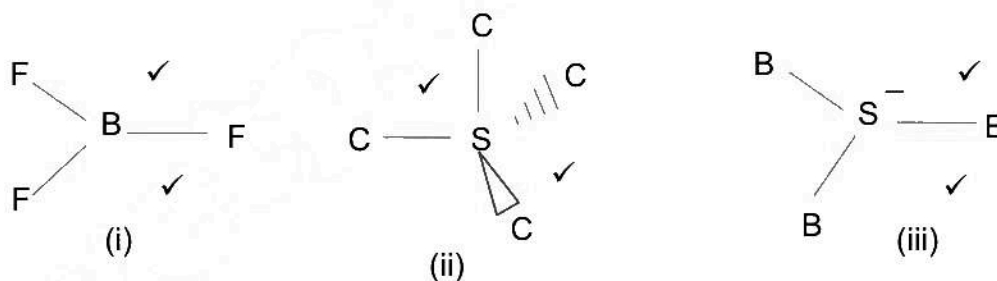


(6)

2.1.2 Negatively charged entity

(1)

2.2 2.2.1



(6)

2.2.2 (i) Trigonal planar, ✓ (ii) tetrahedral, ✓ (iii) pyramidal ✓

(3)

2.2.3 (i)

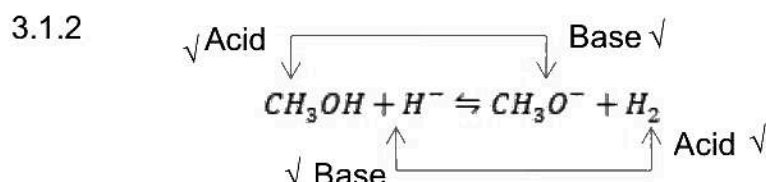
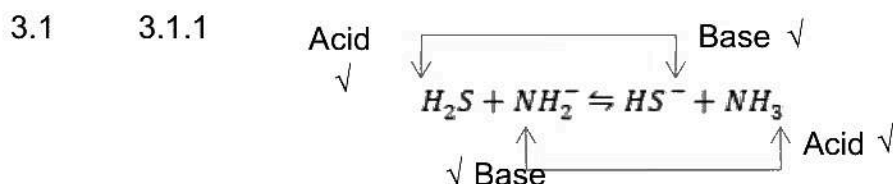
(1)

2.2.4 (iii)

(1)

[18]

QUESTION 3: ACIDS AND BASES

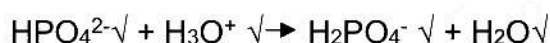


(2 × 2) (4)

3.2 As an acid:



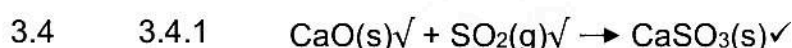
As a base:



(2 × 2) (4)

3.3 Acidity increases down a group. Br is lower in Group 7A than F, hence it will be more acidic. ✓ It will ionise more readily than a weaker acid, hence the larger K_a value. ✓

(2)



3.4.2 CaO is a base ✓ (as it donated an electron pair) ✓ and SO_2 is an acid ✓ (as it accepted an electron pair from CaO). ✓

(2 × 2) (4)

3.5 3.5.1 Acidity: $HCl < HBr < HI$ ✓ (acidity increases down a group) ✓

(2)

3.5.2 Basicity: $H^- > OH^- > H_2O$ ✓ (chloride ion is neutral, hydride is the strongest base) ✓

(2)

3.5.3 Acidity: $NaHSO_3 < NaHSeO_3 < NaHSO_4$. ✓ Na^+ is neutral. There are three anions of oxoacids, with HSO_4^- having the strongest ability to donate a proton (two oxo groups). ✓ Se is lower than S on the periodic table (hence for comparable oxo groups, it will be stronger). Hence HSO_3^- is the weakest. ✓

(3)

3.5.4 Basicity: $BrO^- > BrO_2^- > BrO_3^- > BrO_4^-$ ✓ (anions of oxoacids, the weakest being that of the strongest acid $HBrO_4$) ✓

(2)

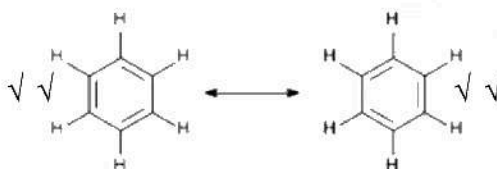
[23]

QUESTION 4: DESCRIPTIVE CHEMISTRY OF CARBON

4.1 Gaseous mixture of CO✓ and hydrogen✓ (1)

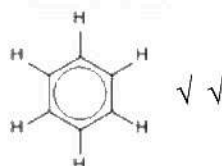
- 4.2
- Manufacture of hydrogen
 - Manufacture of methanol
 - Manufacture of higher alcohols
 - Manufacture of methanoic (formic) acid
 - Source of hydrogen as well as a fuel
 - Used to directly reduce metal oxides
 - Liquid fuels and lubricants via the Fischer–Tropsch process
 - Synthesis of ammonia via the Haber process
 - Synthesis of oxo alcohols via an intermediate aldehyde
- (Any 4 × 1) (4)

4.3 4.3.1



(4)

4.3.2



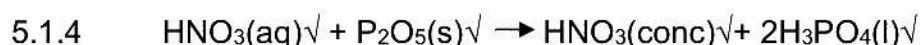
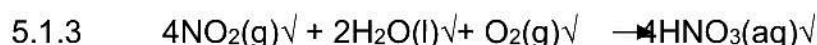
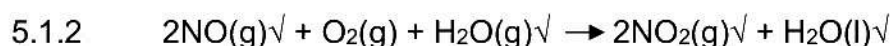
(2)

- 4.4 4.4.1
- Ionic carbide
 - Interstitial carbide
 - Covalent carbide

- 4.4.2
- CaC₂(s)
 - Fe₃C(s)
 - SiC(s)

(2 × 3) (6)
[17]

QUESTION 5: DESCRIPTIVE CHEMISTRY OF NITROGEN AND HYDROGEN



(4 × 2) (8)

Protium (ordinary hydrogen) ✓ / deuterium ✓ and tritium ✓

- 5.3 $H^+ < H < H^-$. ✓ The naked proton has been stripped of its electron (there is no electron cloud surrounding the nucleon), hence the smallest size. The hydride anion has an extra electron in the first orbital, which results in greater electron-electron repulsion, leading to an increase in size. ✓ (2)
- 5.4
- From steam and carbon or (hydrocarbons)
 - Electrolysis
 - Reaction of metals with acids
 - Reaction of ionic hydride with water
- (4)

[17]

QUESTION 6: DESCRIPTIVE CHEMISTRY OF OXYGEN

- 6.1 Hard water contains cations that form an insoluble scum before it forms lather with soap. (1)
- 6.2 $CaHCO_3(aq)$ ✓ and $MgHCO_3(aq)$ ✓ (2)
- 6.3 By boiling ✓ or by Clark's process ✓ (2)
- 6.4 $CaHCO_3(aq) \checkmark + Ca(OH)_2(aq) \checkmark \rightarrow CaCO_3(s) \checkmark + 2H_2O(l) \checkmark$
- OR
- $MgHCO_3(aq) \checkmark + Mg(OH)_2(aq) \checkmark \rightarrow MgCO_3(s) \checkmark + 2H_2O(l) \checkmark$ (2)
- 6.5
- Important in cellular respiration (in plants and animals)
 - Used in combustion
 - Used in oxyacetylene welding and cutting
 - Used in manufacture of metals
 - Used in hospitals for hyperaeration
 - Used in high altitude flying
 - Used in mountaineering
 - Used in satellite launching
- (Any 5 × 1) (5)
- 6.6
- Bleaching agent
 - Manufacture of organic peroxides
 - Preparation of antiseptics
 - Used as a reagent for rocket propulsion
- (Any 3 × 1) (3)

[15]

TOTAL: 100