



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

**TECHNICAL SCIENCES P2
TEGNIJSE WETENSKAPPE V2**

NOVEMBER 2025

MARKING GUIDELINES/NASIEENRIGLYNE

MARKS/PUNTE: 75

**These marking guidelines consist of 7 pages.
*Hierdie nasienriglyne bestaan uit 7 bladsye.***

QUESTION/VRAAG 1

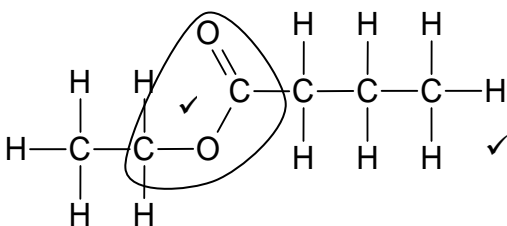
- 1.1 D ✓✓ (2)
1.2 A ✓✓ (2)
1.3 D ✓✓ (2)
1.4 B ✓✓ (2)
1.5 C ✓✓ (2)

[10]

QUESTION/VRAAG 2

- 2.1.1 A ✓ (1)
2.1.2 D ✓ (1)
2.1.3 E ✓ (1)
2.2.1 Carbonyl (group) ✓ /Karboniel (groep) (1)
2.2.2 1-bromo-2-methyl propane ✓ /1-bromo-2-metielpropaan (2)
2.3.1 Ester ✓ /Ester (1)

2.3.2



Marking criteria/Nasienkriteria:

- 1 mark for functional group/
1 punt vir funksionele groep
- 1 mark for correct structure/
1 punt vir korrekte struktuur

NOTE/LET WEL: Penalise once if hydrogen or bond is omitted./
Penaliseer eenmalig indien 'n binding of waterstof weggelaat is.

(2)

2.3.3 $C_nH_{2n}O_2$ ✓

(1)

[10]

QUESTION/VRAAG 3

- 3.1 The pressure exerted by a vapour in equilibrium with its liquid ✓ in a closed system. ✓ /Die druk uitgeoefen deur 'n damp in ewewig met sy vloeistof in 'n geslote sisteem. (2)
- 3.2.1 Increases ✓ /Neem toe (1)
- 3.2.2 B ✓ (1)
- 3.2.3 It is the temperature at which the vapour pressure of compound **B** equals atmospheric pressure/101,3 kPa/1 atm. ✓✓ /Dit is die temperatuur waarby die dampdruk van verbinding **B** gelyk is aan die atmosferiese druk/101,3 kPa/1 atm. (2)
- 3.2.4 C ✓

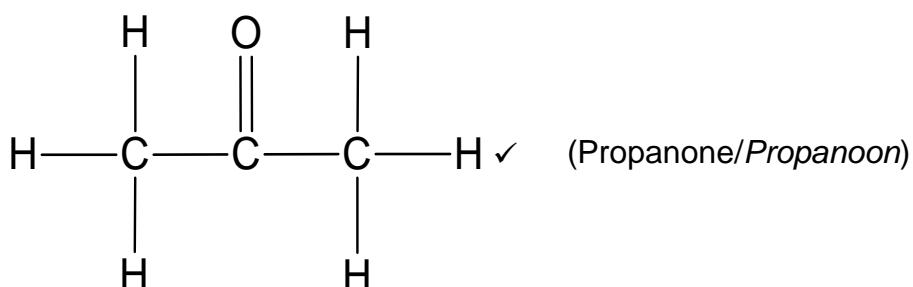
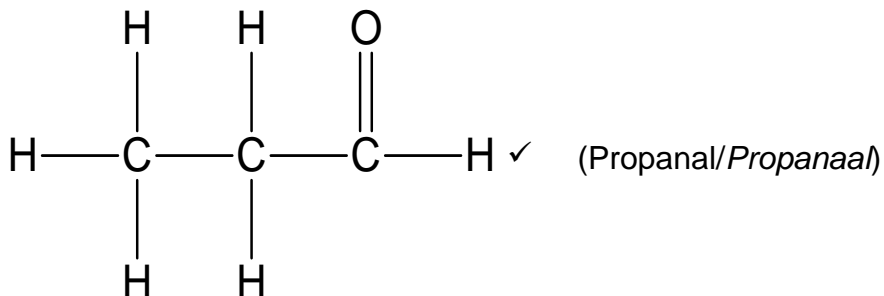
NEGATIVE MARKING/NEGATIEWE NASIEN

- (At any temperature,) **C** has the lowest vapour pressure. ✓ / (By enige temperatuur) het **C** die laagste dampdruk.
 - It has stronger intermolecular forces (London forces/dispersion forces/induced dipole forces) than **A** and **B**. ✓ / Dit het sterker intermolekulêre kragte (Londonkragte/dispersie kragte/geïnduseerde dipoolkragte) as **A** en **B**. (3)
- [9]

QUESTION/VRAAG 4

- 4.1.1 Hydration ✓ /Hidrasie (1)
- 4.1.2 • Sulphuric acid (H_2SO_4)/Phosphoric acid (H_3PO_4) ✓ /Swaelsuur (H_2SO_4)/Fosforsuur (H_3PO_4)
• Excess water ✓ /Oormaat water (2)
- 4.2 Addition (reaction) ✓ /Addisie (reaksie) (1)
- 4.3 $\text{Cl}_2(\text{g})$ ✓ (1)
- 4.4 Hydrolysis ✓ /Hidrolise (1)
- 4.5.1 Propanal and propanone ✓✓ /Propanaal en propanoon (2 or/of 0) (2)

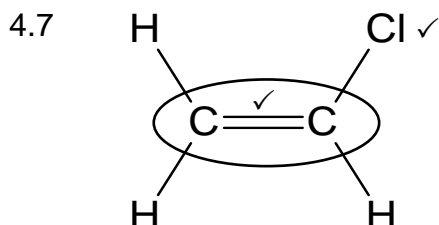
- 4.5.2 (Propanal and propanone) have the same molecular formula ✓ (C_3H_6O), but different functional groups/homologous series. ✓ /(*Propanaal en propanoon*) *besit dieselfde molekulêre formule (C_3H_6O), maar verskillende funksionele groepe/homoloë reekse.*



(4)

- 4.6 A large molecule composed of smaller monomer units ✓ covalently bonded to each other in a repeating pattern. ✓ /*n Groot molekule bestaande uit kleiner monomeer-eenhede wat kovalent aan mekaar in 'n herhalende patroon gebind is.*

(2)



Marking criteria/Nasienkriteria:

- 1 mark for functional group/
1 punt vir funksionele groep
- 1 mark for correct structure/
1 punt vir korrekte struktuur

NOTE/LET WEL: Penalise once if hydrogen or bond is omitted./
Penaliseer eenmalig indien 'n binding of waterstof weggelaat is.

(2)

[16]

QUESTION/VRAAG 5

5.1 Anode ✓ /Anode (1)

5.2 Forward biased ✓ /Meevoorspanning (1)

5.3 **NEGATIVE MARKING FROM QUESTION 5.2./NEGATIEWE NASIEN VANAF VRAAG 5.2.**

The anode/p-type is connected to the positive terminal of the power source ✓ and the cathode/n-type is connected to the negative terminal. ✓ /Die anode/p-tipe is gekoppel aan die positiewe terminaal van die kragbron en die katode/n-tipe is gekoppel aan die negatiewe terminaal. (2)

5.4 **POSITIVE MARKING FROM QUESTION 5.2./POSITIEWE NASIEN VANAF VRAAG 5.2.**

- The voltage-drop (across the forward biased p-n junction diode) is very low. ✓ /Current increases exponentially (after barrier voltage has been exceeded). /The depletion zone gets narrower. /Die spanningsdaling (oor die meevoorspanning p-n verbindings-diode) is baie laag. /Stroom neem eksponensieel toe (nadat die versperringspanning oorskry is). /Die uitputtingsone word nouer.
- Current flows only in ONE direction (when the p-n junction diode is forward biased). ✓ /Stroom vloei slegs in EEN rigting (wanneer die p-n verbindingsdiode meevoorspannend is).
- Resistance becomes lower. /Weerstand word laer.

(Any correct two/Enige korrekte twee) (2)
[6]

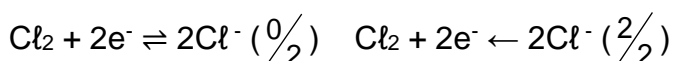
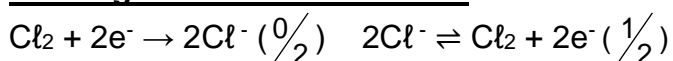
QUESTION/VRAAG 6

6.1 A solution/liquid/dissolved substance that conducts electricity ✓ through the movement of ions. ✓ /'n Oplossing/vloeistof/opgeloste stof wat elektrisiteit deur die beweging van ione gele. (2)

6.2 M ✓ (1)

6.3 $2\text{Cl}^-(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + 2\text{e}^-$ ✓

Marking criteria/Nasienkriteria:



NOTE/LET WEL:

- Do not penalise if the phases are omitted. /Moenie penaliseer indien fases weggelaat word nie.
- Penalise once for an unbalanced half-reaction and/or if the charge on the Cl⁻ ion is omitted. /Penaliseer eenmalig vir ongebalanseerde halfreaksie en/of indien ladingsteken op die Cl⁻ ioon weggelaat is.

(2)

- 6.4.1 Cu(s)✓ (1)
- 6.4.2 Copper(II) ions ✓ /Koper(II) ione (1)
- 6.5.1
- Renewable ✓ /Hernubaar
 - Cost effective/cheaper/Koste-effektief/goedkoper
 - Contribute to the economy of local communities/Dra by tot die ekonomie van plaaslike gemeenskappe
 - Environmentally friendly/Omgewingsvriendelik
 - No toxic spills/landfill challenges/Geen giftige stortings/stortingsterrein uitdagings nie
 - Reducing pollution/Less toxic gasses/Verminder besoedeling/Minder toksiese gasse
 - User friendly/Gebruikersvriendelik
 - Biodegradable/Bioafbreekbaar
 - Less exhaust emissions/Minder uitlaatgasse
- (Any correct one/Enige korrekte een) (1)
- 6.5.2 B ✓ (1)
- 6.5.3 From solar energy to electrical energy. ✓ /Vanaf stralingsenergie na elektriese energie. (1)
- 6.5.4 (Renewable) fuel ✓ that is produced from animal fats/plant oils. ✓ / (Hernubare) brandstof wat vervaardig word vanuit diervette/plantolies. (2)
- [12]

QUESTION/VRAAG 7

- 7.1 The gain of electrons. ✓✓ /Die wins van elektrone. (2)

- 7.2
- $$E^{\ominus}_{\text{cell/sel}} = E^{\ominus}_{\text{cathode/katode}} - E^{\ominus}_{\text{anode/anode}}$$
- $$E^{\ominus}_{\text{cell/sel}} = E^{\ominus}_{\text{reduction/reduksie}} - E^{\ominus}_{\text{oxidation/oksidasie}}$$
- $$E^{\ominus}_{\text{cell/sel}} = E^{\ominus}_{\text{oxidising agent/oksideermiddel}} - E^{\ominus}_{\text{reducing agent/reduseermiddel}}$$
- } ✓ Any one/ Enige een

$$0,17 \checkmark = -0,27 \checkmark - E^{\ominus}_{\text{anode/anode}}$$

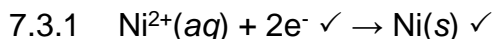
$$E^{\ominus}_{\text{anode/anode}} = -0,44 \text{ V } \checkmark$$

Electrode **B** is Fe or Iron ✓ /
Elektrode **B** is Fe of Yster

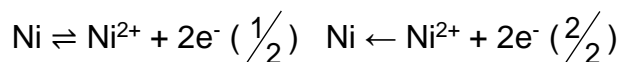
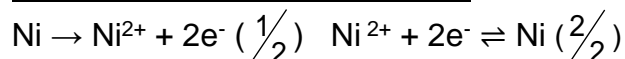
Marking criteria/Nasienkriteria:

- 1 mark for formula/1 punt vir formule
- 1 mark for EACH substitution/ 1 punt vir ELKE substitusie
- 1 mark for final answer with correct unit/1 punt vir finale antwoord met korrekte eenheid
- 1 mark for Fe or Iron/1 punt vir Fe of Yster

(5)



Marking criteria/Nasienkriteria:

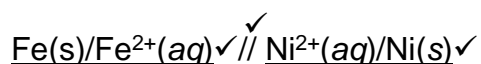


NOTE/LET WEL:

- Do not penalise if the phases are omitted./Moenie penaliseer indien fases weggelaat word nie.
- Penalise with 1 mark for an unbalanced half-reaction or if the charge on the Ni-ion is omitted./Penaliseer met 1 punt vir ongebalanseerde halfreaksie of indien ladingsteken op die Ni-ioon weggelaat is.

(2)

7.3.2 **POSITIVE MARKING FROM QUESTION 7.2/POSITIEWE NASIEN VANAF VRAAG 7.2**



Marking criteria/Nasienkriteria:

NOTE/LET WEL:

Do not penalise if the phases are omitted./Moenie penaliseer indien fases weggelaat word nie.

(3)
[12]

TOTAL/TOTAAL: 75