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basic education

Department:
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**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

**TECHNICAL SCIENCES P2
TEGNIJSE WETENSKAPPE V2**

NOVEMBER 2025

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 75

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



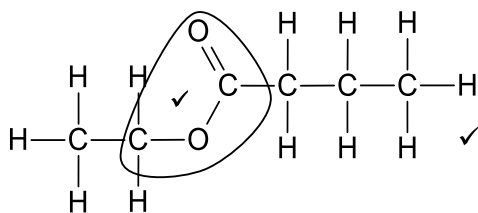
QUESTION/VRAAG 1

- 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-metielpropan (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 $\text{C}_n\text{H}_{2n}\text{O}_2$ ✓

(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 (H₂SO₄)/Phosphoric acid (H₃PO₄) ✓ *Swaelsuur (H₂SO₄)/Fosforsuur (H₃PO₄)*
• Excess water ✓ *Oormaat water* (2)

4.2 Addition (reaction) ✓ *Addisie (reaksie)* (1)

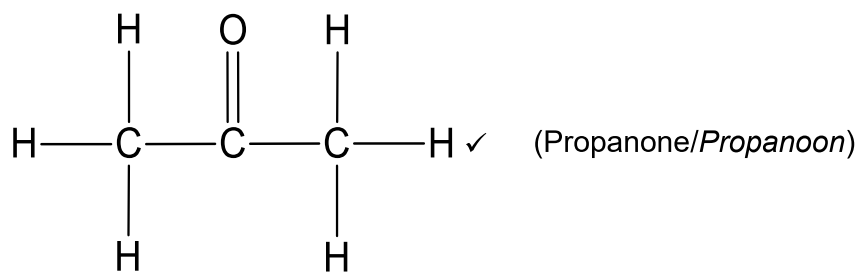
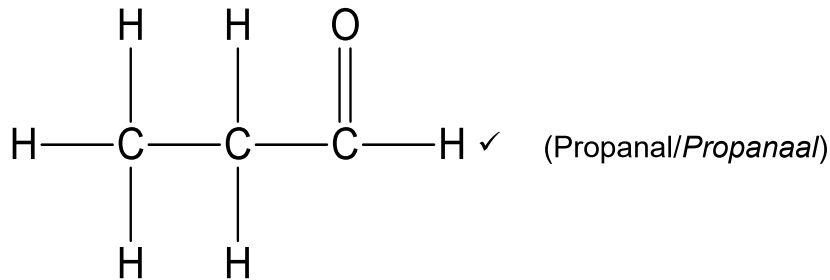
4.3 Cl₂(g) ✓ (1)

4.4 Hydrolysis ✓ *Hidrolise* (1)

4.5.1 Propanal and propanone ✓✓ *Propanaal en propanoon* (2 or/of 0) (2)



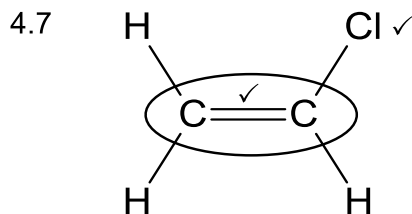
- 4.5.2 (Propanal and propanone) have the same molecular formula ✓ (C_3H_6O), but different functional groups/homologous series. ✓ *!(Propanaal en propanoon) besit dieselfde molekulêre formule (C_3H_6O), maar verskillende funksionele groepe/homoloë reekse.*



(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)

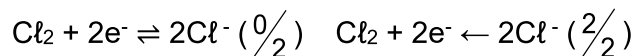
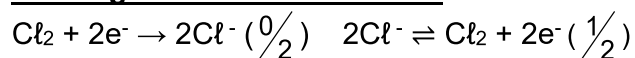
[6]

QUESTION/VRAAG 6

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

6.2 M ✓ (1)

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

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⁻ ion 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

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

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

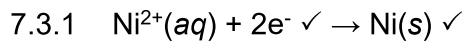
Electrode **B** is Fe or Iron ✓ /
Elektrode **B** is Fe of Yster

Marking criteria/Nasienkriteria:

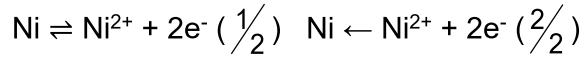
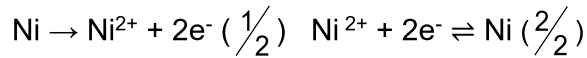
- 1 mark for formula/1 punt vir formule
- 1 mark for EACH substitution/
1 punt vir ELKE substitusie
- 1 mark for final answer with correct unit/1 punt vir finale antwoord met korrekte eenheid
- 1 mark for Fe or Iron/1 punt vir Fe of Yster

(5)





Marking criteria/Nasienkriteria:

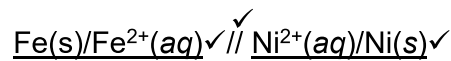


NOTE/LET WEL:

- 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

