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**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

**TECHNICAL SCIENCES P2
TEGNIESE WETENSKAPPE V2**

NOVEMBER 2024

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 75

**These marking guidelines consist of 6 pages.
Hierdie nasienriglyne bestaan uit 6 bladsye.**

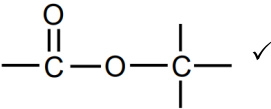


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QUESTION/VRAAG 1

- 1.1 B ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 A ✓✓ (2)
- 1.4 B ✓✓ (2)
- 1.5 A ✓✓ (2)
- [10]**

QUESTION/VRAAG 2

- 2.1.1 2-methyl pentane /2-metielpentaaan (2)
- 2.1.2 C_6H_{14} ✓ (1)
- 2.1.3 C_nH_{2n+2} ✓ (1)
- 2.1.4 CO_2 ✓ and/en H_2O ✓ (2)
- 2.2.1 Aldehyde ✓ /Aldehyede (1)
- 2.2.2 Formyl (group) ✓ /Formiel (groep) (1)
- 2.3.1  ✓ (1)
- 2.3.2 Propanoic acid ✓ /Propanoësuur (1)
- 2.4.1 D ✓ (1)
- 2.4.2 E ✓ (1)
- 2.5 Tertiary ✓ /Tersiër (1)
- [13]**



QUESTION/VRAAG 3

3.1 The temperature at which the vapour pressure of a substance is equal to atmospheric pressure. ✓✓ /Die temperatuur waarby die dampdruk gelyk is aan die atmosferiese druk. (2)

3.2 Ethanoic acid; ethanol; bromoethane; ethane ✓
Etanoësuur; etanol; bromoetaan; etaan (1)

3.3 The stronger the intermolecular forces, the higher the boiling point of the compound. ✓✓ /Hoe sterker die intermolekulêre kragte, hoe hoër die kookpunt van die verbinding.

OR/OF

The weaker the intermolecular forces, the lower the boiling point of the compound. /Hoe swakker die intermolekulêre kragte, hoe laer die kookpunt van die verbinding. (2)

3.4 Ethane ✓ /Etaan (1)

- 3.5
- Bromoethane has dipole-dipole forces of attraction and London forces. ✓
/Bromoetaan het dipool-dipool aantrekkende kragte en Londonkragte.
 - Ethane has only London forces/momentary dipole forces/dispersion forces. ✓ /Etaan het slegs Londonkragte/momentêre dipoolkragte/dispersie kragte.
 - Dipole-dipole forces/intermolecular forces of Bromoethane are stronger ✓
than London forces/intermolecular of Ethane. Dipool-dipoolkragte/
intermolekulêre kragte van Bromoetaan is sterker as Londonkragte/
intermolekulêre kragte van Etaan.

OR/OF

- London forces/intermolecular forces of Ethane are weaker than dipole-dipole forces/intermolecular forces of Bromoethane. /Londonkragte/
intermolekulêre kragte van Etaan is swakker as dipool-dipoolkragte/
intermolekulêre kragte van Bromoetaan. (3)

3.6.1 Functional (isomers) ✓ /Funksionele (isomere) (1)

3.6.2 **POSITIVE MARKING FROM QUESTION 3.6.1/POSITIEWE NASIEN
VANAF VRAAG 3.6.1**

Organic molecules that have the same molecular formula ✓ but different functional groups. ✓ /Organiese molekules met dieselfde molekulêre formule, maar verskillende funksionele groepe. (2)

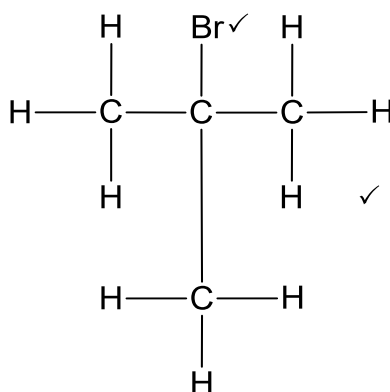
[12]

QUESTION/VRAAG 4

4.1 Alkenes ✓ /Alkene

(1)

4.2.1

**Marking criteria/Nasienkriteia:**

- Correct functional group/Korrekte funksionele groep
- Whole structure correct/Volledige struktuur korrek

(2)

4.2.2 The halide ion/bromide ion/ Br^- is bonded to a carbon atom that is bonded to THREE other carbon atoms. ✓✓ /Die haliedioon/broomioon/ Br^- is gebind aan die koolstofatoom wat gebind is aan DRIE ander koolstofatome.

(2)

4.2.3 To avoid addition of the hydroxyl ion instead of the halide ion. ✓✓ /Om die byvoeging van die hidroksielioon in plaas van die haliedioon te vermy.

OR/OF

To avoid the formation of an alcohol./To avoid hydration of compound **A**./Om die vorming van 'n alkohol te voorkom./Om hidrasie van verbinding **A** te voorkom.

(2)

4.3.1 • Mild heat ✓ /Matige hitte

• Dilute strong base/ KOH / NaOH /Verdunde sterk basis/ KOH / NaOH • Excess water/ H_2O /Oormaat water/ H_2O

(ANY ONE/ENIGE EEN) (1)

4.3.2 $\text{C}_4\text{H}_9\text{Br}$ ✓ + NaOH (dil) ✓ $\longrightarrow$ $\text{C}_4\text{H}_{10}\text{O}$ + NaBr ✓ $\text{C}_4\text{H}_9\text{Br}$ + KOH (dil) $\longrightarrow$ $\text{C}_4\text{H}_{10}\text{O}$ + KBr $\text{C}_4\text{H}_9\text{Br}$ + H_2O (excess) $\longrightarrow$ $\text{C}_4\text{H}_{10}\text{O}$ + HBr **Marking criteria/Nasienriglyne:**

- 2 marks for the reactants/2 punte vir reaktante
- 1 mark for products/1 punt vir produkte

Do not penalise if "dilute" and "excess" is omitted/
Moenie penaliseer indien "verdunde" of "oormaat"
weggelaat word nie

(3)

4.4.1 Hydration ✓ /Hidrasie

Addition ✓ /Addisie

(2)

4.4.2 H_2O ✓

(1)



4.5.1 Hydrogen gas ✓ /Waterstofgas (1)

4.5.2 Pt ✓ / Pd / Ni (1)

[16]

QUESTION/VRAAG 5

5.1 The decomposition of a substance when an electric current is passed through it. ✓✓ /Die ontbinding van 'n stof wanneer 'n elektriese stroom daardeur gelei word.

OR/OF

The chemical process/reaction in which electrical energy is converted to chemical energy./Die chemiese proses/reaksie waarin elektriese energie omgeskakel word na chemiese energie.

OR/OF

The use of electrical energy to produce a chemical change./Die gebruik van elektriese energie om 'n chemiese verandering teweeg te bring.

(2)

5.2 To remove other chemicals ✓✓ that might be on the surface of the iron ring. / Om ander chemikalieë te verwyder wat dalk op die oppervlak van die yster ring mag wees.

OR/OF

To remove dirt/impurities/rust that might interfere with the electroplating process./Om vuilheid/onsuiwerhede/roes te verwyder wat dalk die proses van elektroplatering kan beïnvloed.

OR/OF

To ensure adhesion between the silver deposit and surface./Om vashegting te verseker tussen die silwerneerslag en oppervlak.

(2)

5.3 Anode ✓ /Anode (1)

5.4 **NEGATIVE MARKING FROM QUESTION 5.3/NEGATIEWE NASIEN VANAF VRAAG 5.3**

Oxidation occurs at electrode X. ✓✓ /Oksidasie vind plaas by elektrode X.

OR/OF

It is connected to the positive terminal./Dit is gekoppel aan die positiewe terminaal.

OR/OF

It loses electrons./Dit verloor elektrone.

(2)

5.5 Silver ion ✓ /Silwerioon (1)

5.6 $\text{Ag}^+ + \text{e}^- \longrightarrow \text{Ag}$ ✓✓

Marking criteria/Nasienriglyne:

- | | |
|---|-----|
| • $\text{Ag} \longleftarrow \text{Ag}^+ + \text{e}^-$ | 2/2 |
| • $\text{Ag} \longrightarrow \text{Ag}^+ + \text{e}^-$ | 0/2 |
| • $\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}$ | 1/2 |
| • $\text{Ag} \rightleftharpoons \text{Ag}^+ + \text{e}^-$ | 0/2 |

(2)

[10]



QUESTION/VRAAG 6

6.1 Galvanic (cell) ✓/Voltaic (cell)/Galvaniese (sel)/Voltaïese (sel) (1)

6.2 **NEGATIVE MARKING FROM QUESTION 6.1/NEGATIEWE NASIEN VANAF VRAAG 6.1**

There is no power source. ✓✓ /Daar is geen kragbron.

OR/OF

The electrodes are in separate beakers./Die elektrodes is in aparte bekere.

OR/OF

Chemical energy is converted to electrical energy./Chemiese energie word omgeskakel na elektriese energie. (2)

6.3 0 (V) ✓ **OR/OF** Zero/Nul (1)

6.4 Salt bridge ✓ /Soutbrug (1)

6.5

- Completes the electric circuit. ✓ /Voltooi die elektriese stroombaan.
- Maintains electrical neutrality ✓ (of the electrolytes) by allowing movement of ions between the electrolytes./Handhaaf elektriese neutraliteit (van die elektroliete) deur die beweging van ione tussen die elektroliete te bewerkstellig. (2)

6.6 **X** ✓ (1)

6.7 Reducing agent. ✓ /Reduseermiddel

Electrode **A** is oxidised/undergoes oxidation ✓ Elektrode **A** word geoksideer/ondergaan oksidasie.

OR/OF

Electrode **A** loses electrons/Elektrode **A** verloor elektrone (2)

6.8 $E^{\theta}_{\text{cell/sel}} = E^{\theta}_{\text{cathode/katode}} - E^{\theta}_{\text{anode/anode}} \checkmark$

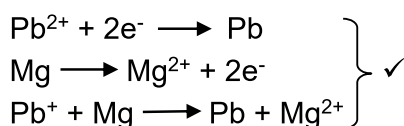
$$E^{\theta}_{\text{cell/sel}} = -0,13 \checkmark - (-2,36) \checkmark$$

$$E^{\theta}_{\text{cell/sel}} = 2,23 \text{ V } \checkmark$$

NOTE/LET WEL:

- Accept any correct formula from the data sheet./Aanvaar enige korrekte formule vanaf die gewensblad.
- Penalise with one mark for unconventional or incomplete formula./Penaliseer met een punt vir onkonvensionele of onvolledige formule.

OR/OF



$$E^{\theta} = -0,13 \checkmark$$

$$E^{\theta} = -(-2,36) \checkmark$$

$$E^{\theta} = 2,23 \text{ V } \checkmark$$

(4)

[14]

TOTAL/TOTAAL: 75

