



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

**TECHNICAL SCIENCES P2
TEGNIESE WETENSKAPPE V2**

2023

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 75

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

QUESTION / VRAAG 1

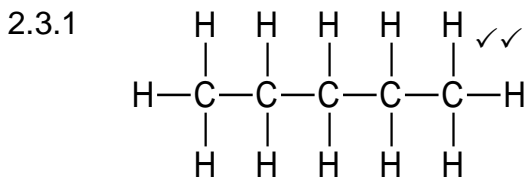
- 1.1 D ✓✓ (2)
1.2 C ✓✓ (2)
1.3 D ✓✓ (2)
1.4 B ✓✓ (2)
1.5 D ✓✓ (2)
[10]

QUESTION / VRAAG 2

2.1 Molecules containing carbon atoms. ✓✓
Molekule wat koolstofatome bevat. (2)

2.2.1 Alkene ✓ / *Alkeen* (1)

2.2.2 Alkyne ✓ / *Alkyn* (1)



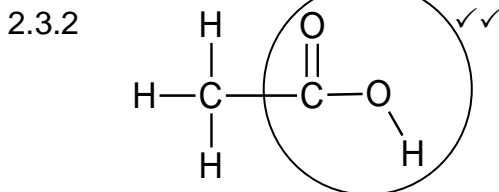
Marking Criteria:

- Whole structure correct.
- If a bond or hydrogen is missing ½

Nasienkriteria:

- Volledige struktuur korrek
- Indien 'n binding van waterstof ontbreek ½

(2)



Marking Criteria:

- Correct functional group.
- Whole structure correct.
- If a bond or hydrogen is missing ½

Nasienkriteria:

- Korrekte funksionele groep
- Volledige struktuur korrek
- Indien 'n binding van waterstof ontbreek ½

(2)

2.4 2,3-dimethyl ✓ butane ✓
2,3-dimetielbutaan

Marking Criteria:

- Correct root name: butane
- Correct branches/alkyl group and position: 2,3-dimethyl
- If hyphen, comma, hydrogen or a bond is missing ½

Nasienkriteria:

- Korrekte stamkettingsnaam: butaan
- Korrekte vertakking/alkielgroep en posisie: 2,3-dimetiel
- Indien koppelteken, komma, waterstof of binding ontbreek ½

(2)

2.5.1 Formyl group ✓ / *Formielgroep* (1)

2.5.2 C₃H₆O ✓ (1)

[12]

QUESTION / VRAAG 3

3.1 The pressure exerted by a vapour at equilibrium with its liquid ✓ in a closed system. ✓

Die druk wat deur 'n damp toegepas word by ewewig met sy vloeistof in 'n geslote sisteem. (2)

3.2 (Compound) **A** ✓ / (Verbinding) **A**



(1)

- 3.3
- Compound **A** has a larger surface area / longer chain length / less branches than compound **B**. ✓
 - Compound **A** has stronger London forces / intermolecular forces than those of compound **B**. ✓
 - More energy is needed to overcome the stronger London forces / intermolecular forces in compound **A** than in compound **B**. ✓
 - Verbinding **A** het 'n groter oppervlaksarea / langer kettinglengtes / minder vertakkings as verbinding **B**.
 - Verbinding **A** het sterker London-kragte / intermolekulêre kragte as verbinding **B**.
 - Meer energie word benodig om die sterker London-kragte / intermolekulêre kragte in verbinding **A** te oorkom as in verbinding **B**.

OR / OF

- Compound **B** has a smaller surface area / shorter chain length / more branches than compound **A**.
- Compound **B** has weaker London forces / intermolecular forces than those of compound **A**.
- Less energy is needed to overcome the weaker London forces / intermolecular forces in compound **B** than in compound **A**.
- Verbinding **B** het 'n kleiner oppervlaksarea / korter kettinglengtes / meer vertakkings as verbinding **A**.
- Verbinding **B** het swakker London-kragte / intermolekulêre kragte as verbinding **A**.
- Minder energie word benodig om die swakker London-kragte / intermolekulêre kragte in verbinding **B** te oorkom as in verbinding **A**. (3)

3.4 Chain isomer ✓ / Kettingisomeer



(1)

3.5 The (organic) compounds have the same molecular formula ✓ but different types of chains. ✓

Die (organiese) verbindings het dieselfde molekulêre formule, maar verskillende tipes kettings. (2)

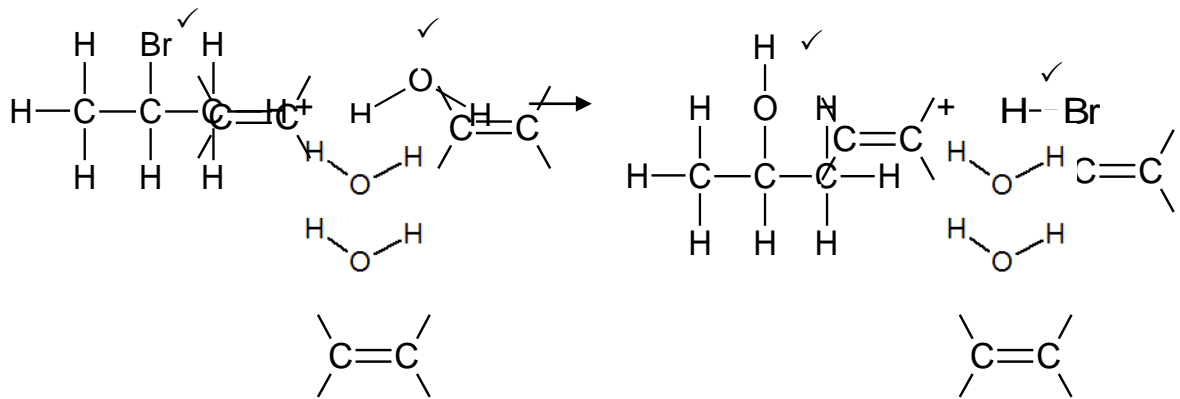
[9]

QUESTION / VRAAG 4

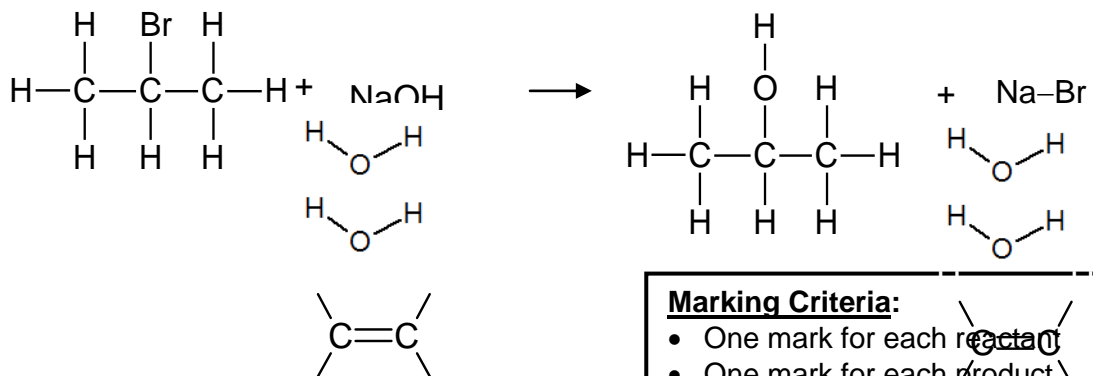
4.1.1 Hydrohalogenation ✓ / Hydrobromination
 Hidrohalogenering / Hidrohalogenasie / Hidrobromogenering /
 Hidrobromogenasie (1)

4.1.2 Hydrogenation ✓ / Hidrogenering / Hidrogenasie (1)

4.2



OR / OF



Marking Criteria:

- One mark for each reactant
- One mark for each product

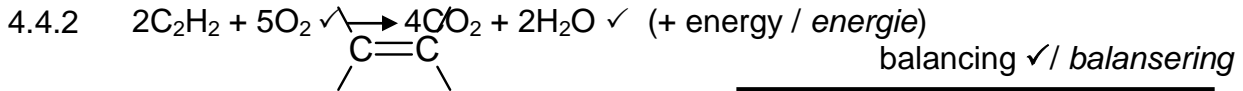
Nasiengkriteria:

- Een punt vir elke reaktant
- Een punt vir elke produk

(4)

4.3 No water ✓
 Unreactive solvent ✓
 Geen water
 Onreaktiewe oplosser (2)

4.4.1 Combustion ✓ / Oxidation / Verbranding / Oksidasie (1)



Marking Criteria:

- One mark for reactants
- One mark for product
- One mark for balancing

Nasienkriteria:

- Een punt vir reaktante
- Een punt vir produk
- Een punt vir balansering

(3)

4.5.1 A chemical reaction in which monomer molecules join to form a polymer. ✓✓

'n Chemiese reaksie waarin monomeermolekule verbind om 'n polimeer te vorm.

(2)

4.5.2 A molecule consisting of a large number of atoms. ✓✓

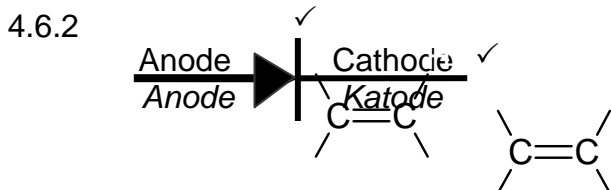
'n Molekuul wat uit 'n groot aantal atome bestaan.

(2)

4.6.1 The process of adding impurities to intrinsic semiconductors. ✓✓

Die proses waardeur onsuiverhede by intrinsieke halfgeleiers gevoeg word.

(2)



Marking Criteria:

- One mark for symbol
- One mark for correct labels

Nasienkriteria:

- Een punt vir simbool
- Een punt vir korrekte byskrifte

(2)

[20]

QUESTION / VRAAG 5

5.1 Electrolytic cell ✓ / *Elektrolitiese sel* (1)

5.2 Cell ✓
Carbon rods ✓
(One / 1) beaker (Any two)

Sel
Koolstofstawe
(Een / 1) beker (Enige twee) (2)

5.3.1 Electrode connected to the positive terminal. ✓
Elektrode gekoppel aan die positiewe terminaal. (1)

5.3.2 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Cu}(\text{s})$ ✓✓

Marking criteria / Nasienkriteria:			
$\text{Cu}(\text{s}) \leftarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-}$	$(\frac{2}{2})$	$\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \rightleftharpoons \text{Cu}(\text{s})$	$(\frac{1}{2})$
$\text{Cu}(\text{s}) \rightleftharpoons \text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-}$	$(\frac{0}{2})$	$\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \leftarrow \text{Cu}(\text{s})$	$(\frac{0}{2})$
NOTE: Do not penalise if the phases are not included. <i>LET WEL: Moenie penaliseer as die fases weggelaat word nie.</i>			

(2)

5.3.3 Chlorine gas ✓ / $\text{Cl}_2(\text{g})$ / *Chloorgas / Cl_2 (g)* (1)

5.4 Hydropower ✓
Biodiesel ✓
Fuel cell ✓
Photovoltaic cell / Solar energy
Wind energy
Natural gas (Any three)

Hidrokrag
Biodiesel
Brandstofselsel
Fotovoltaïese sel / Sonkrag (Sonenergie)
Wind energie
Natuurlike gas (Enige drie) (3)

[10]

QUESTION / VRAAG 6

6.1.1 Chemical (energy) to electrical (energy). ✓✓
Chemiese (energie) na elektriese (energie). (2)

6.1.2 $\text{Mg(s)} + \text{Zn}^{2+}(\text{aq}) \checkmark \rightarrow \text{Mg}^{2+}(\text{aq}) + \text{Zn(s)} \checkmark$

Marking Criteria:

- One mark for reactants
- One mark for products

NOTE: Do not penalise when phases are omitted. Penalise if charges are omitted.

Nasienkriteria:

- Een punt vir reaktante
- Een punt vir produkte

*LET WEL: Moenie penaliseer wanneer fases weggelaat is nie.
Penaliseer wanneer ladings weggelaat word.*

(2)

6.1.3 From Zn to Mg ✓ / *Vanaf Zn na Mg* (1)

6.1.4 Spontaneous ✓ / *Spontaan* (1)

6.1.5 $E^{\theta}_{\text{cell/sel}} = E^{\theta}_{\text{cathode/katode}} - E^{\theta}_{\text{anode/anode}} \checkmark$

$$E^{\theta}_{\text{cell/sel}} = -0,76 \checkmark - (-2,36) \checkmark$$

$$E^{\theta}_{\text{cell/sel}} = 1,60 \text{ V} \checkmark$$

NOTE:

- Accept any other correct formula from the data sheet.
- If unconventional abbreviations are used in the formula, followed by correct substitution, then award maximum 3 marks.

LET WEL:

- *Aanvaar enige ander korrekte formule vanuit die gegewensblad.*
- *Indien nie-konvensionele afkortings gebruik word in die formule, gevolg deur korrekte substitusies, dan word maksimum 3 punte toegeken.*

(4)

6.2.1 Salt bridge ✓ / *Soutbrug* (1)

6.2.2 No ✓ / *Nee* (1)

6.2.3  The circuit/cell is incomplete. ✓✓
Die stroombaan/sel is onvoltooid. (2)

[14]

TOTAL / TOTAAL: 75