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# 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**

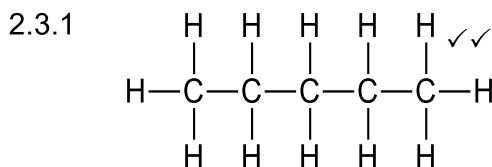
- 1.1 D ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 D ✓✓ (2)
- 1.4 B ✓✓ (2)
- 1.5 D ✓✓ (2)
- [10]**

**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:**

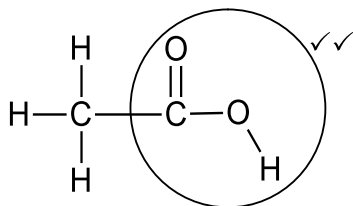
- Whole structure correct.
- If a bond or hydrogen is missing ½

**Nasienkriteria:**

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

(2)

2.3.2

**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 C<sub>3</sub>H<sub>6</sub>O ✓ (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)

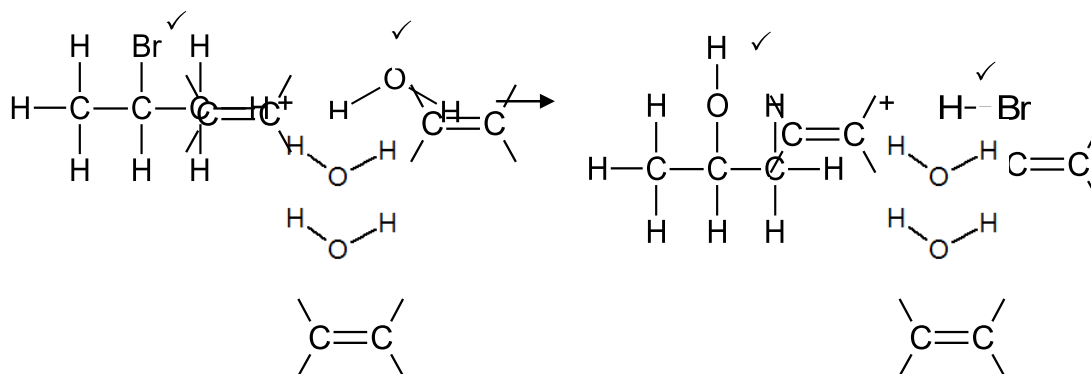
**[9]**

**QUESTION / VRAAG 4**

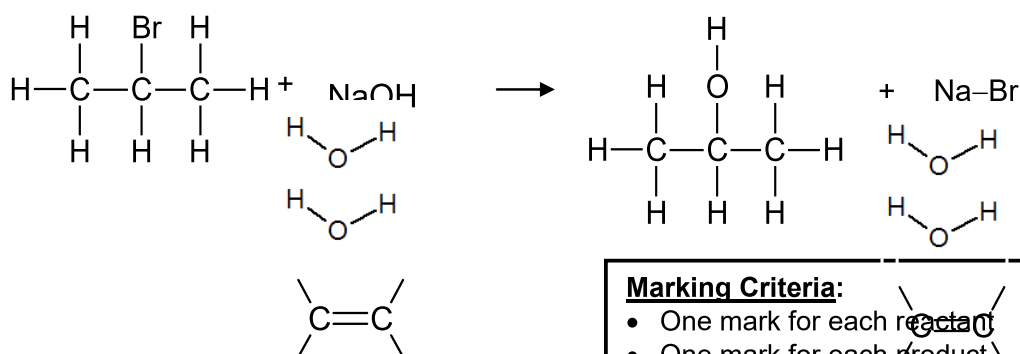
4.1.1 Hydrohalogenation ✓ / Hydrobromination  
*Hidrohalogenering / Hidrohalogenasie / Hidrobromogenering / Hidrobromogenasie* (1)

4.1.2 Hydrogenation ✓ / Hidrogenering / Hidrogenasie (1)

4.2



OR / OF

**Marking Criteria:**

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

**Nasienkriteria:**

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

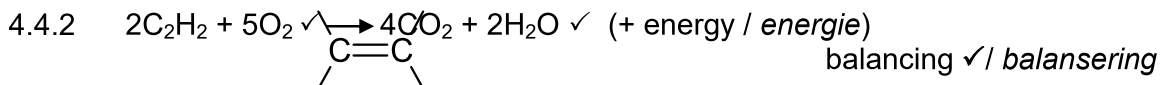
(4)

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.*

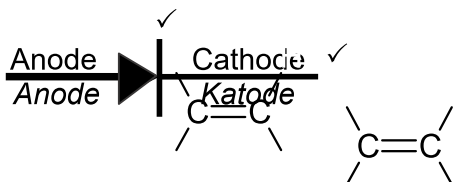
(2)

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

*Die proses waardeur onsuiverhede by intrinsieke halfgeleiers gevoeg word.*

(2)

4.6.2

**Marking Criteria:**

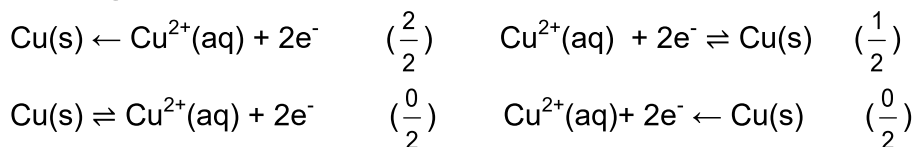
- One mark for symbol
- One mark for correct labels

**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:**

NOTE: Do not penalise if the phases are not included.

*LET WEL: Moenie penaliseer as die fases weggelaat word nie.*

(2)

5.3.3 Chlorine gas ✓ /  $\text{Cl}_2(\text{g})$  / *Chloorgas* /  $\text{Cl}_2(\text{g})$  (1)5.4 Hydropower ✓  
Biodiesel ✓  
Fuel cell ✓  
Photovoltaic cell / Solar energy  
Wind energy  
Natural gas (Any three)*Hidrokrag*  
*Biodiesel*  
*Brandstofsels*  
*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**