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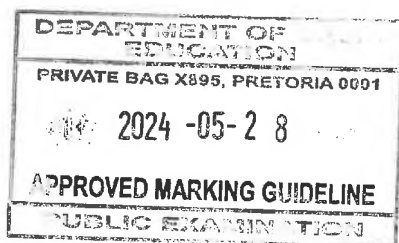


# basic education

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**  
**MAY/JUNE/MEI/JUNIE 2024**  
**MARKING GUIDELINES/NASIENRIGLYNE**



**MARKS/PUNTE: 75**

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

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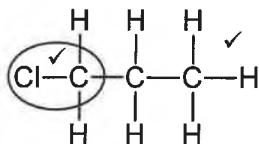
**QUESTION/VRAAG 1**

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

**QUESTION/VRAAG 2**

- 2.1 Organic compounds that consist of hydrogen and carbon (atoms) only. ✓✓  
Organiese verbindings bestaan slegs uit waterstof en koolstof(atome) (2)
- 2.2 A ✓ and/en F ✓ (2)
- 2.3.1  $C_nH_{2n}O_2$  ✓ (1)
- 2.3.2  $C_nH_{2n}$  ✓ (1)
- 2.4.1 Methyl ✓ ethanoate ✓  
Metieletanoaat (2)
- 2.4.2 Pent ✓ane ✓  
Pentaan (2)

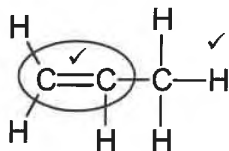
2.5.1

**Marking criteria/Nasienkriteria:**

- Correct functional group/Korrekte funksionele groep
- The whole structure correct/Volledige struktuur korrek
- If a bond or hydrogen is missing  $\frac{1}{2}$  / Indien 'n binding of waterstof weggelaat word  $\frac{1}{2}$

(2)

2.5.2

**Marking criteria/Nasienkriteria:**

- Correct functional group/Korrekte funksionele groep
- The whole structure correct/Volledige struktuur korrek
- If a bond or hydrogen is missing  $\frac{1}{2}$  / Indien 'n binding of waterstof weggelaat word  $\frac{1}{2}$

(2)

**[14]**

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**QUESTION/VRAAG 3**

3.1 Alkanes ✓  
Alkane (1)

3.2 Organic molecules with the same molecular formula ✓ but different structural formulae. ✓  
Organiese molekules met dieselfde molekulêre formule, maar verskillende struktuurformule. (2)

3.3 Chain (isomers) ✓  
Ketting(isomere) (1)

3.4 London forces ✓/Induced dipole forces/dispersion forces  
Londonkragte/Geïnduseerde dipoolkragte/dispersiekrigte (1)

3.5 A ✓ (1)



3.6 **NEGATIVE MARKING FROM QUESTION 3.5/NEGATIEWE NASIEN VANAF VRAAG 3.5**

Compound **A**/Butane is less branched than compound **B**/  
2-methyl propane. ✓✓

*Verbinding A/Butaan is minder vertak as verbinding B/2-metielpropan.*

OR/OF

Compound **B**/2-methyl propane is more branched than compound  
**A**/Butane. ✓✓

*Verbinding B/2-metielpropan is meer vertak as verbinding A/Butaan.*

OR/OF

Compound **A**/Butane has a longer chain length than compound **B**/  
2-methyl propane.

*Verbinding A/Butaan het 'n langer ketting as verbinding B/2-metielpropan.*

OR/OF

Compound **B**/2-methyl propane has a shorter chain length than compound  
**A**/Butane.

*Verbinding B/2-metielpropan het 'n korter ketting as verbinding A/Butaan.*

OR/OF

Compound **A**/Butane has a larger surface area than compound **B**/  
2-methyl propane.

*Verbinding A/Butaan besit 'n groter oppervlaksarea as verbinding B/2-metielpropan.*

OR/OF

Compound **B**/2-methyl propane has a smaller surface area than compound  
**A**/Butane.

*Verbinding B/2-metielpropan besit 'n kleiner oppervlaksarea as verbinding A/Butaan.*

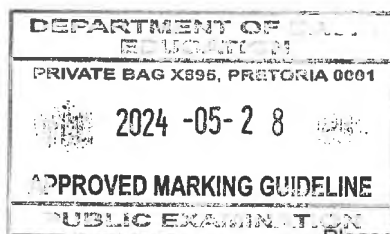
(2)



- 3.7 The pressure exerted by a vapour at equilibrium with its liquid ✓ in a closed system. ✓  
Die druk uitgeoefen deur 'n damp by ewewig met sy vloeistof in 'n geslote sisteem. (2)
- 3.8.1 A ✓ or/of Butane/Butaan (1)
- 3.8.2 B ✓ or/of 2-methylpropane/2-metielpropaan (1)
- [12]**

**QUESTION/VRAAG 4**

- 4.1.1 Substitution ✓ /Hydrolysis  
Substitusie/Hidrolise (1)
- 4.1.2 CH<sub>3</sub>CH<sub>2</sub>OH ✓✓ (2)
- 4.1.3 Primary (alcohol) ✓  
Primêre (alkohol) (1)
- 4.2.1 2C<sub>2</sub>H<sub>2</sub> + 5O<sub>2</sub> → 4CO<sub>2</sub> + 2H<sub>2</sub>O ✓ + heat/hitte (1)
- 4.2.2 Exothermic ✓ / Eksotermies  
Heat (energy) is released. ✓✓ /Hitte (energie) word vrygestel. (3)
- 4.3.1 Hydrogenation ✓  
Hidrogenering/Hidrogenasie (1)
- 4.3.2 But✓ane✓  
Butaan (2)
- 4.3.3 Platinum (Pt) ✓ / Palladium (Pd) / Nickel (Ni)  
Platinum (Pt) / Palladium (Pd) / Nikkel (Ni) (1)
- 4.4.1 A large molecule composed of smaller monomer units ✓ covalently bonded to each other in a repeating pattern. ✓  
'n Groter molekule bestaande uit kleiner monomeer-eenhede wat kovalent verbind is met mekaar in 'n herhalende patroon. (2)
- 4.4.2 Ethene ✓  
Eteen (1)
- [15]**






## QUESTION/VRAAG 5

5.1 (Electrochemical) cell that converts electrical energy into chemical energy. ✓✓  
(Elektrochemiese) sel wat elektriese energie omskakel na chemiese energie. (2)

5.2 Cr ✓ or/of Chromium/Chroom (1)

5.3 B ✓  
It is an electrode where reduction takes place. ✓  
Dit is 'n elektrode waar reduksie plaasvind.

OR/OF

It is an electrode which gains electrons./ Dit is 'n elektrode waar 'n wins van elektrone plaasvind. (2)

5.4.1  $\text{Cr} \rightarrow \text{Cr}^{3+} + 3\text{e}^-$  ✓✓

**Marking criteria/Nasienkriteria:**

**Note/Let wel:** Do not penalise if the phases are omitted./Moenie penaliseer indien die fases weggelaat word nie. (2)

5.4.2  $\text{Cr}^{3+} + 3\text{e}^- \rightarrow \text{Cr}$  ✓✓

**Marking criteria/Nasienkriteria:**

**Note/Let wel:** Do not penalise if the phases are omitted./Moenie penaliseer indien die fases weggelaat word nie. (2)

5.5 To provide (electrical) energy. ✓  
Om (elektriese) energie te verskaf. (1)

5.6 • To ensure that oxidation and reduction half reactions do not occur at the same electrode (during different cycles/periods) ✓✓  
Om te verseker dat oksidasie en reduksie halfreaksies nie by dieselfde elektrode (tydens verskillende siklusse/periodes) plaasvind nie.

OR/OF

- Polarity of the electrodes remains the same.  
Polariteit van die elektrodes bly dieselfde.

OR/OF

- To provide current that flows in ONE direction.  
Om stroom te voorsien wat in een rigting vloei. (2)

**[12]**


**QUESTION/VRAAG 6**6.1 Redox reaction ✓ / *Redoksreaksie*

OR/OF

Exothermic reaction / *Eksotermiese reaksie*

OR/OF

*Spontaneous reaction / Spontane reaksie*

(1)

6.2 0 (V) ✓ or/of Zero / Nul

(1)

6.3.1  $E^{\theta}_{\text{cell/se}} = E^{\theta}_{\text{cathode/katode}} - E^{\theta}_{\text{anode/anode}}$  ✓  
 $= -0,13 \checkmark - (-1,66) \checkmark$   
 $= 1,53 \text{ V} \checkmark$ **Marking criteria/Nasienkriteria:**

- 1 mark for formula (Accept alternative formulae only from data sheet). /1 punt vir formule (Aanvaar alternatiewe formules slegs vanaf gegewensblad).
- 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.

(4)

6.3.2 Al ✓

It undergoes oxidation. ✓✓ / *Dit ondergaan oksidasie.*

OR/OF

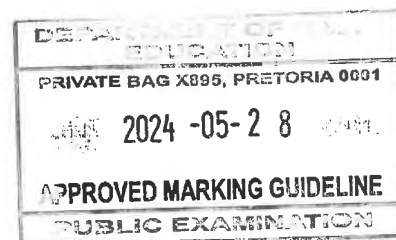
It loses electrons. / *Dit verloor elektrone.*

(3)

6.3.3  $2\text{Al}(\text{s}) + 3\text{Pb}^{2+}(\text{aq}) \checkmark \rightarrow 2\text{Al}^{3+}(\text{aq}) + 3\text{Pb}(\text{s}) \checkmark$  (Balancing ✓ / *Balansering*)**Marking criteria/Nasienkriteria:**

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

(3)

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