



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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

TECHNICAL SCIENCES P2/TEGNIIESE WETENSKAPPE V2

MAY/JUNE/MEI/JUNIE 2025

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 75

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

QUESTION/VRAAG 1

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

QUESTION/VRAAG 2

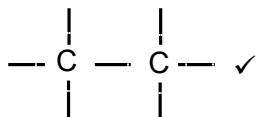
- 2.1 2-methyl but-1-ene ✓ / 2-methyl-1-butene /
2-metiel but-1-een / 2-metiel-1-buteen (2)
- 2.2 Organic molecules with the same molecular formula ✓ but different structural formulae. ✓ / Organiese molekules met dieselfde molekulêre formule, maar verskillende struktuurformules. (2)
- 2.3 B and/en C ✓ (1)
- 2.4.1 Ethanal ✓ / *Etanal* (1)
- 2.4.2 Ethane ✓ / *Etaan* (1)
- 2.4.3 Ethanoic acid ✓ / *Etanoësuur* (1)
- 2.5.1 Small organic molecules that can be covalently bonded ✓ to each other in a repeating pattern. ✓ / Klein organiese molekules wat kovalent aan mekaar gebind kan word in 'n herhalende patroon. (2)
- 2.5.2 Polymerisation ✓ / *Polimerisasie* (1)
- 2.5.3 Manufacture plastics ✓ (Accept: plastic bottles; plastic bags; plastic containers; insulating electrical materials etc.) / *Vervaardig plastiek (Aanvaar: plastiekbottels, plastieksakke, plastiekhouders, Isolerende elektriese materiale, ens)* (1)
- [12]**

QUESTION/VRAAG 3

3.1.1 Alkanes ✓/Alkane

(1)

3.1.2



(1)

3.2 London forces ✓/Induced dipole forces/Momentary dipole forces/Dispersion forces. /Londonkragte/Geïnduseerde dipoolkragte/Momentêre dipoolkragte/Dispersiekragte

(1)

3.3 Candle wax ✓/Kerswas

(1)

3.4 Petrol ✓ /Petrol



Has the weakest intermolecular forces/London forces ✓, thus the lowest amount of heat energy is needed to overcome them ✓ and therefore it has the lowest boiling point./Het die swakste intermolekulêre kragte/Londonkragte, dus die laagste hoeveelheid hitte energie wat benodig word om hul te oorkom en daarom het hul die laagste kookpunt.

(3)

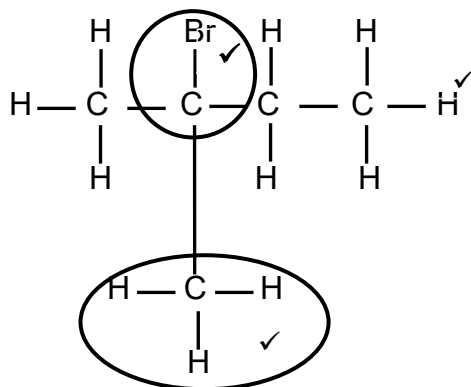
[7]**QUESTION/VRAAG 4**4.1 An organic compound in which the carbon atom to which the hydroxyl group is attached ✓, is bonded to three other carbon atoms.✓/’n Organiese verbinding waarin die koolstofatoom waaraan die hidroksielgroep gekoppel is aan drie ander koolstofatome verbind is.

(2)

4.2.1 C₅H₁₀ ✓

(1)

4.2.2

**Marking criteria/Nasienkriteria**

- One mark for functional group/Een punt vir funksionele groep
- One mark for the methyl substituent/Een punt vir die metielsubstituent
- One mark for the whole structure correct/Een punt vir die volledige struktuur korrek

Penalise 1 mark if a H or a bond is omitted./Penaliseer 1 punt indien ’n H of verbinding weggelaat is.


(3)

4.2.3 2-methyl butan-2-ol / 2-methyl-2-butanol
2-metiel butan-2-ol / 2-metiel-2-butanol

(2)

- 4.3 Substitution✓/Substitusie **OR/OF** Hydrolysis/Hidrolise (1)
- 4.4
- Excess water/Use dilute potassium hydroxide (KOH)✓ /Sodium hydroxide (NaOH)/Strong base./Oormaat water/Gebruik verdunde kaliumhidroksied (KOH)/ Natriumhidroksied (NaOH)/Sterk basis
 - Mild heat ✓/Matige hitte
- (2)
- [11]

QUESTION/VRAAG 5

- 5.1 (An intrinsic semiconductor) is a pure semiconductor.✓✓ /('n Intrinsieke halfgeleier) is 'n suiwer halfgeleier. (2)
- 5.2 Graphite ✓/C(s)/Diamond /Grafiet/C(s)/Diamant
Silicon/Si /Silikoon/Si
Germanium/Ge /Germanium/Ge
Tin/Sn /Tin/Sn (ANY ONE/ENIGE EEN) (1)
- 5.3 (Reverse biased ✓/Teenvoorspannend) (1)
- 5.4  The positive terminal of the battery is connected to the cathode, ✓ and the negative terminal is connected to the anode. ✓/Die positiewe terminaal van die battery is gekoppel aan die katode, en die negatiewe terminaal is gekoppel aan die anode.
OR/OF
The positive terminal of the battery is connected to the n-type semiconductor, and the negative terminal is connected to the p-type semiconductor./Die positiewe terminaal van die battery is gekoppel aan die n-tipe halfgeleier, en die negatiewe terminaal is gekoppel aan die p-tipe halfgeleier. (2)
- 5.5 Graph/Grafiek **B** ✓ (1)
- 5.6 As the applied voltage across the ends of the p-n junction diode is increased: /Soos die toegepaste spanning oor die punte van die p-n-verbindingsdiode verhoog:
- The diffusion current increases slowly. ✓/Die diffusiestroom neem stadig toe.
 - The resistance decreases slowly. ✓/Die weerstand neem stadig af.
 - At the breakdown voltage of (0,69 V) the current increases exponentially.✓/Die stroom neem eksponensieel toe by die afbreekspanning van (0,69 V).
- (3)
- [10]

QUESTION/VRAAG 6

6.1 It is the gain of electrons. ✓✓/Dit is die wins van elektrone. (2)

6.2.1 Copper(II)chloride / $\text{CuCl}_2(\text{aq})$ ✓ /Koper(II)chloried/ $\text{CuCl}_2(\text{aq})$ (1)

6.2.2 Copper/ $\text{Cu}(\text{s})$ ✓/Koper/ $\text{Cu}(\text{s})$ (1)

6.2.3 Chlorine (gas) ✓ / $\text{Cl}_2(\text{g})$ /Chloor(gas)/ $\text{Cl}_2(\text{g})$ (1)

6.2.4 $\text{Cu}^{2+}(\text{ions})$ ✓ / $\text{Cu}^{2+}(\text{ione})$ **OR/OF** Copper(II)ions/Koper(II)ione (1)

6.3 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$ ✓✓

Marking criteria/Nasienriglyne:

- $\text{Cu}(\text{s}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^-$ 0/2
- $\text{Cu}(\text{s}) \leftarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^-$ 2/2
- $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Cu}(\text{s})$ 1/2
- $\text{Cu}(\text{s}) \rightleftharpoons \text{Cu}^{2+}(\text{aq}) + 2\text{e}^-$ 0/2

Please note/Let wel: Do not penalise if phases are omitted./Moenie penaliseer indien fases weggelaat word nie.

(2)
[8]

QUESTION/VRAAG 7

7.1 An (electrochemical) cell that converts chemical energy to electrical energy. ✓✓/In (Elektrochemiese) sel wat chemiese energie na elektriese energie omskakel. (2)

7.2

- Completes the circuit. ✓/Voltooi die stroombaan.
- Maintains electrical neutrality ✓ (through the movement of ions)./Handhaaf elektriese neutraliteit (deur die beweging van ione).

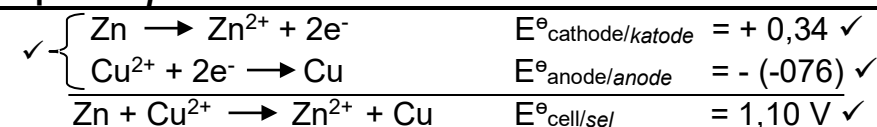
(2)

7.3 Zn to/na Cu ✓ (1)

7.4

Option/Opsie 1

$E^{\circ}_{\text{cell/sel}} = E^{\circ}_{\text{cathode/katode}} - E^{\circ}_{\text{anode/anode}}$	} any one/ enige een
$E^{\circ}_{\text{cell/sel}} = E^{\circ}_{\text{reduction/reduksie}} - E^{\circ}_{\text{oxidation/oksidasie}}$	
$E^{\circ}_{\text{cell/sel}} = E^{\circ}_{\text{oxidising agent/oksideermiddel}} - E^{\circ}_{\text{reducing agent/reduseermiddel}}$	
$= 0,34 \checkmark - (-0,76) \checkmark$ $= 1,10 \text{ V} \checkmark$	

Option/Opsie 2

(4)

- 7.5 The reaction did not take place under standard conditions. ✓✓/Die reaksie het nie onder standaardtoestande plaasgevind nie.

OR/OF

The temperature of the electrolyte was not 25 °C./ The concentration of the electrolyte was not 1 mol·dm⁻³./Die temperatuur van die elektroliet was nie 25 °C nie./Die konsentrasie van die elektroliet was nie 1 mol·dm⁻³ nie.

(2)

- 7.6 (Diagram/Diagram **B** ✓

(1)

- 7.7 Releasing greenhouse gases ✓✓ (as a result of smoke emission during burning of coal). /Vrystelling van kweekhuisgasse (as gevolg van rook wat vrygestel word tydens die verbranding van steenkool).

OR/OF

Contributes to air pollution/global warming/climate change/acid rain formation (as a result of smoke emission during burning of coal)./Dra by tot besoedeling/aardverwarming/klimaatverandering/vorming van suurreën (as gevolg van rook wat vrygestel word tydens die verbranding van steenkool).

OR/OF

Ecological damage (due to the removal of plantation)./Ekologiese skade (as gevolg van die verwydering van plantasie).

OR/OF

Coal is a non-renewable resource and the coal reserves will be depleted./Steenkool is 'n nie-hernubare bron en die steenkoolreserwes sal uitgeput word.

OR/OF

Large volumes of water (which is a scarce resource), are used during the production of electric power./Groot hoeveelhede water (wat 'n skaars bron is), word gebruik tydens die produksie van elektriese krag.

(ANY CORRECT ONE/ENIGE KORREKTE EEN)

(2)

- 7.8 South Africa is generally sunny ✓✓ (and therefore solar energy can be harnessed easily)./Suid-Afrika is oor die algemeen sonnig (en dus kan sonenergie maklik ingespan word).

OR/OF

Large open spaces available (for the installation of solar panel equipment/ establishment of solar farms./Groot oop spasies beskikbaar (vir die installering van sonpaneeltoerusting/stigting van sonkragplase).

(2)

- 7.9
- Wind (energy) ✓/Wind(energie)
 - Water (energy)/Hydropower/Hydro-energy
Water (energie)/Hidrokras/Hidro-energie
 - Nuclear (energy)/Kern(energie)
 - Biodiesel/Bio-diesel

(ANY CORRECT ONE/ENIGE KORREKTE EEN)

(1)

[17]

TOTAL/TOTAAL:

75