basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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.

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-metielpentaan* (2)

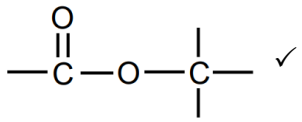
2.1.2 C_6H_{14} ✓ (1)

2.1.3 C_nH_{2n+2} ✓ (1)

2.1.4 CO_2 ✓ and/*en* H_2O ✓ (2)

2.2.1 Aldehyde ✓ /*Aldehiede* (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 ✓ /*Tersiêr* (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***

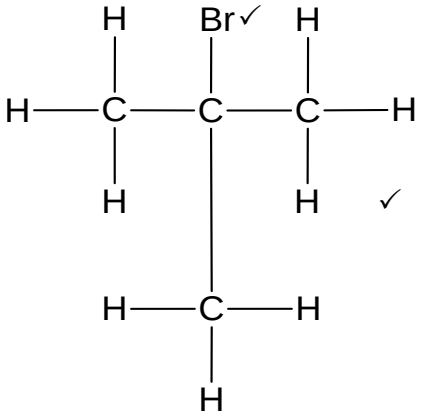
Organic molecules that have the same molecular formula ✓ but different functional groups. ✓ /*Organiese molekules met dieselfde molekulêre formule, maar verskillende funksionele groepe.* (2)

[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 C_4H_9Br ✓+ NaOH (dil) ✓ ⟶ $C_4H_{10}O$ + NaBr ✓
C_4H_9Br + KOH (dil) ⟶ $C_4H_{10}O$ + KBr
C_4H_9Br + H_2O (excess) ⟶ $C_4H_{10}O$ + 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 $Ag^+ + e^- \longrightarrow Ag$ ✓✓

Marking criteria/*Nasienriglyne*:
- $Ag \longleftarrow Ag^+ + e^-$ 2/2
- $Ag \longrightarrow Ag^+ + e^-$ 0/2
- $Ag^+ + e^- \rightleftharpoons Ag$ 1/2
- $Ag \rightleftharpoons Ag^+ + e^-$ 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 bekers.*
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 $E^{\theta}_{cell/sel} = E^{\theta}_{cathode/katode} - E^{\theta}_{anode/anode}$ ✓
$E^{\theta}_{cell/sel} = - 0,13$ ✓ $- (-2,36)$ ✓
$E^{\theta}_{cell/sel} = 2,23$ V ✓

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

OR/*OF*

$Pb^{2+} + 2e^- \longrightarrow Pb$ ✓ $E^{\theta} = -0,13$ ✓
$Mg \longrightarrow Mg^{2+} + 2e^-$ ✓ $E^{\theta} = - (-2,36)$ ✓
$Pb^{+} + Mg \longrightarrow Pb + Mg^{2+}$ ✓ $E^{\theta} = 2,23$ V ✓ (4)

[14]

TOTAL/*TOTAAL*: 75