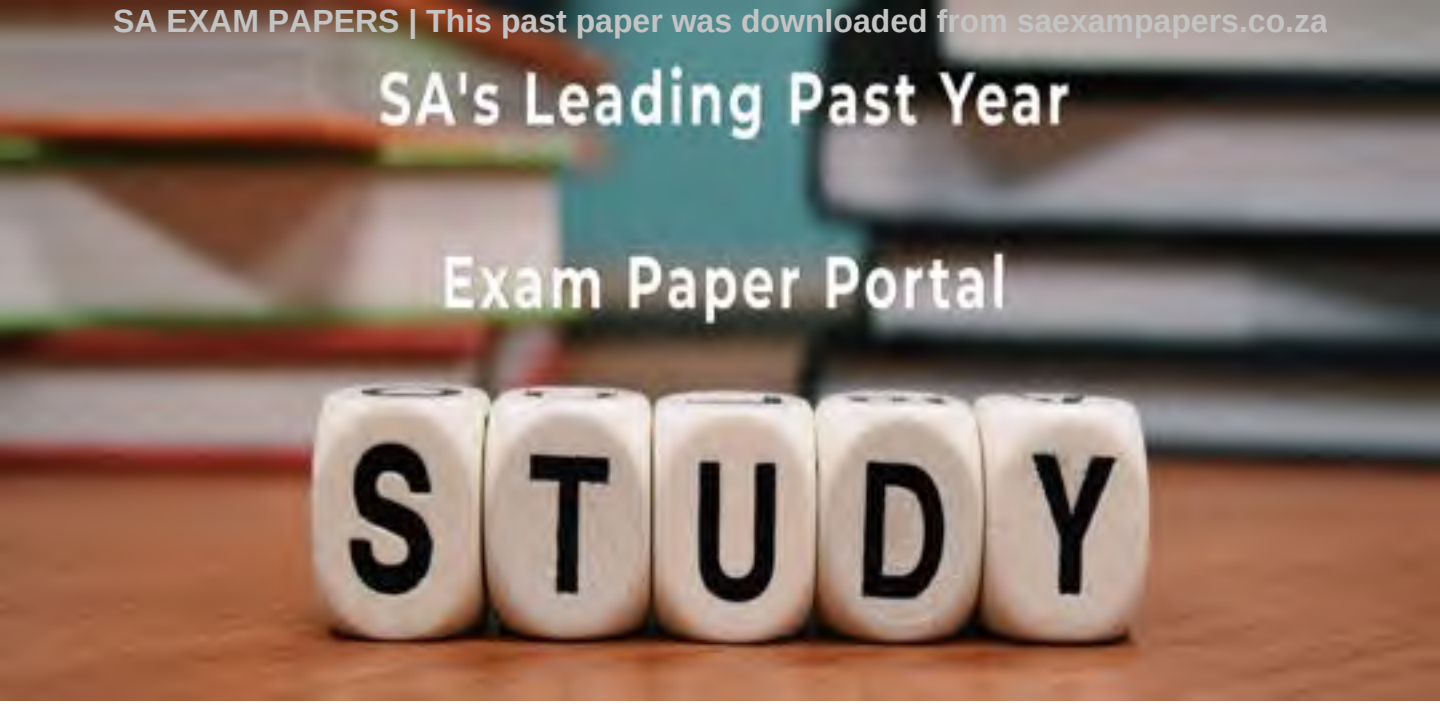


basic education

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.

DBE IM	DBE IM	UMALUSI : EM	UMALUSI : EM
21/05/2024	21/05/2024	21/05/2024	21/05/2024

Please turn over/*Blaai om asseblief*

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)

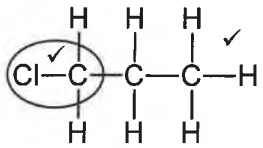
2.3.1 $C_nH_{2n}O_2$ ✓ (1)

2.3.2 C_nH_{2n} ✓ (1)

2.4.1 Methyl✓ ethanoate ✓
Metieletanoaat (2)

2.4.2 Pent✓ane ✓
Pentaan (2)

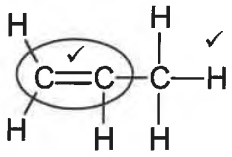
2.5.1



Marking criteria/*Nasienkriteria*:
- Correct functional group/*Korrekte funksionele groep*
- The whole structure correct/*Volledige struktuur korrek*
- If a bond or hydrogen is missing ½ / *Indien 'n binding of waterstof weggelaat word* ½

(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 ½/ *Indien 'n binding of waterstof weggelaat word* ½

(2)

[14]

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/dispersiekragte (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-metielpropaan.*
OR/*OF*
Compound **B**/2-methyl propane is more branched than compound **A**/Butane.✓✓
*Verbinding **B**/2-metielpropaan 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-metielpropaan.*
OR/*OF*
Compound **B**/2-methyl propane has a shorter chain length than compound **A**/Butane.
*Verbinding **B**/2-metielpropaan 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-metielpropaan.* OR/*OF*
Compound **B**/2-methyl propane has a smaller surface area than compound **A**/Butane.
*Verbinding **B**/2-metielpropaan 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_3CH_2OH ✓✓ (2)

4.1.3 Primary (alcohol) ✓
Primêre (alkohol) (1)

4.2.1 $2C_2H_2 + 5O_2 \longrightarrow 4CO_2 + 2H_2O$ ✓ + 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 molekuul 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 $Cr \rightarrow Cr^{3+} + 3e^-$ ✓✓

Marking criteria/*Nasienkriteria*:
$Cr \leftarrow Cr^{3+} + 3e^-$ $(0/2)$ $Cr^{3+} + 3e^- \rightleftharpoons Cr$ $(0/2)$
$Cr \rightleftharpoons Cr^{3+} + 3e^-$ $(1/2)$ $Cr^{3+} + 3e^- \leftarrow Cr$ $(2/2)$
Note/*Let wel*: Do not penalise if the phases are omitted./*Moenie penaliseer indien die fases weggelaat word nie.*

(2)

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

Marking criteria/*Nasienkriteria*:
$Cr \leftarrow Cr^{3+} + 3e^-$ $(2/2)$ $Cr^{3+} + 3e^- \rightleftharpoons Cr$ $(1/2)$
$Cr \rightleftharpoons Cr^{3+} + 3e^-$ $(0/2)$ $Cr \rightarrow Cr^{3+} + 3e^-$ $(0/2)$
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]

Please turn over/*Blaai om asseblief*

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 $E^{\theta}_{cell/sel} = E^{\theta}_{cathode/katode} - E^{\theta}_{anode/anode}$ ✓
$= -0,13$ ✓ $\underline{- (-1,66)}$ ✓
$= 1,53$ V ✓

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 $2Aℓ (s) + 3Pb^{2+}(aq)$ ✓$\rightarrow 2Aℓ^{3+}(aq) + 3Pb(s)$ ✓ (Balancing ✓ / *Balansering*)

Marking criteria/*Nasienkriteria*:
- Do not penalise if phases are omitted.
- Moenie penaliseer indien fases weggelaat word nie.

(3)

[12]

TOTAL/TOTAAL: 75