



**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2025

**PHYSICAL SCIENCES P2: CHEMISTRY/
FISIESE WETENSKAPPE V2: CHEMIE
MARKING GUIDELINE / NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 17 pages./
Hierdie nasienriglyn bestaan uit 17 bladsye.

QUESTION/VRAAG 1

- | | | |
|------|------|-------------|
| 1.1 | B ✓✓ | (2) |
| 1.2 | C ✓✓ | (2) |
| 1.3 | D ✓✓ | (2) |
| 1.4 | C ✓✓ | (2) |
| 1.5 | B ✓✓ | (2) |
| 1.6 | C ✓✓ | (2) |
| 1.7 | A ✓✓ | (2) |
| 1.8 | C ✓✓ | (2) |
| 1.9 | D ✓✓ | (2) |
| 1.10 | D ✓✓ | (2) |
| | | [20] |

QUESTION/VRAAG 2

- 2.1 A series of organic compounds that can be described by the same general formula. ✓✓
’n Reeks organiese verbindings wat deur dieselfde algemene formule beskryf kan word.

OR / OF

A series of organic compounds in which one member differs from the next with a CH_2 group. ✓✓
’n Reeks organiese verbindings waarin een lid van die volgende met ’n CH_2 -groep verskil.

- 2.2 2.2.1 C ✓ (1)
 2.2.2 E ✓ (1)
 2.2.3 D and/en E ✓✓ (2)

- 2.3 2.3.1 4-chloro-2-methylhexane ✓✓✓
 4-chloro-2-metielheksaan

Marking criteria/Nasienkriteria:

- hexane / heksaan ✓
- chloro and methyl / en metiel ✓
- Whole name correct / Hele naam korrek ✓

(3)

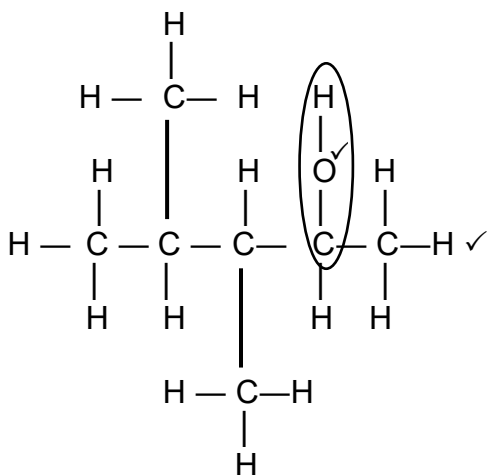
- 2.3.2 4-methylpent-2-yne ✓✓
 4-metielpent-2-yn
OR / OF
 4-methyl-2-pentyne ✓✓
 4-metiel-2-pentyn

Marking criteria/Nasienkriteria:

- Pentyne / Pentyn ✓
- Whole name correct / Hele naam korrek ✓

(2)

2.4

**Marking criteria/Nasienkriteria:**

- Correct functional group. ✓
- Whole structure correct ✓
- Korrek funksionele groep
- Hele struktuur korrek

(2)

2.5 2.5.1

Marking criteria/ Nasienkriteria

If any of the underlined key words/phrases in the **correct context** are omitted: - 1 mark per word/phrase.

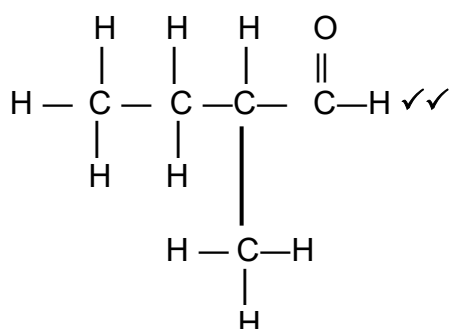
*Indien enige van onderstreepte die sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per woord/frase.*

Compounds with the same molecular formula but different positions of the side chain, substituents or functional group on the parent chain. ✓✓

Verbindings met dieselfde molekulêre formule, maar verskillende posisies van die syketting, substituent of funksionele groepe op die stamketting.

(2)

2.5.2

**Marking criteria/Nasienkriteria:**

- Position of the methyl group moved to carbon 2 ✓
- Whole structure correct ✓
- *Posisie van metiel groep verskuif na koolstof 2*
- *Hele struktuur korrek*

NOTE: If position of functional group is changed then 0/2

LET WEL: As die posisie van die funksionele groep verander dan 0/2

(2)

2.6 2.6.1

Using oxygen/gebruik suurstof

$$P(2) + 6(1) = 8(2) \quad \checkmark$$

$$P = 5 \quad \checkmark$$

Using hydrogen/gebruik waterstof

$$6 \times 2 = 12 \quad \text{C}_x\text{H}_{12} \quad \checkmark \quad \therefore \text{C}_5\text{H}_{12}$$

$$P = 5 \quad \checkmark$$

(2)

2.6.2 CH₃CH₂CH₂CH₂CH₃ ✓✓

(2)

[21]

QUESTION/VRAAG 3

Marking criteria/ Nasienkriteria

If any of the underlined key words/phrases in the **correct context** are omitted:
- 1 mark per word/phrase.

*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per woord/frase.*

- 3.1 The pressure exerted by a vapour at equilibrium with its liquid in a closed system. ✓✓

Die druk wat deur damp uitgeoefen word by ewewig met sy vloeistof in 'n geslote sisteem.

(2)

- 3.2 LIQUID ✓

The boiling points of the substances are above room temperature. ✓

OR

The vapour pressure of the substances at 25 °C are below the atmospheric pressure. ✓

VLOEISTOF

Die kookpunt van die stowwe is hoër as kamertemperatuur.

OF

Die dampdruk van die stowwe by 25 °C is laer as die atmosferiese druk.

(2)

- 3.3 DECREASES / LAER AS. ✓

(1)

- 3.4 The longer the chainlength / stronger the intermolecular forces the lower the vapour pressure. ✓✓

Hoe langer die kettinglengte / sterker die intermolekulêre kragte hoe laer die dampdruk.

(2)

- 3.5 3.5.1 **Marking criteria/ Nasienkriteria**

If any of the underlined key words/phrases in the **correct context** are omitted: - 1 mark per word/phrase.

*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per woord/frase.*

The temperature at which the vapour pressure of a substance equals the atmospheric pressure. ✓✓

Die temperatuur waarteen die dampdruk van 'n stof gelyk is aan die atmosferiese druk.

(2)

3.5.2

Marking criteria

- Identify the number of sites of hydrogen bonds in propan-1-ol
- Identify the number of sites of hydrogen bonds in propanoic acid
- Compare the strength of the hydrogen bonds / intermolecular forces
- Relate the strength of intermolecular to energy involved.

Nasienkriteria

- *Identifiseer die aantal waterstofbindings in propan-1-ol*
- *Identifiseer die aantal waterstofbindings in propaansuur*
- *Vergelyk die sterkte van die waterstofbindings / intermolekulêrekrigte*
- *Vergelyk die energie van die intermolekulêrekrigte*

- One site of hydrogen bonds in propan-1-ol/A ✓
- Two sites of hydrogen bonds in propanoic acid/B ✓
- Hydrogen bonds / intermolecular forces in propanoic acid/B are stronger than that of propan-1-ol/A ✓
- More energy is needed to overcome the intermolecular forces in propanoic acid/B ✓

OR

- One site of hydrogen bonds in propan-1-ol/A ✓
- Two sites of hydrogen bonds in propanoic acid/B ✓
- Hydrogen bonds/ intermolecular forces in propan-1-ol/A is weaker than that of propanoic acid/B ✓
- Less energy is needed to overcome the intermolecular forces in propan-1-ol/A ✓

- *Een plek vir waterstofbindings in propan-1-ol/A*
- *Twee plekke vir waterstofbindings in propaansuur/B*
- *Waterstofbinding/ intermolekulêrekrigte in propaansuur/B is sterker as dié van propan-1-ol/A*
- *Meer energie word benodig om die intermolekulêrekrigte in propaansuur/B te oorkom*

OF

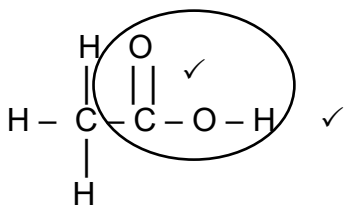
- *Een plek vir waterstofbindings in propan-1-ol/A*
- *Twee plekke vir waterstofbindings in propaansuur/B*
- *Waterstofbinding / intermolekulêrekrigte in propan-1-ol/A is swakker as dié van propaansuur/B*
- *Minder energie word benodig om die intermolekulêrekrigte in propan-1-ol/A te oorkom*

(4)
[13]

QUESTION/VRAAG 4

4.1 4.1.1 Esterification/Condensation/*Esterifikasie/Versteuring* ✓ (1)

4.1.2



Marking criteria/Nasienkriteria

- Correct functional group ✓
Funksionele groep korrek
- Whole structure correct ✓
Hele struktuur korrek

(2)

4.2 4.2.1 H_2SO_4 / Sulphuric acid / *Swawelsuur* ✓ (1)

4.2.2 But-1-ene/ 1-Butene/ *But-1-een /1-Buteen* ✓✓ (2)

4.3 4.3.1 Hydrohalogenation/*Hidrohalogenering* ✓ (1)

4.3.2 Secondary Halolalkane ✓

The halogen/Cl is bonded to a secondary carbon. /The halogen/Cl is bonded to a carbon that is bonded to two other carbon atoms. /The halogen/Cl is bonded to a carbon that contains one hydrogen atom. ✓

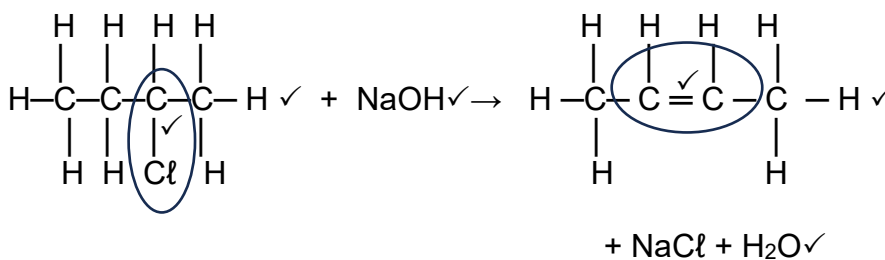
Sekondêre haloalkaan

Die halogeen/Cl is aan 'n sekondêre koolstof verbind. /Die halogeen/ Cl is verbind aan 'n koolstof wat verbind is aan twee ander koolstofatome. / Die halogeen/ Cl is verbind aan 'n koolstof wat een waterstof atoom bevat.

(2)

4.4 4.4.1 Elimination/dehydrohalogenation/
Eliminasie/dehidrohalogenering ✓ (1)

4.4.2



Marking criteria for organic compounds/

Nasienkriteria vir organiese verbindings

- Correct functional group ✓
Funksionele groep korrek
- Whole structure correct ✓
Hele struktuur korrek

Inorganic reagent / Anorganiese reagense

- NaOH , ✓ NaBr and H_2O ✓

(6)

[16]

QUESTION/VRAAG 5

5.1 **Marking criteria/ Nasienkriteria**

If any of the underlined key words/phrases in the **correct context** are omitted:
- 1 mark per word/phrase.

*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per woord/frase.*

ANY ONE

Change in concentration ✓ of reactant or product per (unit) time. ✓

Change in amount/ number of moles/ volume/ mass of products or reactants per (unit) time. ✓✓

Change in amount/ number of moles/ volume/ mass of products formed or reactants used reactants per (unit) time. ✓✓

ENIGE EEN

Verandering in konsentrasie van reaktanse of produkte per (eenheid) tyd.

Verandering in hoeveelheid/ getal mol/ volume /massa van produkte of reaktanse per (eenheid) tyd.

Verandering in hoeveelheid/ getal mol/ volume/ massa van produkte gevorm/ reaktanse gebruik per (eenheid) tyd.

OR/OF

The rate of change in concentration/amount of moles/number of moles/volume /mass. ✓✓ **(2 or 0)**

*Die tempo van verandering in konsentrasie/hoeveelheid mol/getal mo/volume/ massa. **(2 of 0)*** (2)

- 5.2 Volume of carbon dioxide (CO₂) gas produced remains constant/No CO₂ gas bubbles produced ✓
Volume koolstof dioksied (CO₂) wat geproduseer word bly konstant/Geen CO₂ gasborrels word geproduseer. (1)

5.3 5.3.1 Reaction rate = $\frac{\Delta V}{\Delta t}$
Reaksietempo

$$= \frac{147 - 0}{50} \checkmark$$

$$= 2,94 \text{ (cm} \cdot \text{s}^{-1}) \checkmark$$
 (3)

5.3.2 **Marking criteria/ Nasienkriteria**

- (a) Substitution into/ *Vervanging in* $n = V / V_m$
- (b) Use of mole ratio/ *Gebruik van mol verhouding* CaCO₃ : CO₂
- (c) Substitution into/ *Vervanging in* $m = nM$
- (d) Substitution into *percentage purity equation/ Vervanging in persentasie suiwerheid vergelyking*
- (e) Final answer/ *Finale Antwoord*

$$n = \frac{V}{V_m}$$

$$= \frac{147}{24\,000} \quad (a) \checkmark$$

$$n = 6,125 \times 10^{-3} \text{ mol}$$

$$n(\text{CaCO}_3) = n(\text{CO}_2) = 6,125 \times 10^{-3} \text{ mol} \quad (b) \checkmark$$

$$m = nM$$

$$m(\text{CaCO}_3) = (6,125 \times 10^{-3})(100) \quad (c) \checkmark$$

$$m(\text{CaCO}_3) = 0,6125 \text{ g}$$

$$\% \text{ purity/ suiwerheid} = \frac{0,6125}{2,5} \times 100 \quad (d) \checkmark$$

$$\% \text{ purity/ suiwerheid} = 24,5 \% \quad (e) \checkmark$$

(5)

5.4 5.4.1 INCREASES / TOENEEM $\checkmark$

(1)

- 5.4.2
- Powdered CaCO_3 will increase the surface area/contact area/ increases the state of division of CaCO_3 . $\checkmark$
 - More particles will collide with the correct orientation. $\checkmark$
 - More effective collisions per unit time / Frequency of the effective collisions increase $\checkmark$
 - Gepoeierde CaCO_3 sal die oppervlakte/kontakarea vergroot/vergroot die toestand van verdeling van CaCO_3 .
 - Meer deeltjies sal met die korrekte oriëntasie bots
 - Meer effektiewe botsings per eenheidstyd/ Frekwensie van die effektiewe botsings neem toe

(3)

- 5.5 5.5.1 Particles with sufficient kinetic energy for effective collisions. $\checkmark$
Deeltjies met genoeg kinetiese energie vir effektiewe botsings.

(1)

5.5.2 INCREASE/ TOENEEM $\checkmark$

An increase in temperature increases the average kinetic energy of the particles. $\checkmark$

'n Toename in temperatuur verhoog die gemiddelde kinetiese energie van die deeltjies.

(2)

[18]

QUESTION/VRAAG 6

6.1

Marking criteria/ Nasienkriteria

If any of the underlined key words/phrases in the **correct context** are omitted:
- 1 mark per word/phrase.

*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per word/frase.*

When the equilibrium in a closed system is disturbed, the system will re-instate a new equilibrium by favouring the reaction that will oppose/cancel the disturbance. ✓✓

Wanneer die ewewig in 'n geslote sisteem versteur word, sal die sisteem 'n nuwe ewewig herstel deur die reaksie wat die versteuring sal teenwerk/kanselleer, te bevoordeel.

(2)

6.2

6.2.1 Blue/Blou ✓

(1)

6.2.2 Green/Groen ✓

(1)

6.3

- The addition of saturated sodium chloride solution increases the concentration of the chloride ions (Cl^-). ✓
- According to Le Chatelier's principle the system will respond by consuming the $\text{Cu}(\text{H}_2\text{O})_6^{2+}$ and Cl^- . ✓
- The forward reaction will be favoured / the equilibrium position shifts towards right ✓
- Die byvoeging van versadigde natriumchloriedoplossing verhoog die konsentrasie van die chloriedione (Cl^-).
- Volgens Le Chatelier se beginsel sal die sisteem reageer deur die $\text{Cu}(\text{H}_2\text{O})_6^{2+}$ en Cl^- op te gebruik
- Die voortwaartse reaksie word bevoordeel/Die ewewigsposisie verskuif na regs

(3)

6.4

6.4.1 INCREASES / TOENEEM ✓

- According to Le Chatelier's principle an increase in temperature favours the endothermic reaction. ✓
- The forward reaction is favoured / the equilibrium position shifts towards right. ✓
- More CO_2 is produced.
- Volgens Le Chatelier se beginsel 'n toename in temperatuur bevoordeel die endotermiese reaksie.
- Die voortwaartse reaksie word bevoordeel/ die ewewigsposisie verskuif regs.
- Meer CO_2 word geproduseer.

(3)

6.4.2 **OPTION 1 / OPSIE 1****Marking criteria:**

- (a) Correct K_c expression ✓
- (b) Substitution into correct K_c expression ✓
- (c) Calculation of moles of CO_2 by substitution into $n = cV$ ✓
- (d) The use of molar ratio to calculate reacted moles of CaCO_3 ✓
- (e) Calculating the mol of CaCO_3 that is unreacted ✓
- (f) Substituting molar mass and unreacted moles of CaCO_3 in $m = nM$ ✓
- (g) Final answer ✓

Nasienkriteria:

- (a) Korrekte K_c -uitdrukking
- (b) Vervanging in korrekte K_c -uitdrukking
- (c) Bereken die mol van CO_2 deur in $n = cV$ te vervang
- (d) Die gebruik van mol verhouding om die aantal mol te bereken van CaCO_3 wat reageer het
- (e) Bereken die aantal onreageerde mol van CaCO_3
- (f) Vervanging van molêre massa en onreageerde mole van CaCO_3 in $m = nM$
- (g) Finale antwoord ✓

$$\begin{aligned}
 K_c &= [\text{CO}_2] \text{ (a) } \checkmark \\
 [\text{CO}_2] &= 0,0385 \text{ mol} \cdot \text{dm}^{-3} \text{ (b) } \checkmark \\
 n(\text{CO}_2) &= cV \\
 &= 0,0385 \times 2 \text{ (c) } \checkmark \\
 &= 0,077 \text{ mol} \\
 n(\text{CO}_2) &= n(\text{CaCO}_3) \\
 n(\text{CaCO}_3) &= 0,077 \text{ mol CaCO}_3 \text{ reacted/reageer (d) } \checkmark \\
 n(\text{unreacted / onreageerde CaCO}_3) &= n(\text{Initial}) - n(\text{reacted/reageer}) \\
 &= 0,24 - 0,077 \checkmark \text{ (e) } \\
 &= 0,163 \text{ mol} \\
 m(\text{unreacted/onreageerde}) &= nM \\
 &= 0,163 \times 100 \checkmark \text{ (f) } \\
 &= 16,3 \text{ g } \checkmark \text{ (g) }
 \end{aligned}$$

OPTION 2 / OPSIE 2**Marking criteria:**

- (a) Correct mol ratio
- (b) Divide the equilibrium mol of CO_2 by 2
- (c) Correct K_c expression ✓
- (d) Substitution into correct K_c expression ✓
- (e) Calculating the mol of CaCO_3 that is unreacted ✓
- (f) Substituting molar mass and unreacted moles of CaCO_3 in $m = nM$ ✓
- (g) Final answer ✓

Nasienkriteria:

- (a) Korrekte mol verhouding
- (b) Deel ewewigs mol van CO_2 deur 2
- (c) Korrekte K_c -uitdrukking
- (d) Vervanging in korrekte K_c -uitdrukking
- (e) Bereken die aantal onreageerde mol van CaCO_3
- (f) Vervanging van molêre massa en onreageerde mole van CaCO_3 in $m = nM$
- (g) Finale antwoord ✓

	CaCO_3 (s)	CaO (s)	CO_2 (g)
Initial mol <i>Aanvangsmol</i>	0,24		
Change in mol <i>Verandering in mol</i>	- x		$+x$ ✓ (a)
Equilibrium mol <i>Ewewigsmol</i>	$0,24 - x$		x
Concentration			$\frac{x}{2}$ ✓ (b)

$$K_c = [\text{CO}] \quad \checkmark \quad (\text{c})$$

$$0,038 = \frac{x}{2} \quad \checkmark \quad (\text{d})$$

$$x = 0,077$$

$$n_e = 0,24 - 0,077 \quad \checkmark \quad (\text{e})$$

$$n_e = 0,163 \text{ mol}$$

$$m(\text{CaCO}_3) = nM$$

$$m(\text{CaCO}_3) = (0,163)(100) \quad \checkmark \quad (\text{f})$$

$$(\text{CaCO}_3) = 16,3 \text{ g} \quad \checkmark \quad (\text{g})$$

(7)
[17]

QUESTION/VRAAG 7

- 7.1 7.1.1 Bases produce hydroxide ions (OH^-) in aqueous solution. ✓✓ (2 or 0)
 Basisse produseer hidroksiedione (OH^-) in waterige oplossing. (2 of 0) (2)
- 7.1.2 A ✓ (1)
- 7.1.3 SO_4^{2-} ✓ (1)
- 7.2 7.2.1 It ionises incompletely in water ✓ to form low concentration of H_3O^+ ions. ✓
Dit ioniseer onvolledig in water om lae konsentrasie H_3O^+ -ione te vorm. (2)
- 7.2.2 Alkaline salt/Alkaliese sout ✓ (1)
- 7.2.3 $\text{CH}_3\text{COO}^- + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{COOH} + \text{OH}^-$ ✓✓
 (reactants / reaktanse and / en products / produkte)
 Excess OH^- is produced/Produseer oormaat OH^- . ✓ (3)
- 7.3 7.3.1 Bromothymol blue/Broomtimol blou ✓ (1)
- 7.3.2 **Marking criteria**
 (a) Substitution in c_aV_a
 (b) Substitution in c_bV_b
 (c) Substitution in n_a/ n_b
 (d) Use of mole ratio $\text{H}_2\text{SO}_4 : \text{H}_3\text{O}^+$
 (e) Formula $\text{pH} = -\log [\text{H}_3\text{O}^+]$
 (f) Substitution in $\text{pH} = -\log [\text{H}_3\text{O}^+]$
 (g) Final answer
- Nasienkriteria**
 (a) Vervanging in c_aV_a
 (b) Vervanging in c_bV_b
 (c) Vervanging in n_a/ n_b
 (d) Gebruik van mol verhouding $\text{H}_2\text{SO}_4 : \text{H}_3\text{O}^+$
 (e) Formule $\text{pH} = -\log [\text{H}_3\text{O}^+]$
 (f) Vervanging in $\text{pH} = -\log [\text{H}_3\text{O}^+]$
 (g) Finale antwoord

OPTION 1 / OPSIE 1

$$\frac{c_a V_a}{c_b V_b} = \frac{n_a}{n_b}$$

$$\frac{c_a \times 25 \text{ (a) } \checkmark}{0,2 \times 12,5 \text{ (b) } \checkmark} = \frac{1}{2} \text{ (c) } \checkmark$$

$$c_a = 0,05 \text{ mol} \cdot \text{dm}^{-3}$$

OPTION 2 / OPSIE 2

$$n(\text{NaOH}) = cV$$

$$n(\text{NaOH}) = (0,2)(12,5 \times 10^{-3}) \text{ (a) } \checkmark$$

$$n(\text{NaOH}) = 2,5 \times 10^{-3} \text{ mol}$$

$$n(\text{H}_2\text{SO}_4) = 2 \times n(\text{NaOH})$$

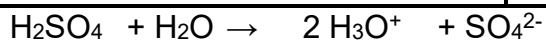
$$n(\text{H}_2\text{SO}_4) = \frac{1}{2} \times (2,5 \times 10^{-3}) \text{ (b) } \checkmark$$

$$n(\text{H}_2\text{SO}_4) = 1,25 \times 10^{-3} \text{ mol}$$

$$c = n/V$$

$$c = 1,25 \times 10^{-3} / 25 \times 10^{-3} \text{ (c) } \checkmark$$

$$c_a = 0,05 \text{ mol} \cdot \text{dm}^{-3}$$



$$c(\text{H}_3\text{O}^+) = 2 c(\text{H}_2\text{SO}_4)$$

$$c(\text{H}_3\text{O}^+) = 2(0,05) \text{ (d) } \checkmark$$

$$[\text{H}_3\text{O}^+] = 0,1 \text{ mol} \cdot \text{dm}^{-3}$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+] \text{ (e) } \checkmark$$

$$= -\log 0,1 \text{ (f) } \checkmark$$

$$= 1 \text{ (g) } \checkmark$$

(7)
[18]

QUESTION 8/VRAAG 8

8.1 8.1.1 Chemical energy to electrical energy. ✓✓
Chemiese energie na elektriese energie. (2)

8.1.2 Metal **M** ✓

The substance with the lower standard electrode potential is more easily oxidized. / Metal **M** is a stronger reducing agent than silver. ✓
 Metal M will be oxidised ✓

Metaal M

*Die stof met die laer standaard elektrodepotensiaal word makliker geoksideer / Metaal **M** is 'n sterker reduseermiddel as silwer.*

Metaal M sal geoksideer word (3)

8.2 8.2.1 $E^\theta_{\text{cell}} = E^\theta_{\text{cathode/reduction/oxidising agent}} - E^\theta_{\text{anode/oxidation/reducing agent}}$ ✓
 $E^\theta_{\text{sel}} = E^\theta_{\text{katode/reduksie/oksidaseermiddel}} - E^\theta_{\text{anode/oksidasie/reduseermiddel}}$

$1,54 \checkmark = (0,8) - E^\theta_{\text{anode/oxidation/reducing agent}} / E^\theta_{\text{anode/oksidasie/reduseermiddel}}$ ✓

$E^\theta_{\text{anode/oxidation/reducing agent}} / E^\theta_{\text{anode/oksidasie/reduseermiddel}} = 0,74 \text{ V}$ ✓

Metal is chromium (Cr) ✓

Metaal is chroom (Cr)

Marking criteria/Nasienkriteria

- Any other formula using unconventional abbreviation, e.g. /
 $E^\theta_{\text{cell}} = E^\theta_{\text{OA}} - E^\theta_{\text{RA}}$ followed by the correct substitution Max $\frac{3}{4}$
Enige ander formule wat onkonvensionele afkorting gebruik bv. $E^\theta_{\text{sel}} = E^\theta_{\text{OM}} - E^\theta_{\text{RM}}$ gevolg deur korrekte vervanging Maks $\frac{3}{4}$

(5)

8.2.2 $\text{Cr} | \text{Cr}^{3+} \checkmark || \checkmark \text{Ag}^+ | \text{Ag} \checkmark$

(3)

8.3 8.3.1 REMAINS THE SAME/BLY DIESELFDE ✓

(1)

8.3.2 INCREASES/TOENEEM ✓

(1)

[15]

QUESTION/VRAAG 9

- 9.1 A substance of which aqueous solutions contains ions ✓✓ **(2 or 0)**
'n Stof waarvan die oplossing in water ione bevat (2 of 0)

OR / OF

A substance that dissolves in water to give a solution that conducts electricity. **(2 or 0)** ✓✓
'n Stof wat in water oplos om 'n oplossing te vorm wat elektrisiteit gelei.
(2 of 0)

(2)

- 9.2 ENDOTHERMIC/ENDOTERMIES ✓

(1)

- 9.3 X ✓

(1)

- 9.4 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$ ✓✓
 Ignore phases/ Ignoreer fase

(2)

Marking criteria / Nasienkriteria

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

Ignore if the charge omitted on electron/
 Ignoreer indien lading weggelaat op elektron

- 9.5 Silver (Ag) is a weaker reducing agent than copper (Cu) and Zinc (Zn). ✓
 Silver (Ag) will not be oxidized.
Silwer (Ag) is 'n swakker reduseermiddel as koper (Cu) en sink (Zn).
Silwer (Ag) word nie geoksideer nie.

(1)

- 9.6 **Marking criteria / Nasienkriteria**

- (a) Substitution in/ Vervang in $n = N/N_A$
- (b) Use of mole ratio/ Gerbuik van mol verhouding $M : e^-$
- (c) Formula/ Formule $n = m/M$
- (d) Substitution into/ Vervang in $n = m/M$
- (e) Formula/ Formule CaCl_2

$$n = \frac{N}{N_A}$$

$$n = \frac{1,806 \times 10^{22}}{6,02 \times 10^{23}} \quad (\text{a}) \checkmark$$

$$n = 0,03 \text{ mol}$$

$$n(M) = 0,03 \times \frac{1}{2} \text{ (b) } \checkmark$$

$$n(M) = 0,015 \text{ mol}$$

$$M = \frac{m}{n} \text{ (c) } \checkmark$$

$$M = \frac{0,6}{0,015} \text{ (d) } \checkmark$$

$$M = 40 \text{ g} \cdot \text{mol}^{-1}$$

$$M = \text{CaCl}_2 \text{ (e) } \checkmark$$

(5)
[12]

TOTAL/TOTAAL: 150