Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD 12*

JUNE/*JUNIE* 2024

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

MARKS/*PUNTE*: 150

This marking guideline consists of 19 pages./
Hierdie nasienriglyn bestaan uit 19 bladsye.

QUESTION 1/*VRAAG 1*

1.1 C ✓✓ (2)

1.2 D ✓✓ (2)

1.3 A ✓✓ (2)

1.4 D ✓✓ (2)

1.5 B ✓✓ (2)

1.6 B ✓✓ (2)

1.7 C ✓✓ (2)

1.8 C ✓✓ (2)

1.9 B ✓✓ (2)

1.10 B ✓✓ (2)

[20]

QUESTION 2/*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 verskil met 'n CH_2 -groep (2)

2.2 2.2.1 B ✓ (1)

2.2.2 A ✓ (1)

2.2.3 B ✓ (1)

2.2.4 C ✓ (1)

2.3 Secondary alcohol / *Sekondêre alkohol* ✓
The carbon that contains the hydroxyl group/ -OH is bonded to two carbon atoms. ✓
Die koolstof wat die hidroksielgroep / -OH bevat is verbind aan twee ander koolstowwe

OR/*OF*

The hydroxyl group / -OH is bonded to a secondary carbon.
Die hidroksielgroep / -OH is verbind aan 'n sekondêre koolstof

OR/OF

The carbon that contains the hydroxyl group */ OH* contains one hydrogen atom
Die koolstof wat die hidroksielgroep / OH bevat het een waterstof-atoom (2)

2.4 2.4.1 C_nH_{2n} ✓ (1)

2.4.2 4-methylpent-2-ene ✓✓
4-metielpen-2-een
OR/*OF*
4-methyl-2-pentene ✓✓
4-metiel-2-penteen

Marking criteria/*Nasienkriteria*:
- Pent-2-ene / 2-pentene✓ *Pent-2-een / 2-penteen*
- Whole name correct ✓ *Hele naam korrek*

(2)

2.4.3 5,5-dimethylhexan-3-ol ✓✓✓
5,5-dimetielhexan-3-ol
OR/*OF*
5,5-dimethyl-3-hexanol ✓✓✓
5,5-dimetiel-3-hexanol

Marking criteria/*Nasienkriteria*:
- Hexan-3-ol / 3-hexanol ✓
- Dimethyl / *dimetiel* ✓
- Whole name correct / *hele naam korrek* ✓

(3)

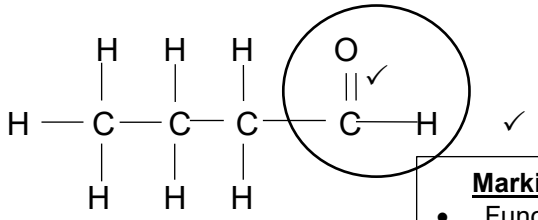
2.5 2.5.1

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 die sleutelwoorde/frases in die korrekte konteks weggelaat word: -1 punt per woord/frase.

Compounds that have the same molecular formula but different functional groups. ✓✓

Verbindings met dieselfde molekulêre formule maar verskillende funksionele groepe. (2)

2.5.2



Marking criteria/*Nasienkriteria*
- Functional group / *funksionele groep* ✓ 1/2
- Whole structure correct / *Hele struktuur korrek* ✓*2/2*

(2)

2.6 2.6.1 Esterification / Condensation / *Esterifikasie / Kondensasie* ✓ (1)

2.6.2

Mol C	: Mol H	: Mol O
$\frac{58,82}{12}$ ✓	: $\frac{9,81}{1}$ ✓	: $\frac{31,37}{16}$ ✓
4,90	: 9,81	: 1,96
2,5	: 5	: 1
5	: 10	: 2 ✓

Marking criteria/*Nasienkriteria*
- % C divide by M (C/) *% C gedeel deur M (C)*
- % H divide by M (H)/ *% H gedeel deur M(H)*
- % O divide by M (O)/ *% O gedeel deur M (O)*
- Simplest mole ratio/ *Eenvoudigste molverhouding*
- Molecular formula/ *Molekulêre formule*

Empirical formula / Empiriese formule: $C_5H_{10}O_2$

Molecular Formula / Molekulêre formule: $C_5H_{10}O_2$ ✓ (5)

2.6.3 $M\ (C_xH_yO_2) = 74\ g\cdot mol^{-1}$

$12n + 2n + 2(16) = 74$ ✓

$n = 3$ ✓

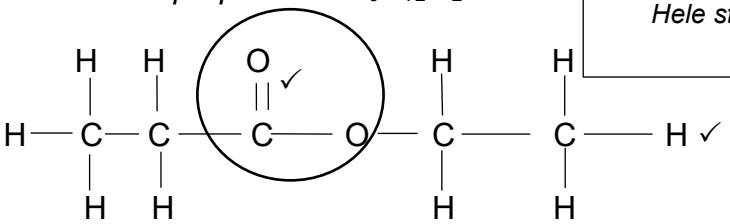
Propanoic acid/Propanoësuur ✓✓ (4)

2.6.4 **Marking criteria/*Nasienkriteria***

- Determining the molar mass of alcohol **P** / *Bepaal die molekulêre massa van alkohol **P*** ✓
- Identifying alcohol **P** / *Identifiseer alkohol **P*** ✓
- Name of ester / *Naam van ester* ✓✓
- Structural formula of the ester/ *Struktuurformule van die ester* ✓✓

Propanoic acid + alcohol **P** → ester + H_2O
Propanoësuur + *alkohol **P***→ ester + H_2O
M (Alcohol / *Alkohol* P) = 102 + 18 – 74 = 46 g·mol^{-1} ✓
Alcohol / *Alkohol* P = Ethanol / *etanol* ✓

Ester = ethyl ✓ propanoate ✓
Ester = etielpropanoaat $C_6H_{12}O_2$



Marking criteria/*Nasienkriteria*
- Functional group / *funksionele groep* ✓ 1/2
- Whole structure correct / *Hele struktuur korrek* ✓2/2

(6)
[34]

QUESTION 3/*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 sleutelwoorde frases in die **korrekte konteks** weggelaat word: -1 punt per woord/frase.*

3.1 Boiling point is the temperature at which the vapour pressure of a liquid / substance equal the atmospheric pressure ✓✓

Kookpunt is die temperatuur waarby die dampdruk van 'n vloeistof/stof gelyk aan die atmosferiese druk is. (2)

3.2 Alcohols are flammable / *Alkohole is vlambaar* ✓ (1)

3.3 140 (˚C) ✓ (1)

3.4 YES. ✓ Compounds have the same molecular mass/ compounds are Isomers / only one independent variable. ✓
JA. Verbindings het dieselfde molekulêre massa/ verbindings is isomere / slegs een onafhanklike veranderlike. (2)

3.5 2-methylbutan-1-ol ✓✓ *2-metielbutan-1-ol*
OR/*OF*
2-methyl-1-butanol ✓✓ *2-metiel-1-butanol*

Marking criteria/*Nasienkriteria*:
- butan-1-ol ✓
- Whole name correct / *hele naam korrek* ✓

(Accept/*Aanvaar*)

3-methylbutan-1-ol ✓✓ *3-metielbutan-1-ol*
OR/*OF*
3-methyl-1-butanol ✓✓ *3-metiel-1-butanol* (2)

3.6 Alcohol **3** ✓ accept: 2,2-dimethylpropan-1-ol / 2,2-dimethyl-1-propanol
*Alkohol **3*** *aanvaar: 2,2-metielpropan-1-ol/ 2,2-dimetiel-1-propanol* (1)

3.7 **Marking criteria / *Nasienkriteria***
- Chain length decreases from **1** to **3**
  *Kettinglengte neem af vanaf **1** tot **3***
- Decrease in the strength of the London forces/dispersion forces/induced dipole forces from 1–3
  Afname in die sterkte van die Londonkragte/verspreidingskragte/ Geïnduseerde dipool-dipool kragte vanaf 1–3
- Relate the strength of London forces/dispersion forces/induced dipole to energy involved
  Vergelyk the sterkte van die Londonkragte/verspreidingskragte/ Geïnduseerde dipool-dipool kragte na die energie

From **1** to **3**

- Surface area / chain length decreases / increased in the number of branches ✓
  Oppervlakte / kettinglengte neem af / toename in die aantal takke
- Strength of London forces/dispersion forces/induced dipole forces decreases ✓
  Sterkte van die Londonkragte/verspreidingskragte/geïnduseerde dipool-dipool kragte neem af
- Less energy is needed to overcome intermolecular forces ✓
  Minder energie word benodig om die intermolekulêre kragte te oorkom

OR/*OF*

Marking criteria/Nasienkriteria

- Chain length increases from ***3*** *to* ***1***
  Kettinglengte neem toe vanaf ***3*** *na* ***1***
- Increase in the strength of the London forces/dispersion forces/induced dipole forces from 3 to 1
  Toename in die sterkte van die Londonkragte/Verspreidingskragte / geïnduseerde dipool-dipool kragte vanaf 3 na 1
- Relate the strength of London forces to energy involved.
  Vergelyk the sterkte van die Londonkragte/Verspreidingskragte/ geïnduseerde dipool-dipool kragte na die energie

From **3** to **1** */ Vanaf* ***3*** *tot* ***1***

- Surface area / chain length increases/ decreased in the number of branches ✓
  Oppervlakte/ kettinglengte neem toe/ afname in die aantal takke
- Strength of London forces/Dispersion forces/Induced dipole forces increases ✓
  Sterkte van die Londonkragte/Verspreidingskragte /Geïnduseerde dipool-dipool kragte neem toe
- More energy needed to overcome intermolecular forces ✓
  Meer energie word benodig om die intermolekulêre kragte te oorkom (3)

3.8 3.8.1

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

The pressure exerted by a vapour at equilibrium with its liquid in a closed system. ✓✓/
Die druk uitgeoefen deur 'n damp in ewewig met sy vloeistof in 'n geslote sisteem. (2)

3.8.2 **Marking criteria/*Nasienkriteria***

- Butan-1-ol has hydrogen bonds ✓/
  Butan-1-ol het waterstofbinding
- Butanone has dipole-dipole forces ✓ /
  Butanoon het dipool-dipool kragte /
- Compare the strength of the hydrogen bonds to dipole-dipole forces ✓/
  Vergelyk die sterkte van die waterstofbinding met dipool-dipoolkragte /
- Relate strength intermolecular forces to vapour pressure ✓/
  Verwys die sterkte van die intermolekulêrekragte met die dampdruk

- Butan-1-ol has hydrogen bonds (and London forces) ✓/
  Butan-1-ol het waterstofbinding (en Londonkragte)
- Butanone has dipole-dipole forces (and London forces) ✓/
  Butanoon het dipool-dipoolkragte (en Londonkragte)
- Hydrogen bonds is stronger than the dipole-dipole forces ✓/
  Waterstofbinding is sterkter as die dipool-dipoolkragte
- Stronger intermolecular forces result in lower vapour pressure ✓/
  Sterker intermolekulêrekragte lei tot laer dampdruk

OR/*OF*

- Butan-1-ol has for hydrogen bonds (and London forces) ✓/
  Butan-1-ol het waterstofbinding (en Londonkragte)
- Butanone has dipole-dipole forces (and London forces) ✓/
  Butanoon het dipool-dipoolkragte (en Londonkragte)
- Dipole-dipole forces weaker than the hydrogen bonds ✓/
  Dipool-dipoolkragte is swakker as die waterstofbinding
- Weaker intermolecular forces result in higher vapour pressure ✓/
  Swakker intermolekulêrekragte sal tot 'n hoër dampdruk lei (4)

3.8.3 INCREASE / *TOENEEM* ✓ (1)

[19]

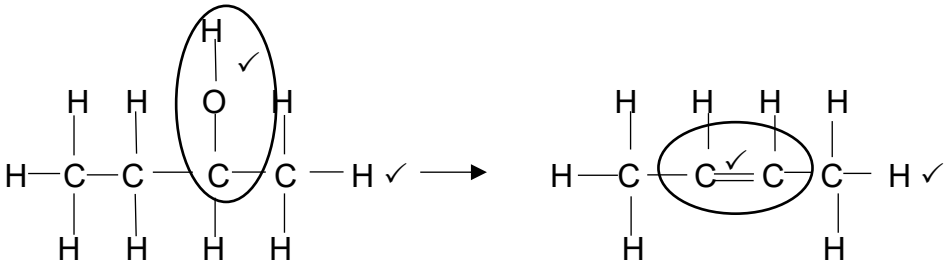
QUESTION 4/*VRAAG 4*

4.1 4.1.1 Dehydration / *Dihidratering / dihidrasie* ✓ (1)

4.1.2 Sulphuric acid / *swawelsuur* / H_2SO_4 ✓ (1)

4.1.3

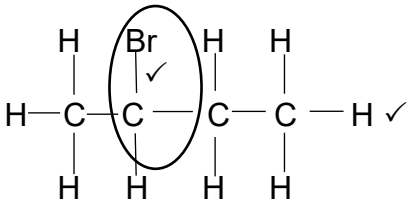
Marking criteria/*Nasienkriteria*:
Organic compounds only/ *Slegs vir organiese verbinding*
- Functional group/ *funksionele groep* ✓ 1/2
- Whole structure correct / *Hele struktuur korrek* ✓ (2/2)
  Hele struktuur korrek ✓ *2/2*



\+ H_2O (4)

4.1.4 Addition / hydrohalogenation / *Addisie / hidrohalogenering/ hidrohalogenasie* ✓ (1)

4.1.5 2-bromobutane ✓✓/
2-bromobutaan



Marking criteria/ *Nasienkriteria*
Name of compound / *Naam van verbinding*
- Butane / *butaan* ✓ 1/2
- Whole name correct ✓ *2/2*
  hele naam korrek

Structure /
- Functional group ✓ 1/2
  funksionele groep
- Whole structure correct ✓/*Hele struktuur korrek 2/2*

(4)

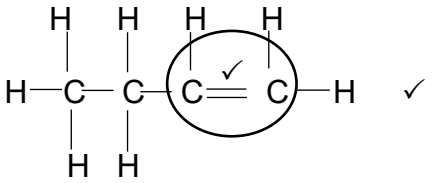
4.1.6 Mild heat ✓ and dilute strong base /LiOH/KOH/NaOH ✓/
Matige hitte en verdunde sterk basis /LiOH/KOH/NaOH (2)

4.2 4.2.1 Breaking down of long chain hydrocarbon molecules into more useful shorter chains ✓✓ **(2 or 0)** */*
Die proses waarin langer kettingkoolwaterstof-molekule afgebreek word in korter, meer bruikbare, molekule ***(2 of 0)*** (2)

4.2.2 Minimize the UV light present / No substitution reaction can occur in the saturated hydrocarbon ✓/
Verminder die teenwoordige UV-lig / Geen substitusiereaksie kan in die versadigde koolwaterstof plaasvind nie (1)

4.2.3 C_4H_z. ✓ It readily reacts with bromine (without the presence of UV-light) ✓
C_4H_z. Dit reageer geredelik met broom (sonder die teenwoordigheid van UV-lig) (2)

4.2.4



✓

Marking criteria/*Nasienkriteria*
- Functional group ✓ ½
  Funksionele groep
- Whole structure correct/ ✓ *2/2*
  Hele struktuur korrek

(2)

4.2.5 $2\ C_4H_{10} + 13\ O_2$ ✓ → $8\ CO_2 + 8\ H_2O$ ✓ (✓ bal.)

Marking criteria / *Nasienkriteria*
- Reactants / *Reaktanse* 1/3
- Products / *Produkte* *2/3*
- Balancing */ Balansering* *3/3*

(3)
[23]

QUESTION 5/*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 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 reaktanse of produkte 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 mol / volume / massa. **(2 of 0)*** (2)

5.2 Temperature / *Temperatuur* ✓ (1)

5.3 5.3.1 Experiment / *Eksperiment* **2** ✓ (1)

5.3.2 **OPTION 1 / *OPSIE 1***

- In experiment 2 more particles are exposed / larger surface area ✓
- More particles will collide with the correct orientation ✓
- More effective collisions per unit time / Frequency of the effective collisions increases ✓

- *In eksperiment 2 word meer deeltjies blootgestel / groter oppervlakte*
- *Meer deeltjies sal met die korrekte oriëntasie bots*
- *Meer effektiewe botsings per tydseenheid / Frekwensie van die effektiewe botsings neem toe*

OR/*OF*

OPTION 2 / *OPSIE 2*

- In experiment 3 less particles are exposed / smaller surface area ✓
- Less particles will collide with the correct orientation ✓
- Less effective collisions per unit time / Frequency of the effective collisions decreases ✓

- *In eksperiment 3 word minder deeltjies blootgestel / kleiner oppervlakte*
- *Minder deeltjies sal met die korrekte oriëntasie bots*
- *Minder effektiewe botsings per tydseenheid / Frekwensie van die effektiewe botsings neem af* (3)

5.4 5.4.1

Marking criteria /	***Nasienkriteria***
• Subst. Into the rate equation • Subst. into n = m/M • Using the mol ratio CO_2 : $MgCO_3$ • Formula m = nM • Subst. into m = nM • Final answer	• *Vervang in die tempo vergelyking* • *Vervang in n = m/M* • *Gebruik die mol verhouding CO_2 : $MgCO_3$* • *Formule m = n/M* • *Vervanging in m = n/M* • *Finale antwoord*

$$\text{Rate/ } \textit{Tempo} = \frac{\Delta m}{\Delta t}$$

$$0,25 = \frac{m - 0}{10,44} \checkmark$$

$$m = 2,61 \text{ g}$$

$$n = \frac{M}{m}$$

$$n = \frac{2,61}{44} \checkmark$$

$$n = 0,0593 \text{ mol}$$

$n (CO_2) = n (MgCO_3) = 0,0593$ mol ✓

$m = nM$ ✓

$m = (0,0593)(84)$ ✓

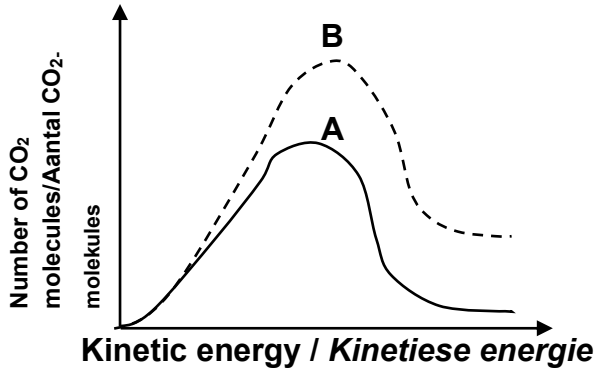
$m = 4,9812$ g ✓ (6)

5.4.2 $n = \frac{V}{V_m}$ ✓

$0,0593 = \frac{1,47}{V_m}$ ✓

$V_m = 24,79\ dm^3$ ✓ (3)

5.5



Marking criteria / *Nasienkriteria*

- Shape of **B** starting at the origin ✓
  *Vorm van **B** begin by oorsprong*
- Curve of **B** is higher / *Kurwe **B** is hoër* ✓

NOTE: A or B must be indicated
Ignore the labels of the axes.
LET WEL: A of B moet aangedui word.
Ignoreer die benoeming van die asse.

(2)
[18]

QUESTION 6/*VRAAG 6*

6.1 6.1.1

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 sleutelwoorde/frases in die **korrekte konteks** weggelaat word: - 1 punt per woord/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 deur die reaksie wat die versteuring teenwerk, te bevoordeel (2)

6.1.2 EQUAL TO / *GELYK AAN* ✓
Chemical equilibrium is reached / *Chemiese ewewig word bereik* ✓ (2)

6.1.3 Y ✓
2 mol of SO_2 will react for every 1 mol of O_2 ✓/
2 mol van SO_2 sal reageer met elke 1 mol van O_2

OR/*OF*

The rate at which SO_2 is consumed is twice that of O_2./
Die tempo waarteen SO_2 verbruik word is twee keer as dié van O_2

OR/*OF*

0,925 mol of SO_2 reacted with 0,46 mol of O_2 ✓/
0,925 mol van SO_2 reageer met 0,46 mol O_2 (2)

6.1.4 NEGATIVE / *NEGATIEF* ✓ (1)

6.1.5
- The amount/concentration of SO_3 increased / SO_2 and O_2 decreased ✓
- (According to Le Chatelier's principle) A decrease in temperature favours the exothermic reaction. ✓
- The forward reaction was favoured / The equilibrium position shifted towards the right ✓

- *Die hoeveelheid/konsentrasie van SO_3 neem toe / SO_2 en O_2 verlaag*
- *(Volgens Le Chatelier se beginsel) 'n Afname in temperatuur bevoordeel die eksotermiese reaksie*
- *Die voorwaartse reaksie word bevoordeel / Die ewewigsposisie verskuif na regs* (3)

6.2 6.2.1 **OPTION 1: MOLE CALCULATIONS / *OPSIE 1: MOLBEREKENINGE***

a. Determine the change in mol of NOCℓ / *Bepaal die verandering in mol van NOCℓ*
b. Correct ratio NOCℓ : NO : $Cℓ_2$ / *Korrekte verhouding NOCℓ : NO : $Cℓ_2$*
c. Determine the equilibrium mol for NOCℓ , NO and $Cℓ_2$ / *Bepaal die ewewig mol van NOCℓ , NO en $Cℓ_2$*
d. Dividing by/ *Deel deur* 1,5
e. Correct Kc expression with square brackets / *Korrekte Kc uitdrukking met vierkanthakkies*
f. Subst. into the correct Kc expression /*Vervanging in korrekte Kc uitdrukking*
g. Final answer / *Finale antwoord*

Δn (NOCℓ) = 2,5 x 28/100 = 0,7 ✓ (a)

	2 NOCℓ	2 NO (g)	$Cℓ_2$ (g)	
Initial mol *Aanvangsmol*	2,5	-	-	
Change in mol *Verandering in mol*	0,7	0,7	0,35	(b) ✓
Equilibrium mol *Ewewigsmol*	1,8	0,7	0,35	(c) ✓
Concentration *Konsentrasie*	=1,8 / 1,5 = 1,2	= 0,7 / 1,5 = 0,47	=0,35 / 1,5 0,23	(d) ✓

$$K_c = \frac{[NO]^2[Cℓ_2]}{[NOCℓ]^2}$$ (e) ✓

$$K_c = \frac{(0,47)^2(0,23)}{(1,2)^2}$$ (f) ✓

K_c = 0,035 ✓ (g)

OPTION 2: CONCENTRATION CALCULATIONS / *OPSIE 2: KONSENTRASIE BEREKENINGE*

a. Determine the initial concentration NOCℓ / *Bepaal die aanvanklike konsentrasie van NOCℓ*
b. Determine the change in conc of NOCℓ / *Bepaal die verandering in konsentrasie van NOCℓ*
c. Correct ratio NOCℓ : NO : $C\ell_2$ */ Korrekte verhouding NOCℓ : NO : $C\ell_2$*
d. Determine the equilibrium conc. for NOCℓ , NO and $C\ell_2$ / *Bepaal die ewewigs konsentrasie van NOCℓ , NO en $C\ell_2$*
e. Correct Kc expression with square brackets / *Korrekte Kc uitdrukking met vierkanthakkies*
f. Subst. into the correct Kc expression/ *Vervanging in korrekte Kc uitdrukking*
g. Final answer / *Finale antwoord*

c_i (NOCℓ) = 2,5 ÷ 1,5 = 1,67 ✓ (a)
Δc (NOCℓ) = 1,67 x 28 / 100 = 0,47 ✓ (b)

	2 NOCℓ	2 NO (g)	$C\ell_2$ (g)	
Initial concentration *Aanvangskonsentrasie*	1,67	-	-	
Change in concentration *Verandering in konsentrasie*	0,47	0,47	0,235	(c) ✓
Equilibrium concentration *ewewigskonsentrasie*	1,2	0,47	0,235	(d) ✓

$$K_c = \frac{[NO]^2[C\ell_2]}{[NOC\ell]^2} \quad \text{(e) ✓}$$

$$K_c = \frac{(0,47)^2(0,23)}{(1,2)^2} \quad \text{(f) ✓}$$

K_c = 0,035 ✓ (g) (7)

6.2.2 REMAINS THE SAME / *BLY DIESELFDE* ✓

Only temperature has an effect on the value of the equilibrium constant. ✓/
Slegs temperatuur het 'n effek op die waarde van die ewewigskonstante (2)
[19]

QUESTION 7/*VRAAG 7*

7.1 7.1.1 Acids produce hydrogen ions (H^+/H_3O^+/ hydronium ions) in aqueous solutions. ✓✓/

'n Suur is 'n stof wat waterstof-ione (H^+/H_3O^+/ hydroniumione) vorm wanneer dit in water oplos (2)

7.1.2 H_2O ✓and / *en* HSO_4^- ✓ (2)

7.1.3 $H_2SO_4 + 2\ KOH$ ✓ → $K_2SO_4 + 2\ H_2O$ ✓ (✓ bal.)

Marking criteria/ *Nasienkriteria*
• Reactants / *Reaktanse*
• Products /*Produkte*
• Balancing / *Balansering*

(3)

7.2 7.2.1

OPTION 1 / *OPSIE 1*	**OPTION 2 / *OPSIE 2***
$c = \frac{m}{MV}$ ✓	$n = \frac{m}{M}$
$c = \frac{3,812}{(40)(100x10^{-3})}$ ✓	$n = \frac{3,812}{40}$
$c = 0,953\ mol\cdot dm^{-3}$ ✓	$n = 0,0953\ mol$
	$c = \frac{n}{V}$ ✓
	$c = \frac{0,0953}{100x10^{-3}}$ ✓
	$c = 0,953\ mol\cdot dm^{-3}$ ✓

(3)

7.2.2 **OPTION 1 / *OPSIE 1***

Marking criteria/ *Nasienkriteria*

- Subst. c and V of NaOH into n = cV / *Vervang van c en V van NaOH in n = Cv*
- Use of **ratio** CH_3COOH : NaOH
- *Gebriuk van **verhouding** CH_3COOH : NaOH*
- Subst. of n and V of CH_3COOH into c = n/V / *Vervang van c en V van CH_3COOH in n = cV*
- Formula / *Formule* m = cMV
- Subst. into / *Vervanging in* m = cMV
- Subst. into percentage formula / *Vervanging in persentasie-formule*
- Final answer / *Finale antwoord*

n (NaOH) = cV

n (NaOH) = $(0,953)(21,8 \times 10^{-3})$ ✓

n (NaOH) = 0,0207754 mol

n (CH_3COOH) = n (NaOH) = 0,0207754 mol ✓

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

$$c = \frac{0,0207754}{25 \times 10^{-3}} \checkmark$$

$$c = 0,831016 \text{ mol·dm}^{-3}$$

m = cMV ✓

m = $(0,831016)(60)(25 \times 10^{-3})$ ✓

m = 1,2465 g

$$\text{Percentage mass / } \textit{Persentasie massa} = \frac{1,2465}{25} \text{ X } 100\ \% \checkmark$$

Percentage mass / *Persentasie massa* = 4,986 % ✓

OPTION 2 / *OPSIE 2*
Marking criteria / *Nasienkriteria*

- Subst. into / *Vervang in* n_a and/ *en* n_b $\frac{c_aV_a}{c_bV_b} = \frac{n_a}{n_b}$
- Subst. into / *Vervang in* V_a $\frac{c_aV_a}{c_bV_b} = \frac{n_a}{n_b}$
- Subst. into / *Vervang in* c_b and/ *en* V_b $\frac{c_aV_a}{c_bV_b} = \frac{n_a}{n_b}$
- Formula /*Formule* m = cMV
- Subst into / *Vervanging in* m = cMV
- Subst into percentage formula / *Vervanging in persentasie formule*
- Final answer / *Finale antwoord*

$$\frac{c_aV_a}{c_bV_b} = \frac{n_a}{n_b}$$

$$\frac{c_a(25)\ \checkmark}{(0{,}953)(21{,}8)\ \checkmark} = \frac{1}{1}\ \checkmark$$

$c_a = 0{,}831016\ mol{\cdot}dm^{-3}$

m = cMV ✓

m = (0,831016)(60)(25 x 10^{-3}) ✓

m = 1,2465 g

Percentage mass / *Persentasie massa* $= \frac{1{,}2465}{25}$ X 100% ✓

Percentage mass / *Persentasie massa* = 4,986% ✓ (7)
[17]

TOTAL/*TOTAAL*: 150