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**NATIONAL
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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.



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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 CH₂ group ✓✓

'n Reeks organiese verbindings waarin een lid van die volgende verskil met 'n CH₂-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

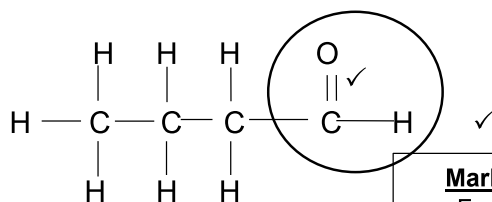
If any of the underlined key words/phrases in the **correct context** are omitted: -1 mark per word/phrase.

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

$$\frac{\text{Mol C}}{58,82} \checkmark : \frac{\text{Mol H}}{9,81} \checkmark : \frac{\text{Mol O}}{31,37} \checkmark$$

$$\frac{12}{12} \checkmark : \frac{1}{1} \checkmark : \frac{16}{16} \checkmark$$

$$4,90 : 9,81 : 1,96$$

$$2,5 : 5 : 1$$

$$5 : 10 : 2 \checkmark$$

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: C₅H₁₀O₂

Molecular Formula / Molekulêre formule: C₅H₁₀O₂ ✓ (5)

2.6.3 M (C_xH_yO₂) = 74 g·mol⁻¹

$$12n + 2n + 2(16) = 74 \checkmark$$

$$n = 3 \checkmark$$

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 + H₂O

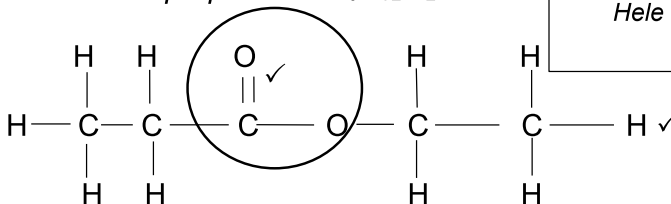
Propanoësuur + alkohol P → ester + H₂O

M (Alcohol / *Alkohol P*) = 102 + 18 – 74 = 46 g·mol⁻¹ ✓

Alcohol / *Alkohol P* = Ethanol / *etanol* ✓

Ester = ethyl ✓ propanoate ✓

Ester = etielpropanoaat C₆H₁₂O₂

**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*
 (Accept/Aanvaar)
- Marking criteria/Nasienkriteria:**

 - butan-1-ol ✓
 - Whole name correct / *hele naam korrek* ✓
- 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 intermolekulêre kragte 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 sterker as die dipool-dipoolkragte
- Stronger intermolecular forces result in lower vapour pressure ✓ /
Sterker intermolekulêre kragte 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 intermolekulêre kragte sal tot 'n hoër dampdruk lei

(4)

3.8.3 INCREASE / TOENEEM ✓

(1)

[19]

QUESTION 4/VRAAG 4

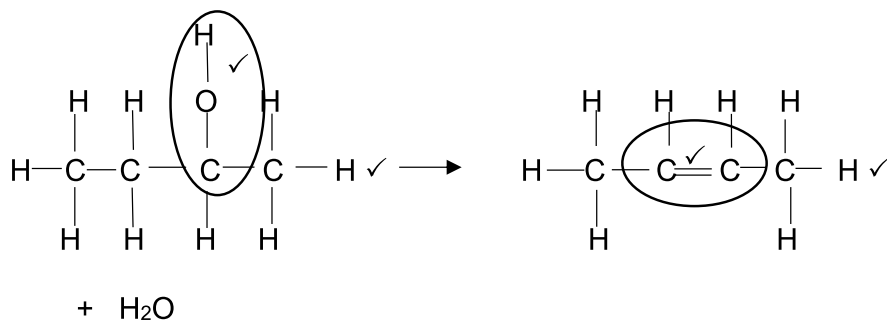
4.1 4.1.1 Dehydration / Dihidratering / dihidrasie ✓ (1)

4.1.2 Sulphuric acid / swawelsuur / H₂SO₄ ✓ (1)

4.1.3

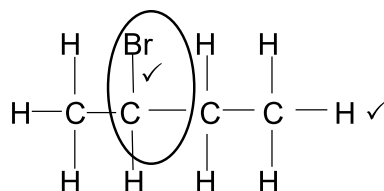
Marking criteria/Nasienkriteria:
Organic compounds only/ Slegs vir organiese verbinding

- Functional group/ funksionele groep ✓ 1/2
- Whole structure correct / Hele struktuur korrek ✓ (2/2)
 Hele struktuur korrek ✓ 2/2



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)

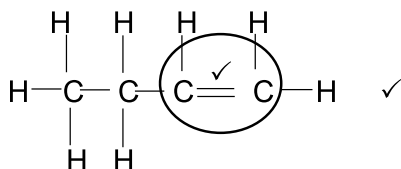


4.2 4.2.1 Breaking down of long chain hydrocarbon molecules into more useful shorter chains ✓✓ (2 or 0) /
Die proses waarin langer kettingkoolwaterstof-molekule afgebreek word in korter, meer bruikbare, molekule (2 of 0) (2)

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_8 . ✓ It readily reacts with bromine (without the presence of UV-light) ✓
 C_4H_8 . Dit reageer geredelik met broom (sonder die teenwoordigheid van UV-lig) (2)

4.2.4



Marking criteria/Nasienkriteria

- Functional group ✓ 1/2
Funksionele groep
- Whole structure correct/ ✓ 2/2
Hele struktuur korrek

(2)

4.2.5 $2 C_4H_{10} + 13 O_2 \rightarrow 8 CO_2 + 8 H_2O$ ✓ (✓ 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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • <i>Vervang in die tempo vergelyking</i> • <i>Vervang in $n = m/M$</i> • <i>Gebruik die mol verhouding CO_2 : MgCO_3</i> • <i>Formule $m = nM$</i> • <i>Vervanging in $m = nM$</i> • <i>Finale antwoord</i>

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

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

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

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

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

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

$$n(\text{CO}_2) = n(\text{MgCO}_3) = 0,0593 \text{ mol} \checkmark$$

$$m = nM \checkmark$$

$$m = (0,0593)(84) \checkmark$$

$$m = 4,9812 \text{ g} \checkmark$$

(6)



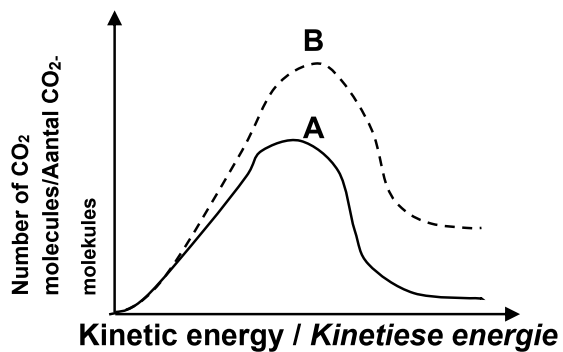
$$5.4.2 \quad n = \frac{V}{V_m} \checkmark$$

$$0,0593 = \frac{1,47}{V_m} \checkmark$$

$$V_m = 24,79 \text{ dm}^3 \checkmark$$

(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 SO₂ will react for every 1 mol of O₂ ✓/

2 mol van SO₂ sal reageer met elke 1 mol van O₂

OR/OF

The rate at which SO₂ is consumed is twice that of O₂/

Die tempo waarteen SO₂ verbruik word is twee keer as dié van O₂

OR/OF

0,925 mol of SO₂ reacted with 0,46 mol of O₂ ✓/

0,925 mol van SO₂ reageer met 0,46 mol O₂

(2)

6.1.4 NEGATIVE / NEGATIEF ✓

(1)

6.1.5 • The amount/concentration of SO₃ increased / SO₂ and O₂ 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 SO₃ neem toe / SO₂ en O₂ 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**

- Determine the change in mol of NOCl / *Bepaal die verandering in mol van NOCl*
- Correct ratio $\text{NOCl} : \text{NO} : \text{Cl}_2$ / *Korrekte verhouding $\text{NOCl} : \text{NO} : \text{Cl}_2$*
- Determine the equilibrium mol for NOCl , NO and Cl_2 / *Bepaal die ewewig mol van NOCl , NO en Cl_2*
- Dividing by/ *Deel deur 1,5*
- Correct K_c expression with square brackets / *Korrekte K_c uitdrukking met vierkanthakkies*
- Subst. into the correct K_c expression / *Vervanging in korrekte K_c uitdrukking*
- Final answer / *Finale antwoord*

$$\Delta n (\text{NOCl}) = 2,5 \times 28/100 = 0,7 \checkmark \text{ (a)}$$

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

$$K_c = \frac{[\text{NO}]^2[\text{Cl}_2]}{[\text{NOCl}]^2} \text{ (e) } \checkmark$$

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

$$K_c = 0,035 \checkmark \text{ (g)}$$



OPTION 2: CONCENTRATION CALCULATIONS / OPSIE 2:
KONSENTRASIE BEREKENINGE

- Determine the initial concentration NOCl / *Bepaal die aanvanklike konsentrasie van NOCl*
- Determine the change in conc of NOCl / *Bepaal die verandering in konsentrasie van NOCl*
- Correct ratio $\text{NOCl} : \text{NO} : \text{Cl}_2$ / *Korrekte verhouding $\text{NOCl} : \text{NO} : \text{Cl}_2$*
- Determine the equilibrium conc. for NOCl , NO and Cl_2 / *Bepaal die ewewigs konsentrasie van NOCl , NO en Cl_2*
- Correct K_c expression with square brackets / *Korrekte K_c uitdrukking met vierkanthakkies*
- Subst. into the correct K_c expression / *Vervanging in korrekte K_c uitdrukking*
- Final answer / *Finale antwoord*

$$c_i (\text{NOCl}) = 2,5 \div 1,5 = 1,67 \checkmark \text{ (a)}$$

$$\Delta c (\text{NOCl}) = 1,67 \times 28 / 100 = 0,47 \checkmark \text{ (b)}$$

	2 NOCl	2 NO (g)	Cl_2 (g)	
Initial concentration <i>Aanvangskonsentrasie</i>	1,67	-	-	
Change in concentration <i>Verandering in konsentrasie</i>	0,47	0,47	0,235	(c) ✓
Equilibrium concentration <i>ewewigskonsentrasie</i>	1,2	0,47	0,235	(d) ✓

$$K_c = \frac{[\text{NO}]^2[\text{Cl}_2]}{[\text{NOCl}]^2} \text{ (e) } \checkmark$$

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

$$aK_c = 0,035 \checkmark \text{ (g)} \quad (7)$$

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 $H_2SO_4 + 2 KOH \checkmark \rightarrow K_2SO_4 + 2 H_2O \checkmark$ (✓ bal.)

Marking criteria/ Nasienkriteria

- Reactants / Reaktanse
 - Products / Produkte
 - Balancing / Balansering
- (3)

7.2 7.2.1

OPTION 1 / OPSIE 1

$$c = \frac{m}{MV} \checkmark$$

$$c = \frac{3,812}{(40)(100 \times 10^{-3})} \checkmark$$

$$c = 0,953 \text{ mol} \cdot \text{dm}^{-3} \checkmark$$

OPTION 2 / OPSIE 2

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

$$n = \frac{3,812}{40}$$

$$n = 0,0953 \text{ mol}$$

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

$$c = \frac{0,0953}{100 \times 10^{-3}} \checkmark$$

$$c = 0,953 \text{ mol} \cdot \text{dm}^{-3} \checkmark$$

(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** $\text{CH}_3\text{COOH} : \text{NaOH}$
- *Gebruik van **verhouding** $\text{CH}_3\text{COOH} : \text{NaOH}$*
- 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*

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

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

$$n(\text{NaOH}) = 0,0207754 \text{ mol}$$

$$n(\text{CH}_3\text{COOH}) = n(\text{NaOH}) = 0,0207754 \text{ mol} \checkmark$$

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

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

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

$$m = cMV \checkmark$$

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

$$m = 1,2465 \text{ g}$$

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

$$\text{Percentage mass / Persentasie massa} = 4,986 \% \checkmark$$



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

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

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

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

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

$$m = cMV \checkmark$$

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

$$m = 1,2465 \text{ g}$$

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

$$\text{Percentage mass / Persentasie massa} = 4,986\% \checkmark$$

(7)
[17]**TOTAL/TOTAAL: 150**