basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 12

PHYSICAL SCIENCES: CHEMISTRY (P2)
FISIESE WETENSKAPPE: CHEMIE (V2)

FEBRUARY/MARCH/*FEBRUARIE/MAART* 2012

MEMORANDUM

MARKS/*PUNTE:* 150

This memorandum consists of 15 pages.
Hierdie memorandum bestaan uit 15 bladsye.

Learning Outcomes and Assessment Standards *Leeruitkomste en Assesseringstandaarde*		
LO/*LU* 1	**LO/*LU* 2**	**LO/*LU* 3**
AS 12.1.1: Design, plan and conduct a scientific inquiry to collect data systematically with regard to accuracy, reliability and the need to control variables. *Ontwerp, beplan en voer 'n wetenskaplike ondersoek uit om data te versamel ten opsigte van akkuraatheid, betroubaarheid en die kontroleer van veranderlikes.*	**AS 12.2.1:** Define, discuss and explain prescribed scientific knowledge. *Definieer, bespreek en verduidelik voorgeskrewe wetenskaplike kennis.*	**AS 12.3.1:** Research, discuss, compare and evaluate scientific and indigenous knowledge systems and knowledge claims by indicating the correlation among them, and explain the acceptance of different claims. *Doen navorsing, bespreek, vergelyk en evalueer wetenskaplike en inheemse kennissisteme en kennisaansprake deur die ooreenkoms aan te dui en verduidelik die aanvaarding van verskillende aansprake.*
AS 12.1.2: Seek patterns and trends, represent them in different forms, explain the trends, use scientific reasoning to draw and evaluate conclusions, and formulate generalisations. *Soek patrone en tendense, stel dit in verskillende vorms voor, verduidelik tendense, gebruik wetenskaplike beredenering om gevolgtrekkings te maak en te evalueer, en formuleer veralgemenings.*	**AS 12.2.2:** Express and explain prescribed scientific principles, theories, models and laws by indicating the relationship between different facts and concepts in own words. *Verduidelik en druk voorgeskrewe wetenskaplike beginsels, teorieë, modelle en wette uit deur die verwantskap tussen verskillende feite en konsepte in eie woorde aan te dui.*	**AS 12.3.2:** Research case studies and present ethical and moral arguments from different perspectives to indicate the impact (pros and cons) of different scientific and technological applications. *Vors gevallestudies na en lewer etiese en morele argumente uit verskillende perspektiewe om die impak (voordele en nadele) van verskillende wetenskaplike en tegnologiese toepassings aan te dui.*
AS 12.1.3: Select and use appropriate problem-solving strategies to solve (unseen) problems. *Kies en gebruik geskikte probleemoplossingstrategieë om (ongesiene) probleme op te los.*	**AS 12.2.3:** Apply scientific knowledge in everyday life contexts. *Pas wetenskaplike kennis in kontekste van die alledaagse lewe toe.*	**AS 12.3.3:** Evaluate the impact of scientific and technological research and indicate the contribution to the management, utilisation and development of resources to ensure sustainability continentally and globally. *Evalueer die impak van wetenskaplike en tegnologiese navorsing en dui die bydrae tot bestuur, benutting en ontwikkeling van bronne om volhoubaarheid kontinentaal en globaal te verseker.*
AS 12.1.4: Communicate and defend scientific arguments with clarity and precision. *Kommunikeer en verdedig wetenskaplike argumente duidelik en presies.*		

SECTION A/*AFDELING A*

QUESTION 1/*VRAAG 1*

1.1   Functional group/*Funksionele groep* ✓   (1)

1.2   Hydrohalogenation/*Hidrohalogenering of hidrohalogenasie* ✓   (1)

1.3   Activation energy/*Aktiveringsenergie* ✓   (1)

1.4   Salt bridge/*Soutbrug* ✓   (1)

1.5   Primary (cells)/*Primêre (selle)* ✓   (1)
                                                                                [5]

QUESTION 2/*VRAAG 2*

2.1   C ✓✓   (2)

2.2   B ✓✓   (2)

2.3   C ✓✓   (2)

2.4   D ✓✓   (2)

2.5   C ✓✓   (2)

2.6   A ✓✓   (2)

2.7   B ✓✓   (2)

2.8   C ✓✓   (2)

2.9   D ✓✓   (2)

2.10   D ✓✓   (2)
                                                                                [20]

                                                    TOTAL SECTION A: 25

SECTION B/*AFDELING B*

QUESTION 3/*VRAAG 3*

3.1   Alkanes/*Alkane* ✓   (1)

3.2   2,4-dimethyl✓hexane ✓
       2,4-dimetiel✓ heksaan ✓   (2)

3.3   4-fluoro-3-methyl✓cyclopentene ✓
       4-fluoro-3-metiel✓ siklopenteen ✓
       4-fluoor-3-metiel✓ siklopenteen ✓
                                                                                                          (2)

3.4   4-methyl✓pent-2-yne ✓ OR 4-methyl✓-2-pentyne ✓
       4-metiel✓ pent-2-yn ✓ OF *4-metiel✓-2-pentyn* ✓   (2)

3.5

   (2)
                                                                                                          [9]

QUESTION 4/*VRAAG 4*

4.1
4.1.1   (An organic) compound/substance/ molecule which contains/consists of
         carbon and hydrogen (atoms only). ✓✓

         ('n Organiese) verbinding/stof/
         molekuul wat slegs uit koolstof- en waterstof(atome) bestaan. ✓✓   (2)

4.1.2 C_5H_{12} ✓   (1)

4.1.3   Any TWO:
         Speeds up the reaction/Increase reaction rate. ✓
         Reaction runs at a lower temperature/energy. ✓
         Cost is reduced/better safety.

         Enige TWEE:
         Versnel die reaksie./Verhoog reaksietempo. ✓
         Reaksie verloop by laer temperatuu/energie. ✓
         Koste word verminder/groter veiligheid.   (2)

4.1.4
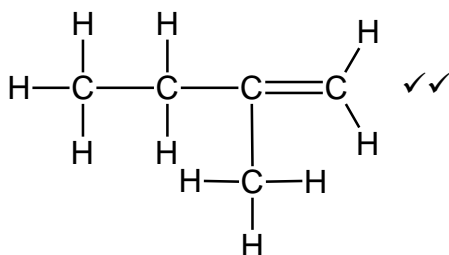
(2)

4.1.5   Addition/hydrogenation ✓
          Addisie/hidrogenering   (1)

4.2
4.2.1   Compounds have the same molecular formula, but different structural
          formulae. ✓✓

          *Verbindings het dieselfde molekulêre formule, maar verskillende
          struktuurformules.* ✓✓   (2)

4.2.2   **From A to C:/*Van A na C:***
          Boiling points decrease from **A** to **C**. ✓
          *Kookpunte verminder van **A** na **C**.*

          <u>Branching increases./Molecules become more compact./Molecules become
          more spherical./Decrease in surface</u> area (over which the intermolecular
          forces act.) ✓
          <u>Decrease in (strength) of intermolecular forces.</u> ✓
          Less energy needed to overcome intermolecular forces. ✓

          *<u>Vertakking vermeerder./Molekule word meer kompak./Molekule word meer
          sferies./Afname in oppervlak</u> (waaroor intermolekulêre kragte werk.)* ✓
          <u>Afname in (sterkte) van intermolekulêre kragte.</u> ✓
          Minder energie benodig om intermolekulêre kragte te oorkom. ✓

          OR/*OF*
          From C to A:/*Van C na A*:
          Boiling points increase from **C** to **A**. ✓
          *Kookpunte verhoog van **C** na **A**.*

          <u>Less branching.</u>/Molecules become less compact./Molecules become less
          spherical./Increase in surface area (over which intermolecular forces act.) ✓
          <u>Increase in (strength) of intermolecular forces.</u> ✓
          More energy needed to overcome intermolecular forces. ✓

          *<u>Vertakking verminder./Molekule word minder kompak./Molekule word minder
          sferies./Toename in oppervlak</u> (waaroor intermolekulêre kragte werk.)* ✓
          <u>Toename in (sterkte) van intermolekulêre kragte.</u> ✓
          Meer energie benodig om intermolekulêre kragte te oorkom. ✓   (4)

4.2.3   (Branched chains have weaker intermolecular forces)
therefore they (burn) <u>react faster.</u> ✓✓

Vertakte kettings het swakker intermolekulêre kragte)
Dus (brand) <u>reageer hulle vinniger.</u> ✓✓

OR/*OF*
Branched chains have <u>higher vapour pressures</u>. ✓✓
Vertakte kettings het <u>hoër dampdrukke</u>. ✓✓   (2)

[16]

QUESTION 5/*VRAAG 5*

5.1
5.1.1   Ellimination/dehydrohalogenation/dehydrobromination ✓
Eliminasie/dehidrohalogenering/dehidrobrominering ✓   (1)

5.1.2   Heat ✓
<u>Concentrated sodium hydroxide</u> (NaOH)/<u>Concentrated</u> potassium hydroxide
(KOH)/Concentrated strong base ✓
OR sodium hydroxide (NaOH)/potassium hydroxide (KOH)/strong base
dissolved in ethanol/alcohol

Hitte ✓
<u>Gekonsentreerde natriumhidroksied</u> (NaOH)/<u>Gekonsentreerde</u> kalium-
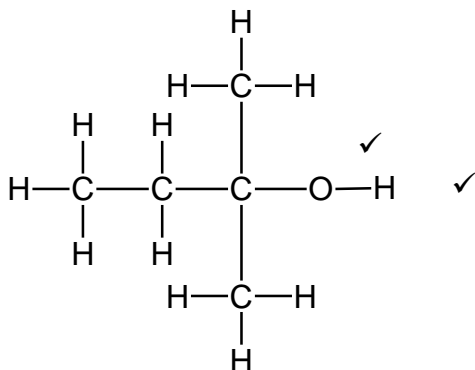*hidroksied (KOH)/Gekonsentreerde sterk basis ✓*
***OF** natriumhidroksied kaliumhidroksied/NaOH/KOH/sterk basis opgelos in*
etanol/ alkohol)

OR/*OF*
Hot ✓ <u>ethanolic sodium hydroxide</u>/potassium hydroxide/KOH/NaOH ✓
Warm ✓ <u>etanoliese natriumhidroksied</u>/kaliumhidroksied/KOH/NaOH ✓   (2)
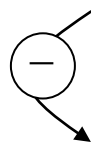
5.1.3

(2)

5.1.4 H_2O/water ✓   (1)

5.1.5   Addition/Hydration ✓   (1)
         Addisie/Hidrasie ✓

5.2
5.2.1   Ethanol/*etanol* ✓✓   (2)

5.2.2   Catalyst/*katalisator* ✓
         Accept/*Aanvaar*: Dehydrating agent/*Dehidreermiddel*   (1)

5.2.3

                                                                     (6)

5.2.4   Alcohols are flammable/volatile/catch fire easily. ✓
         Alkohole is (ont)vlambaar/vlugtig/brand maklik. ✓   (1)

5.2.5   (Food) flavourant/*(Voedsel)geurmiddel* ✓   (1)
                                                                   [18]

QUESTION 6/*VRAAG 6*

6.1   Amount of reactants used ✓per unit time. ✓
         Hoeveelheid reaktanse gebruik per eenheid tyd

         OR/*OF*
         Amount of products formed per unit time.
         Hoeveelheid produkte gevorm per eenheid tyd.

         OR/*OF*
         Change in concentration of reactants or products per unit time.
         Verandering in konsentrasie van reaktanse of produkte per eenheid tyd.   (2)

6.2   To ensure that (nearly) all zinc is used up./Zinc is a limiting reagent. ✓
         *Om seker te maak (feitlik) alle sink word opgebruik./Sink is 'n beperkende
         reagens.* ✓   (1)

6.3

Criteria for hypothesis: *Kriteria vir hipotese*:	Mark *Punt*
The **dependent and independent variables** correctly identified. *Die **afhanklike en onafhanklike veranderlikes** is korrek geïdentifiseer.*	✓
Made a **prediction/statement** about the **relationship between the dependent and independent variables.** *Maak 'n **voorspelling/stelling** oor die verwantskap tussen die afhanklike en onafhanklike veranderlikes.*	✓

Examples/*Voorbeelde*:
- Reaction rate increases with increase in concentration.
  Reaksietempo neem toe met toename in konsentrasie.
- Reaction rate decreases with decrease in concentration.
  Reaksietempo neem af met afname in konsentrasie.
- Reaction rate is directly proportional to concentration.
  Reaksietempo is direk eweredig aan konsentrasie.
- The higher the concentration the faster the rate of the reaction.
  Hoe hoër die konsentrasie, hoe vinniger is die reaksietempo.
- Reaction rate increases with decrease in concentration.
  Reaksietempo verhoog met afname in konsentrasie.
- Reaction rate decreases with deceases in concentration.
  Reaksietempo verlaag met toename in konsentrasie.
- Reaction rate is inversely proportional to concentration.
- *Reaksietempo is omgekeerd eweredig aan konsentrasie.*
- The higher the concentration the lower the rate of the reaction.
  Hoe hoër die konsentrasie, hoe laer is die reaksietempo. (2)

6.4 To make it a fair test./*Om dit 'n regverdige toets te maak.* ✓

OR/*OF*
Ensure validity/reliability of results. ✓
Verseker betroubaarheid van resultate. ✓

OR/*OF*
So that the contact/surface area may not influence the reaction rate./The surface area must not change.
Sodat die (kontak)oppervlak nie die reaksietempo beïnvloed nie./Die oppervlak moenie verander nie.

OR/*OF*
It is the controlled variable./*Dit is die gekontroleerde veranderlike.*

OR/*OF*
To ensure there is only one independent variable.
Om te verseker daar is slegs een onafhanklike veranderlike. (1)

6.5 Number of moles used/*Aantal mol gebruik* = 0,1 – 0,08 = 0,02 mol ✓

$n = \dfrac{m}{M}$ ✓

$0,02 = \dfrac{m}{65}$ ✓

m = 1,3 g✓

(4)

6.6 **POSITIVE MARKING FROM QUESTION 6.5 TO 6.6**
POSITIEWE NASIEN VAN VRAAG 6.5 TOT 6.6

Average rate = $\dfrac{\text{mass Zn used}}{\text{time taken}}$

$= \dfrac{1,3}{60}$ ✓

$= 0,02 \text{ g·s}^{-1}$ ✓ (0,022 g or 0,0217 g)

(2)

6.7
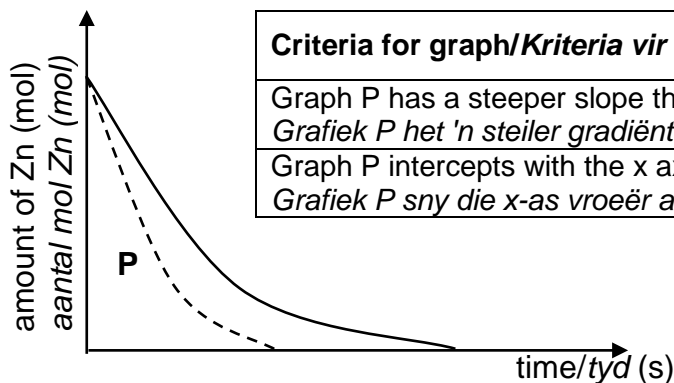
Criteria for graph/*Kriteria vir grafiek*	Marks/*Punte*
Graph P has a steeper slope than the original graph. *Grafiek P het 'n steiler gradiënt as oorspronklike grafiek.*	✓
Graph P intercepts with the x axis earlier than original graph. *Grafiek P sny die x-as vroeër as die oorspronklike grafiek.*	✓

(2)

[14]

QUESTION 7/*VRAAG 7*

7.1   Fertilisers <u>replenish nutrients</u> ✓
        <u>depleted by growing of crops</u>. ✓

        Kunsmis <u>vul voedingstowwe aan</u> ✓
        wat deur <u>groeiende gewasse uitgeput</u> is. ✓   (2)

7.2   Any ONE/*Enige een*:
        • Damage to crops/soil ✓
          resulting in small or no harvest./less income. ✓
          Skade aan gewasse/grond ✓
          wat tot klein of geen oeste lei./kleiner inkomste lei. ✓
        • Excessive fertiliser seeps into groundwater ✓
          and contaminates drinking water. ✓
          Oormaat kunsmis syfer in grondwater in ✓
          en kontamineer drinkwater. ✓
        • Excessive fertiliser run-off into rivers and dams and cause
          eutrophication ✓
          that may result in less income./starvation./poor quality of drinking water./
          fewer recreation areas. ✓
          *Oormaat kunsmis loop in riviere en damme in en veroorsaak
          eutrofikasie* ✓
          *wat kan lei tot kleiner inkomste./hongersnood./swak kwaliteit drinkwater./
          minder ontspanningsgebiede.* ✓   (2)

7.3
7.3.1   Contact process/*Kontakproses* ✓   (1)

7.3.2 V_2O_5/vanadium pentoxide/*vanadiumpentoksied* ✓   (1)

7.3.3   Exothermic/*Eksotermies* ✓
        $\Delta H < 0$ ✓   (2)

7.3.4 $(NH_4)_2$✓SO_4✓ /ammonium✓ sulphate✓/*ammonium*✓ *sulfaat* ✓   (2)

7.3.5   ANY THREE:
        <u>Decrease temperature</u> ✓
        <u>Increase pressure</u> ✓
        <u>Increase concentration</u> of both/any one of reactants. ✓
        <u>Remove SO_3</u> continuously

        ENIGE DRIE:
        <u>Afname in temperatuur</u> ✓
        <u>Toename in druk</u> ✓
        <u>Toename in konsentrasie</u> van beide/enige een van reaktanse ✓
        <u>Verwyder SO_3</u> aanhoudend   (3)

7.3.6 **CALCULATIONS USING NUMBER OF MOLES**
BEREKENINGE WAT AANTAL MOL GEBRUIK
Mark allocation:

- Change in $n(SO_3) = 0,2$ (mol) ✓
- Ratio $n(SO_2) : n(O_2) : n(SO_3) = 2 : 1 : 2$ ✓
- $n(SO_2)$ at equilibrium = initial + change ✓
- $n(O_2)$ at equilibrium = initial + change ✓
- Divide three equilibrium amounts by 2 (calculation of concentration) ✓
- K_c expression ✓
- Substitution into K_c expression ✓
- Final answer = 0,21 ✓

Puntetoekenning:

- *Verandering in $n(SO_3) = 0,2$ (mol)* ✓
- *Verhouding $n(SO_2) : n(O_2) : n(SO_3) = 2 : 1 : 2$* ✓
- *$n(SO_2)$ by ewewig = aanvanklik + verandering* ✓
- *$n(O_2)$ by ewewig = aanvanklik + verandering* ✓
- *Deel drie ewewigshoeveelhede deur 2 (berekening van konsentrasie)* ✓
- *K_c-uitdrukking* ✓
- *Vervanging in K_c-uitdrukking* ✓
- *Finale antwoord = 0,21* ✓

Option 1/*Opsie 1:*

Amount of SO_3 reacted/*Hoeveelheid SO_3 wat reageer* = 0,2 mol ✓
$n(SO_2$ formed/*gevorm*) = 0,2 mol
$n(O_2$ formed) = ½ $n(SO_3$ formed) = 0,1 mol $\Big\}$ Ratio/*verhouding* ✓

At equilibrium/*By ewewig*: $n(SO_2) = 0,6 + 0,2 = 0,8$ mol ✓
$n(O_2) = 0,5 + 0,1 = 0,6$ mol ✓

$c(SO_3) = \dfrac{n}{V} = \dfrac{0,2}{2} = 0,1$ mol·dm⁻³

$c(SO_2) = \dfrac{n}{V} = \dfrac{0,8}{2} = 0,4$ mol·dm⁻³ $\Big\}$ ✓ divide by/*gedeel deur* 2

$c(O_2) = \dfrac{n}{V} = \dfrac{0,6}{2} = 0,3$ mol·dm⁻³

$⊕$

$K_c = \dfrac{[SO_3]^2}{[SO_2]^2[O_2]}$ ✓ $= \dfrac{(0,1)^2}{(0,4)^2(0,3)}$ ✓ $= 0,21$ ✓ (0,208)

No K_C expression, correct substitution: *Geen K_c-uitdrukking, korrekte vervanging:*	Max./Maks. 7/8
Wrong K_C expression/*Verkeerde K_c-uitdrukking:*	Max./Maks. 5/8

Option 2/*Opsie 2*:

	SO_2	O_2	SO_3	
Molar ratio/*Molverhouding*	2	1	2	
Initial quantity (mol) *Aanvanklike hoeveelheid (mol)*	0,6	0,5	0,4	Ratio/*verhouding* ✓
Change (mol)/*Verandering (mol)*	0,2	0,1	0,2 ✓	
Quantity at equilibrium (mol) *Hoeveelheid by ewewig (mol)*	0,8 ✓	0,6 ✓	0,2	
Concentration (mol·dm^{-3}) *Konsentrasie (mol·dm^{-3})*	0,4	0,3	0,1	Divide by 2 *Gedeel deur 2* ✓

$$K_c = \frac{[SO_3]^2}{[SO_2]^2[O_2]} \checkmark = \frac{(0,1)^2}{(0,4)^2(0,3)} \checkmark \overset{\oplus}{\longleftarrow} = 0,21 \checkmark \ (0,208)$$

No K_C expression, correct substitution: *Geen K_c-uitdrukking, korrekte vervanging:*	Max./*Maks.* $\frac{7}{8}$
Wrong K_C expression/*Verkeerde K_c-uitdrukking:*	Max./*Maks.* $\frac{5}{8}$

CALCULATIONS USING CONCENTRATION
BEREKENINGE WAT KONSENTRASIE GEBRUIK
Mark allocation:
- Divide three intial amounts by 2 (calculation of concentration) ✓
- Change in $[SO_3]$ = 0,2 (mol·dm^{-3}) ✓
- Ratio $[SO_2]$: $[O_2]$: $[SO_3]$ = 2 : 1: 2 ✓
- $[SO_2]$ at equilibrium = initial + change ✓
- $[O_2]$ at equilibrium = initial + change ✓
- K_c expression ✓
- Substitution into K_c expression ✓
- Final answer = 0,21 ✓

Puntetoekenning:
- *Deel drie aanvangshoeveelhede deur 2 (berekening van konsentrasie)* ✓
- *Verandering in $[SO_3]$ = 0,2 (mol·dm^{-3})* ✓
- *Verhouding $[SO_2]$: $[O_2]$: $[SO_3]$ = 2 : 1: 2* ✓
- *$[SO_2]$ by ewewig = aanvanklik + verandering* ✓
- *$[O_2]$ by ewewig = aanvanklik + verandering* ✓
- *K_c-uitdrukking* ✓
- *Vervanging in K_c-uitdrukking* ✓
- *Finale antwoord = 0,21* ✓

Option 3/*Opsie 3:*

	SO_2	O_2	SO_3	
Molar ratio/*molverhouding*	2	1	2	
Initial concentration (mol·dm⁻³) *Aanvanklike konsentrasie (mol·dm⁻³)*	0,3	0,25	0,2	Divide by 2 ✓ *Gedeel deur 2*
Change in concentration (mol·dm⁻³) *Verandering in konsentrasie (mol·dm⁻³)*	0,1	0,05	0,1 ✓	Ratio/ *Verhouding* ✓
Equilibrium concentration (mol·dm⁻³) *Ewewigskonsentrasie (mol·dm⁻³)*	0,4✓	0,3✓	0,1	

$$K_c = \frac{[SO_3]^2}{[SO_2]^2[O_2]} \checkmark = \frac{(0,1)^2}{(0,4)^2(0,3)} \checkmark = 0,21 \checkmark \ (0,208)$$

No K_C expression, correct substitution: *Geen K_c-uitdrukking, korrekte vervanging:*	Max./*Maks.* $\frac{7}{8}$
Wrong K_C expression/*Verkeerde K_c-uitdrukking:*	Max./*Maks.* $\frac{5}{8}$

(8)

[21]

QUESTION 8/*VRAAG 8*

8.1   Temperature/*Temperatuur* – 25 °C/298 K ✓
        Concentration (of electrolytes)/*Konsentrasie (van elektroliete)* = 1 mol·dm⁻³ ✓   (2)

8.2   Emf/potential difference ✓
        Emk/potensiaalverskil ✓   (1)

8.3
8.3.1   (Half-cell/*Halfsel*) A ✓   (1)

8.3.2   (Half-cell/*Halfsel*) B ✓   (1)

8.4   (Combination/*Kombinasie*) AB ✓   (1)

8.5
8.5.1   Magnesium/Mg ✓

        Is oxidised/loses electrons/increase in oxidation number/stronger reducing
        agent. ✓
        *Word geoksideer/verloor elektrone/toename in oksidasiegetal/sterker
        reduseermiddel.* ✓   (2)

8.5.2

Option 1/*Opsie 1:*	Option 2/*Opsie 2:*
$E^o_{cell} = E^o_{cathode} - E^o_{anode}$ ✓ $\quad\quad = -0{,}13$ ✓ $- (-2{,}36)$ ✓ $E^o_{anode} = 2{,}23$ V ✓	✓ $\begin{cases} Mg \to Mg^{2+} + 2e^- & E° = +2{,}36 ✓ \\ Pb^{2+} + 2e^- \to Pb & \underline{E° = -0{,}13} ✓ \end{cases}$ $\quad\quad\quad\quad\quad\quad\quad\quad E° = 2{,}23$ V ✓

(4)

8.5.3   Increases/*Vermeerder* ✓✓   (2)

8.5.4   Allows for the migration of <u>positive ions</u> <u>to the cathode</u> half-cell. ✓
Laat migrasie van <u>positiewe ione na die katodehalfsel</u> toe.

Allows for the migration of <u>negative ions</u> <u>to the anode</u> half-cell. ✓
Laat migrasie van <u>negatiewe ione na die anodehalfsel</u> toe.   (2)

[16]

QUESTION 9/*VRAAG 9*

9.1   DC/*GS*✓   (1)

9.2   Free ions needed to conduct electricity. ✓
Vrye ione benodig om elektrisiteit te gelei. ✓   (1)

9.3   Cathode/*Katode* ✓

$Cu^{2+} + 2e^- \to Cu$ ✓✓   (3)

9.4 $Cu \to Cu^{2+} + 2e^-$ ✓✓   (2)

9.5   Pt is a weaker reducing agent ✓ (than Cu)
and will not be oxidised. ✓
Pt is 'n swakker reduseermiddel (as Cu) ✓
en sal nie geoksideer word nie. ✓

OR/*OF*
Cu is a stronger reducing agent (than Pt)
and will be oxidised.
Cu is 'n sterker reduseermiddel (as Pt)
en sal geöksideer word.   (2)

9.6   Remains the same/Bly dieselfde ✓

The <u>rate at which Cu is oxidised</u> ✓at the anode <u>equals</u> the rate at which
<u>Cu^{2+}(aq) is reduced</u> at the cathode. ✓
Die <u>tempo waarteen Cu geoksideer word</u> ✓by die anode is <u>gelyk aan</u> die
tempo waarteen <u>Cu^{2+}(aq) gereduseer word</u> by die katode. ✓   (3)

[12]

QUESTION 10/*VRAAG 10*

10.1   NaCℓ /Na⁺(aq) & Cℓ(aq)✓   (1)

10.2   Y ✓   (1)

10.3 $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ ✓✓   (2)

10.4   The membrane ✓
        prevents chloride ions from moving to the cathode/only allows positive ions. ✓

        Die membraan ✓
        verhoed dat chloriedione (Cℓ-ione) na die katode beweeg/laat slegs positiewe
        ione deur. ✓   (2)

10.5
10.5.1 <u>Job creation</u> ✓
        resulting in more people having a <u>better life</u>. ✓

        <u>*Werkskepping*</u> *✓*
        wat tot 'n <u>*beter lewe*</u> *vir meer mense lei. ✓*   (2)

10.5.2 Use huge amounts of electricity ✓
        resulting in load shedding ✓
        Gebruik groot hoeveelhede elektrisiteit ✓
        wat tot beurtkrag lei. ✓

        OR/*OF*
        Chemical plant uses a lot of space ✓
        that could have been used for housing/gardens, etc. ✓
        Chemiese plant gebruik baie spasie ✓
        wat andersins vir bou van huise/tuine, ens. gebruik kon word. ✓   (2)
                                                                                  [10]

QUESTION 11

11.1   A ✓
        More positive reduction potential./Larger reduction potential. ✓
        Meer positiewe reduksiepotensiaal./Groter reduksiepotensiaal. ✓   (2)

11.2   HgO(s) + Zn(s) ✓→ Hg(ℓ) + ZnO(s) ✓   Bal. ✓   (3)

11.3   Zn ✓
        Oxidation number increases from 0 to +2 ✓ and is thus oxidised.
        Oksidasiegetal neem toe van 0 tot +2 en word dus geöksideer.   (2)

11.4   Mercury is poisonous/corrosive when in contact with skin ✓
        May contaminate ground water/water resources/soil/crops. ✓

        Kwik is giftig/vretend wanneer dit in kontak kom met die vel. ✓
        Kan die grondwater/waterbronne/grond/gewasse kontamineer. ✓   (2)
                                                                                   [9]

                          TOTAL SECTION B/*TOTAAL AFDELING B*:   125
                                   GRAND TOTAL/*GROOTTOTAAL*:   150