education

Department of Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

GRADE/GRAAD 12

PHYSICAL SCIENCES: CHEMISTRY P2
FISIESE WETENSKAPPE: CHEMIE V2

SEPTEMBER 2019

MARKS/*PUNTE*: 150

MARKING GUIDELINES/*NASIENRIGLYN*

This marking guideline consists of 16 pages.
Hierdie nasienriglyn bestaan uit 16 bladsye.

QUESTION 1/*VRAAG 1*

1.1 D ✓✓ (2)

1.2 D ✓✓ (2)

1.3 A ✓✓ (2)

1.4 B ✓✓ (2)

1.5 A ✓✓ (2)

1.6 A ✓✓ (2)

1.7 B ✓✓ (2)

1.8 C ✓✓ (2)

1.9 B ✓✓ (2)

1.10 A ✓✓ (2)
[20]

QUESTION 2/*VRAAG 2*

2.1 A series of organic compounds that can be described by the same general formula and functional group.✓✓
'n Reeks organiese verbindings wat deur dieselfde algemene formule en funksionele groep beskryf kan word.

OR/*OF*

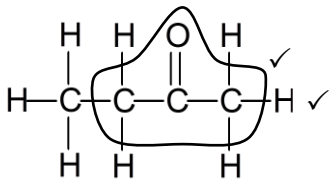
A series of organic compounds in which one member differs from the next by a CH_2 group./*'n Reeks organiese verbindings waarin een lid van die volgende met 'n CH_2-groep verskil.*

Accept/*Aanvaar*:
A series of organic compounds that can be described by the same general formula OR functional group./*'n Reeks organiese verbindings wat deur dieselfde algemene formule OF funksionele groep beskryf kan word.* (2)

2.2

2.2.1 Aldehydes/*aldehiede* ✓ (1)

2.2.2



✓ ✓

Marking criteria/*Nasienriglyne*
- Whole structure correct:
  Hele struktuur korrek: $^2/_2$
- Only functional group correct:
  Slegs funksionele groep korrek: $^1/_2$

IF/*INDIEN*:
More than one functional group/*Meer as een funksionele groep:* $^0/_2$

(2)

2.3

2.3.1 Pent-1-yne/1-pentyne ✓✓
Pent-1-yn/1-pentyn

IF/*INDIEN*:
Pentyne/*Pentyn* Max./*Maks.* $^1/_2$

(2)

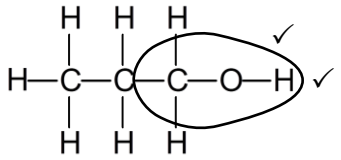
2.3.2 2-methyl✓but-1-ene ✓ / *2-metielbut-1-een*

OR/*OF*

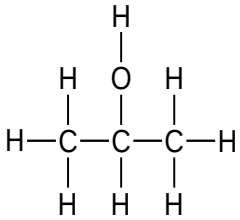
2-methyl-1-butene/*2-metiel-1-buteen* (2)

2.4

2.4.1



OR/*OF*



Marking criteria/*Nasienriglyne*
- Whole structure correct:
  Hele struktuur korrek: $^2/_2$
- Only functional group correct:
  Slegs funksionele groep korrek: $^1/_2$

IF/*INDIEN*:
More than one functional group:
Meer as een funksionele groep: $^0/_2$

ACCEPT/*AANVAAR*:
Any correct structural formula for C_3H_8O.
Enige korrekte struktuurformule vir C_3H_8O.

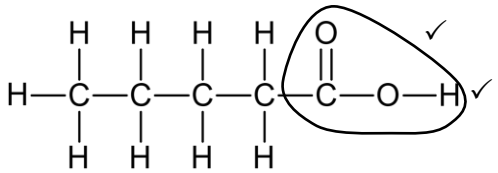
(2)

2.4.2 **POSITIVE MARKING FROM QUESTION 2.4.1.**
POSITIEWE NASIEN VANAF VRAAG 2.4.1.
Propan✓-1-ol✓/1-propanol

OR/*OF*

Propan-2-ol/2-propanol (2)

2.5



Marking criteria/*Nasienriglyne*
- Whole structure correct:
  Hele struktuur korrek: $^2/_2$
- Only functional group correct:
  Slegs funksionele groep korrek: $^1/_2$

IF/*INDIEN*:
More than one functional group/*Meer as een funksionele groep:* $^0/_2$

(2)

[15]

QUESTION 3/*VRAAG 3*

3.1 The temperature at which the vapour pressure of a substance equals atmospheric pressure./*Die temperatuur waar die dampdruk van 'n stof gelyk is aan atmosferiese druk*. ✓✓ (2)

3.2

Criteria for conclusion/*Riglyne vir gevolgtrekking*	
Dependent and independent variable correctly identified. *Afhanklike en onafhanklike veranderlikes korrek identifiseer.*	✓
Relationship between the independent and dependent variables correctly stated./Verwantskap tussen *afhanklike en onafhanklike veranderlikes korrek gestel.*	✓

Examples/*Voorbeelde*:

- Boiling point increases with decrease in branching.
  Kookpunt neem toe met afname in vertakking.
- Boiling point increases with increase in surface area.
  Kookpunt neem toe met toename in oppervlakte.
- Boiling point is proportional to chain length.
  Kookpunt is eweredig aan kettinglengte. (2)

3.3 C ✓ (1)

3.4 Chain (isomers)/*Ketting(isomere)* ✓

- They have the same molecular formula, but different (types of) chains. ✓
  Hulle het dieselfde molekulêre formule, maar verskillende (soorte) kettings. (2)

3.5
- Compound **C**/pentane/alkanes has London/dispersion/induced dipole forces./*Verbinding **C**/pentaan/alkane het London-/dispersie-/ geïnduseerde dipoolkragte.* ✓
- 1-chloropentane/haloalkanes has dipole-dipole forces (in addition to London/dispersion/induced dipole forces)./*1-chloropentaan/haloalkane het dipool-dipoolkragte (tesame met London-/dispersie-/geïnduseerde dipoolkragte).* ✓
- Dipole-dipole forces are stronger than London/dispersion/ induced dipole forces./Dipool-dipoolkragte is sterker as *London-/dispersie-/geïnduseerde dipoolkragte.* ✓

OR/*OF*

London/dispersion/ induced dipole forces are weaker than dipole-dipole forces./*London-/dispersie-/geïnduseerde dipoolkragte is swakker as dipool-dipoolkragte.*
- More energy needed to overcome intermolecular forces in 1-chloropentane than in compound **C**./*Meer energie word benodig om intermolekulêre kragte in 1-chloropentaan te oorkom/breek as in verbinding **C**.* ✓

OR/*OF*

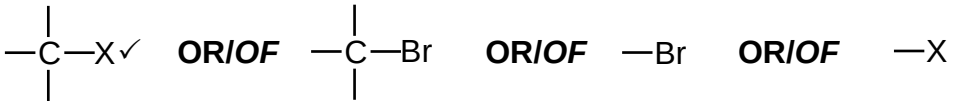
Less energy needed to overcome intermolecular forces in compound **C** than in 1-chloropentane./*Minder energie word benodig om intermolekulêre kragte in verbinding **C** as in 1-chloropentaan te oorkom/breek.* (4)

3.6 $C_5H_{12} + 8O_2 \rightarrow 6H_2O + 5CO_2$ ✓ bal. ✓

Marking criteria/*Nasienriglyne:*
- Products ✓ Balancing ✓
  Produkte *Balansering*
- Ignore phases./*Ignoreer fases*.
- Ignore double arrows./*Ignoreer dubbelpyle.*
- Marking rule 6.3.10/*Nasienreël 6.3.10.*

(2)
[13]

QUESTION 4/*VRAAG 4*

4.1  (1)

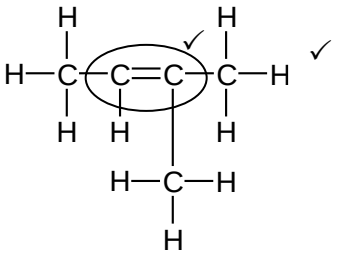
4.2

4.2.1 C_nH_{2n} ✓ (1)

4.2.2

- Use concentrated strong base/NaOH/KOH/LiOH **OR** ethanolic/alcoholic strong base/NaOH/KOH/LiOH ✓
  *Gebruik gekonsentreerde sterk basis/NaOH/KOH/LiOH **OF** etanoliese/alkoholiese sterk basis/NaOH/KOH/LiOH*
- Heat (strongly)/high temperature ✓
  Verhit (sterk)/hoë temperatuur (2)

4.2.3 Elimination/dehydrohalogenation/dehydrobromination ✓
Eliminasie/dehidrohalogenasie/dehidrohalogenering/dehidrobrominasie (1)

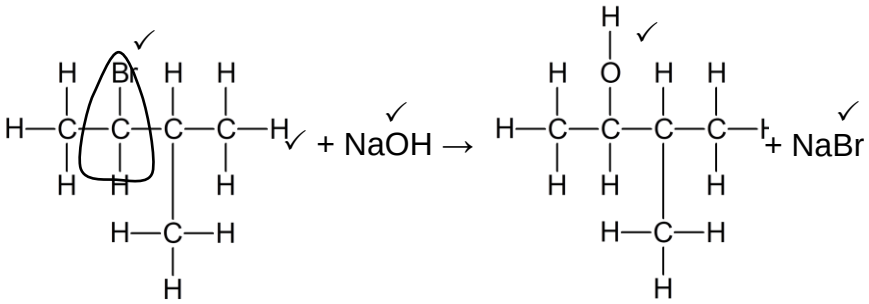
4.2.4 

Marking criteria/*Nasienriglyne*
- Whole structure correct:
  Hele struktuur korrek: $^2/_2$
- Only functional group correct:
  Slegs funksionele groep korrek: $^1/_2$

IF/*INDIEN*:
More than one functional group/*Meer as een funksionele groep:* $^0/_2$ (2)

4.3

4.3.1 Hydrolysis/*hidrolise* ✓ (1)

4.3.2 

Marking guidelines/*Nasienriglyne*
- Ignore/*Ignoreer* ⇌
- Accept coefficients that are multiples.
  Aanvaar koeffisiënte wat veelvoude is.
- Any additional reactants and/or products/*Enige addisionele reaktanse of produkte:* Max./*Maks.* $^4/_5$
- Incorrect balancing/*Verkeerde balansering*: Max./*Maks.* $^4/_5$
- Condensed formulae/*Gekondenseerde formules*: Max./*Maks.* $^4/_5$
- Molecular formulae/*Molekulêre formules:* Max./*Maks.* $^2/_5$

(5)

4.4

4.4.1 Dehydration/elimination ✓
Dehidrasie/dehidratering/eliminasie (1)

4.4.2 2-methyl✓but-2-ene✓/methylbut-2-ene/*2-metielbut-2-een/metielbut-2-een*
OR/*OF*
2-methyl-2-butene/methyl-2-butene/*2-metiel-2-buteen/metiel-2-buteen* (2)
[16]

QUESTION 5/*VRAAG 5*

5.1 **ONLY ANY ONE/*ENIGE EEN*:**

- Change in concentration/amount/number of moles/volume/mass of reactants/products ✓ per (unit) time. ✓
  Verandering in konsentrasie/hoeveelheid/aantal mol/volume/massa van reaktanse/produkte per (eenheids)volume.
- Rate of change in concentration. ✓✓
  Tempo van verandering in konsentrasie.
- Concentration/amount/number of moles/volume/mass of reactants used/products formed ✓ per (unit) time. ✓
  Konsentrasie/hoeveelheid/aantal mol/volume/massa van reaktanse gebruik/produkte gevorm per (eenheids)volume.

> **NOTE/*LET WEL*:**
> Award mark for 'per unit time' only in correct context.
> *Ken punt vir 'per tydeenheid' slegs toe in korrekte konteks.*

(2)

5.2 0 and/*en* 1 (minute/*minuut*) ✓ (1)

5.3 $n(H_2) = \frac{V}{V_m}$
$= \frac{0,75}{24}$ ✓
$= 0,031$ mol

rate/*tempo* $= \frac{\Delta n}{\Delta t}$
$= \frac{0,031 - 0}{2 - 0}$ ✓✓
$= 0,016$ (mol·min^{-1}) ✓

ACCEPT/*AANVAAR*: 0,015 to/*tot* 0,02 mol·min^{-1}) (4)

5.4 0 (dm^3·min^{-1}) ✓ (1)

5.5 No more gas is formed./The reaction is complete./No reaction takes place/Mg used up./*Geen gas word meer gevorm nie./Die reaksie is voltooi./Geen reaksie vind plaas nie/Mg is opgebruik.* ✓ (1)

5.6

5.6.1 Larger than/*Groter as* ✓
Larger mass/moles of magnesium (in experiment 1). ✓
Groter massa/aantal mol magnesium (in eksperiment 1).

OR/OF

Smaller mass/moles of magnesium (in experiment 2).
Kleiner massa/aantal mol magnesium (in eksperiment 2). (2)

5.6.2 Higher than/*Hoër as* ✓

- Higher concentration of HCℓ/more HCℓ particles per unit volume (in experiment 1)./*Hoër* HCℓ*-konsentrasie/meer HCℓ-deeltjies per eenheid volume (in eksperiment 1).* ✓
- More particles (per volume) with correct orientation/more contact points *Meer deeltjies (per volume) met korrekte oriëntasie/meer kontakpunte.*✓
- More effective collisions per unit time./Higher frequency of effective collisions./*Meer effektiewe botsings per eenheid tyd./Hoër frekwensie van effektiewe botsings.* ✓

OR/OF

- Lower concentration of HCℓ/more HCℓ particles per unit volume (in experiment 2)./*Laer* HCℓ*-konsentrasie/minder HCℓ-deeltjies per eenheid volume (in eksperiment 2)*.
- Less particles (per volume) with correct orientation/less contact points *Minder deeltjies (per volume) met korrekte oriëntasie/minder kontakpunte.*
- Less effective collisions per unit time./Lower frequency of effective collisions./*Minder effektiewe botsings per eenheid tyd./Laer frekwensie van effektiewe botsings.* (4)

[15]

QUESTION 6/*VRAAG 6*

6.1 A reaction where products can be converted back to reactants. ✓✓
'n Reaksie waarin produkte terug na reaktanse omgeskakel kan word.

OR/*OF*

A reaction in which the forward and reverse reactions can take place simultaneously./*'n Reaksie waarin die voorwaartse en terugwaartse reaksies gelyktydig kan plaasvind.* (2)

6.2 1 (minute/*minuut*) ✓ (1)

6.3

6.3.1 2 ✓ (1)

6.3.2 1 ✓ (1)

6.3.3 2 ✓ (1)

6.4 **POSITIVE MARKING FROM QUESTION 6.3.**
POSITIEWE NASIEN VANAF VRAAG 6.3.

Marking criteria/*Nasienriglyne*:

- Substitute/*Vervang* 3 mol in $c = \frac{n}{V}$ ✓
- Substitute/*Vervang* 2,5 mol in $c = \frac{n}{V}$ ✓
- Substitute/*Vervang* 1 mol in $c = \frac{n}{V}$ ✓
- Substitute V = 4 dm^3 in the above THREE formulae. ✓
  Vervang V = 4 dm^3 in die bostaande DRIE formules.
- K_c expression/*K_c-uitdrukking* ✓
- Substitution of concentrations into K_c expression ✓
  Vervanging van konsentrasies in K_c-uitdrukking.
- Final answer/*Finale antwoord*: 0,18 ✓

OPTION/*OPSIE* 1

$[A] = \frac{3}{4}$ ✓ = 0,75 mol·dm^{-3}
$[B] = \frac{2,5}{4}$ ✓ = 0,625 mol·dm^{-3}
$[C] = \frac{1}{4}$ ✓ = 0,25 mol·dm^{-3}
} Divide by/*Deel deur* 4 dm^3 ✓

$K_c = \frac{[C]^2}{[A]^2[B]}$ ✓

$= \frac{(0,25)^2}{(0,75)^2(0,625)}$ ✓

= 0,18 ✓

No K_C expression, correct substitution/*Geen K_C-uitdrukking, korrekte substitusie*: Max./*Maks*. $^6/_7$

Wrong K_C expression/*Verkeerde K_C*- uitdrukking: Max./*Maks*. $^4/_7$

OPTION/*OPSIE 2*

	A	B	C
Initial quantity/*Aanvanklike hoeveelheid* (mol)	4	3	0
Change/*Verandering* (mol)	1	0,5	1
Quantity at equilibrium/ *Hoeveelheid by ewewig* (mol)	3 ✓	2,5 ✓	1 ✓
Equilibrium concentration/ *Ewewigskonsentrasie* ($mol \cdot dm^{-3}$)	$\frac{3}{4}$	$\frac{2,5}{4}$	$\frac{1}{4}$

÷ 4 dm^3 ✓

$K_c = \frac{[C]^2}{[A]^2[B]}$ ✓

$= \frac{(0,25)^2}{(0,75)^2(0,625)}$ ✓

$= 0,18$ ✓

No K_C expression, correct substitution/*Geen K_C-uitdrukking, korrekte substitusie*: Max./*Maks*. $^6/_7$
Wrong K_C expression/*Verkeerde K_C*- uitdrukking: Max./*Maks*. $^4/_7$

USING CONCENTRATION/*GEBRUIK VAN KONSENTRASIE*
OPTION/*OPSIE 3*

	A	B	C
Initial concentration/*Aanvanklike konsentrasie* ($mol \cdot dm^{-3}$)	$\frac{4}{4} = 1$	$\frac{3}{4} = 0,75$	0
Change/*Verandering* ($mol \cdot dm^{-3}$)	$\frac{1}{4} = 0,25$	$\frac{0,5}{4} = 0,125$	$\frac{1}{4} = 0,25$
Equilibrium concentration/ E*wewigskonsentrasie* ($mol \cdot dm^{-3}$)	$\frac{3}{4} = 0,75$ ✓	$\frac{2,5}{4} = 0,625$ ✓	$\frac{1}{4} = 0,25$ ✓

÷ 4 dm^3 ✓

$K_C = \frac{[C]^2}{[A]^2[B]}$ ✓

$= \frac{(0,25)^2}{(0,75)^2(0,625)}$ ✓

$= 0,18$ ✓

No K_C expression, correct substitution/*Geen K_C-uitdrukking, korrekte substitusie*: Max./*Maks*. $^6/_7$
Wrong K_C expression/*Verkeerde K_C*- uitdrukking: Max./*Maks*. $^4/_7$

(7)

6.5 Increase in n(A) or [A]/Addition of A(g) ✓
Verhoging in n(A) of [A]/Byvoeging van A(g)

- According to Le Chatelier's principle, the system will react to decrease/oppose the increase in n(A) or [A]/*Volgens Le Chatelier se beginsel sal die sisteem reageer om die verhoging in n(A) of [A] te verminder/teen te werk.* ✓
- The forward reaction is favoured. ✓
  Die voorwaartse reaksie is bevoordeel.

OR/*OF*

n(A) or [A] and n(B) or [B] decrease and n(C) or [C] increases.
n(A) of [A] en n(B) of [B] verminder en n(C) of [C] vermeerder. (3)

[16]

QUESTION 7/*VRAAG 7*

7.1 The reaction of a salt with water./*Die reaksie van 'n sout met water*. ✓✓

OR/*OF*

The reaction of ions with water to produce hydroxide ions/a base or hydronium ions/an acid.
Die reaksie van ione met water om hidroksiedione/'n basis of hidroniumione/'n suur te vorm. (2)

7.2 $HCO_3^-(aq) + H_2O(\ell)$ ✓ ⇌ $H_2CO_3(aq) + OH^-(aq)$ ✓
Due to the formation of OH^- ions the solution is basic. ✓
Weens die vorming van OH-ione is die oplossing basies. (3)

7.3

Marking criteria/*Nasienriglyne*:

- Formula/*Formule*: $c = \frac{n}{V}$ ✓
- Substitution of/*Vervanging van* 0,1 x 4 x 10^{-3}/0,1 x 16,5 x 10^{-3} ✓
- Substitute/*Vervang* V = 41,5 x 10^{-3} ✓ (25 + 12,5 + 4 = 41,5 cm^3)
- Use/*Gebruik* $[H_3O^+] : [H_2SO_4]$ **OR/*OF*** $n(H_3O^+) : n(H_2SO_4) = 2 : 1$ ✓
- Formula/*Formule:* pH = -log $[H_3O^+]$ ✓
- Substitute/*Vervang* $[H^+]$ ✓
- Final answer/*Finale antwoord*: 1,71 ✓ (Range/*Gebied*: 1,7 to/*tot* 1,71)

OPTION/*OPSIE* 1

$n_{a(excess/oormaat)} = cV$ ✓
$= (0,1)(4 \times 10^{-3})$ ✓
$= 4 \times 10^{-4}$ mol

$c_{a(excess/oormaat)} = \frac{n}{V}$
$= \frac{4 \times 10^{-4}}{41,5 \times 10^{-3}}$ ✓
$= 9,639 \times 10^{-3}$ mol·dm^{-3}

$c(H_3O^+) = 2c(H_2SO_4)$
$= 2(9,639 \times 10^{-3})$ ✓
$= 0,0193$ mol·dm^{-3}

pH = log$[H_3O^+]$✓
= - log(0,0193) ✓
= 1,71 ✓

OPTION/*OPSIE* 2

$n_{a(ex/oor)} = cV$ ✓
$= (0,1)(4 \times 10^{-3})$ ✓
$= 4 \times 10^{-4}$ mol

$n(H_3O^+) = 2n(H_2SO_4)$
$= 2(4 \times 10^{-4})$✓
$= 8 \times 10^{-4}$ mol

$c_{(H_3O^+)} = \frac{n}{V}$
$= \frac{8 \times 10^{-4}}{41,5 \times 10^{-3}}$ ✓
$= 0,0193$ mol·dm^{-3}

pH = log$[H_3O^+]$✓
= - log(0,0193) ✓
= 1,71 ✓

OPTION/*OPSIE 3*

$n_a(tot) = cV$ ✓
$= 0,1 \times 16,5 \times 10^{-3}$ ✓
$= 1,65 \times 10^{-3}$ mol

$n_b = cV$
$= 0,1 \times 0,025$
$= 2,5 \times 10^{-3}$ mol

$n_a(rea) = \frac{1}{2} n_b$
$= \frac{1}{2} \times 2,5 \times 10^{-3}$
$= 1,25 \times 10^{-3}$ mol

$n_{a(ex/oorm.)} = n_{a(tot)} - n_{a(rea)}$
$= 1,65 \times 10^{-3} - 1,25 \times 10^{-3}$
$= 4 \times 10^{-4}$ mol

c_a (excess) $= \frac{n}{V}$
$= \frac{4 \times 10^{-4}}{41,5 \times 10^{-3}}$ ✓
$= 9,639 \times 10^{-3}$ mol·dm^{-3}

$c(H_3O^+) = 2c(H_2SO_4)$
$= 2(9,639 \times 10^{-3}$ ✓
$= 0,0193$ mol·dm^{-3}

$pH = \log[H_3O^+]$ ✓
$= - \log(0,0193)$ ✓
$= 1,71$ ✓

(7)
[12]

QUESTION 8/*VRAAG 8*

8.1 Galvanic/voltaic (cell) ✓
Galvaniese/voltaïese (sel) (1)

8.2 Pressure/*Druk*: 1 atmosphere/*atmosfeer* (atm)/101,3 kPa/1,013 x 10^5 Pa ✓
Temperature/*Temperatuur:* 25 °C / 298 K ✓
Concentration/*Konsentrasie*: 1 mol·dm^{-3} ✓ (3)

8.3 Platinum is inert/does not react with the H^+ ions/acid./*Platinum is onreaktief/regaeer nie met H^+-ione/suur nie* ✓
Platinum is a conductor (of electricity)./*Platinum is 'n geleier (van elektrisiteit).* ✓ (2)

8.4 Incomplete circuit/No salt bridge. ✓
Onvoltooide stroombaan/Geen soutbrug nie. (1)

8.5 $2H^+ + 2e^- \rightarrow H_2$ ✓✓

Marking guidelines/*Nasienriglyne*:

- $2H^+ + 2e^- \rightleftharpoons H_2$ $\frac{1}{2}$ $H_2 \rightleftharpoons 2H^+ + 2e^-$ $\frac{0}{2}$
  $H_2 \leftarrow 2H^+ + 2e^-$ $\frac{2}{2}$ $H_2 \rightarrow 2H^+ + 2e^-$ $\frac{0}{2}$
- Ignore if charge omitted on electron./*Ignoreer indien lading op elektron weggelaat is.*
- If charge (+) omitted on H^+/Indien lading (+) weggelaat op H^+: Max. $\frac{1}{2}$
  Example/*Voorbeeld:* $2H + 2e^- \rightarrow H_2$ ✓

(2)

8.6

8.6.1 Phase boundary/interphase/phase separator ✓
Faseskeiding/interfase (1)

8.6.2

OPTION 1/*OPSIE 1*:

$E^{\theta}_{cell/sel} = E^{\theta}_{cathode/katode} - E^{\theta}_{anode}$ ✓
$1,42$ ✓ $= -0,24$ ✓ $- E^{\theta}_{J|J^{2+}}$

$E^{\theta}_{J/J^{2+}} = -1,66$ (V) ✓
J = Aluminium/Aℓ ✓

Notes/*Aantekeninge*

- Accept any other correct formula from the data sheet./*Aanvaar enige ander korrekte formule vanaf gegewensblad*.
- Any other formula using unconventional abbreviations, e.g. $E°_{cell} = E°_{OA} - E°_{RA}$ followed by correct substitutions:/*Enige ander formule wat onkonvensionele afkortings gebruik bv.* $E°_{sel} = E°_{OM} - E°_{RM}$ *gevolg deur*

OPTION/*OPSIE 2*:

$J \rightarrow J^{2+} + 2e^-$
$D^{2+} + 2e^- \rightarrow D$ ✓

$E° = -1,66$ (V) ✓
$E° = -0,24$ (V) ✓
$E^0_{cell} = 1,42$ (V) ✓

J = Aluminium/Aℓ ✓

(5)

8.6.3 Exothermic/*Eksotermies* ✓ (1)

8.7 The cell reaction has reached equilibrium./Reactants used up. ✓
Die selreaksie het ewewig bereik./Reaktanse is opgebruik. (1)

[17]

QUESTION 9/*VRAAG 9*

9.1

9.1.1 Solution/liquid/(dissolved) substance that conducts electricity ✓ through the movement of ions. ✓
'n Oplossing/vloeistof/(opgeloste) stof wat elektrisiteit gelei deur die beweging van ione.

OR/*OF*

A substance of which the aqueous solution contains ions.
'n Stof waarvan die oplossing in water ione bevat.

OR/*OF*

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

9.1.2 The process in which electrical energy is converted to chemical energy. ✓✓
Die proses waarin elektriese energie omgeskakel word na chemiese energie.

OR/*OF*

The use of electrical energy to produce a chemical change./*Die gebruik van elektrisiteit om 'n chemiese verandering teweeg te bring.* (2)

9.2 B ✓ & D ✓
$Cu^{2+} + 2e^- \rightarrow Cu$ ✓✓

Marking guidelines/*Nasienriglyne*:
- $Cu^{2+} + 2e^- \rightleftharpoons Cu$ $\frac{1}{2}$ $Cu \rightleftharpoons Cu^{2+} + 2e^-$ $\frac{0}{2}$
  $Cu \leftarrow Cu^{2+} + 2e^-$ $\frac{2}{2}$ $Cu \rightarrow Cu^{2+} + 2e^-$ $\frac{0}{2}$
- Ignore if charge omitted on electron./*Ignoreer indien lading op elektron weggelaat is.*
- If charge omitted on Cu^{2+}/ Indien lading weggelaat op Cu^{2+}: Max. $\frac{1}{2}$
  Example/*Voorbeeld:* $Cu^2 + 2e^- \rightarrow Cu$ ✓

(4)

9.3

9.3.1 $C\ell_2$/chlorine (gas)/*chloor(gas)* ✓ (1)

9.3.2 Cu^{2+} (ions)/copper(II) ions ✓
Cu^{2+}-(ione)/koper(II)ione (1)

9.4 Cu is a stronger reducing agent ✓ than $C\ell^-$ (ions) ✓ and Cu will be oxidised ✓ (to Cu^{2+})./*Cu is 'n sterker reduseermiddel as $C\ell^-$ (-ione) en Cu sal geoksideer word (na Cu^{2+}).*

OR/*OF*

$C\ell^-$ (ions) is a weaker reducing agent ✓ than Cu and Cu will be oxidised (to Cu^{2+})./*$C\ell^-$ (-ione) is 'n swakker reduseermiddel as Cu en Cu sal geoksideer word (nao Cu^{2+}).*

IF/*INDIEN*
Explained in terms of relative strength of oxidising agent, award mark ONLY for 'Cu will be oxidised'/*Verduidelik in terme van relatiewe sterkte van oksideermiddel, ken punt slegs toe vir 'Cu sal geoksideer word'.*

Max./*Maks*. 1/3

(3)
[13]

QUESTION 10/*VRAAG 10*

10.1
10.1.1 Fractional distillation of liquid air ✓
Fraksionele distillasie van vloeibare lug (1)

10.1.2 Ammonia/*Ammoniak* ✓ (1)

10.1.3 Acid-base/neutralisation reaction ✓
Suur-basis/neutralisasiereaksie (1)

10.2
10.2.1 $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

Marking criteria/*Nasienriglyne:*
- Reactants ✓ *Reaktanse* Products ✓ *Produkte* Balancing ✓ *Balansering*
- Ignore phases./*Ignoreer fases*.
- Ignore double arrows./*Ignoreer dubbelpyle.*
- Marking rule 6.3.10/*Nasienreël 6.3.10.*

(3)

10.2.2 $H_2S_2O_7$/Oleum/pyrosulphuric acid/fuming sulphuric acid ✓
$H_2S_2O_7$/Oleum/piroswawelsuur/rokende swawelsuur (1)

10.3

10.3.1 The mass ratio of nitrogen (N), phosphorus (P) and potassium (K) in a certain fertiliser. ✓
Die massa verhouding van stikstof (N), fosfor (P) en kalium (K) in 'n sekere kunsmis. (1)

10.3.2 Percentage fertiliser in the bag/*Persentasie kunsmis in die sak*. ✓ (1)

10.3.3

OPTION 1/*OPSIE 1*:	**OPTION 2/*OPSIE 2***:
% K = $\frac{6}{13}$ ✓ x 22% ✓ =10,15 % ↓ m (K) = $\frac{10,15}{100}$ x 25 ✓ = 2,54 kg ✓	m (nutrient/*voedingstof*): $\frac{22}{100}$ ✓ x 25 ✓ = 5,5 kg ↓ m (K) = $\frac{6}{13}$ ✓ x 5,5 = 2,54 kg ✓

(4)
[13]

TOTAL/*TOTAAL*: 150