basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

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

NOVEMBER 2019

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 14 pages.
Hierdie nasienriglyne bestaan uit 14 bladsye.

Approved
DBE IM
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Approved Chief Examiner
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15/11/19

QUESTION 1/*VRAAG 1*

1.1 A ✓✓ (2)

1.2 B ✓✓ (2)

1.3 D ✓✓ (2)

1.4 D ✓✓ (2)

1.5 C ✓✓ (2)

1.6 D ✓✓ (2)

1.7 A ✓✓ (2)

1.8 D ✓✓ (2)

1.9 B ✓✓ (2)

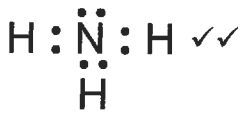
1.10 A ✓✓ (2)
[20]

QUESTION 2/*VRAAG 2*

2.1

2.1.1 Pair of/two electrons shared between (two) atoms (in a covalent bond). ✓✓ **(2 or 0)**
Elektronpaar/twee elektrone gedeel tussen (twee) atome (in 'n kovalente binding). ***(2 of 0)*** (2)

2.1.2

(a)  ✓✓

Marking guidelines/*Nasienriglyne*
- Whole structure correct./*Hele struktuur korrek.* ✓✓
- H : N : H ✓ Max./*Maks.* ½
  H

(2)

(b)  ✓✓

Marking guidelines/*Nasienriglyne*
- Whole structure correct./*Hele struktuur korrek.* ✓✓
- H : O : C ℓ Max./*Maks.* ½

(2)

2.1.3

(a) 3/three/*drie* ✓ (1)

(b) 2/two/*twee* ✓ (1)

(c) Trigonal pyramidal ✓
Trigonaal piramidaal (1)

2.1.4 O-H ✓
Higher ΔEN/*Hoër ΔEN* ✓

OR/*OF*

O-H ΔEN = 3,5 - 2,1 = 1,4
N-H ΔEN = 3 - 2,1 = 0,9 ✓

OR/*OF*

O has a higher EN (value) than N./N has a lower EN(value) than O. ✓
O het 'n hoër EN(-waarde) as N./N het 'n laer EN(-waarde) as O.

OR/*OF*

ΔEN between H and O is greater./ΔEN between N and H is smaller. ✓
ΔEN tussen H en O is groter./ΔEN tussen N en H is kleiner. (2)

2.1.5 Hydrogen bonds ✓
Waterstofbindings

ACCEPT/*AANVAAR*
Dipole-dipole forces/*Dipool-dipoolkragte* ✓ (1)

2.1.6 Dative covalent bon/coordinate covalent bond ✓
Datief kovalente binding (1)

2.2

2.2.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

Energy needed to break (one mole of a compound's) bonds/molecules (into atoms)./ Energy released when (one mole of a compound's) bonds/molecules are formed (from atoms). ✓✓
Energie benodig om (een mol van 'n verbinding) bindings/molekule op te breek (in aparte atome)./Energie vrygestel wanneer (een mol van 'n verbinding se) bindings/molekule gevorm word (uit aparte atome). (2)

2.2.2 A ✓
When the bond order increases/double bond is formed, the bond length decreases ✓ and the bond energy increases. ✓
Wanneer die bindingsorde verhoog/dubbelbinding gevorm word, verlaag die bindingslengte en verhoog die bindingsenergie.

OR/*OF*

When a second bond is formed, the bond length decreases ✓ and the potential energy of the molecule decreases. ✓
Wanneer die tweede binding gevorm word,verlaag die bindingslengte en verlaag die potensiële energie.

OR/*OF*

The length of a double bond is shorter ✓ and needs more/higher energy to break. ✓
Die lengte van die dubbelbinding is korter en benodig meer/hoër energie om te breek. (3)

2.2.3 148 pm ✓ (1)

[19]

QUESTION 3/*VRAAG 3*

3.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases in context are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in konteks uitgelaat is: minus 1 punt

Temperature at which the solid and liquid phases of a substance are at equilibrium. ✓✓
Die temperatuur waarby die vaste- en vloeistoffases van 'n stof in ewewig is. (2)

3.2

Marking criteria
- Type of IMF in HF i.e. hydrogen bonding. ✓
  Tipe IMK in HF d.i. waterstofbinding.
- Type of IMF in HCℓ i.e. dipole-dipole forces. ✓
  Tipe IMK in HCℓ d.i. dipool-dipoolkragte.
- Compare strength of IMF./*Vergelyk sterkte van IMKe.*✓
- Compare energy needed **OR** melting points. ✓
  *Vergelyk energie benodig **OF** smeltpunte.*

- HF has hydrogen bonds between molecules. ✓
- HCℓ has dipole-dipole forces.✓
- Hydrogen bonds are stronger than dipole-dipole forces./*Intermolecular forces in HF stronger./ Intermolecular forces in HCℓ weaker.* ✓
- More energy is needed to overcome/break intermolecular forces in HF.
  OR
  HF has the higher melting point./*HCℓ* has the lower melting point. ✓

- *HF het waterstofbindings tussen molekule.*
- *HCℓ het dipool-dipoolkragte.*
- *Waterstofbindings is sterker as dipool-dipoolkragte./Intermolekulêre kragte in HF sterker./Intermolekulêre kragte in HCℓ swakker.*
- *Meer energie benodig om intermolekulêre kragte te oorkom/breek.*
  OF
  HF het die hoër smeltpunt./*HCℓ* het die laer smeltpunt. (4)

3.3 C **OR/*OF*** CS_2 ✓ (1)

3.4
- CS_2 has a greater surface area/molecular mass/larger molecules (than CO_2). ✓
- London forces increase with molecular mass/molecular size. ✓
  OR
  London forces in CS_2 stronger than in CO_2.
- More energy needed to break/overcome intermolecular forces. ✓

- *CS_2 has a groter oppervlak/molekulêre massa/groter molekule (as CO_2).*
- *Londonkragte neem toe met molekulêre massa/molekulêre grootte.*
  OF
  Londonkragte in CS_2 is sterker as in CO_2.
- *Meer energie benodig om intermolekulêre kragte te oorkom/breek.* (3)

3.5 B **OR/*OF*** HCℓ ✓
Lowest boiling point./*Laagste kookpunt.*✓ (2)

[12]

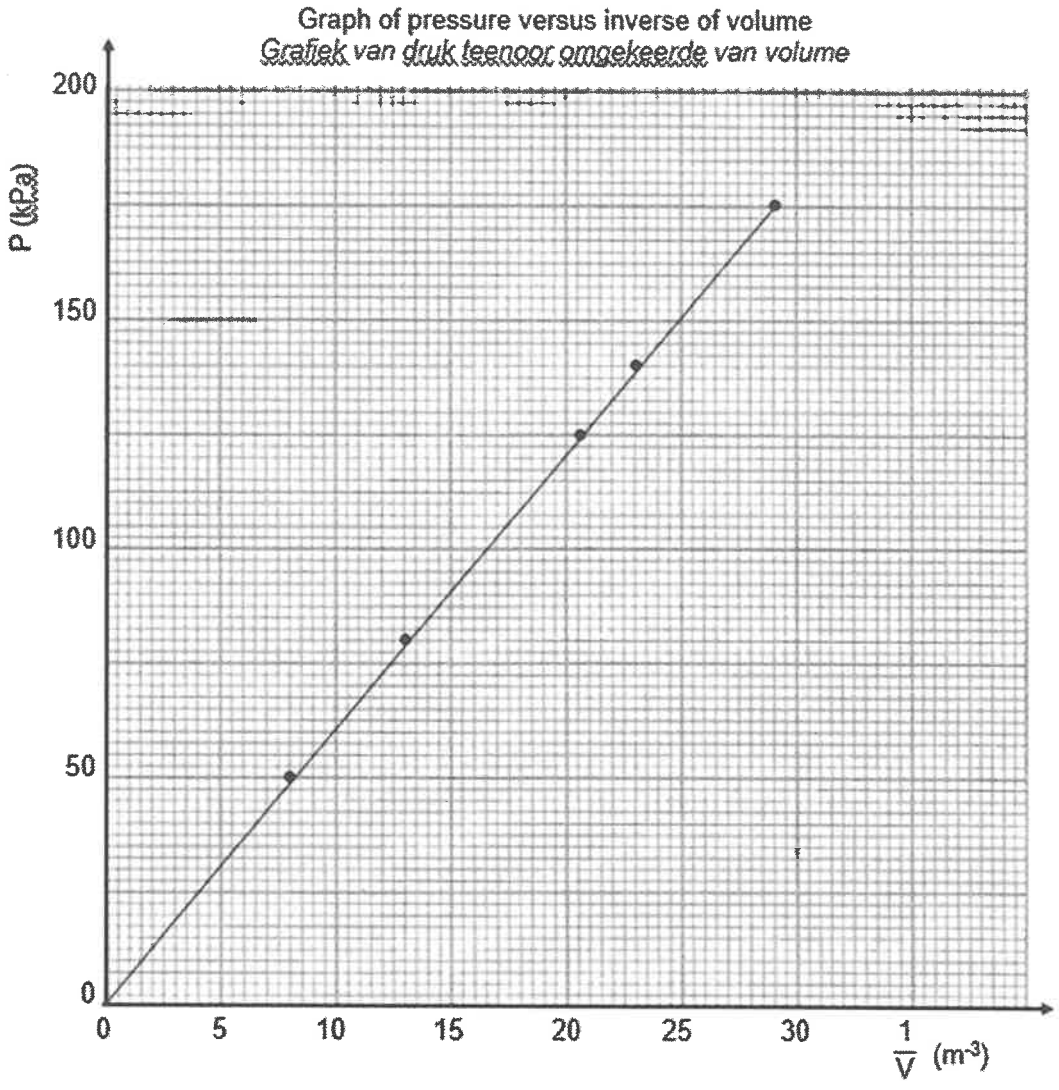
QUESTION 4/*VRAAG 4*

4.1

Marking guidelines/*Nasienriglyne*
If any of the underlined 3 key words/phrases in correct context are omitted: minus 1 mark *Indien enige van die 3 onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is: minus 1 punt*

Pressure of an enclosed/fixed mass of gas at constant temperature is inversely proportional to the volume it occupies. ✓✓
Die druk van 'n ingeslote/fixed mass of gas by konstante temperatuur is omgekeerd eweredig aan die volume wat dit beslaan. (2)

4.2



Marking criteria for graph/*Nasienriglyne vir grafiek*	
All 5 points correctly plotted./*Al 5 punte korrek gestip.* **IF** three (3) points plotted correctly - *only 1 mark.* ***INDIEN** drie (3) punte korrek gestip – slegs 1 punt.*	✓✓
Line of best fit drawn./*Beste paslyn getrek.*	✓

Refer to the last page of marking guideline for graph drawn on supplied graph sheet./*Verwys na die laaste bladsy van nasienriglyn vir grafiek getrek op verskafde grafiekpapier.* (3)

4.3
- Temperature/*Temperatuur* ✓
  OR/*OF*
  Number of moles of gas/*Aantal mol gas*
- Gradient/*gradiënt* = $\Delta pV = nRT$ ✓ (2)

4.4 Particles/molecules of real gases occupy volume. ✓
At high pressure, volume of gas molecules/particles become significant ✓ and the measured volume is greater than expected. ✓

Deeltjies/molekule van werklike gasse beslaan volume.
By hoë druk word volume van molekule/deeltjies beduidend en die gemete volume is groter as verwag. (3)

4.5 $pV = nRT$ ✓
$(125\,000)(0,049)$ ✓ $= n(8,31)(298)$ ✓
$n = 2,47$ mol ✓ (4)
[14]

QUESTION 5/*VRAAG 5*

5.1

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$\frac{p_1}{T_1} = \frac{p_2}{T_2}$ $\frac{240}{303}$ ✓ $= \frac{x}{263}$ ✓ $X = 208,32$ (kPa) ✓	Gradient $= \frac{240\ (-\ 0)}{303\ (-\ 0)}$ ✓ $= 0,792$ $0,792 = \frac{240 - X}{303 - 263}$ ✓ $\therefore X = 208,32$ (kPa) ✓

(3)

5.2 Greater than/*Groter as* ✓ (1)

5.3

Marking guidelines/*Nasienriglyne*	**OR/*OF***
• Compare gradients. *Vergelyk gradiënte.* ✓ • Gradient $= \frac{p}{T} = \frac{nR}{V}$. ✓ • Compare/*Vergelyk* $\frac{1}{V}$ ✓	• T = constant, p(N) < p(M) ✓ • $p_1V_1 = p_2V_2 / \frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2}$ ✓ • $p \propto \frac{1}{V}$ ✓
OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
Gradient of graph for N smaller than gradient of graph for M./*Gradiënt van grafiek vir N kleiner as gradiënt van grafiek vir M.* ✓ Gradient $= \frac{nR}{V}$ ✓ Therefore/*Dus* $(\frac{1}{V})_N < (\frac{1}{V})_M$ ✓ Thus/*Dus* $V_N > V_M$	Gradient (N) < *gradient (M)* ✓ $(\frac{p}{T})_N < (\frac{p}{T})_M$ $(\frac{nR}{V})_N < (\frac{nR}{V})_M$ ✓ $(\frac{1}{V})_N < (\frac{1}{V})_M$ ✓ $V_N > V_M$

OPTION 3/*OPSIE 3*

For the same temperature/T (**OR** give a value for T), the pressure in M is greater than the pressure in N. / p(M) > p(N) ✓

From $p_1V_1 = p_2V_2$, ✓ it follows that p is inversely proportional to V / $p \alpha \frac{1}{V}$. ✓

Therefore $V_N > V_M$

*Vir dieselfde temperatuur/T (**OF** gee waarde vir T), die druk in M is groter as die druk in N/p(M) > p(N)* ✓

Uit $p_1V_1 = p_2V_2$, ✓ *volg dit dat p omgekeerd eweredig is aan V / $p \alpha \frac{1}{V}$.* ✓

Dus $V_N > V_M$ (3)

[7]

QUESTION 6/*VRAAG 6*

6.1

6.1.1 The mass of one mole of substance (measured in $g \cdot mol^{-1}$). ✓✓ **(2 or 0)**
Die massa van een mol stof gemeet (in $g \cdot mol^{-1}$). ***(2 of 0)*** (2)

6.1.2 $n(C) = \frac{39,13}{12}$ ✓ = 3,26

$n(H) = \frac{8,7}{1}$ ✓ = 8,7

$n(O) = \frac{52,17}{16}$ ✓ = 3,26

Ratio/*Verhouding* C : H : O:

$\frac{3,26}{3,26} = 1$

$\frac{8,7}{3,26} = 2,67$ ✓

$\frac{3,26}{3,26} = 1$

C : H : O = 1 : 2,67 : 1 = 3 : 8 : 3 ✓

Empirical formula/*Empiriese formule*:

$C_3H_8O_3$ ✓ (6)

Marking guidelines/*Nasienriglyne*
- Divide %C by 12 $g \cdot mol^{-1}$.
  Deel %C deur 12 $g \cdot mol^{-1}$.
- Divide %H by 1 $g \cdot mol^{-1}$.
  Deel %H deur 1 $g \cdot mol^{-1}$.
- Divide %O by 16 $g \cdot mol^{-1}$.
  Deel %O deur 16 $g \cdot mol^{-1}$.
- Divide by smallest answer.
  Deel deur kleinste antwoord.
- Ratio/*Verhouding:* 3 : 8 : 3
- *Final answer/Finale antwoord:*
  $C_3H_8O_3$ ✓

6.1.3 5 ✓ (1)

6.1.4

Marking guidelines/*Nasienriglyne*

- Substitute/*Vervang* 158 g·mol^{-1} in ratio/*verhouding*/ $n = \frac{m}{M}$ ✓
- Use ratio/*Gebruik verhouding*: $n(Mn_2O_3) = ½n(KMnO_4)$ ✓
- Substitute/*Vervang* 158 g·mol^{-1} in ratio/*verhouding*/ $n = \frac{m}{M}$ ✓
- Final answer/*Finale antwoord:* 9,01 g ✓
  ***Range/Gebied:* 8,69 g to/*tot* 9,48 g**

OPTION 1/*OPSIE 1*

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

$n = \frac{18}{158}$ ✓

$n = 0,114$ mol

$n(Mn_2O_3) = ½n(KMnO_4)$
$= ½(0,114)$ ✓
$= 0,057$ mol

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

$0,057 = \frac{m}{158}$ ✓

$\therefore m = 9,01$ g ✓ (9,006 g)

OPTION 2/*OPSIE 2*

1 mol .....158 g ✓ $KMnO_4$
0,114 mol .....18 g

$n(Mn_2O_3) = ½n(KMnO_4)$
$= ½(0,114)$ ✓
$= 0,057$ mol

1 mol .....158 g ✓ Mn_2O
0,057 mol .....9,01 g ✓ (9,006 g)

OPTION 3/*OPSIE 3*

14 (mol $KMnO_4$) forms 7 (mol Mn_2O_3) ✓
14[39 + 55 + 4(16)]g ✓ $KMnO_4$ forms 7[2(55) + 3(16)] g ✓ Mn_2O_3

2 212 g $KMnO_4$ .....1 106 g Mn_2O_3
18 g $KMnO_4$.....x g Mn_2O_3
$\therefore x = 9$ g ✓

(4)

6.2

6.2.1 The amount/number of moles of (solute/dissolved substance) per litre/dm^3 (of solution). ✓✓ **(2 or 0)**
The hoeveelheid/aantal mol (opgeloste stof) per liter/dm^3 (van die oplossing). **(2 of 0)** (2)

6.2.2 $c = \frac{n}{V}$ ✓

$0,1 = \frac{n}{0,1}$ ✓

$n = 0,01$ mol ✓ (3)

6.2.3

Marking guidelines/*Nasienriglyne*

- Formula/*Formule*: $n = \frac{m}{M} / n = \frac{V}{V_m}$ ✓
- Substitute/*Vervang* 25,45 $dm^3 \cdot mol^{-1}$ & 0,46 dm^3 in ratio/*verhouding*/ $n = \frac{V}{V_m}$. ✓
- Use ratio/*Gebruik verhouding*: n(NaCℓ) = n(HCℓ) ✓
- Substitute/*Vervang* 58,5 $g \cdot mol^{-1}$ ratio/*verhouding*/ $n = \frac{m}{M}$. ✓
- $\frac{m(\text{calculated / } bereken)}{m(\text{impure / } onsuiwer)} \times 100$ ✓
- Final answer/*Finale antwoord:* 73,37% ✓
  ***Range/Gebied:* 73,37% to/*tot* 78%**

$n(HC\ell) = \frac{V}{V_m}$ ✓
$= \frac{0,460}{24,45}$ ✓
= 0,0188 mol

OR/*OF* 1 mol .....24,45 dm^3 ✓ HCℓ
0,188 mol .....0,46 dm^3

n(NaCℓ) = n(HCℓ)
= 0,0188 mol ✓

$n = \frac{m}{M}$
$0,0188 = \frac{m}{58,5}$ ✓
m(NaCℓ) = 1,1 g

OR/*OF* 1 mol .....58,5 g NaCℓ
0,0188 mol .....1,1 g

$\%purity = \frac{1,1}{1,5} \times 100$ ✓
= 73,37% ✓

(6)
[24]

QUESTION 7/VRAAG 7

7.1 The energy absorbed or released per mole in a chemical reaction. ✓✓ **(2 or 0)**
Die energie geabsorbeer of vrygestel per mol in 'n chemiese reaksie. ***(2 of 0)***

IF/*INDIEN*:
The difference between the energy of products and energy of reactants. Max. $^1/_2$
Die verskil tussen die energie van produkte en die energie van reaktanse. Maks. $^1/_2$ (2)

7.2 Endothermic ✓
More energy is absorbed than released./Energy of products higher than energy of reactants./$\Delta H > 0$ ✓
Endotermies
Meer energie is geabsorbeer as vrygestel./Energie van produkte hoër as energie van reaktanse./$\Delta H > 0$ (2)

7.3
7.3.1 544 (kJ/kJ·mol^{-1}) ✓✓ (2)

7.3.2 131 (kJ/kJ·mol^{-1}) ✓✓ (2)
[8]

QUESTION 8/*VRAAG 8*

Penalise ONLY ONCE for incorrect conversion in this question.
Penaliseer SLEGS EEN MAAL vir verkeerde omskakelings in hierdie vraag.

8.1
8.1.1 An acid is a proton/H^+ ion donor. ✓✓
'n Suur is 'n proton-/ H^+-ioonskenker. (2)

8.1.2 HNO_3 & NO_3^- ✓✓ **(2 or/*of* 0)**
OR/*OF*
H_3O^+ & H_2O (2)

8.1.3 Acidic/Suur ✓
Hydronium ions/H_3O^+ formed (in water). ✓
Hidroniumione/H_3O^+ vorm (in water). (2)

8.1.4 An ampholyte is a substance that can act as either acid or base. ✓✓ **(2 or 0)**
'n Amfoliet is 'n stof wat as suur of basis kan optree. ***(2 of 0)*** (2)

8.1.5 H_2O ✓ (1)

8.1.6 Reaction 1: It/H_2O acts as base/accepts a proton or H^+. ✓
Reaction 2: It/H_2O acts as acid/donates a proton or H^+. ✓

Reaksie 1: Dit/H_2O tree as basis op/neem 'n proton of H^+ op.
Reaksie 2: Dit/H_2O tree as suur op/gee 'n proton of H^+ af. (2)

8.1.7

Marking guidelines/*Nasienriglyne*

- Substitute 0,1 dm^3 & 0,2 $mol \cdot dm^{-3}$ in formula/ratio. ✓
  Vervang 0,1 dm^3 & 0,2 $mol \cdot dm^{-3}$ in formule/verhouding.
- Use ratio/*Gebruik verhouding*:
  n(dilute/*verdun*) = n(concentrated/*gekonsentreerd*) ✓
- Substitute 0,02 mol & 0,16 $mol \cdot dm^{-3}$ in formula/ratio.
  Vervang 0,0,2 mol & 0,16 $mol \cdot dm^{-3}$ in formule/verhouding.
- Final answer/*Finale antwoord:* 0,025 dm^3 / 25 cm^3 ✓

OPTION 1/*OPSIE 1*

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

$0,2 = \frac{n}{0,1}$ ✓

∴ n(conc/*gekons*) = 0,02 mol
= n(dilute/verdun) ✓

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

$0,16 = \frac{0,02}{V}$ ✓

$V = 0,125\ dm^3$

Amount added/*Hoeveelheid bygevoeg:*
$0,125 - 0,1 = 0,025\ dm^3$ ✓

OPTION 2/*OPSIE 2*

$c_1V_1 = c_2V_2$
(0,2)(100) ✓ = $(0,16)V_2$ ✓✓
$V_2 = 125\ cm^3$

Amount added/*Hoeveelheid bygevoeg:*
$125 - 100 = 25\ cm^3$ ✓

(4)

8.2.1

Marking guidelines/*Nasienriglyne*

- Formula/*Formule*: $n = \frac{m}{M}$ / $c = \frac{n}{V}$ ✓
- Substitute/*Vervang* 0,16 $dm^3 \cdot mol^{-1}$ & 0,08 dm^3 in $c = \frac{n}{V}$ /ratio/*verhouding* ✓
- Use ratio/*Gebruik verhouding*:
  n(ZnO) = ½n(HNO_3) ✓
- Substitute/*Vervang* 81 $g \cdot mol^{-1}$ in $n = \frac{m}{M}$ /ratio/*verhouding.* ✓
- Final answer/*Finale antwoord:* 0,52 g ✓ **Range/Gebied: 0,405 g to/tot 0,52 g**

OPTION 1/*OPSIE 1*

$c = \frac{n}{V}$ ✓

$0,16 = \frac{n}{0,08}$ ✓

n = 0,0128 mol

n(ZnO) = ½n(HNO_3)
= ½(0,0128) ✓
= 0,0064

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

$0,0064 = \frac{m}{81}$ ✓

m = 0,52 g ✓

OPTION 2/*OPSIE 2*

$c = \frac{n}{V}$ ✓

$0,16 = \frac{n}{0,08}$ ✓

n = 0,0128 mol

n(ZnO) = ½n(HNO_3)
= ½(0,0128) ✓
= 0,0064

1 mol .....81 g ✓ ZnO
0,0064 mol .....0,52 g ✓

(5)

8.2.2 Zinc nitrate/*Sinknitraat* ✓
$Zn(NO_3)_2$ ✓ (2)
[22]

QUESTION 9/*VRAAG 9*

9.1 A reaction in which electrons are transferred. ✓✓
'n Reaksie waar elektrone oorgedra word.
OR/*OF*
A reaction during which oxidation numbers change.
'n Reaksie waartydens oksidasiegetalle verander. (2)

9.2
9.2.1 +7 ✓ (1)

9.2.2 +2 ✓ (1)

9.3. Reduced/*Gereduseer* ✓
The oxidation number decreased. ✓
Die oksidasie getal verminder.
OR/*OF*
Electrons are gained./*Elektrone is opgeneem.* (2)

9.4 (Reaction/*reaksie*) 1 ✓
Oxidation number (of S) decreases ✓ from +4 (in SO_2) to 0 (in S).
Oksidaseigetal (van S) neem af van +4 (in SO_2) na 0 (in S).

OR/*OF*
SO_2 gains electrons **OR** is reduced./*SO_2 neem elektrone op **OF** is gereduseer.*

OR/*OF*
In reaction 2, SO_2 loses electrons **OR** is oxidised.
*In reaksie 2 verloor SO_2 elektrone **OF** is geoksideer.*

OR/*OF*
In reaction 2, the oxidation number (of S) increases from +4 (in SO_2) to +6 (in SO_4^{2-})./*In reaksie 2, neem die oksidasiegetal (van S) toe van +4 (in SO_2) na + 6 in SO_4^{2-}).* (2)

9.5 $H_2S \rightarrow S + 2H^+ + 2e^-$ ✓✓

Marking guidelines/*Nasienriglyne*

- $H_2S \rightleftharpoons S + 2H^+ + 2e^-$ $^1/_2$ $\quad$ $S + 2H^+ + 2e^- \leftarrow H_2S$ $^2/_2$
  $S + 2H^+ + 2e^- \rightleftharpoons H_2S$ $^0/_2$ $\quad$ $S + 2H^+ + 2e^- \rightarrow H_2S$ $^0/_2$
- Ignore if charge on electron is omitted./*Ignoreer indien lading op elektron uitgelaat is.*
- If charge on ion omitted e.g. $S + 2H + 2e^- \rightarrow H_2S$
  Indien lading op ion uitgelaat is bv. $S + 2H + 2e^- \rightarrow H_2S$ Max/*Maks.* $^1/_2$

(2)

9.6

Marking guidelines/*Nasienriglyne*
- Reduction half-reaction/*Reduksie halfreaksie:*
  $SO_2 + 4H^+ + 4e^- \rightarrow S + 2H_2O$ ✓✓
- Oxidation half-reaction multiplied by/*Oksidasie-halfreaksie vermenigvuldig met 2:*
  $2H_2S \rightarrow 2S + 4H^+ + 4e^-$ **OR/*OF*** indicate as /*dui aan* as x 2 **OR/*OF*** shown in final answer/*aangedui in finale antwoord.*
- Final answer/*Finale antwoord:* $2H_2S + SO_2 \rightarrow 3S + 2H_2O$ ✓

$H_2S \rightarrow S + 2H^+ + 2e^-$ (x2 ✓)
$SO_2 + 4H^+ + 4e^- \rightarrow S + 2H_2O$ ✓✓
$2H_2S + SO_2 \rightarrow 3S + 2H_2O$ ✓

ACCEPT/*AANVAAR:* $2H_2S + SO_2 \rightarrow$ **2S + S** $+ 2H_2O$ ✓

Notes/Aantekeninge:
- No half-reactions shown/Geen halfreaksies getoon nie: Max./*Maks.* $^1/_4$
- Ignore double arrow in final answer./*Ignoreer dubbelpyl in finale antwoord.*
- For reduction half-reaction/*Vir reduksiehalfreaksie* (2 marks/*punte*):
  $SO_2 + 4H^+ + 4e^- \rightleftharpoons S + 2H_2O$ $^1/_2$ $S + 2H_2O \rightarrow SO_2 + 4H^+ + 4e^-$ $^0/_2$

(4)
[14]

QUESTION 10/*VRAAG 10*

10.1 Cyanide/CN^-/It is toxic/poisonous/dangerous/contaminates environment. ✓
Sianied/CN^-/Dit is giftig/gevaarlik/kontamineer die omgewing. (1)

10.2 Basic/*Basies* **OR/*OF*** alkaline/*alkalies* ✓
Hydroxide/OH^- (is formed)./*Hidroksied/OH^- (word gevorm).* ✓ (2)

10.3 +1 ✓ (1)

10.4 Au ✓ (1)

10.5 Oxidation/*Oksidasie* ✓ (1)

10.6 $Zn \rightarrow Zn^{2+} + 2e^-$ ✓✓

Marking guidelines/*Nasienriglyne*
- $Zn \rightleftharpoons Zn^{2+} + 2e^-$ $^1/_2$ $Zn^{2+} + 2e^- \leftarrow Zn$ $^2/_2$
  $Zn^{2+} + 2e^- \rightleftharpoons Zn$ $^0/_2$ $Zn^{2+} + 2e^- \rightarrow Zn$ $^0/_2$
- Ignore if charge on electron is omitted./*Ignoreer indien lading op elektron uitgelaat is.*
- If charge on ion omitted e.g. $Zn \rightarrow Zn + 2e^-$
  Indien lading op ion uitgelaat is bv. $Zn \rightarrow Zn + 2e^-$ Max/*Maks.* $^1/_2$

(2)

10.7 $\%Au = \frac{197}{272} \times 100$ ✓
$= 72{,}43\%$ ✓ (2)
[10]

TOTAL/*TOTAAL*: 150

GRAPH SHEET/*GRAFIEKPAPIER*

SUBMIT THIS GRAPH SHEET WITH THE ANSWER BOOK.
LEWER HIERDIE GRAGIEKPAPIER SAAM MET DIE ANTWOORDEBOEK IN.

NAME/*NAAM* _____ **CLASS/*KLAS*** _____

QUESTION/*VRAAG* 4.2

Graph of pressure versus inverse of volume
Grafiek van druk teenoor omgekeerde van volume