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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 2018

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 16 pages.
*Hierdie nasienriglyne bestaan uit 16 bladsye.***

QUESTION 1/VRAAG 1

- | | | |
|------|------|-------------|
| 1.1 | B ✓✓ | (2) |
| 1.2 | C ✓✓ | (2) |
| 1.3 | D ✓✓ | (2) |
| 1.4 | B ✓✓ | (2) |
| 1.5 | C ✓✓ | (2) |
| 1.6 | A ✓✓ | (2) |
| 1.7 | A ✓✓ | (2) |
| 1.8 | B ✓✓ | (2) |
| 1.9 | D ✓✓ | (2) |
| 1.10 | D ✓✓ | (2) |
| | | [20] |

QUESTION 2/VRAAG 2

- 2.1 Chemical bond is mutual attraction between two atoms resulting from the simultaneous attraction between their nuclei and (outer) electrons. ✓✓
Chemiese binding is die wedersydse aantrekking tussen twee atome as gevolg van die gelyktydige aantrekking tussen hulle kerne en (buite)-elektrone. (2)
- 2.2.1 $\text{H}:\text{C}:::\text{N}:$ ✓✓ (2)
- 2.2.2 $\begin{array}{c} \cdot\cdot \\ \cdot\text{O}:\text{H} \\ \cdot\cdot \\ \text{H} \end{array}$ ✓✓ (2)
- 2.3 Linear ✓
Lineêr (1)
- 2.4 $3 - 2,5 = 0,5$ ✓ (1)
- 2.5 Polar ✓
Polêr (1)
- 2.6 CN has a higher order bond/triple bond with more orbitals overlapping ✓
than CH, which is a single bond. ✓ Thus CN bond needs more energy to break.
CN het 'n hoër orde/drievoudige binding met meer orbitale wat oorvleuel as die CN enkel binding. Dus benodig die CN-binding meer energie om te breek. (2)
- 2.7 CN has a longer bond length than CH ✓ because the H atom is smaller than the N atom. ✓
CN het 'n groter bindingslengte as CH omdat die H-atoom kleiner as die N-atoom is (2)

2.8 Yes/Ja ✓

(1)

2.9



- HCN has polar molecules with dipole-dipole forces. ✓
- H₂O has polar molecules with hydrogen bonds (dipole-dipole forces). ✓
- If the forces are of the same order/comparable the substances will dissolve. ✓

OR

- Both molecules are polar ✓
- HCN has dipole-dipole forces and H₂O has (dipole-dipole forces) hydrogen bonds ✓
- Like dissolve like. ✓

- *HCN het polêre molekules met dipool-dipoolkragte.*
- *H₂O het polêre molekules met waterstofbindings.*
- *Indien die intermolekulêre kragte van dieselfde orde is, sal stowwe oplos*

OF

- *Beide molekules is polêr ✓*
- *HCN het dipool-dipool kragte en H₂O het (dipool-dipool kragte) waterstofbindings ✓*
- *Soort los op in soort ✓*

(3)
[17]

QUESTION 3/VRAAG 3

3.1

- NH₃ has hydrogen bonds between the molecules ✓
- N₂ has London forces/induced dipole forces ✓
- NH₃ has stronger intermolecular forces than N₂ and therefore a higher boiling point than N₂ ✓
(Accept: more energy requires to overcome stronger forces of NH₃)

OR

- N₂ has weaker intermolecular forces than NH₃ and therefore a lower boiling point than NH₃
(Accept: less energy requires to overcome weaker forces of H₂)

- *NH₃ het waterstofbindings tussen die molekules*
- *N₂ het Londonkragte/geïnduseerde dipoolkragte*
- *NH₃ het sterker intermolekulêre kragte as N₂ en daarom 'n hoër kookpunt as N₂*

OF

- *N₂ het swakker intermolekulêre kragte as NH₃ en daarom 'n laer kookpunt as NH₃*
(Aanvaar: NH₃ vereis meer energie om sterker kragte te oorkom)

(3)

3.2 H₂ ✓

(1)

3.3

- H_2 and N_2 both have weak London forces/induced dipole forces ✓
- N_2 is a larger molecule/has a greater molecular mass/has a larger surface area than H_2 ✓
- and therefore N_2 has stronger intermolecular forces. ✓

OR

- H_2 is a smaller molecule/has a smaller molecular mass/has a smaller surface area than N_2 ✓
- and therefore H_2 has weaker intermolecular forces. ✓

- *H_2 en N_2 het beide swak Londonkragte/geïnduseerde dipoolkragte*
- *N_2 is 'n groter molekule/groter molekulêre massa/groter oppervlakarea as H_2*
- *en daarom het N_2 sterker intermolekulêre kragte.*

OF

- *H_2 is 'n kleiner molekule/het kleiner molekulêre massa/kleiner oppervlakarea as N_2*
- *en daarom swakker intermolekulêre kragte.*

(3)

3.4

H_2 ✓

It has the weakest intermolecular forces/London forces ✓

It has the lowest boiling point ✓

OR

It has the weakest intermolecular forces/London forces ✓

Boiling point is inversely proportional to vapour pressure ✓

Dit het die swakste intermolekulêre kragte

Dit het die laagste kookpunt

OF

Dit het die swakste intermolekulêre kragte/Londonkragte

Kookpunt is omgekeerd eweredig aan die dampdruk

(3)

[10]

QUESTION 4/VRAAG 4

4.1 Boyle's law/*Boyle se wet* ✓

(1)

| | | |
|-----|--|---|
| 4.2 | Criteria for hypothesis/<i>Riglyne vir hipotese</i> | |
| | The dependent and independent variables are stated correctly. <i>Die afhanklike en onafhanklike veranderlikes korrek genoem.</i> | ✓ |
| | State the relationship between the dependent and independent variables. <i>Stel die verwantskap tussen die afhanklike en onafhanklike veranderlike.</i> | ✓ |
| | Dependent variable/ <i>afhanklike veranderlike</i> : volume Independent variable/ <i>onafhanklike veranderlike</i> : pressure/ <i>druk</i> | |

Example:*/Voorbeeld:*

If the pressure of an enclosed gas increases the volume will decrease at constant temperature.

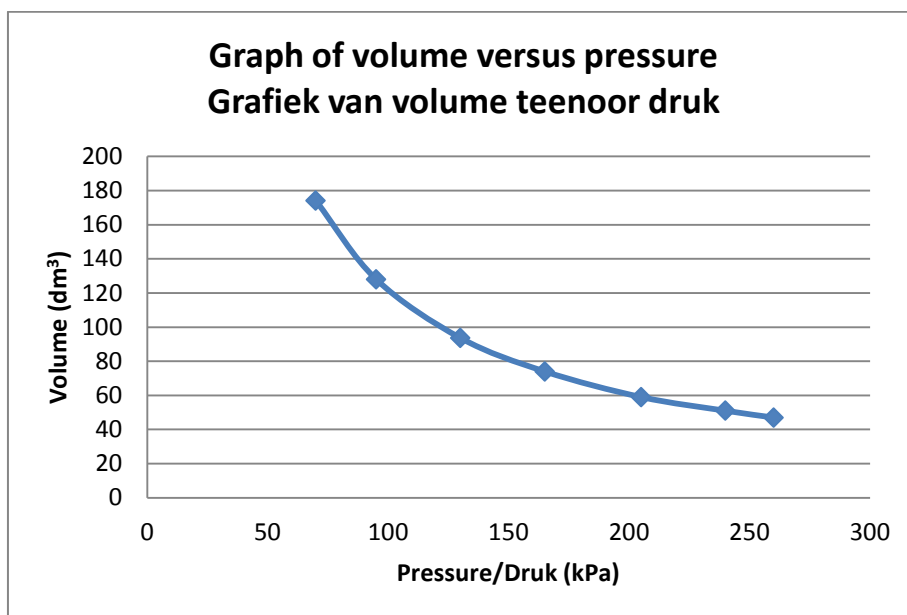
The pressure of an enclosed gas is inversely proportional to the volume it occupies if the temperature is kept constant.

Die druk van 'n ingeslote gas is omgekeerd eweredig aan die volume wat dit beslaan indien die temperatuur konstant gehou word.

Indien die druk van 'n ingeslote gas toeneem, sal die volume afneem.

(2)

4.3



Refer to the last page of the memo for the graph drawn to scale
Verwys na die laaste bladsy van die memo vir die skaalgrafiek

| | |
|--|---|
| Criteria for marking the graph/<i>Nasienkriteria vir grafiek</i> | |
| Use of correct scale on both axis (If learners used table values as scale values maximum $\frac{1}{3}$ for line drawn) <i>Korrekte skaal op die asse</i> (<i>Indien leerders tabelwaardes as skaalwaardes gebruik maksimum $\frac{1}{3}$ vir lyn getrek</i>) | ✓ |
| At least five (5) points plotted correctly <i>Ten minste vyf (5) punte korrek gestip</i> | ✓ |
| Curve is drawn <i>Kurwe getrek</i> | ✓ |

(3)

4.4 Any set of values can be used from the table :
Enige stel waardes vanaf die tabel kan gebruik word:
 $p_1V_1 = p_2V_2 \checkmark$
 $70(174) = (300)V_2 \checkmark$
 $V_2 = 40,6 \text{ dm}^3 \checkmark$
 (Accept/Aanvaar 40,32 – 40,8 dm³) (3)

4.5 At high pressure a gas starts to deviate from ideal gas behaviour ✓
 because the volume of the molecules of a gas and the intermolecular forces start to influence the measured value, causing it to be greater than the theoretical value calculated/Forces of repulsion between the gas particles prevents them from moving closer ✓
By hoë druk sal 'n gas begin afwyk van ideale gasgedrag want die volume van die gasdeeltjies en intermolekulêre kragte begin die waarde van die volume beïnvloed, wat veroorsaak dat die gemete waarde groter is as die berekende waarde/Afstotingskragte veroorsaak dat gasdeeltjies nie nader aan mekaar kan beweeg nie (2)

4.6 Low/Laag ✓ (1)



4.7 Temperature is an indication of the average kinetic energy of the molecules of a gas. If the temperature of a gas decreases, the molecules move slower and closer together ✓ up to a point where the gas will start to condense ✓ and not behave like an ideal gas.
 OR
 The intermolecular forces of attraction becomes significant ✓ then the gas condenses. ✓
Temperatuur is die aanduiding van die gemiddelde kinetiese energie van die molekules van 'n gas. Indien die temperatuur afneem sal die molekules stadiger en nader aan mekaar beweeg tot by die punt waar die gas sal begin kondenseer sodat dit nie meer soos 'n ideale gas optree nie.
 OF
Die intermolekulêre kragte word beduidend en dit veroorsaak dat die gas kondenseer. (2)

4.8 $pV = nRT \checkmark$
 $(70\ 000)(174 \times 10^{-3}) \checkmark = n(8,31)(293) \checkmark$
 $n = 5 \text{ moles} \checkmark$ (4)
[18]

QUESTION 5/VRAAG 5

5.1 $n = \frac{m}{M}$
 $n = \frac{160}{40} \checkmark$
 $n = 4 \text{ mole}$
 $pV = nRT \checkmark$
 $(120\ 000)V \checkmark = (4)(8,31)(288) \checkmark$
 $V = 0,08 \text{ m}^3 \checkmark$ (4)

5.2 **POSITIVE MARKING FROM QUESTION 5.1**
POSITIEWE NASIEN VANAF VRAAG 5.1
OPTION 1/OPSIE 1

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2} \checkmark$$

$$\frac{120(0,08)}{288} = \frac{240V_2}{308} \checkmark$$

$$V_2 = 0,043 \text{ m}^3 \checkmark \quad (427,78 \text{ dm}^3)$$

OPTION 2/OPSIE 2

$$pV = nRT \checkmark$$

$$(240\ 000)V \checkmark = (4)(8,31)(308) \checkmark$$

$$V = 0,043 \text{ m}^3 \checkmark \quad (426,58 \text{ dm}^3)$$

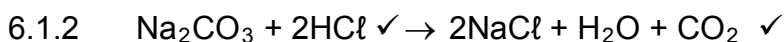
(4)
 [8]

QUESTION 6/VRAAG 6

6.1.1 One mole is the amount of a substance having the same number of particles as there are atoms in 12 g carbon-12. $\checkmark\checkmark$
Een mol is die stofhoeveelheid wat dieselfde getal deeltjies het as wat daar atome in 12 g koolstof-12 is.

[2 or 0]

(2)



(2)

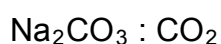
6.1.3 **Mark allocation/Nasienriglyne:**

- Formula for/ *Formule vir* volume \checkmark
- Substitution of 0,306 and 24,45 \checkmark / *Vervanging van 0,306 en 24,45*
- Using ratio/*Gebruik verhouding* \checkmark
- Formula for/*Formule vir* mass \checkmark
- Substitutions of moles \checkmark and 106 \checkmark / *Vervanging van mole en 106*
- Answer with units/*Antwoord met eenheid* \checkmark

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

$$n = \frac{0,306}{24,45} \checkmark$$

$$n = 0,0125 \text{ mol of CO}_2$$



1 : 1 \checkmark (use of the ratio/*gebruik die verhouding*)

$$n = 0,0125 \text{ mol of Na}_2\text{CO}_3$$

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

$$0,0125 = \frac{m}{106} \checkmark$$

$$m = 1,33 \text{ g} \checkmark \quad (1,325 - 1,33 \text{ g})$$

(7)

6.1.4 **POSITIVE MARKING FROM QUESTION 6.3**

POSITIEWE NASIEN VANAF VRAAG 6.3

OPTION 1/OPSIE 1

$$\begin{aligned} \% \text{CaCO}_3 \text{ unreacted} &= \frac{1,5 - 1,33}{1,5} \times 100 \quad \checkmark \\ &= 11,33\% \quad \checkmark \quad (11,33\% - 11,67\%) \end{aligned}$$

OPTION 2/OPSIE 2

$$\% \text{CaCO}_3 \text{ reacted} = \frac{1,33}{1,5} \times 100 = 88,67\% \quad \checkmark$$

$$\% \text{ unreacted} = 100 - 88,67 = 11,33\% \quad \checkmark$$

OPTION 3/OPSIE 3

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

$$n = \frac{1,5}{106}$$

$$n = 0,0142 \text{ mol}$$

$$\text{initial mol} - \text{reacted mol} = 0,0142 - 0,0125 = 0,0017 \text{ mol unreacted}$$

$$\% \text{CaCO}_3 \text{ unreacted} = \frac{0,0017}{0,0142} \times 100 = 11,97\% \quad \checkmark \quad (2)$$

6.2.1 Sulphuric acid \checkmark
Swawelsuur

(1)

6.2.2

| Mark allocation/Punte toekenning: | |
|---|--|
| <ul style="list-style-type: none"> Any one of the formulae/Enige een van formules ✓ Substitution of/Vervanging van 3 g (5 g – 2 g) ✓ Ratio/Verhouding 1:1 ✓ Substitution of moles and volume in dm^3 /Vervanging van mol en volume in dm^3 ✓ Answer with units/Antwoord met eenheid ✓ | |
| <p>OPTION 1/OPSIE 1</p> $n = \frac{m}{M}$ $= \frac{3}{65} \checkmark \quad (5 - 2)$ <p>= 0,0462 mol of Zn</p> <p>Ratio Zn : H₂SO₄ 1 : 1 ✓</p> <p>n(H₂SO₄) = 0,0462 mol</p> $c = \frac{n}{V}$ $= \frac{0,0462}{0,05} \checkmark$ <p>= 0,92 mol·dm⁻³ ✓</p> | <p>OPTION 2/OPSIE 2</p> $n = \frac{m}{M}$ $= \frac{3}{65} \checkmark$ <p>= 0,0462 mol of Zn</p> <p>Ratio Zn : H₂SO₄ 1 : 1 ✓</p> <p>n(H₂SO₄) = 0,0462 mol</p> $m = nM$ $= (0,0462)(98)$ <p>= 4,5276 g of H₂SO₄</p> $c = \frac{m}{MV}$ $= \frac{4,5276}{(98)(0,05)} \checkmark$ <p>= 0,92 mol·dm⁻³ ✓</p> |
| <p>OPTION 3/OPSIE 3</p> $n = \frac{m}{M}$ $= \frac{5}{65}$ <p>= 0,0769 mol of Zn initial</p> $n = \frac{m}{M}$ $= \frac{2}{65}$ <p>= 0,0308 mol of Zn final</p> <p>n_{used} = 0,0769 ✓ – 0,0308 = 0,0461 mol</p> <p>Ratio Zn : H₂SO₄ 1 : 1 ✓</p> <p>n(H₂SO₄) = 0,0461 mol</p> $c = \frac{n}{V}$ $= \frac{0,0461}{0,05} \checkmark$ <p>= 0,92 mol·dm⁻³ ✓</p> | <p>✓ any one of the two formula/Enige een van formules</p> |

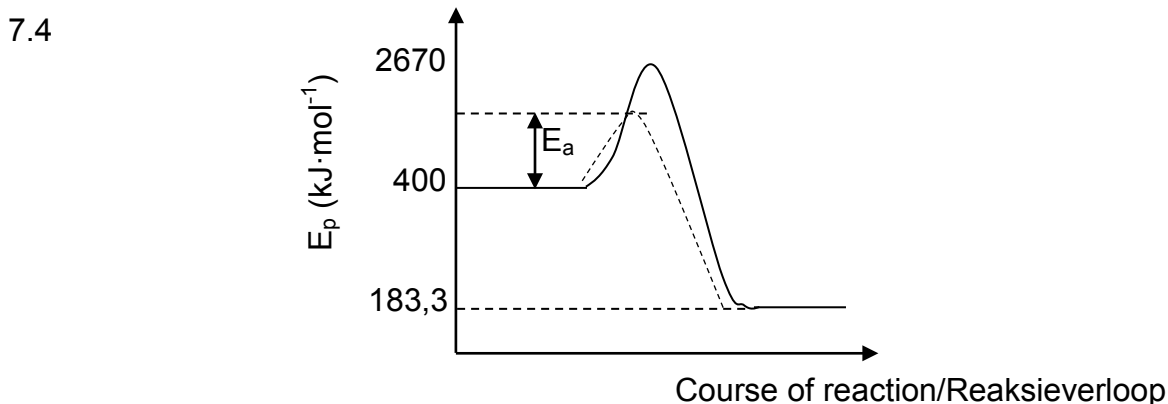
(5)
[19]

QUESTION 7/VRAAG 7

7.1 The minimum energy needed for a reaction to take place. ✓✓
Die minimum energie benodig vir die reaksie om plaas te vind.
[2 or 0] (2)

7.2 More energy is released than absorbed **OR** energy of products is less than energy of reactants **OR** $\Delta H < 0$ **OR** ΔH is negative ✓
*Meer energie word afgegee as opgeneem **OF** energie van die produkte is minder as die energie van reaktante **OF** $\Delta H < 0$ **OF** ΔH is negatief* (1)

7.3 $\Delta H = H_{\text{products}} - H_{\text{reactants}}$
 $= 183,3 - 400$ ✓
 $= -216,7 \text{ kJ}\cdot\text{mol}^{-1}$ ✓ (3)



| Criteria for marking/Nasienkriteria | |
|--|---|
| Lower curved line/Laer kurwelyn | ✓ |
| Lower activation energy indicated <i>Laer aktiveringsenergie aangedui</i> | ✓ |

(2)

7.5 One mole of any gas occupies the same volume at the same temperature and pressure. ✓✓
Een mol van enige gas beslaan dieselfde volume by dieselfde temperatuur en druk.
[2 or 0] (2)

7.6

OPTION 1/OPSIE 1

| | 4NH ₃ | 5O ₂ | 4NO | 6H ₂ O | |
|---------------|------------------|-----------------|-----|-------------------|---------|
| Initial vol | 6 | 9 ✓ | 0 | 0 | |
| Change in vol | 6 | 7,5 | 6 | 9 | Ratio ✓ |
| Final vol | 0 | 1,5 | 6 | 9 | |

$$\text{Total volume} = 1,5 + 6 + 9 = 16,5 \text{ dm}^3 \quad \checkmark$$

OPTION 2/OPSIE 2

Mol ratio 4 : 5 : 4 : 6 from balanced equation

Mol verhouding 4 : 5 : 4 : 6 vanuit gebalanseerde vergelyking

Volume ratio reacting 6 : 7,5 : 6 : 9 ✓

*Volume verhouding wat reageer 6 : 7,5 : 6 : 9*O₂ in excess/in oormaatOnly/Slegs 7,5 dm³ of/van 9 dm³ reacts/reageer

$$9 - 7,5 = 1,5 \text{ dm}^3 \quad \checkmark$$

$$\text{Total volume at the end of reaction} = 6 + 9 + 1,5 = 16,5 \text{ dm}^3 \quad \checkmark$$

$$\text{Totale volume aan die einde van die reaksie} = 6 + 9 + 1,5 = 16,5 \text{ dm}^3 \quad (4)$$

7.7

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

$$n(\text{H}) = \frac{1,59}{1} \quad \checkmark$$

$$= 1,59 \text{ mol}$$

$$n(\text{N}) = \frac{22,2}{14} \quad \checkmark$$

$$= 1,5857 \text{ mol}$$

$$n(\text{O}) = \frac{76,2}{16} \quad \checkmark$$

$$= 4,625 \text{ mol}$$

$$\begin{array}{ccc} \text{H} & : & \text{N} & : & \text{O} \\ 1,59 & : & 1,5857 & : & 4,625 \\ \hline 1,5857 & : & 1,5857 & : & 1,5857 \\ \hline 1 & : & 1 & : & 3 \end{array}$$

✓ divide by smallest number/
deel deur kleinste getal

Empirical formula/*Empiriese formule* is HNO₃ ✓(5)
[19]

QUESTION 8/VRAAG 8

8.1 A hydroxide ion can act as proton acceptor. ✓✓
'n Hidroksiedioon kan optree as protonontvanger. (2)

8.2 Dative covalent bond ✓
Datiefkovalente binding (1)

8.3 $\text{HCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \checkmark \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \checkmark$
OR/OF
 $\text{HCl}(\text{aq}) + \text{NH}_3(\text{g}) \checkmark \rightarrow \text{NH}_4^+(\text{aq}) + \text{Cl}^-(\text{aq}) \checkmark$ (2)

8.4 Concentration is the amount of solute per litre of solution. ✓✓
Konsentrasie is die hoeveelheid opgeloste stof per liter van 'n oplossing.
OR/OF
Concentration is the number of moles of a substance per dm^3 of solution.
Konsentrasie is die aantal mol van 'n stof per dm^3 –oplossing. (2)

| | |
|---|--|
| <p>8.5</p> <p>OPTION 1/OPSIE 1</p> $c = \frac{n}{V} \checkmark$ $0,75 = \frac{n}{5} \checkmark$ $n = 3,75 \text{ mol}$ $c = \frac{n}{V}$ $= \frac{3,75}{1000} \checkmark$ $= 3,75 \times 10^{-3} \text{ mol} \cdot \text{dm}^{-3} \checkmark$ | <p>OPTION 2/OPSIE 2</p> $c_1V_1 = c_2V_2 \checkmark$ $(0,75)(5) \checkmark = c_2(1000) \checkmark$ $c_2 = 3,75 \times 10^{-3} \text{ mol} \cdot \text{dm}^{-3} \checkmark$ <p>OPTION 3/OPSIE 3</p> $\frac{\checkmark 5}{1000 \checkmark} = \frac{c}{0,75} \checkmark$ $c = 3,75 \times 10^{-3} \text{ mol} \cdot \text{dm}^{-3} \checkmark$ |
|---|--|

(4)

8.6 **Mark allocation/Punte toekenning**

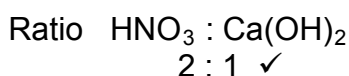
- Usage of formula(e) of $c = n/V$ and/or $n = m/M$
- Usage or calculation of number of moles (3,75 mol) of HNO_3
- Ratio/*Verhouding* 2:1
- Usage of $74 \text{ g}\cdot\text{mol}^{-1}$ in formula $n = m/M$
- Answer/*Antwoord*
- Correct conclusion/*Korrekte gevolgtrekking*

OPTION 1/OPSIE 1

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

$$0,75 = \frac{n}{5}$$

$$n = 3,75 \text{ mol} \checkmark$$



$$n(\text{Ca(OH)}_2) = 1,875 \text{ mol}$$

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

$$1,875 = \frac{m}{74} \checkmark$$

$$m = 138,75 \text{ g} \checkmark$$

No, it is insufficient. \checkmark

Nee, dit is nie genoeg nie

**POSITIVE MARKING FROM 8.5
POSITIEWE NASIEN VANAF 8.5**

OPTION 3/OPSIE 3

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

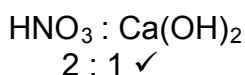
$$n = \frac{120}{74} \checkmark$$

$$n = 1,62 \text{ mol}$$

$$n = cV$$

$$= 3,75 \times 10^{-3}(1000)$$

$$= 3,75 \text{ mol} \checkmark$$



$$n(\text{Ca(OH)}_2) = \frac{1}{2}(3,75) \\ = 1,875 \text{ mol} \checkmark$$

$$1,875 > 1,62 \text{ mol}$$

No it is insufficient \checkmark

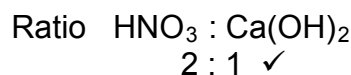
Nee dis nie genoeg nie

**POSITIVE MARKING FROM 8.5
POSITIEWE NASIEN VANAF 8.5
OPTION 2/OPSIE 2**

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

$$3,75 \times 10^{-3} = \frac{n}{1000}$$

$$n = 3,75 \text{ mol} \checkmark$$



$$n(\text{Ca(OH)}_2) = 1,875 \text{ mol}$$

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

$$1,875 = \frac{m}{74} \checkmark$$

$$m = 138,75 \text{ g} \checkmark$$

No, it is insufficient. \checkmark

Nee, dit is nie genoeg nie

\checkmark any one of the two formula/Enige een van formules

\checkmark any one of the two formula/Enige een van formules

\checkmark any one of the two formula/Enige een van formules

QUESTION 9/VRAAG 9

- 9.1 Reduction is a decrease in oxidation number ✓✓
Reduksie is die afname in oksidasiegetalle (2)
- 9.2 Mn is +7 / Mn⁷⁺ ✓ (1)
- 9.3 H₂S / S²⁻ ✓ (1)
- 9.4 The oxidation number of S increases ✓ from -2 to 0 ✓
Die oksidasiegetal van S neem toe van -2 na 0 (2)
- 9.5 MnO₄⁻ / Mn⁺⁷ ✓ (1)
- 9.6 H₂S(g) → S + 2H⁺ + 2e⁻ ✓✓ (2)
- 9.7 H₂S → S + 2H⁺ + 2e⁻
MnO₄⁻ + 8H⁺ + 5e⁻ → 2Mn²⁺ + 4H₂O ✓

2MnO₄⁻ + 5H₂S + 6H⁺ → 2Mn²⁺ + 5S + 8H₂O ✓ balancing ✓ equation (3)
- [12]**

QUESTION 10/VRAAG10

- 10.1
 - Dangerous for workers because they can be trapped underground. ✓
 - Sinkholes ✓
 (Any relevant answer)
 - *Gevaarlik vir werkers want hulle kan ondergronds vasgekeer word*
 - *Sinkgate*
 (Enige relevante antwoord) (2)
- 10.2 O₂ ✓ (1)
- 10.3 Oxidation number of O decreases from 0 (in O₂) to -2 (in NaOH) ✓
Die oksidasiegetal van O neem af van 0 (in O₂) na -2 (in NaOH) (1)
- 10.4 Fe³⁺ + 3e⁻ → Fe ✓✓ (2)
- 10.5 %Fe = $\frac{2(56)}{160} \times 100\%$ ✓
= 70 % ✓ (2)
- 10.6 m(Fe) = (0,65)(2 500) ✓ or/of $\frac{65}{100}(2\ 500)$
= 1 625 kg Fe extracted/*ontgin* ✓ (Accept/Aanvaar 1,625 x 10⁶ g) (2)
- [10]**

TOTAL/TOTAAL: 150

**SUBMIT THIS SHEET WITH THE ANSWER BOOK/
LEWER SAAM MET DIE ANTWOORDEBOEK IN**

NAME/NAAM _____ CLASS/KLAS _____

QUESTION/VRAAG 4.3

