



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

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

EXEMPLAR/MODEL 2012

MEMORANDUM

MARKS/PUNTE: 150

**This memorandum consists of 10 pages.
Hierdie memorandum bestaan uit 10 bladsye.**

QUESTION 1/VRAAG 1

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

QUESTION 2/VRAAG 2

- | | | |
|-------|---|-----|
| 2.1 | | |
| 2.1.1 | F ✓ | (1) |
| 2.1.2 | G ✓ | (1) |
| 2.1.3 | E ✓ | (1) |
| 2.1.4 | B ✓ | (1) |
| 2.1.5 | A ✓ | (1) |
| 2.1.6 | C ✓ | (1) |
| 2.1.7 | D ✓ | (1) |
| 2.2 | Phase change (directly) ✓ from solid to gas. ✓
<i>Faseverandering (direk) ✓ van vaste stof na gas. ✓</i> | (2) |

- 2.3 Due to the higher temperature outside:
Particles have higher average kinetic energy./Particles vibrate (move) faster. ✓
Forces of attraction (between molecules) become weaker. ✓
Regular pattern (structure) breaks down./Phase change starts to occur. ✓

Weens die hoër temperatuur buite:

Deeltjies het hoër gemiddelde kinetiese energie./Deeltjies vibreer vinniger. ✓

Aantrekkingskragte (tussen molekule) word swakker. ✓

Reëlmatige patroon (struktuur) word afgebreek. /Faseverandering begin plaasvind. ✓

(3)
[12]

QUESTION 3/VRAAG 3

- 3.1
3.1.1 54 °C ✓ (1)
3.1.2 93 °C ✓ (1)
3.2 No ✓
Melting point is not 0 °C./Boiling point is below 100 °C. ✓

Nee ✓
Smeltpunt is nie 0 °C nie./Kookpunt is minder as 100 °C. ✓ (2)
3.3
3.3.1 Liquid ✓ and gas ✓ (2)
Vloeistof ✓ en gas ✓
3.3.2 Solid/Vaste stof ✓ (1)
3.4 Remains constant. ✓
Energy is used to break bonds during the phase change. ✓
No energy available to increase kinetic energy of particles. ✓

Bly konstant ✓
Energie word gebruik om bindings te breek tydens die faseverandering. ✓
Geen energie is beskikbaar om die kinetiese energie van deeltjies te verhoog
nie. ✓ (3)
[10]

QUESTION 4/VRAAG 4

4.1

4.1.1 Table salt/Tafelsout ✓

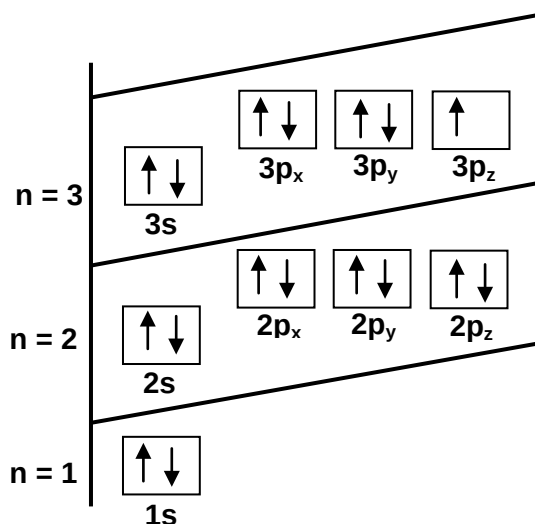
(1)

4.1.2 NaCl ✓

(1)

4.2

4.2.1



Criteria for Aufbau diagram:/Riglyne vir Aufbau-diagram:	
Two paired electrons shown in block/circle as opposite pointing arrows in 1 st energy level. <i>Twee gepaarde elektrone in blokkie/sirkel, as pyltjies wat in teenoorgestelde rigting wys, in die 1^{ste} energievlak aangetoon.</i>	✓
Eight paired electrons shown in 4 blocks/circles as opposite pointing arrows in 2 nd energy level. <i>Agt gepaarde elektrone in 4 blokkies/sirkels, as pyltjies wat in teenoorgestelde rigting wys, in die 2^{de} energievlak aangetoon.</i>	✓
Six paired electrons shown in 3 blocks/circles as opposite pointing arrows and one unpaired electron shown as arrow in 3 rd energy level. <i>Ses gepaarde elektrone in 3 blokkies/sirkels, as pyltjies wat in teenoorgestelde rigting wys, en een ongepaarde elektron in blokkie in die 3^{de} energievlak aangetoon.</i>	✓

(3)

4.2.2 7 ✓

(1)

4.3

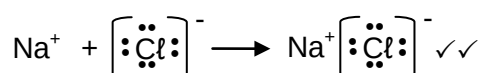
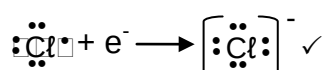
4.3.1 1s²2s²sp⁶ ✓3s¹ ✓

(2)

4.3.2 11 ✓

(1)

4.4 Na• → Na⁺ + e⁻ ✓



(4)

4.5 Ionic (lattice) ✓
Ioniese (rooster) ✓ (1)

4.6

4.6.1 A group of two or more atoms bonded covalently ✓
 and that behave as a unit in chemical reactions. ✓

*'n Groep van twee of meer atome wat kovalent gebind is ✓
 en wat as 'n eenheid in chemiese reaksies optree. ✓*

(2)

4.6.2 Covalent bond/Kovalente binding ✓

(1)

4.6.3 $\text{:}\ddot{\text{Cl}}\text{:}\ddot{\text{Cl}}\text{:}$ ✓✓

Criteria/Riglyne:

- Symbols of two chlorine atoms shown with two electrons shown as dots/crosses between them. ✓
Simbole van twee chlooratome getoon met twee elektrone aangedui as kolle/kruise tussen hulle. ✓
- Another 6 electrons as pairs placed around each chlorine atom. ✓
6 ander elektrone as pare rondom elke chlooratoom geplaas. ✓

(2)

[19]

QUESTION 5/VRAAG 5

5.1

5.1.1 S ✓

(1)

5.1.2 S ✓

(1)

5.1.3 Q ✓

(1)

5.2

5.2.1 Q ✓ & Y ✓

(2)

5.2.2 (Group/Groep) 1 ✓

(1)

5.3

5.3.1 R ✓

(1)

5.3.2 Brick-red/Yellow-red ✓
Baksteenrooi/Geelrooi ✓

(1)

5.4

5.4.1 Q_2P ✓
 Accept/Aanvaar: Li_2S

(1)

5.4.2 RT_2 ✓

Accept/Aanvaar: CaCl_2

(1)

5.5 $^{37}_{17}\text{Cl}$ ✓✓✓

Criteria/Riglyne:

- Correctly identified as Cl /Korrek as Cl geïdentifiseer ✓
 A = 37 ✓
 Z = 17 ✓

(3)

5.6

5.6.1 Atoms of the same element/Atoms with the same atomic numbers, but different mass numbers (due to difference in number of neutrons). ✓ (2)

Atome van dieselfde element/Atome met dieselfde atoomgetal, maar verskillende massagetalle (as gevolg van 'n verskil in die aantal neutrone.) ✓

5.6.2 Relative atomic mass/Relatiewe atoommassa $= \frac{5(23) + 15(25)}{20}$
 $= 24,5$ ✓ (4)
[19]

QUESTION 6/VRAAG 6

6.1

6.1.1 (ii) ✓ (1)

6.1.2 (i) ✓ (1)

6.2 Gaseous phase/Gas ✓
Gasfase/Gas ✓ (1)

6.3 $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ ✓ Bal. ✓ Phases/fases ✓

Reactants ✓	Products ✓	Balancing ✓	Phases ✓
Reaktanse ✓	Produkke ✓	Balansering ✓	Fases ✓

 (4)

6.4 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_3(\text{g})$ ✓ (1)

6.5 Law of conservation of mass ✓
Wet van behoud van massa ✓ (1)

6.6 Reactants/Reaktanse:
 $m(2\text{SO}_2) + m(\text{O}_2) = 2(32 + 32) + 32 = 128 + 32 = 160 \text{ g}$ ✓

Products/Produkke:
 $m(2\text{SO}_3) = 2(32 + 48) = 160 \text{ g}$ ✓

Mass(reactants) = mass(products) ✓
Massa(reaktanse) = massa(produkke) ✓ (3)
[12]

QUESTION 7/VRAAG 7

7.1

7.1.1 No free/mobile ions. ✓
Geen vrye/beweeglike ione nie. ✓ (1)

7.1.2 Electrolyte/Elektroliet ✓ (1)

7.1.3 NH_4^+ ✓ & NO_3^- ✓ (2)

7.1.4

<u>OPTION 1/OPSIE 1</u>	<u>OPTION 2/OPSIE 2</u>
$n(\text{NH}_4\text{NO}_3) = \frac{m}{M} \checkmark$ $= \frac{15}{80} \checkmark$ $= 0,19 \text{ mol}$ $c(\text{NH}_4\text{NO}_3) = \frac{n}{V} \checkmark$ $= \frac{0,19}{250 \times 10^{-3}} \checkmark$ $= 0,75 \text{ mol} \cdot \text{dm}^{-3} \checkmark$	$c((\text{NH}_4\text{NO}_3) = \frac{m}{MV} \checkmark \checkmark$ $= \frac{15}{(80)(250 \times 10^{-3})} \checkmark \checkmark$ $= 0,75 \text{ mol} \cdot \text{dm}^{-3} \checkmark$

(5)

7.2

7.2.1 Barium sulphate/*Bariumsulfaat* ✓
 BaSO_4 ✓ (2)

7.2.2 To ensure the precipitate is indeed a sulphate./Barium sulphate is insoluble in nitric acid. ✓
Om te bevestig dat die presipitaat wel 'n sulfaat is./Bariumsulfaat is onoplosbaar in salpetersuur. ✓ (1)

7.2.3 B ✓✓ (2)

7.3

7.3.1 $\text{BaCl}_2(\text{aq}) + \text{MgSO}_4(\text{aq}) \checkmark \rightarrow \text{BaSO}_4(\text{s}) + \text{MgCl}_2(\text{aq}) \checkmark$ Bal. ✓ Phases: ✓

Reactants ✓	Products ✓	Balancing ✓	Phases ✓
<i>Reaktanse</i> ✓	<i>Produkke</i> ✓	<i>Balansering</i> ✓	<i>Fases</i> ✓

(4)

7.3.2 Precipitation reaction/*Presipitasie*reaksie ✓ (1)

[19]

QUESTION 8/VRAAG 8

8.1

8.1.1

$$\begin{aligned} n(\text{Mg}) &= \frac{m}{M} \\ &= \frac{1,5}{24} \checkmark \\ &= 0,0625 \text{ mol} \end{aligned}$$

$$n(\text{H}_2) = n(\text{Mg}) = 0,0625 \text{ mol} \checkmark$$

$$\begin{aligned} m(\text{H}_2) &= nM \\ &= (0,0625) (2) \checkmark \\ &= 0,125 \text{ g} \checkmark \end{aligned}$$

✓ Any one/Enige een

(5)

8.1.2 **POSITIVE MARKING FROM QUESTION 8.1.1**
POSITIEWE NASIEN VAN VRAAG 8.1.1

$$n(\text{H}_2) = \frac{V}{V_m} \checkmark$$

$$0,0625 = \frac{V}{22,4} \checkmark$$

$$\therefore V = 1,4 \text{ dm}^3 \checkmark$$

(3)

8.1.3 **POSITIVE MARKING FROM QUESTION 8.1.1**
POSITIEWE NASIEN VAN VRAAG 8.1.1

$$n(\text{MgCl}_2) = \frac{m}{M} \checkmark$$

$$0,0625 \checkmark = \frac{m}{95} \checkmark$$

$$\therefore m = 5,94 \text{ g} \checkmark$$

(4)

8.1.4 **POSITIVE MARKING FROM QUESTION 8.1.1**
POSITIEWE NASIEN VAN VRAAG 8.1.1

$$n(\text{Cl}) = \frac{N}{N_A} \checkmark$$

$$\underline{2(0,0625)} \checkmark = \frac{N}{6,02 \times 10^{23}} \checkmark$$

$$\therefore N(\text{Cl atoms/atome}) = 7,53 \times 10^{22} \checkmark$$

(3)

8.2 $M(\text{Na}_2\text{CO}_3) = 106 \text{ g} \cdot \text{mol}^{-1} \checkmark$
 $M(\text{xH}_2\text{O}) = 268 - 106 = 162 \text{ g} \cdot \text{mol}^{-1} \checkmark$

$$n(\text{H}_2\text{O}) = \frac{162}{18} \checkmark = 9 \text{ mol} \checkmark$$

(4)

8.3

8.3.1 The formula which gives the simplest whole-number ratio of atoms in the compound. ✓✓

Die formule wat die eenvoudigste heelgetalverhouding van atome in die verbinding voorstel. ✓✓

(2)

8.3.2 In 100 g of compound/*In 100 g van die verbinding:*

71,65g Cl; 24,27 g C and 4,07 g H

$$n(\text{Cl}) = \frac{71,65}{35,5} = 2,02 \text{ mol } \checkmark$$

$$n(\text{C}) = \frac{24,27}{12} = 2,02 \text{ mol } \checkmark$$

$$n(\text{H}) = \frac{4,07}{1} = 4,07 \text{ mol } \checkmark$$

Whole number ratio/*Heelgetalverhouding:*

$$\frac{2,02}{2,02} : \frac{2,02}{2,02} : \frac{4,07}{2,02} \checkmark$$

$$\text{C} : \text{H} : \text{Cl} = 1 : 2 : 1$$

Empirical formula/*Empiriese formule* = CH₂Cl ✓

(5)

[26]

QUESTION 9/VRAAG 9

9.1

9.1.1 Evaporation/*Verdamping* ✓

(1)

9.1.2 Condensation/*Kondensasie* ✓

(1)

9.1.3 Transpiration/*Transpirasie* ✓

(1)

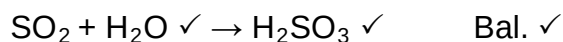
9.2

9.2.1 (Sample/*Monster*) 1 ✓

Too acidic/*Té suur* ✓

(2)

9.2.2



Reactants ✓

Products ✓

Balancing ✓

Reaktanse ✓

Produkke ✓

Balansering ✓

(3)

9.2.3 **ANY ONE/ENIGE EEN:**

- Destroy/Damage/Harm plants. ✓

Vernietig/Beskadig plante. ✓

- Less food for animals due to damage to plants/crops.

Minder voedsel vir diere as gevolg van skade aan plante/gewasse.

(1)

9.3

9.3.1 **ANY ONE/ENIGE EEN:**

- Disinfectant/*Ontsmettingsmiddel* ✓✓
- Destroy harmful bacteria/organisms
Vernietig skadelike bakterieë/organismes

(2)

9.3.2 AgNO_3 /Silver nitrate/*Silwernittraat* ✓✓

(2)

[13]

TOTAL/TOTAAL: 150