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. ✓
Faseverandering (direk)✓van vaste stof na gas. ✓ (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. /Fasever-andering 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*

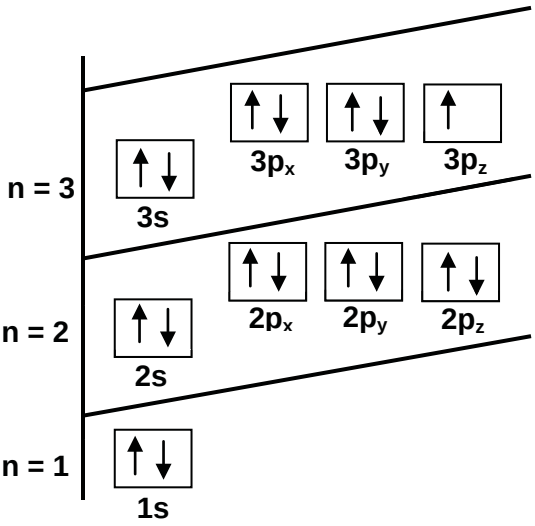
4.1

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 1st energy level. *Twee gepaarde elektrone in blokkie/sirkel, as pyltjies wat in teenoorgestelde rigting wys, in die 1ste energievlak aangetoon.*	✓
Eight paired electrons shown in 4 blocks/circles as opposite pointing arrows in 2nd energy level. *Agt gepaarde elektrone in 4 blokkies/sirkels, as pyltjies wat in teenoorgestelde rigting wys, in die 2de energievlak aangetoon.*	✓
Six paired electrons shown in 3 blocks/circles as opposite pointing arrows and one unpaired electron shown as arrow in 3rd energy level. *Ses gepaarde elektrone in 3 blokkies/sirkels, as pyltjies wat in teenoorgestelde rigting wys, en een ongepaarde elektron in blokkie in die 3de energievlak aangetoon.*	✓

(3)

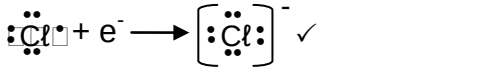
4.2.2 7 ✓ (1)

4.3

4.3.1 $1s^2 2s^2 sp^6$ ✓ $3s^1$ ✓ (2)

4.3.2 11 ✓ (1)

4.4 $Na\bullet \rightarrow Na^+ + e^-$ ✓



✓

✓✓

(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  ✓✓

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*: $CaC\ell_2$ (1)

5.5 $^{37}_{17}C\ell$ ✓✓✓

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, m*aar ✓
verskillende massagetalle (as gevolg van 'n verskil in die aantal neutrone.) ✓

5.6.2 Relative atomic mass/*Relatiewe atoommassa* $= \frac{5(23)^{\checkmark} + 15(25)^{\checkmark}}{20^{\checkmark}}$
$= 24{,}5$ ✓ (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 $CaCO_3(s)$ ✓→ $CaO(s) + CO_2(g)$ ✓ Bal. ✓ Phases/*fases* ✓

Reactants ✓	Products ✓	Balancing ✓	Phases ✓
Reaktanse ✓	*Produkte* ✓	*Balansering* ✓	*Fases* ✓

(4)

6.4 $2SO_2(g) + O_2(g) \rightarrow SO_3(g)$ ✓ (1)

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

6.6 Reactants/*Reaktanse*:
$m(2SO_2) + m(O_2) = 2(32 + 32) + 32 = 128 + 32 = 160$ g ✓

Products/*Produkte*:
$m(2SO_3) = 2(32 + 48) = 160$ g ✓

Mass(reactants) = mass(products) ✓
Massa(reaktanse) = massa(produkte) ✓ (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

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$n(NH_4NO_3) = \frac{m}{M}$ ✓ $= \frac{15}{80}$ ✓ $= 0,19$ mol $c(NH_4NO_3) = \frac{n}{V}$ ✓ $= \frac{0,19}{250 \times 10^{-3}}$ ✓ $= 0,75$ mol·dm^{-3} ✓	$c((NH_4NO_3) = \frac{m}{MV}$ ✓✓ $= \frac{15}{(80)(250 \times 10^{-3})}$ ✓✓ $= 0,75$ mol·dm^{-3} ✓

(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 $BaC\ell_2(aq) + MgSO_4(aq)$ ✓→ $BaSO_4(s) + MgC\ell_2(aq)$ ✓ Bal. ✓ Phases: ✓

Reactants ✓	Products ✓	Balancing ✓	Phases ✓
Reaktanse ✓	*Produkte* ✓	*Balansering* ✓	*Fases* ✓

(4)

7.3.2 Precipitation reaction/*Presipitasiereaksie* ✓ (1)
[19]

QUESTION 8/*VRAAG 8*

8.1

8.1.1 $n(Mg) = \frac{m}{M}$

$= \frac{1,5}{24}$ ✓

$= 0,0625$ mol

$n(H_2) = n(Mg) = 0,0625$ mol ✓

$m(H_2) = nM$

$= (0,625)\ (2)$✓

$= 0,125$ g ✓

✓ Any one/*Enige een*

(5)

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

$n(H_2) = \frac{V}{V_m}$ ✓

$0,0625 = \frac{V}{22,4}$ ✓

$\therefore$ V = 1,4 dm^3 ✓ (3)

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

$n(MgC\ell_2) = \frac{m}{M}$ ✓

$0,0625$ ✓ $= \frac{m}{95}$ ✓

$\therefore$ m = 5,94 g ✓ (4)

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

$n(C\ell) = \frac{N}{N_A}$ ✓

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

$\therefore$ N(Cℓ atoms/*atome*) = $7,53 \times 10^{22}$ ✓ (3)

8.2 $M(Na_2CO_3) = 106$ g·mol^{-1} ✓

$M(xH_2O) = 268 - 106 = 162$ g·mol^{-1} ✓

$n(H_2O) = \frac{162}{18}$ ✓ = 9 mol ✓ (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

$n(C\ell) = \frac{71,65}{35,5}$ = 2,02 mol ✓

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

$n(H) = \frac{4,07}{1}$ = 4,07 mol ✓

Whole number ratio/*Heelgetalverhouding:*

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

C : H : Cℓ = 1 : 2 : 1 (5)

Empirical formula/*Empiriese formule* = $CH_2C\ell$ ✓ **[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

$SO_2 + H_2O$ ✓ → H_2SO_3 ✓ Bal. ✓

Reactants ✓	Products ✓	Balancing ✓
Reaktanse ✓	*Produkte* ✓	*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/*Silwernitraat* ✓✓ (2)

[13]

TOTAL/*TOTAAL*: 150