



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)**

NOVEMBER 2018

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 10 pages.
Hierdie nasienriglyne bestaan uit 10 bladsye.**

**NOTE/NOTA: Ignore 1.4/ Ignoreer 1.4 and
Question 8.4 molecular formula not in CAPS /Vraag 8.4 molekulere
formule nie in KABV
MARKS/PUNTE: 141**

QUESTION 1/VRAAG 1

- 1.1 C ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 B ✓✓ (2)
- 1.4 (Ignore this question/*Ignoreer hierdie vraag*)
- 1.5 A ✓✓ (2)
- 1.6 D ✓✓ (2)
- 1.7 C ✓✓ (2)
- 1.8 C ✓✓ (2)
- 1.9 D ✓✓ (2)
- 1.10 C ✓✓ (2)
- [18]**

QUESTION 2/VRAAG 2

- 2.1 A pure substance consisting of one type of atom. ✓✓/*'n Suiwer stof wat uit een tipe atoom bestaan.* (2)
- 2.2.1 P ✓ (1)
- 2.2.2 Q ✓ (1)
- 2.2.3 R ✓ (1)
- 2.3 Element ✓ (1)
- 2.4 Evaporation ✓/*Verdamping* (1)
- 2.5.1 Q: Boiling point ✓/*Kookpunt* (1)
- 2.5.2 R: Magnetism ✓/*Magnetisme* (1)
- [9]**

QUESTION 3/VRAAG 3

3.1 The temperature of the liquid at which the vapour pressure equals the external (atmospheric) pressure. ✓✓/Die temperatuur van die vloeistof waarteen die dampdruk aan die eksterne (atmosferiese) druk gelyk is. (2)

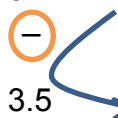
3.2.1 80 °C ✓ (1)

3.2.2 D ✓ (1)

3.2.3 C ✓ (1)

3.3 Liquid changes to gas ✓/Vloeistof verander na gas (1)

3.4 Remains the same. ✓/Bly dieselfde (1)

3.5  Energy is used to overcome the intermolecular forces. ✓/Energie word gebruik om die intermolekulêre kragte te oorkom. No energy available to increase the kinetic energy of the particles. ✓/Geen energie beskikbaar om die kinetiese energie van die partikels te verhoog nie. (2)

3.6 A ✓
 Lowest boiling point. ✓✓/Laagste kookpunt

OR/OF

Highest vapour pressure at a specific temperature./Hoogste dampdruk by 'n spesifieke temperatuur (3)

3.7 Vapour pressure increases with an increase in temperature. ✓✓/Dampdruk verhoog wanneer temperatuur verhoog.

OR/OF

Vapour pressure is proportional to temperature. ✓✓/Dampdruk is direk eweredig aan temperatuur. (2)

[14]

QUESTION 4/VRAAG 4

4.1 The number of protons in an atom of an element ✓✓/Die aantal protone in 'n atoom van 'n element (2)

4.2.1 $^{30}_{14}\text{Si}$ ✓✓ $^{28}_{14}\text{Si}$ ✓

- Identification of element (Si)/ Identifiseer element (Si)✓
- Correct mass number and atomic number (A and Z)/Korrekte massagetal en atoomgetal (A en Z)✓
- No mark for swapping of A and Z/Geen punt indien A en Z omgeruil word

(2)

4.2.2 P ✓ / Sodium / Na/ Natrium (1)

4.2.3 S^{2-} ✓✓

- Identification of correct element (S)/Identifiseer korrekte element (S)✓
- Correct charge (2-)/Korrekte lading (2-)✓
- Incorrect identification of element/Verkeerde element (0/2)

(2)

4.3.1 Rb_2O ✓✓ (2)

4.3.2 Rb is in the same group as P / Na✓ /Rb is in dieselfde groep as P/ Na
OR/OF Rb is in group 1/Rb is in groep 1
 ∴ has the same valency as P/ Na. ✓/ ∴ het dieselfde valensie as P/ Na. (2)

4.4 Increases. ✓/Neem toe
 From P to R, the atomic radius gets smaller. ✓ **OR/OF** The outer electrons get closer to the nucleus.
 Van P na R raak die atomiese radius kleiner./Die buite-elektrone kom nader aan die kern.
 The attraction between the nucleus and the outer electron gets stronger ✓ ∴ more energy is needed to remove the electrons. ✓/Die aantrekkingskrag tussen die kern en die buite-elektrone raak sterker ∴ meer energie is nodig om die elektrone te verwyder. (4)

4.5 10 (electrons) ✓

2p

↑↓

↑↓

↑↓

✓

2s

↑↓

1s

↑↓

} ✓

(3)

4.6 Hund's rule ✓/Hund se reël (1)

4.7 Relative atomic mass/*Relatiewe atoommassa*:

$$A_r = \frac{(28 \times 92,23 + 29 \times 4,68 + 30 \times 3,09) \checkmark}{100 \checkmark}$$
$$= 28,11 \text{ (u)} \checkmark$$

(3)
[22]

QUESTION 5/VRAAG 5

5.1 A change in which no new substances are formed. ✓✓/In Verandering waarin geen nuwe stowwe gevorm word nie.

OR/OF

A change in which energy changes are small in relation to chemical changes. ✓✓/In Verandering waarin energieveranderinge klein is in vergelyking met chemiese veranderinge.

OR/OF

A change in which mass, number of atoms and molecules are being conserved. ✓✓/In Verandering waarin massa, getal atome en molekule behoue bly.

(2)

5.2.1 X ✓

(1)

5.2.2 Y ✓

(1)

5.3 Sublimation. ✓/Sublimasie

(1)

5.4 Colour change. ✓/Kleurverandering

Formation of gas ✓/Vorming van gas

Formation of a precipitate ✓/Vorming van 'n neerslag

Change in temperature ✓/Verandering in temperatuur (Any two/Enige twee)

(2)

5.5.1 Heat. ✓/Hitte

(1)

5.5.2 $4\text{Fe(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Fe}_2\text{O}_3\text{(s)}$

(4)

Notes/Aantekeninge

- Reactants✓; products✓; phases✓; balancing✓

Reaktanse/produkte/fases/balansering

Marking rule 6.3.10./Nasienreël 6.3.10.

5.6.1 States that, no matter how a chemical compound is prepared, it always contains the same elements in the same proportion by mass. ✓✓/Stel dit dat dit nie saak maak hoe 'n chemiese binding berei word nie; dit bevat altyd dieselfde elemente in dieselfde verhouding by massa.

(2)

5.6.2 **OPTION 1/ OPSIE 1:**

Mass of CO₂ in the 1st sample/Massa van CO₂ in die 1^{ste} monster
= 20 – 11,2 ✓
= 8,8 g

Proportion of CO₂ in the 1st sample/Verhouding van CO₂ in die 1^{ste} monster
= $\frac{8,8}{20}$ ✓

∴ Mass of CO₂ in the 2nd sample/Massa van CO₂ in die 2^{de} monster
= $\frac{8,8}{20} \times 30$ ✓
= 13,2 g ✓

(4)

OPTION 2/ OPSIE 2:	OPTION 3/ OPSIE 3:
100 g CaCO ₃ → 44 g CO ₂ ✓ 30 g CaCO ₃ → x g CO ₂ ✓	20 g CaCO ₃ → 11,2 g CaO ✓ 30 g CaCO ₃ → x g CaO ✓
$x = \frac{30 \times 44}{100}$ ✓	x = 16,83 g CaO
x = 13,2 g ✓	∴ Mass of CO ₂ in the 2 nd sample/ Massa van CO ₂ in die 2 ^{de} monster = 30 – 16,83 ✓ = 13,2 g ✓

[18]

QUESTION 6/VRAAG 6

6.1.1 A ✓ (1)

6.1.2 B ✓ (1)

6.2 It is formed when a pool of delocalised electrons ✓ surround the positive metal ion core. ✓ /Rooster metaal ione met wolk/poel gedelokaliseerde elektrone wat positiewe ioonkerne omring (2)

6.3 Ionic (bond) ✓ /Ioniese (binding) (1)

6.4.1 A pure substance consisting of two or more different elements. ✓ ✓ /'n Suiwer stof wat uit twee of meer verskillende elemente bestaan. (2)

6.4.2 Alkali earth ✓ (metals)/Aardalkali (metale) (1)

6.4.3 1 (one/een) ✓ (1)

6.4.4 $\text{Mg} \bullet \bullet + 2 \begin{bmatrix} \times \times \\ \times \text{Cl} \times \\ \times \times \end{bmatrix} \longrightarrow \text{Mg}^{2+} + 2 \begin{bmatrix} \times \times \times \\ \times \text{Cl} \times \\ \times \times \end{bmatrix}^{-} \longrightarrow \text{MgCl}_2$ (3)
[12]

QUESTION 7/VRAAG 7

7.1 Hydrated: surrounded by water molecules ✓ / Gehidrateer: omring deur water molekules (1)

7.2 $\text{Na}_2\text{CO}_3(\text{s}) \rightarrow 2\text{Na}^+(\text{aq}) + \text{CO}_3^{2-}(\text{aq})$
Products: ✓ Balancing: ✓ / Produkte: / Balansering: (2)

7.3.1 The amount of a substance having the same number of particles as there are atoms in 12 g carbon-12. ✓✓ / Die hoeveelheid van 'n stof met dieselfde getal partikels as wat daar atome in 12 g koolstof-12 is. (2)

7.3.2 Acid-base ✓ / gas forming (reaction) / Suur-basis / gasvormend (reaksie) (1)

7.3.3
$$c(\text{HCl}) = \frac{n(\text{HCl})}{V(\text{HCl})} \checkmark$$
$$1 = \frac{n(\text{HCl})}{0,005} \checkmark$$
$$n = 0,005 \text{ mol} \checkmark$$
 (3)

7.4 POSITIVE MARKING FROM 7.3.3/ POSITIEWE NASIEN VANAF 7.3.3

$n(\text{NaCl}) : n(\text{HCl}) = 1 : 1$
 $n(\text{NaCl}) = \frac{1}{1} \times 0,005 \checkmark$
 $n(\text{NaCl}) = 0,005 \text{ mol}$
 $n(\text{NaCl}) = \frac{m}{M} \checkmark$
 $0,005 \checkmark = \frac{m}{58,5 \checkmark} \checkmark$
 $m = 0,29 \text{ g} \checkmark$

Marking criteria/Nasiengriglyne:

- Using ratio / **Gebruik** verhouding ✓
- Formula / **Formule** $n = \frac{m}{M}$ ✓
- Substituting of / **Invervang** van 0,005 mol ✓ & $58,5 \text{ g} \cdot \text{mol}^{-1}$ ✓ in $n = \frac{m}{M}$
- Final answer / **Finale antwoord**: 0,29 g ✓

(5)
[14]

QUESTION 8/VRAAG 8

8.1 A solution that conducts electricity ✓✓ (through the movement of ions). / 'n Oplossing wat elektrisiteit deur die beweging van ione gelei.
NOTE/LET WEL: If learners refer to movement of electrons, a mark is forfeited / **Indien leerder verwys na beweging van elektrone, penaliseer met 1 punt.** (2)

8.2.1 What is the relationship between a type of substance and its (electrical) conductivity? ✓✓ / **Wat is die verwantskap tussen 'n tipe stof en sy (elektriese) geleidingsvermoë?**

OR/OF

How does a type of substance affect the (electrical) conductivity of a substance? ✓✓/Hoe beïnvloed 'n tipe stof die (elektriese) geleidingsvermoë van 'n stof? (2)

Marking Criteria/Nasienriglyne:	
Dependent and independent variable correctly stated. <i>Afhanklike en onafhanklike veranderlikes korrek genoem.</i>	✓
Ask a question about the relationship between the independent and dependent variables. <i>Vra 'n vraag oor die verwantskap tussen die onafhanklike en afhanklike veranderlikes.</i>	✓

8.2.2 Conductivity ✓/Geleidingsvermoë (1)

8.2.3 Type of a substance ✓/Tipe stof (1)

8.2.4 Mass OR Temperature ✓/Massa OF Temperatuur (1)

8.3.1 A solution of CaCl_2 ✓/'n Oplossing CaCl_2
It is the strongest electrolyte ✓/Dit is die sterkste elektroliet.

OR/OF

It has the highest concentration of (chloride) ions ✓/Dit het die grootste getal (chloried) ione. (2)

8.3.2 A solution of sugar ✓/'n Oplossing van suiker
It contains no free ions. ✓/Dit bevat geen vrye ione nie. (2)

8.4 $n(\text{C}):\text{C}(\text{H}):n(\text{O})$ [ignore this question]

$$\frac{m(\text{C})}{M[\text{C}]} : \frac{m(\text{H})}{M[\text{H}]} : \frac{m(\text{O})}{M[\text{O}]}$$

Assume mass of 100 g of a sample/Aanvaar massa van 100 g van 'n monster

$$\frac{40}{12} \checkmark : \frac{6,67}{1} \checkmark : \frac{53,33}{16} \checkmark$$

$$3,33 : 6,67 : 3,33$$

$$\frac{3,33}{3,33} : \frac{6,67}{3,33} : \frac{3,33}{3,33}$$

$$1 : 2 : 1 \checkmark$$

Empirical formula/Empiriese formule: CH_2O

$$M(\text{CH}_2\text{O}) = 12 + 2 + 16 = 30 \text{ g}\cdot\text{mol}^{-1} \checkmark$$

$$\text{Factor/Faktor} = \frac{180}{30} = 6 \checkmark$$

∴ Molecular formula/Molekulêre formule is: $\text{C}_6\text{H}_{12}\text{O}_6 \checkmark$

(7)
[11]

QUESTION 9/VRAAG 9

9.1 Precipitation reaction ✓/Presipitasiereaksie (1)

9.2.1 Sulphate ✓/Sulfaat (1)

9.2.2 $\text{BaCO}_3 + 2\text{HNO}_3 \checkmark \rightarrow \text{Ba}(\text{NO}_3)_2 + \text{CO}_2 + \text{H}_2\text{O} \checkmark$

Reactants ✓; products ✓; balancing ✓
Reaktanse/produkte/ balansering (3)

9.3.1 $n(\text{Na}_2\text{CO}_3) = \frac{m}{M} \checkmark$
 $= \frac{5}{106} \checkmark$
 $= 0,047 \text{ mol}$
 $n(\text{BaCO}_3) : n(\text{Na}_2\text{CO}_3)$
 $1 : 1 \checkmark$

<p>Marking criteria/Nasienriglyne:</p> <ul style="list-style-type: none">• Formula/Formule $n = \frac{m}{M} \checkmark$• Substitution/Invervanging ✓• Using ratio/Gebruik verhouding ✓• Multiply by/Vermenigvuldiging met $197 \text{ g} \cdot \text{mol}^{-1} \checkmark$ in $n = \frac{m}{M}$• Final answer/Finale antwoord: 9,26 g ✓
--

$m(\text{BaCO}_3) = n \times M$
 $= 0,047 \times 197 \checkmark$
 $= 9,26 \text{ g} \checkmark$ (Range/Gebied: 9,25 – 9,87) (5)

9.3.2 **POSITIVE MARKING FROM 9.3.1/ POSITIEWE NASIEN VANAF 9.3.1**

$\% \text{ yield/opbrengs} = \frac{\text{actual yield/werklike opbrengs}}{\text{theoretical yield/teoretiese opbrengs}} \times 100$
 $= \frac{8,3}{9,26} \times 100 \checkmark$
 $= 89,63\% \checkmark$ (Range/Gebied: 84,26 – 89,64) (2)

[12]

QUESTION 10/VRAAG 10

- 10.1 Hydrosphere: includes all water of the earth found as liquid water ✓
Hidrosfeer: sluit alle water van die aarde in wat as vloeibare water gevind word
Biosphere: includes all the living organisms. ✓/*Biosfeer: sluit alle lewende organismes in* (2)
- 10.2.1 (A) Transpiration ✓/*Transpirasie*
- 10.2.2 (B) Condensation ✓/*Kondensasie*
- 10.2.3 (C) Precipitation ✓/*Presipitasie* (3)
- 10.3 (A) Energy gained ✓/*Energie gewen*
- (B) Energy lost. ✓/*Energie verloor* (2)
- 10.4 Roots of plants absorb water from the ground. ✓/*Plantwortels absorbeer water uit die grond.*
Plants release the water to the atmosphere by transpiration. ✓/*Plante stel water deur transpirasie aan die atmosfeer vry.*
The water condenses to form clouds. ✓/*Die water kondenseer om wolke te vorm.*
Then water falls back to the ground by precipitation. ✓/*Water val dan terug grond toe deur presipitasie.* (4)

[11]

**TOTAL/TOTAAL: 150/
FINAL TOTAL: 141**