



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 2019

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

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

QUESTION 1/VRAAG 1

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

QUESTION 2/VRAAG 2

2.1

2.1.1 Positive ions/*positiewe ione* ✓
Delocalised valence electrons/*gedelokaliseerde valenselektrone* ✓ (2)

2.1.2 Metallic bond/*metaalbinding* ✓ (1)

2.2 Left/*Links* ✓ (1)

2.3 Hg ✓ (1)

2.4

2.4.1 Homogeneous/*Homogeen* ✓
 Uniform composition/Separate particles cannot be distinguished./All components are in the same phase. ✓
Uniforme samestelling/Afsonderlike deeltjies kan nie onderskei word nie./Alle komponente is in dieselfde fase. (2)

2.4.2 Fe₂O₃ ✓ (1)

2.5

2.5.1 A ✓
Lowest density/*Laagste digtheid* ✓ (2)

2.5.2 Electrical conductivity is the conduction of electric current/charge ✓ and thermal conductivity is the conduction of heat. ✓
Elektriese geleiding is die geleiding van elektriese stroom/ladings en termiese geleiding is die geleiding van hitte. (2)

2.5.3 B ✓
 B has a high density./B is a good conductor of electricity./B is a good conductor of heat. ✓
B het 'n hoë digtheid./B is 'n goeie geleier van elektrisiteit./B is 'n goeie geleier van hitte. (2)

[14]

QUESTION 3/VRAAG 3

3.1

3.1.1

Marking guidelines/Nasiemriglyne

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

Atoms of the same element having the same number of protons, but different number of neutrons. ✓✓

Atome van dieselfde element wat dieselfde getal protone het, maar verskillende getalle neutrone.

OR/OF

Same atomic number, but different mass numbers.

Dieselfde atoomgetalle, maar verskillende massagetalle.

(2)

3.1.2

$$\text{Average/gemiddelde } A_R = \frac{(80)(24)}{100} + \frac{(10)(25)}{100} + \frac{(10)(26)}{100}$$

$$= 24,3$$

(4)

3.1.3

- (a) 12
- (b) 12
- (c) 12
- (d) 10
- (e) 24

(1)
(1)
(1)
(1)
(1)

3.2

3.2.1

7 ✓

(1)

3.2.2

3 ✓

(1)

3.2.3

3 ✓

(1)

3.2.4

Cl ✓

(1)

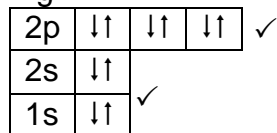
3.2.5

Ionic bond/Ioniese binding ✓

(1)

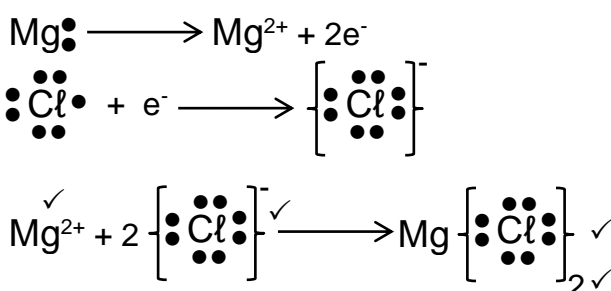
3.2.6

Mg²⁺:



(2)

3.2.7



(4)

[22]

QUESTION 4/VRAAG 4

- 4.1
- 4.1.1 J ✓ (accept/aanvaar F) (1)
- 4.1.2 E ✓ (accept/aanvaar Be) (1)
- 4.1.3 A ✓ (accept/aanvaar K) (1)
- 4.1.4 J ✓ (accept/aanvaar F) (1)
- 4.1.5 H ✓ (accept/aanvaar Ge) (1)
- 4.1.6 L ✓ (accept/aanvaar He) (1)
- 4.1.7 **Any ONE/Enige EEN**
- G (accept/aanvaar O) ✓
 - J (accept/aanvaar F) (1)
- 4.1.8 D ✓ (accept/aanvaar Al) (1)
- 4.2
- 4.2.1 **Marking guidelines/Nasiemriglyne**
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
- First ionisation energy is the energy needed per mole ✓ to remove the first electron from an atom in the gaseous phase. ✓
Eerste ionisasie-energie is die energie benodig per mol om die eerste electron te verwyder vanaf 'n atom in die gasfase. (2)
- 4.2.2 $A(g) + 400 \text{ kJ}\cdot\text{mol}^{-1} \rightarrow \underline{A^+(g)} \checkmark + \underline{e^-} \checkmark$ (2)
- 4.3 Electron affinity/*Elektronaffiniteit* ✓ (1)
- 4.4
- 4.4.1 $D_2G_3 \checkmark\checkmark$ (accept/aanvaar Al_2O_3) (2)
- 4.4.2 AJ ✓✓ (accept/aanvaar KF) (2)
- [17]

QUESTION 5/VRAAG 5

5.1 Aluminium sulphate/Aluminiumsulfaat ✓ (1)

5.2 **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

The mass of one mole of a substance measured in $\text{g}\cdot\text{mol}^{-1}$. ✓✓
Die massa van een mol van 'n stof gemeet in $\text{g}\cdot\text{mol}^{-1}$. (2)

5.3

5.3.1 $M(\text{Al}_2(\text{SO}_4)_3) = 2(27) + 3(32) + 12(16)$
 $= 342 \text{ g}\cdot\text{mol}^{-1}$ ✓✓

Note/Let wel:
If unit omitted/*Indien eenheid uitgelaat*
is: Max./Maks. $\frac{1}{2}$

(2)

5.3.2 **POSITIVE MARKING FROM QUESTION 5.3.1.**
POSITIEWE NASIEN VANAF VRAAG 5.3.1.

$$\% \text{Al} = \frac{2(27)}{342} \times 100$$
$$= 15,79\%$$

$$\% \text{S} = \frac{3(32)}{342} \times 100$$
$$= 28,07\%$$

$$\% \text{O} = \frac{12(16)}{342} \times 100$$
$$= 56,14\%$$

(3)

5.3.3 **POSITIVE MARKING FROM QUESTION 5.3.1.**
POSITIEWE NASIEN VANAF VRAAG 5.3.1.

$$n(\text{Al}_2(\text{SO}_4)_3) = \frac{m}{M} \checkmark$$
$$= \frac{85,5}{342} \checkmark$$
$$= 0,25 \text{ mol} \checkmark$$

(3)

5.3.4 **POSITIVE MARKING FROM QUESTION 5.3.3.**
POSITIEWE NASIEN VANAF VRAAG 5.3.3.

$$\text{Number of Al atoms} = n \times N_A \times \text{number of atoms}$$
$$= (0,25)(6,02 \times 10^{23}) \checkmark (2) \checkmark$$
$$= 3,01 \times 10^{23} \text{ atoms} \checkmark$$

(3)

5.4

5.4.1 Ionic structure/*Ioniese struktuur* ✓ (1)

5.4.2 Al^{3+} / aluminium ions/ positive ions/ *aluminium-ione/positiewe ione* ✓
 SO_4^{2-} / sulphate ions/ negative ions/ *sulfaat-ione/negatiewe ione* ✓ (2)

5.4.3 **ANY TWO/ENIGE TWEE:**

- Brittle/bros ✓
- Hard ✓
- Non-conductor of electricity/ *nie-geleier van elektrisiteit*
- Non-conductor of heat/ *nie-geleier van hitte*
- High melting point/ *hoë smeltpunt*

(2)

5.5

5.5.1

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

The number of moles of solute per cubic decimetre/litre of solution.

Die getal mol opgelostee stof per kubieke sentimeter/liter van die oplossing.

(2)

5.5.2

OPTION 1/OPSIE 1

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

$$= \frac{500}{342} \checkmark$$

$$= 1,46 \text{ mol}$$

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

$$= \frac{1,46}{2} \checkmark$$

$$= 0,73 \text{ mol} \cdot \text{dm}^{-3} \checkmark$$

OPTION 2/OPSIE 2

$$c = \frac{m}{MV} \checkmark$$



$$= \frac{500}{\sqrt{342}(2)} \checkmark$$



$$= 0,73 \text{ mol} \cdot \text{dm}^{-3} \checkmark$$

(4)
[25]

QUESTION 6/VRAAG 6

6.1

6.1.1  Exothermic ✓
 Energy is released. ✓

 Eksotermies.
 Energie word vrygestel.

(2)

6.1.2

Marking guidelines/Nasienriglyne

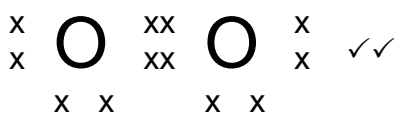
If any of the underlined key words/phrases are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

A group of two or more atoms that are covalently bonded and that functions as a unit. ✓✓

'n Groep van twee of meer atome wat kovalent gebind is en as 'n eenheid funksioneer.

(2)

6.1.3



(2)

6.1.4
$$n(\text{ZnS}) = \frac{m}{M} \checkmark$$
$$= \frac{7}{97} \checkmark$$
$$= 0,072 \text{ mol} \checkmark$$
 (3)

6.1.5 **POSITIVE MARKING FROM QUESTION 6.1.4.**
POSITIEWE NASIEN VANAF VRAAG 6.1.4.

$$n(\text{O}_2) = \frac{3}{2} n(\text{ZnS})$$
$$= \frac{3}{2} (0,072) \checkmark$$
$$= 0,108 \text{ mol}$$

$$n(\text{O}_2) = \frac{m}{M}$$
$$0,108 = \frac{m}{32} \checkmark$$
$$\therefore m = 3,46 \text{ g} \checkmark$$

<p>Marking criteria/Nasienriglyne</p> <ul style="list-style-type: none">• Use ratio/Gebruik verhouding: $n(\text{O}_2) = \frac{3}{2} n(\text{ZnS})$• Substitute/Vervang 32 g·mol⁻¹.• Final answer/Finale antwoord: 3,46 g
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6.1.6 **POSITIVE MARKING FROM QUESTION 6.1.4.**
POSITIEWE NASIEN VANAF VRAAG 6.1.4.

$$n(\text{SO}_2) = n(\text{ZnS})$$
$$= 0,072 \text{ mol} \checkmark$$
$$n = \frac{V}{V_m} \checkmark$$
$$0,072 = \frac{V}{22,4} \checkmark$$

$$V(\text{SO}_2) = 1,62 \text{ dm}^3 \checkmark$$
 (4)

6.2

6.2.1 Sulphuric acid/ swawelsuur ✓
ACCEPT/AANVAAR:
Hydrogen sulphate/Waterstofsulfaat ✓ (1)

6.2.2 ZnSO₄ ✓✓ (2)

6.2.3 Redox (reaction)/Redoks(reaksie) ✓
The charge of Zn changes from 0 in Zn ✓ to +2 in ZnSO₄. ✓ /The charge of H changes from +1 in H₂SO₄ to 0 in H₂.
Die lading van Zn verander van 0 in Zn na +2 in ZnSO₄. /Die lading van H verander van + 1 in H₂SO₄ na 0 in H₂. (3)

6.2.4 When a burning woodsplinter is brought close to the gas it makes a popping sound. ✓✓
'n Brandende houtsplinter wat naby die gas gebring word, maak 'n plofgeluid. (2)

[24]

QUESTION 7/VRAAG 7

7.1

7.1.1

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

An electrolyte is a solution that conducts electricity ✓ through the movement of ions. ✓

'n Elektroliet is 'n oplossing wat elektrisiteit gelei deur die beweging van ione. (2)

7.1.2 Polar/Polêr ✓

It has two oppositely charged poles/Dit het twee teenoorgesteld gelaaide pole. ✓ (2)

7.1.3

a) Concentration of ions/Konsentrasie van ione ✓ (1)

b) Conductivity/Geleidingsvermoë ✓ (1)

7.1.4 $\text{NaCl}(s) \xrightarrow{\text{H}_2\text{O}(\ell)} \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$ ✓ Bal. ✓

NOTE/LET WEL:

Ignore phases./Ignoreer fases. (3)

7.1.5 CaCl_2 ✓



A higher concentration of ions forms in solution. ✓
'n Hoër konsentrasie van ione vorm in oplossing. (2)

7.2

7.2.1 K_2CO_3 ✓✓ (2)

7.2.2 BaSO_4 ✓✓ (2)

7.2.3 $\text{BaCO}_3(s) + 2\text{HNO}_3(\text{aq}) \rightarrow \text{Ba}(\text{NO}_3)_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\ell)$ ✓ Bal. ✓

NOTE/LET WEL:

Ignore phases./Ignoreer fases. (3)

[18]

QUESTION 8/VRAAG 8

8.1

8.1.1

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

Condensation is the process during which a gas or vapour changes to a liquid. ✓✓

Kondensasie is die proses waardeur 'n gas of damp in 'n vloeistof verander.

(2)

8.1.2

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

Evaporation is the change of a liquid into a vapour at any temperature below the boiling point. ✓✓

Verdamping is die verandering van 'n vloeistof in 'n damp by enige temperatuur onder die kookpunt.

(2)

8.2

8.2.1 Evaporation/Verdamping ✓

(1)

8.2.2 Condensation/Kondensasie ✓

(1)

8.2.3 Precipitation/Presipitasie ✓

(1)

8.2.4 Infiltration/Infiltrasie/insypeling ✓

(1)

8.3 The hydrosphere is the water of the Earth. ✓ It is found as liquid water, ice and water vapour in the atmosphere. ✓

Die hidrosfeer is die water van die Aarde en dit word gevind as vloeibare water, ys en waterdamp in die atmosfeer.

(2)

[10]

TOTAL/TOTAAL:

150

