



# 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)         |
|      |      | <b>[20]</b> |



**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 Fe<sub>2</sub>O<sub>3</sub> ✓ (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

(1)

(b) 12

(1)

(c) 12

(1)

(d) 10

(1)

(e) 24

(1)



3.2

3.2.1 7 ✓

(1)

3.2.2 3 ✓

(1)

3.2.3 3 ✓

(1)

3.2.4 Cl ✓

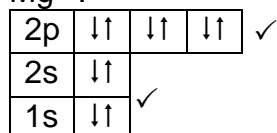
(1)

3.2.5 Ionic bond/Ioniese binding ✓

(1)

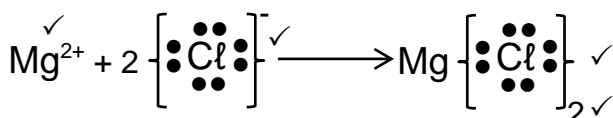
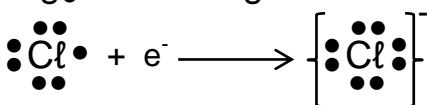
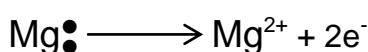
3.2.6

Mg<sup>2+</sup>:



(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/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

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.

- 4.2.2  $A(g) + 400 \text{ kJ}\cdot\text{mol}^{-1} \rightarrow \underline{A^+(g)}$  ✓ +  $\underline{e^-}$  ✓ (2)
- 4.3 Electron affinity/*Elektronaffiniteit* ✓ (1)
- 4.4
- 4.4.1  $D_2G_3$  ✓✓ (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.**

$$\%Al = \frac{2(27)}{342} \times 100$$

$$= 15,79\%$$

$$\%S = \frac{3(32)}{342} \times 100$$

$$= 28,07\%$$

$$\%O = \frac{192}{342} \times 100$$

$$= 56,14\%$$



(3)

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

$$n(\text{Al}_2(\text{SO}_4)_3) = \frac{m}{M}$$

$$= \frac{85,5}{342}$$

$$= 0,25 \text{ mol}$$

(3)

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

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

(3)

5.4

5.4.1 Ionic structure/Ioniese struktuur ✓ (1)

5.4.2  $\text{Al}^{3+}$  / aluminium ions/ positive ions/ *aluminium-ione/positiewe ione* ✓  
 $\text{SO}_4^{2-}$  / 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

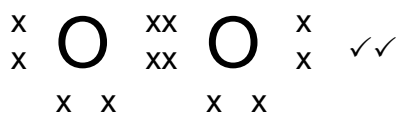
*Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt*

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.**

$$n(\text{O}_2) = \frac{3}{2} n(\text{ZnS})$$

$$= \frac{3}{2} (0,072) \checkmark$$

$$= 0,108 \text{ mol}$$

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

$$0,108 = \frac{m}{32} \checkmark$$

$$\therefore m = 3,46 \text{ g} \checkmark$$
 (3)

**Marking criteria/Nasienriglyne**

- Use ratio/Gebruik verhouding:  

$$n(\text{O}_2) = \frac{3}{2} n(\text{ZnS})$$
- Substitute/Vervang 32 g·mol<sup>-1</sup>.
- Final answer/Finale antwoord:  
3,46 g

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 ZnSO<sub>4</sub> ✓✓ (2)

6.2.3 Redox (reaction)/Redoks(reaksie) ✓  
 The charge of Zn changes from 0 in Zn ✓ to +2 in ZnSO<sub>4</sub>. ✓/The charge of H changes from +1 in H<sub>2</sub>SO<sub>4</sub> to 0 in H<sub>2</sub>.  
 Die lading van Zn verander van 0 in Zn na +2 in ZnSO<sub>4</sub>./Die lading van H verander van + 1 in H<sub>2</sub>SO<sub>4</sub> na 0 in H<sub>2</sub>. (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  $\text{NaCl(s)} \xrightarrow{\text{H}_2\text{O(l)}} \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$  ✓ Bal. ✓**NOTE/LET WEL:**

Ignore phases./Ignoreer fases.



(3)

7.1.5  $\text{CaCl}_2$  ✓A higher concentration of ions forms in solution. ✓*'n Hoër konsentrasie van ione vorm in oplossing.* (2)

7.2

7.2.1  $\text{K}_2\text{CO}_3$  ✓✓ (2)7.2.2  $\text{BaSO}_4$  ✓✓ (2)7.2.3  $\text{BaCO}_3(\text{s}) + 2\text{HNO}_3(\text{aq}) \rightarrow \text{Ba}(\text{NO}_3)_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$  ✓ 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**

