

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE SENIOR  
SERTIFIKAAT**

**GRADE 10/GRAAD 10**

**NOVEMBER 2019**

**PHYSICAL SCIENCES (CHEMISTRY) P2  
MARKING GUIDELINE/  
FISIESE WETENSKAPPE (CHEMIE) V2  
NASIENRIGLYN  
EXEMPLAR/EKSEMPLAAR**

**MARKSIPUNTE: 150**

---

This marking guideline consists of 12 pages.  
*Hierdie nasienriglyn bestaan uit 12 bladsye.*

---



**QUESTION 1/VRAAG 1**

- 1.1 D ✓✓ (2)
- 1.2 A ✓✓ (2)
- 1.3 B ✓✓ (2)
- 1.4 A ✓✓ (2)
- 1.5 C ✓✓ (2)
- 1.6 B ✓✓ (2)
- 1.7 B ✓✓ (2)
- 1.8 B ✓✓ (2)
- 1.9 B ✓✓ (2)
- 1.1 C ✓✓ (2)
- 0 (2)
- [20]**

**QUESTION 2/VRAAG 2**

- 2.1 A mixture which has a uniform composition and where all components are in the same phase. ✓✓  
*'n Mengsel wat 'n eenvormige samestelling het en waarvan alle komponente in dieselfde fase is.* (2)
- 2.2 2.2.1 Copper wire /Koperdraad  
 Table salt/Tafelsout  
 Aluminium  
 Iron/Yster  
**ANY TWOIENIGE TWEE** ✓✓ (2)
- 2.2.2 Air ✓/ Brass Lug/Messing (1)
- 2.2.3 Table salt ✓ Tafelsout (1)
- 2.2.4 Brass/Copper wire/ Aluminium/ Iron (Any one) ✓  
 Messing/Koperdraad/Aluminium/Yster (Enige een) (1)
- 2.2.5 Glass ✓/ Table salt Glas/ Tafelsout (1)
- 2.2.6 Sodium chloride ✓ Natriumchloried (1)
- 2.2.7 Iron ✓ Yster (1)
- [10]**

**QUESTION 3/VRAAG 3**

- 3.1 The temperature at which vapour pressure of a liquid is equal to the atmospheric pressure/external pressure. ✓✓  
*Die temperatuur waarteen die dampdruk van 'n vloeistof gelyk is aan die atmosferiese druk / eksterne druk.* (2)
- 3.2 3.2.1 Boiling point ✓ / melting point  
*Kookpunt / Smeltpunt* (1)
- 3.2.2 What is the relationship between a change in temperature and a boiling point/ melting point? ✓✓  
*Wat is die verhouding tussen verandering in temperatuur en kookpunt / smeltpunt?* (2)
- 3.3 3.3.1 D ✓ (1)
- 3.3.2 B ✓ (1)
- 3.3.3 A ✓  
Highest melting point (or boiling point) ✓  
*Hoogste smeltpunt (Kookpunt)* (2)
- 3.3.4 E ✓  
Lowest melting point (or boiling point) ✓  
*Laagste smeltpunt (Kookpunt)* (2)
- 3.4 3.4.1 B, C, A ✓✓ (2)
- 3.4.2 Liquid ✓ phase  
*Vloeistof-fase* (1)

**[14]**

QUESTION 4/VRAAG 4

4.1 John Dalton ✓ (1)

- 4.2 • In atomic model A it was suggested that atoms are the smallest particles and are indivisible. ✓
- Atomic model B, shows atoms which can be further divided into smaller particles ✓ called protons, neutrons and electrons. ✓
- *In atoommodel A is voorgestel dat atome die kleinste deeltjies is en ondeelbaar is.*
- *Atoommodel B toon atome wat verder verdeel kan word in kleiner deeltjies wat protone, neutrone en elektrone genoem word.* (3)

4.3 Isotopes are atoms of the same element having the same atomic number but different mass number. ✓✓  
*Isotope is atome van dieselfde element met dieselfde atoomgetal, maar verskillende massagetal.*

OR/OF

Atoms of the same element with the same number of protons but different number of neutrons.  
*Atome van dieselfde element met dieselfde aantal protone, maar verskillende getal neutrone.* (2)

4.4 % Cu- 63: X      % Cu- 65: Y  
 X + Y = 100  
 For 100 atoms / Vir 100 atome  
 63,5 =  
 6350 = 63X + 65Y.....  
 X = 100 - Y.....  
 Substitute 2 into 1/Vervang 2 in 1  
 6350 = 63 (100 - Y) + 65Y  
 Y = 25%  
 Substitute Y into 2/Vervang Y in 2  
 X = 100 - 25  
 X = 75%  
 % Cu - 63 = 75%  
 % Cu - 65 = 25%  
 ∴Cu - 63 is most abundant/ Kom die meeste in natuur voor

1

2

(5)  
[11]

**QUESTION 5/VRAAG 5**

5.1 2/two ✓ twee(2) (1)

5.2  $1s^2$  ✓✓ (2)

5.3 3/Three ✓ drie (3) (1)

5.4 E ✓ (1)

5.5 5.5.1 J ✓ (1)

5.5.2 I ✓ (1)

5.5.3 L ✓ (1)

5.5.4 I ✓ (1)

5.5.5 H ✓ (1)

5.6

- D ✓
- In a group, the valence electrons are further away from the nucleus, which makes an electron affinity of an atom represented by letter D, less than that of an atom represented by letter C. ✓
- In a period, the atomic radius will increase force of attraction between nucleus and electrons and this makes an atom represented by letter F to have more electron affinity than that of an atom represented by letter C. ✓
- D
- *In 'n groep is die valenselektrone verder weg van die kern, wat 'n elektronaffiniteit van 'n atoom voorgestel deur letter D, minder as dié van 'n atoom wat deur letter C voorgestel word.*
- *In 'n periode, sal die atoomradius die aantrekkingskrag tussen kern en elektrone verhoog, en dit maak dat 'n atoom wat deur letter F voorgestel word, meer elektron-affiniteit het as dié van 'n atoom wat deur letter C voorgestel word.* (3)

5.7

- Letter B represents an atom of an element with less electronegativity ✓ as electronegativity increases from left to right in the period. This means letter B represents an atom that loses electrons easier and is more reactive. ✓
- Letter J represents an atom of an element with more electronegativity. ✓ Larger electronegativity indicates a stronger attraction for electrons, hence less reactive than an atom represented by letter B. ✓
- *Letter B stel 'n atoom voor van 'n element met minder elektronegatiwiteit soos die elektronegatiwiteit in die periode van links na regs toeneem. Dit beteken dat letter B 'n atoom voorstel wat elektrone makliker verloor en meer reaktief is.*
- *Letter J verteenwoordig 'n atoom van 'n element met meer elektronegatiwiteit. Groter elektronegatiwiteit dui op 'n sterker aantrekkingskrag vir elektrone, dus minder reaktief as 'n atoom wat deur letter B voorgestel word.* (4)

**[17]**

## QUESTION 6/VRAAG 6

- 6.1 The minimum energy needed to remove the first electron from an atom ✓ in the gaseous phase. ✓

*Die minimum energie wat benodig word om die eerste elektron uit 'n atoom te verwyder wat in die gasfase is.*

(2)

- 6.2 There is an increase in the number of protons from sodium to magnesium in a period ✓ that will lead to an increase in nuclear charge ✓ that will hold electrons in energy level tightly.

*Daar is 'n toename in die aantal protone van natrium tot magnesium in 'n periode wat sal lei tot 'n toename in kernlading wat elektrone in die energievlak styf sal hou.*

(2)

- 6.3 **Accept any answer between**  $450 \text{ KJ.mol}^{-1}$  to  $500 \text{ KJ.mol}^{-1}$  ✓

**Aanvaar enige antwoord tussen**  $450 \text{ KJ.mol}^{-1}$  to  $500 \text{ KJ.mol}^{-1}$

(1)

- 6.4 Magnesium have lower ionisation energy than non-metals ✓✓

*Magnesium het 'n laer ionisasie-energie as nie-metale.*

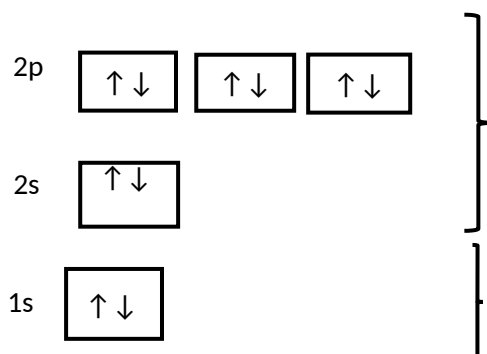
(2)

6.5

$$\frac{500}{6,02 \times 10^{23}} = 8,31 \times 10^{-22} \text{ J per atom/per atom } \checkmark$$

(3)

6.6



(2)

- 6.7 6.7.1 Covalent bond ✓  
*Kovalente binding*

(1)

- 6.7.2 Electrons are shared ✓ between the atoms of (hydrogen and nitrogen/ non-metals) ✓  
*Elektrone word gedeel tussen die atome van (waterstof en stikstof / nie-metale).*

(2)

**[15]**

## QUESTION 7/VRAAG 7

7.1 A group of atoms covalently bonded ✓ and acts as a unit in a chemical reaction ✓

*’n Groep atome wat kovalent gebind is en dien as ’n eenheid in ’n chemiese reaksie*

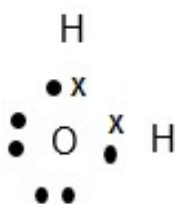
(2)

7.2 Mass cannot be created or destroyed / The sum of mass of the reactants equals the sum of mass of the products. ✓✓

*Massa kan nie geskep of vernietig word nie / Die massa van die reaktante is gelyk aan die som van die massa van die produkte.*

(2)

7.3 7.3.1



Marking criteria	
Four electron pairs around O atom	✓
Two H atoms share one electron pair each with O atom	✓

*Nasienglyne*

*Vier elektronpare rondom die O-atoom*

*Twee H-atome deel elektronpaar met die O-atoom*

(2)

7.3.2  $4\text{HCl}(aq) + \text{MnO}_2(s) \rightarrow \text{MnCl}_2(s) + 2\text{H}_2\text{O}(l) + \text{Cl}_2(g)$  ✓  
Balanced/Gebalanseerd ✓ Phases/Fase ✓

Notes/Nota:

Reactants/Reaktante:

Products/Produkte:

Phases/Fase:

Balanced/Gebalanseerd:

(4)

7.4  $M(\text{H}_2\text{O}) = (1 \times 2) + 16$  ✓  
 $= 18 \text{g} \cdot \text{mol}^{-1}$  ✓

(2)

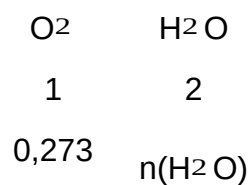
**[12]**

## QUESTION 8/VRAAG 8

8.1 8.1. Exothermic reaction is the reaction where energy is released during  
 1 chemical change. ✓✓  
*Eksotermiese reaksie is die reaksie waar energie vrygestel word tydens chemiese verandering.* (2)

8.1. Synthesis ✓  
 2 Elements react to form new compounds ✓  
*Sintese*  
*Elemente reageer om nuwe verbindings te vorm* (2)

8.1.  
 3 
$$n(\text{O}_2) = \frac{m}{M} = \frac{8.75}{32} = 0,273 \text{ mol}$$



$$n(\text{H}_2\text{O}) = 0,273 \times 2 \checkmark$$

$$n(\text{H}_2\text{O}) = 0,546$$

(2)

8.2 8.2. Amount of substance ✓ present per volume of a solution ✓  
 1 *Hoeveelheid stof per volume van 'n oplossing teenwoordig* (2)

8.2. Yes ✓  
 2 Electron transfer takes place between the reactants/ charges of all atoms in reactants and product charges. ✓

*Ja*

*Elektroniese oordrag vind tussen die reaktante / ladings van alle atome in reaktante en produkloadings plaas.* (2)

8.2.  
 3  $n(\text{ZnCl}_2) = \frac{m}{M} \checkmark = \frac{0,85}{136,4} = 0,0062 \text{ mol}$

Ratio/Verhouding:

HCl	ZnCl <sub>2</sub>
2	1
n(HCl)	0,0062

$$n(\text{HCl}) = 0,0062 \times 2$$

$$n(\text{HCl}) = 0,0124 \text{ mol } \checkmark$$

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

$$0,1 = \frac{0,0124}{V} \checkmark$$

..... 3 ✓

(5)  
 [15]

## QUESTION 9/VRAAG 9

- 9.1 9.1.1 The simplest whole number ratio of atoms in the compound ✓✓  
*Die eenvoudigste heelgetalverhouding van atome in die verbinding.* (2)

9.1.2

n (Pb) =	= 0,1855 mol	}
n (C) =	= 1,485 mol	
n (H) =	= 3,78 mol	
Whole number ratio/ <i>heelgetalverhouding</i>		
∴		
Pb: C: H = 1: 8: 20		
Empirical formula/ <i>Empiriese formule</i> = PbCH		

(4)

- 9.2 Molecular formula/ *Molekulêre formule* is (CH) $n$

$$n = \frac{\text{molecular formula}}{\text{empirical formula}} = \frac{78,11}{13,02} \checkmark = 6$$

Molecular formula/ *Molekulêre formule* = (CH) $_6$  = C $_6$ H $_6$  ✓ (2)

- 9.3 9.3.1 Water of crystallisation ✓  
*Kristallasiewater* (1)

9.3.2  $2X + 12 + (3 \times 16) + (10 \times 2) + (10 \times 16) = 286$

$$2X + 240 = 286 \checkmark$$

$$X = 23 \checkmark$$

$$X = \text{Na/ Sodium/Natrium} \checkmark$$

(3)  
[12]

**QUESTION 10/VRAAG 10**

- 10.1 The process in which solid ionic crystals are broken up into ions ✓ when dissolved in water. ✓  
*Die proses waarin soliede ioniese kristalle in ione opgebreek word wanneer dit in water opgelos word.* (2)
- 10.2 Consists of free moving ions ✓✓ **OR** can conduct electricity  
*Bestaan uit vrye ione **OF** kan elektrisiteit lei* (2)
- 10.3 Barium Sulphate ✓ *Bariumsulfaat* (1)
- 10.4
- |   |   |   |
|---|---|---|
| X | Potassium iodide ✓<br><i>Kaliumjodied</i>       | Barium chloride solution gives no precipitate because there is no insoluble substance formed. ✓<br><i>Bariumchloriedoplossing gee geen neerslag nie omdat daar geen onoplosbare stof gevorm word nie.</i> |
| Y | Sodium carbonate ✓<br><i>Natriumkarbonaat</i>   | Precipitate formed in Y solution dissolves in nitric acid. ✓<br><i>Presipitaat wat in die Y-oplossing gevorm word, word in salpetersuur opgelos.</i>  |
| Z | Magnesium Sulphate ✓<br><i>Magnesiumsulfaat</i> | Precipitate formed in Y solution stays the same/ does not dissolve in nitric acid. ✓<br><i>Neerslag gevorm in die Y-oplossing bly dieselfde / los nie in salpetersuur op nie.</i>                         |
- (6)
- 10.5 Acid base ✓ *Suur-basis* (1)
- [12]**

**QUESTION 11/VRAAG 11**

- 11.1 All the water of the earth ✓  
*Al die water van die aarde* (1)
- 11.2 11.2. Transpiration ✓ *Transpirasie*  
1 (1)
- 11.2. Evaporation ✓ *Verdamping*  
2 (1)
- 11.2. Condensation ✓ *Kondensasie*  
3 (1)
- 11.3 Water evaporates into the atmosphere ✓ where transportation and condensation takes place. ✓ This results in precipitation.  
*Water verdamp in die atmosfeer waar die beweging van water en kondensasie plaasvind. Dit lei tot neerslag.* (2)
- 11.4
- The populations of countries have grown at a rate which has outstripped the existing water supply. ✓✓
  - Many countries have seen a rapid increase in industrialisation which requires large quantities of water. ✓✓
  - Weather patterns have changed and many countries have experienced drought, which in many instances are prolonged and so available water supplies have dwindled. ✓✓
  - *Die bevolkings van lande het gegroei teen 'n koers wat die bestaande watervoorraad oortref.*
  - *In baie lande is daar 'n vinnige toename in industrialisasie wat groot hoeveelhede water benodig.*
  - *Weerpatrone het verander en baie lande het droogtes beleef, wat in baie gevalle vir lang tydperke was en dus het watervoorraad afgeneem.* (6)

**[12]****TOTAL/TOTAAL: 150**