

**NATIONAL SENIOR
CERTIFICATE/NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 11

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**PHYSICAL SCIENCES P2
FISIESE WETENSKAPPE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 100

This marking guideline consists of 8 pages./
Hierdie nasienriglyn bestaan uit 8 bladsye.

QUESTION/VRAAG 1

- 1.1 A ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 A ✓✓ (2)
- 1.4 B ✓✓ (2)
- 1.5 C ✓✓ (2)
- 1.6 A ✓✓ (2)
- 1.7 D ✓✓ (2)
- [14]**

QUESTION/VRAAG 2

- 2.1 A group of two or more covalently bonded atoms that function as a unit. ✓✓
'n Groep van twee of meer atome wat kovalent verbind is en as 'n eenheid funksioneer. (2)
- 2.2 2.2.1 $\text{O} :: \text{O}$ ✓✓ (2)
- 2.2.2 $\begin{array}{c} \text{H}:\ddot{\text{O}}: \\ \text{H} \end{array}$ ✓✓ (2)
- 2.3 2.3.1 Dative covalent bond/Co-ordinate covalent bond ✓
Datiewe kovalentebinding/Gekoördineerde kovalentebinding (1)
- 2.3.2 $\left(\begin{array}{c} \text{H} \\ \text{H}:\ddot{\text{O}}: \\ \text{H} \end{array} \right)^+$ ✓✓ (2)

- 2.4 H_2O ✓
 O_2
 The difference in electronegativity is 0. ✓
Die verskil in elektronegatiwiteit is 0.
- H_2O
 O-atom is more electronegative than the H-atom /
 The O – H bond is polar ✓
O-atoom is meer elektronegatief as die H-atoom/ Die O – H binding is polêr.
- The molecular geometry is asymmetrical/bent/angular. ✓
Die molekulêre geometrie is asimmetries/gebuig/hoekig.
- (4)
[13]

QUESTION/VRAAG 3

- 3.1 The temperature at which the solid and liquid phases (of a substance are) in equilibrium. ✓✓
Die temperatuur waarteen vastestof en vloeistof fases (van 'n stof) in ewewig is. (2)
- 3.2 The molecular size/mass increases from CH_4 to CCl_4 . ✓
 All three molecules have London forces/induced-dipole forces/dispersion ✓
 The strength of London forces/induced-dipole forces/dispersion forces increases with an increase in molecular size/mass. ✓
 More energy will be required to overcome the London forces with the molecules with the higher melting point ✓
- Die molekulêre grootte/massa vergroot van CH_4 na CCl_4
 Al drie molekules het Londonkragte./geïnduseerde dipoolkragte/dispersie
 Die sterkte van die Londonkragte geïnduseerde dipoolkragte/dispersie vergroot met 'n toename in molekulêre grootte/massa
 Meer energie word benodig om die Londonkragte te oorkom in die molekules wat hoër smeltpunte het.* (4)
- 3.3 CH_4 ✓
 Lowest melting point / Laagste smeltpunt ✓ (2)
- 3.4 CCl_4 have only London forces ✓/induced-dipole forces/dispersion / *het slegs Londonkragte geïnduseerde dipoolkragte/dispersie*
 H_2O has both hydrogen bonds (and London forces/induced-dipole forces/dispersion /) *het beide waterstofbindings (en Londonkragte geïnduseerde dipoolkragte/dispersie) ✓*
 The hydrogen bonds are stronger than the London forces ✓
Die waterstofbinding is sterker as die Londonkragte (2)
- 3.5 Dipole-induced dipole forces / *Dipool-geïnduseerde dipoolkragte ✓* (2)
[12]

QUESTION/VRAAG 4

- 4.1 4.1.1 Boyle's law/*Boyle se wet* ✓ (1)
- 4.1.2 Temperature/*Temperatuur* **OR/OF** the amount of gas/*die hoeveelheid gas* ✓ (1)
- 4.1.3 The pressure of the gas is inversely proportional to the volume of the gas. ✓✓
Die druk van die gas is omgekeerd eweredig aan die volume van die gas. (2)
- 4.2 $p_1V_1 = p_2V_2$ ✓
- (100,33) (7,34) ✓ = X (6,97) ✓ **OR/OF** $102,2 \times 7,21 = X \cdot 6,97$
- X = 105,66 (kPa) ✓ X = 105,66 (kPa) ✓
- OR/OF** $103,93 \cdot 7,09 = X \cdot 6,97$
X = 105,66 (kPa)
- (Any two point (co-ordinates) can be used / *enige twee punte (koördinate) kan gebruik word.*) (4)
- 4.3 High temperature / *Hoër temperatuur* ✓ and/en low pressure/ *lae druk* ✓ (2)
- 4.4 Helium ✓ or / of Hydrogen / *Waterstof* (1)
- [11]**

QUESTION/VRAAG 5

- 5.1 5.1.1 The simplest whole number ratio between the elements/atoms of a compound. ✓✓
Die eenvoudigste heelgetal verhouding tussen die elemente/atome van 'n verbinding. (2)

5.1.2

Element	Mass/Massa	Mole/Mol	Simplest mol ratio Eenvoudigste mol- verhouding
C	54,55	= 54,55 / 12 ✓ = 4,55	= 4,55 / 2,27 = 2
H	9,09	= 9,09 / 1 ✓ = 9,09	= 9,09 / 2,27 = 3
O	36,36	= 36,36 / 16 ✓ = 2,27	= 2,27 / 2,27 = 1

(Dividing by 2,27 in last column / Deel die laaste kolom deur 2,27) ✓

Empirical formula/*Empiriese formule*: C₂H₃O

Molecular formula/*Molekulêre formule*: C₄H₆O₂ ✓ (5)

- 5.2 5.2.1 The substance that is completely used up during a chemical reaction. ✓✓
Die stof wat volledig tydens 'n chemiese reaksie reageer/opgebruik word. (2)

$$5.2.2 \quad n = \frac{m}{M} \checkmark$$

$$n = \frac{7}{65} \checkmark$$

$$n = 0,11 \text{ mol of Zn}$$

mole ratio / *mol verhouding* Zn : HCl
1 : 2

Actual / *Werklik* 0,11 : 1 ✓✓

The actual ratio of Zn to HCl is too small.
Die werklike verhouding van Zn tot HCl is te klein.

Therefore Zn is the limiting reagent ✓
Daarom is Zn die beperkende reagens (5)

5.2.3 Lower than/Laer as ✓

Zn is the limiting reagent / *Zn is die beperkende reagens* ✓
Smaller amount of zinc is used in experiment 2 ✓✓
Kleiner hoeveelheid sink word in eksperiment 2 gebruik (4)

$$5.2.4 \quad n = \frac{m}{M} \checkmark$$

$$n = \frac{3,27}{65} \checkmark$$

$$n = 0,05 \text{ mol of Zn}$$

$$n(\text{Zn}) = n(\text{H}_2) = 0,05 \text{ mol} \checkmark$$

$$V = nV_m$$

$$V = (0,05)(25,7) \checkmark$$

$$V = 1,285 \text{ dm}^3 \checkmark \quad (5)$$

[23]

QUESTION/VRAAG 6

6.1 6.1.1 It is a substance that donates protons (H^+ ions) ✓✓
Dit is die stof wat protone (H^+ -ione) skenk. (2)

6.1.2 H_3O^+ and/en H_2O ✓✓ **OR/OF** HCl and Cl^- (2)

6.1.3 H_2O ✓ (1)

6.2.1 EXOTHERMIC / EKSOTERMIES ✓

$\Delta H < 0$ **OR / OF** Net energy is released / *Netto energie vrygestel* ✓ (2)

6.2.2 **CaCO₃**

$$m(\text{CaCO}_3) = 8 \times 0,95 \checkmark$$

$$m(\text{CaCO}_3) = 7,6 \text{ g}$$

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

$$n = \frac{7,6}{100} \checkmark$$

$$n = 0,076 \text{ mol}$$

Mole ratio/Molverhouding

$$n(\text{HCl}) = 2 n(\text{CaCO}_3)$$

$$n(\text{HCl}) = 2 (0,076) \checkmark$$

$$n(\text{HCl}) = 0,152 \text{ mol}$$

HCl

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

$$(0,5) = \frac{(0,152)}{V} \checkmark$$

$$V = 0,304 \text{ dm}^3$$

$$V = 304 \text{ cm}^3 \checkmark$$

(7)
[14]

QUESTION/VRAAG 7

- 7.1 7.1.1 Loss of electrons ✓✓ / *Verlies aan elektrone*
The reaction wherein the electrons is donated to./Die reaksie waarin elektrone geskenk word. (2)
- 7.1.2 $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$ ✓✓ (2)
- 7.1.3 Cu ✓ (1)
- 7.1.4 The oxidation number increases ✓ from 0 to + 2 ✓
Die oksidatiegetal neem toe vanaf 0 tot + 2 (2)
- 7.2 7.2.1 $2x + 7(-2) = -2$
 $x = + 6$ ✓✓ (2)
- 7.2.2 Oxidation half reaction: $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$ ✓
Oksidasie halfreaksie:
- Reduction half reaction: $\text{Cr}_2\text{O}_7^{2-} + 14 \text{H}^+ + 6\text{e}^- \rightarrow 2 \text{Cr}^{3+} + 7 \text{H}_2\text{O}$ ✓
Reduksie-halfreaksie:
- Net ionic equation: $6 \text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} + 14 \text{H}^+ \rightarrow 6 \text{Fe}^{3+} + 2 \text{Cr}^{3+} + 7 \text{H}_2\text{O}$ ✓✓
Netto ioniese reaksie:

Marking criteria/NasienkriteriaCorrect oxidation half reaction / *Korrek oksidasie halfreaksie* 1/4Correct reduction half reaction / *Korrek reduksie halfreaksie* 1/4

Reactants and products correct in net ionic equation 2/4

*Reaktante en produkte korrek volgens netto ioniese vergelyking*Balancing/*Balansering*(4)
[13]**TOTAL/TOTAAL: 100**