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**NATIONAL
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SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2022

**TECHNICAL SCIENCES: CHEMISTRY P2/
TEGNIESE WETENSKAPPE: CHEMIE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/ PUNTE: 75

This marking guideline consists of 6 pages./
Hierdie nasienriglyn bestaan uit 6 bladsye.

QUESTION/VRAAG 1

- 1.1 A ✓✓ (2)
- 1.2 A ✓✓ (2)
- 1.3 D ✓✓ (2)
- 1.4 C ✓✓ (2)
- 1.5 B ✓✓ (2)
- [10]**

QUESTION/VRAAG 2

- 2.1 Hydrocarbons are organic compounds containing *ONLY* carbon atoms and hydrogen atoms. ✓✓
Koolwaterstowwe is organiese verbindings wat uit SLEGS koolstofatome en waterstofatome bestaan. ✓✓ (2)
- 2.2 2.2.1 Organic molecules with the same molecular formula, but different structural formula. ✓✓
Organiese molekules met dieselfde molekulêre formule maar verskillende struktuurformules. (2)
- 2.2.2
- $$\begin{array}{cccccccc}
 & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \\
 & | & | & | & | & | & | & \\
 \text{H} & -\text{C} = & \text{C} - & \text{C} - & \text{C} - & \text{C} - & \text{H} & \quad \checkmark\checkmark \\
 & & & | & | & | & | & \\
 & & & \text{H} & \text{H} & \text{H} & \text{H} &
 \end{array}$$
- (2)
- 2.2.3 Aldehydes/Aldehiede ✓ (1)
- 2.2.4 1-chloro-2-methyl-Prop-1-ene ✓✓/
 1-chloro-2-metiel-Prop-1-een ✓✓

OR/OF

- 2-chloro-2-methyl-Prop-1-ene ✓✓/
 2-chloro-2-metiel-Prop-1-een ✓✓ (2)
- 2.3. Monomers are small organic molecules that can be covalently bonded to each other ✓ in a repeating pattern to form a macromolecule. ✓
Monomere is klein organiese molekules wat kovalent met mekaar verbind is in 'n herhalende patroon ✓ om 'n makromolekule te vorm. ✓ (2)
- [11]**

QUESTION/VRAAG 3

3.1 C_nH_{2n+2} ✓ (1)

3.2

$$\begin{array}{ccccccc}
 & & \text{H} & & \text{O} & & \text{H} \\
 & & | & & || & & | \\
 \text{H} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\
 & & | & & & & | & & \\
 & & \text{H} & & & & \text{H} & & \\
 & & & & & & & & \checkmark \checkmark
 \end{array}$$

(2)

3.3 Propanal / Propanaal ✓ (1)

3.4 3.4.1 Hydrogen bonds/Waterstofbindings ✓ (1)

3.4.2 London forces/Londonkragte ✓ (1)

3.5 As the strength of the intermolecular forces become stronger (increases) ✓ the vapour pressure will become lower ✓ (decrease).
Indien die sterkte van die intermolekulêre kragte sterker word (toeneem) ✓ sal die dampdruk laer wees (afneem). ✓

OR/OF

As the strength of intermolecular forces become weaker, ✓ the vapour pressure will become higher. ✓ (increase).
Indien die sterkte van die intermolekulêre kragte swakker word (afneem) ✓ sal die dampdruk hoër wees (toeneem). ✓ (2)

3.6 Ethanoic acid. ✓ There are 2 sites between ethanoic acid molecules to form hydrogen bonds and only 1 between propan-1-ol. ✓ The intermolecular forces are stronger between ethanoic acid molecules, therefore the boiling point is higher, and the vapour pressure is lower. ✓/
Etanonoësuur. ✓ Tussen etanonoësuur-molekules kan 2 waterstofbindings vorm en tussen propan-1-ol molekules slegs een. ✓ Dus is die intermolekulêre kragte sterker tussen etanonoësuur se molekules en dus is die kookpunt hoër en dampdruk laer. ✓ (3)

[11]

QUESTION/VRAAG 4

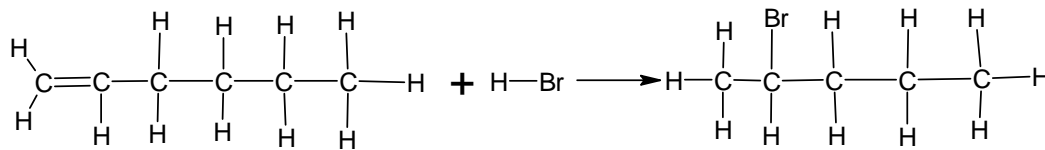
4.1 4.1.1 Addition (Hydration)/Addisie (Hidrasie) ✓ (1)

4.1.2 Substitution (Halogenation)(bromination) ✓
Substitusie (Halogenering)(brominering) ✓ (1)

4.1.3 Addition (Hydrogenation)/Addisie (Hidrogenering) ✓ ✓ (1)

4.2 4.2.1 Sodium hydroxide / Potassium hydroxide ✓
Natriumhidroksied / Kaliumhidroksied ✓ (1)

4.2.2 A dilute strong base ✓ and mild heat ✓
'n Verdunde sterk basis ✓ en matige hitte ✓ (2)



One mark for each product and reactant ✓✓✓
Een punt vir elke produk en reaktant ✓✓✓ (3)

4.3 $\text{C}_5\text{H}_{12} + 8\text{O}_2 \checkmark \rightarrow 5\text{CO}_2 + 6\text{H}_2\text{O} \checkmark$ ✓ balance/balanseer (3)

[12]

QUESTION/VRAAG 5

- 5.1 A semiconductor is a material that has electrical conductivity between that of a conductor and an insulator. ✓✓
'n Halfgeleier is 'n materiaal wat elektriese geleiding het tussen 'n geleier en 'n isolator. ✓✓ (2)
- 5.2 5.2.1 Doping/Dotering ✓ (1)
- 5.2.2 N-type. ✓ The mobile charge carriers have a negative charge. ✓/
N-tipe. ✓ *Die mobiele ladingdraers het 'n negatiewe lading.* ✓ (2)
- [5]

QUESTION/VRAAG 6

- 6.1 An electrolyte is a substance of which the aqueous solution contains ions. ✓✓/
'n Elektroliet is 'n stof waarvan die waterige oplossing ione bevat. ✓✓

OR/OF

A substance that dissolves in water to give a solution of ions that conduct electricity. ✓✓/
'n Stof wat in water oplos om 'n oplossing ione te gee wat elektrisiteit gelei. ✓✓

OR/OF

- A substance that forms free ions when melted. ✓✓/
'n Stof wat vrye ione vorm wanneer dit smelt. ✓✓ (2)
- 6.2 6.2.1 $2 \text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ ✓✓ (2)
- 6.2.2 $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ ✓✓ (2)
- 6.3 Electrical energy to chemical energy. ✓/
Elektriese energie na chemiese energie. ✓ (1)
- 6.4 **Q.** ✓ Reduction takes place / *Reduksie vind plaas* ✓ (2)
- 6.5 6.5.1 Cu is a stronger reducing agent ✓ than Cl⁻ ions. Cu will be oxidised to Cu²⁺ ions ✓ resulting in the plate becoming eroded. ✓/
Cu is 'n sterker reduseermiddel ✓ as Cl⁻ ione. Cu word geoksideer na Cu²⁺ ione ✓ wat veroorsaak dat die plaat roes (erodeer). ✓ (3)
- 6.5.2 Non-spontaneous / *Nie-spontaan* ✓ (1)
- [13]

QUESTION/VRAAG 7

7.1 Chemical energy is converted to electrical energy/ ✓
Chemiese energie word na elektriese energie omgesit. ✓ (1)

7.2 It maintains electrical neutrality. ✓/
Dit behou elektriese neutraliteit ✓

OR/OF

It separates the two compartments, so that they do not mix. ✓/
Dit skei die twee oplossings, sodat hulle nie meng nie. ✓

OR/OF

It completes the circuit. ✓
Dit voltooi die stroombaan. ✓ (1)

7.3 $\text{Cd} \rightarrow \text{Cd}^{+2} + 2\text{e}^-$ ✓✓ (2)

7.4 From Cd to Sn / *Vanaf Cd na Sn* ✓ (1)

7.5 $\text{Cd} + \text{Sn}^{+2} \rightarrow \text{Cd}^{+2} + \text{Sn}$ ✓✓ ✓ Balance/*Balanseer* (3)

7.6 $E^{\theta}_{\text{cell}} = E^{\theta}_{\text{cathode}} - E^{\theta}_{\text{Anode}} / E^{\theta}_{\text{sel}} = E^{\theta}_{\text{katode}} - E^{\theta}_{\text{anode}}$ ✓
 $= (-0,14) - (-0,40)$ ✓
 $= +0,26 \text{ V}$ ✓ (3)

7.7 It means they did not take the measurements at standard conditions ✓ where the temperature is 298 K (25 °C) ✓ and the concentrations of the solutions are 1 mol.dm⁻³. ✓
Dit beteken dat nie al die meetings by standardtoestande geneem is nie waar die temperatuur 298 K (25 °C) is en die konsentrasie van die oplossings 1 mol.dm⁻³ moet wees. (2)
[13]

TOTAL/TOTAAL: 75