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**NATIONAL SENIOR CERTIFICATE/  
NASIONALE SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**JUNE/JUNIE 2022**

**TECHNICAL SCIENCES P2/TEGNIJSE WETENSKAPPE V2  
MARKING GUIDELINE/NASIENRIGLYN**

**MARKS/PUNTE: 75**

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*This marking guideline consists of 7 pages/  
Hierdie nasienriglyn bestaan uit 7 bladsye.*

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**QUESTION/VRAAG 1**

- |     |      |     |
|-----|------|-----|
| 1.1 | B ✓✓ | (2) |
| 1.2 | B ✓✓ | (2) |
| 1.3 | A ✓✓ | (2) |
| 1.4 | C ✓✓ | (2) |
| 1.5 | D ✓✓ | (2) |

**[10]****QUESTION/VRAAG 2**

- 2.1 An atom or a group of atoms that determine the chemical properties of a molecule./ ✓✓ *'n Atoom of groep atome wat die chemiese eienskappe van 'n molekule bepaal* ✓✓

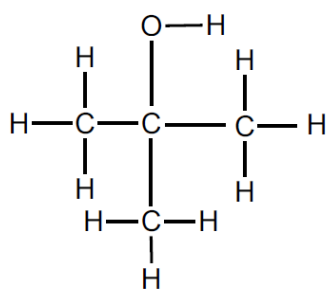
**OR/OF**

An atom or a group of atoms that determine(s) the physical and chemical properties of a group of organic compounds./ ✓✓ *'n Atoom of groep atome wat die fisiese en chemiese eienskappe van 'n groep organiese verbindings bepaal.* ✓✓

(2)

- |     |       |                                    |     |
|-----|-------|------------------------------------|-----|
| 2.2 | 2.2.1 | D ✓                                | (1) |
|     | 2.2.2 | B ✓                                | (1) |
|     | 2.2.3 | F ✓                                | (1) |
|     | 2.2.4 | E ✓                                | (1) |
|     | 2.2.5 | A and/en B ✓                       | (1) |
|     | 2.2.6 | C and/en D ✓                       | (1) |
| 2.3 | 2.3.1 | Butan-2-ol ✓                       | (1) |
|     | 2.3.2 | Propanone/Propanoon ✓              | (1) |
|     | 2.3.3 | Ethyl propanoate/Etielpropanoaat ✓ | (1) |

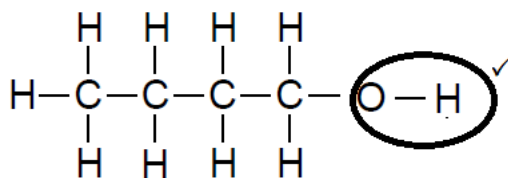
2.4 2.4.1



✓✓

(2)

2.4.2

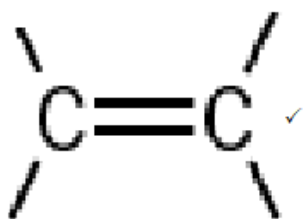


(1)

2.4.3 C<sub>5</sub>H<sub>12</sub> ✓

(1)

2.4.4



✓

(1)  
[16]

**QUESTION/VRAAG 3**

- 3.1 3.1.1 Carboxylic acid/Karboksielsuur ✓ (1)
- 3.1.2 Ketone /Ketoon ✓ (1)
- 3.2 Van der Waals forces / Van der Waals-kragte ✓ (1)
- 3.3 Hydrogen bond / Waterstofbinding ✓ (1)
- 3.4 Alcohol has **one site for a hydrogen bond** and carboxylic acid has **two bond sites for hydrogen bonds** ✓ which causes carboxylic acid to have **stronger** intermolecular forces than alcohol. ✓ The **stronger the intermolecular forces** the **higher the boiling point.** ✓  
*Alkohol het **een punt vir 'n waterstofbinding** en karboksielsuur het **twee verbindingspunte vir waterstofbinding** ✓ wat veroorsaak dat die karboksielsuur **sterker intermolekulêre kragte** as alkohol het. ✓ Hoe **sterker die intermolekulêre kragte**, hoe **hoër die kookpunt.** ✓* (3)
- [7]

**QUESTION/VRAAG 4**

- 4.1 Homologous series is a series of organic compounds that can be described by the same general formula and where each member differs from the next by a  $\text{CH}_2$ -group. ✓✓

*'n Homoloë reeks is 'n reeks organiese verbindings wat deur dieselfde algemene formule beskryf kan word en waar elke lid verskil van die volgende deur 'n  $\text{CH}_2$ -groep. ✓✓*

(2)

- 4.2 4.2.1 C ✓

(1)

- 4.2.2 A ✓

(1)

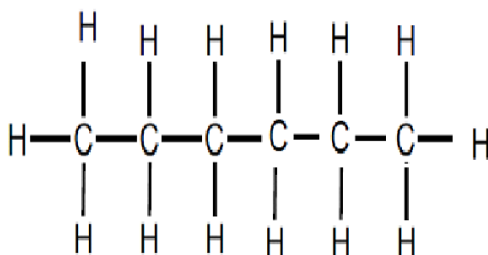
- 4.2.3 B ✓

(1)

- 4.2.4 A ✓

(1)

- 4.3



(2)

- 4.4 Increase in number of carbon atoms, increases chain length/molecular mass/size/surface area. ✓

*Toename in aantal koolstof atome vermeerder die kettinglengte/molekulêre massa/grootte/oppervlakte. ✓*

Strength of intermolecular forces increases/ more sites for London forces

*Sterkte van die intermolekulêre kragte neem toe/meer punte vir*

*Londonkragte. ✓*

More energy is required to overcome intermolecular forces; therefore, the boiling point is higher. ✓

*Meer energie word benodig om die intermolekulêre kragte te oorkom dus is die kookpunt hoër. ✓*

(3)

**[11]**

## QUESTION/VRAAG 5

5.1 5.1.1 Pent-2-ene /Pent-2-een ✓✓ (2)

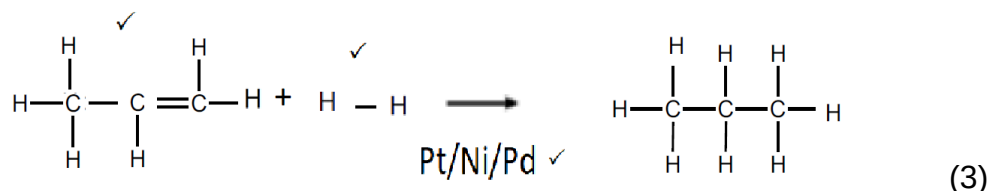
5.1.2 Addition reaction/ hydrolysis✓  
Addisie reaksie/hidrolise (1)

5.1.3 Excess water (H<sub>2</sub>O) **OR**  
Conc. sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) **OR** } ✓  
Dilute sulphuric acid (H<sub>2</sub>SO<sub>4</sub>)  
Oormaat water (H<sub>2</sub>O) **OF**  
Gekon. swawelsuur (H<sub>2</sub>SO<sub>4</sub>) **OF** } ✓  
Verdunde swawelsuur (H<sub>2</sub>SO<sub>4</sub>) (Any one) (1)

5.1.4 Secondary alcohol /Sekondêre alkohol ✓ (1)

5.1.5 Major product/Hoof produk ✓ (1)

5.2 5.2.1



5.2.2 Hydrogenation / Hidrogenasie ✓ (1)

5.2.3 C<sub>n</sub>H<sub>2n</sub> ✓ (1)

5.3 Contains only single bonds between carbon atoms. ✓✓  
Bevat slegs enkelbindings tussen koolstof atome. ✓✓ (2)

5.4 5.4.1 Chlorine /Chloor (Cl or/of Cl<sub>2</sub> 0/1) ✓ (1)

5.4.2



5.4.3 2-chlorobutane /2-chlorobutaan ✓ (1)

5.5 Polymer is a large molecule composed of smaller monomer units covalently bonded to each other in a repeating pattern. ✓✓  
Polimeer is 'n groot molekule wat saamgestel is uit kleiner monomeer eenhede wat kovalent in 'n herhalende patroon aan mekaar verbind is. ✓✓ (2)

5.6 Plastic bags /Plastiese sakke }  
Plastic bottles /Plastiese bottels }  
Cling wrap /Kleef plastiek } (Any ONE / Enige EEN) ✓ (1)

[20]

**QUESTION/VRAAG 6**

- 6.1 6.1.1 An intrinsic semiconductor is a pure semiconductor. ✓✓  
*'n Intrinsieke halfgeleier is 'n suiwer halfgeleier.* ✓✓ (2)
- 6.1.2 Doping is the process of adding impurities to intrinsic semiconductors. ✓✓  
*Doktering is die proses van die toevoeging van onsuiverhede by intrinsieke halfgeleiers.* ✓✓ (2)
- 6.2 6.2.1 Semiconductor /Halfgeleier 2 ✓ (1)
- 6.2.2 Semiconductor /Halfgeleier 1 ✓ (1)
- 6.2.3 A is an extra electron ✓ and B is a positive hole. ✓  
*A is 'n ekstra elektron ✓ en B is 'n positiewe holte.* ✓ (1)
- 6.3 The p-n junction is formed when:
- a p-doped semiconductor (with positive holes) is connected to an n-doped semiconductor (with spare electrons). In the p-region electrons fill some holes and the holes become neutral. ✓
  - The p-region becomes negatively charged – it has gained electrons and the n-region becomes positively charged because it has lost some electrons. ✓
  - There is potential difference between the two sides of the diode. ✓
- 'n p-n verbinding word gevorm wanneer:*  
*'n p-gedokteerde halfgeleier (met positiewe holtes) aan 'n n-gedokteerde halfgeleier (met spaar elektrone) verbind word. In die p-gebied vul elektrone die holtes en sommige holtes word neutral.* ✓
- *Die p-gebied word negatief gelaai – dit verkry elektrone en die n-gebied word positief gelaai want dit het sommige elektrone verloor.* ✓
  - *Daar is 'n potensiaal verskil tussen die twee kante van die diode.* ✓ (3)
- [11]

**TOTAL/TOTAAL: 75**