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# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**TECHNICAL SCIENCES P2  
TEGNIESE WETENSKAPPE V2**

**NOVEMBER 2023**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 75**

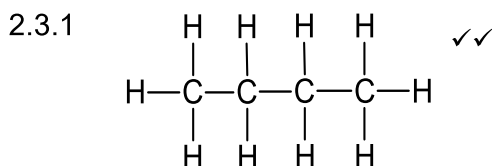
**These marking guidelines consist of 7 pages.  
*Hierdie nasienriglyne bestaan uit 7 bladsye.***

**QUESTION/VRAAG 1**

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

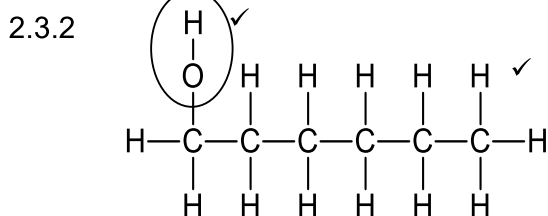
**QUESTION/VRAAG 2**

- 2.1 Molecules containing carbon atoms. ✓✓  
*Molekule wat koolstofatome bevat.* (2)  
 2.2.1 B ✓ (1)  
 2.2.2 C and/en D ✓✓ **NOTE/LET WEL:** 2 marks or/of 0 (2)  
 2.2.3 A ✓ or/of B (1)

**Marking criteria/Nasienkriteria:**

- Correct functional group/Korrekte funksionele groep
- Whole structure correct/Volledige struktuur korrek
- If a bond or hydrogen is missing/Indien 'n binding of waterstof ontbreek  $\frac{1}{2}$

(2)

**Marking criteria/Nasienkriteria:**

- Correct functional group/Korrekte funksionele groep
- The whole structure correct/Volledige struktuur korrek
- If a bond or hydrogen is missing/Indien 'n binding of waterstof ontbreek  $\frac{1}{2}$

(2)

- 2.4 Organic compounds that have the same molecular formula ✓ but different functional groups. ✓  
*Organiese molekule met dieselfde molekulêre formule, maar verskillende funksionele groepe.* (2)  
 2.5 Propanal ✓ / Propanaal (2)  
 2.6 Ketone ✓ / Keton (1)

**[15]**

**QUESTION/VRAAG 3**

3.1 The temperature at which the solid and liquid phases of a substance are in equilibrium. ✓✓  
*Die temperatuur waarby die vaste en vloeistoffases van 'n stof in ewewig is.* (2)

- 3.2
- Compound **A**/Propane and compound **B**/Butane both contain London forces/induced dipole forces/dispersion forces. ✓/  
*Verbinding **A**/Propaan en verbinding **B**/Butaan besit beide Londonkragte/geïnduseerde dipoolkragte/dispersiekragte.*
  - Chain length/molecular mass/surface area of compound **B**/Butane is longer/larger than that of compound **A**/Propane. ✓/  
*Kettinglengte/molekulêre massa/oppervlakarea van verbinding **B**/Butaan is langer/groter as dié van verbinding **A**/Propaan.*
  - London forces/intermolecular forces/induced dipole forces/dispersion forces in compound **B**/Butane are stronger than that in compound **A** Propane. ✓/  
*Londonkragte/intermolekulêre kragte/geïnduseerde dipoolkragte/dispersiekragte in verbinding **B**/Butaan is sterker as dié in verbinding **A**/Propaan.*

**OR/OF**

- Compound **A**/Propane and compound **B**/Butane both contain London forces/induced dipole forces/dispersion forces./  
*Verbinding **A**/Propaan en verbinding **B**/Butaan besit beide Londonkragte/geïnduseerde dipoolkragte/dispersiekragte.*
- Chain length/molecular mass/surface area of compound **A**/Propane is shorter/smaller than that of compound **B**/Butane./  
*Kettinglengte/molekulêre massa/oppervlakarea van verbinding **A**/Propaan is korter/kleiner as dié van verbinding **B**/Butaan.*
- London forces/intermolecular forces/induced dipole forces/dispersion forces in compound **A**/Propane are weaker than that in compound **B**/ Butane.  
*Londonkragte/intermolekulêre kragte/geïnduseerde dipoolkragte/dispersiekragte in verbinding **A**/Propaan is swakker as dié in verbinding **B**/Butaan.* (3)

3.3.1 Yes ✓/Ja



Only one independent variable ✓ used during the investigation.  
*(Accept: Both have the same chain length/number of carbon atoms).*  
Slegs een onafhanklike veranderlike word gebruik tydens die ondersoek. *(Aanvaar: Beide het dieselfde kettingslengte/aantal koolstofatome).* (2)



3.3.2

**Marking criteria/Nasienkriteria:**

- Relevant dependent and independent variables./*Toepaslike afhanklike en onafhanklike veranderlikes.*

Examples/Voorbeelde:

What is the relationship between type of functional groups/homologous series and melting point? ✓✓

*Wat is die verhouding tussen die tipe funksionele groepe/homoloë reeks en smeltpunt?*

**OR/OF**

How will the type of functional groups/homologous series influence the melting point?

*Hoe sal die tipe funksionele groepe/homoloë reeks die smeltpunt beïnvloed?*

(2)

3.3.3 Functional groups ✓/Type of homologous series/Compounds

*Funksionele groepe/Tipe homoloë reeks/Verbindings*

(1)

3.3.4 Lower than ✓/Laer as

(1)

3.3.5 The melting point of compound **A**/Propane is lower than that of compound **C**/Propan-1-ol. ✓✓

*Die smeltpunt van verbinding **A**/Propaan is laer as dié van verbinding **C**/Propan-1-ol.*

**OR/OF**

The melting point of compound **C**/Propan-1-ol is higher than that of compound **A**/Propane.

*Die smeltpunt van verbinding **C**/Propan-1-ol is hoër as dié van verbinding **A**/Propaan.*

**OR/OF**

The intermolecular forces of compound **A**/Propane are weaker than that of compound **C**/Propan-1-ol.

*Die intermolekulêre kragte van verbinding **A**/Propaan is swakker as dié van verbinding **C**/Propan-1-ol.*

**OR/OF**

The intermolecular forces of compound **C**/Propan-1-ol are stronger than that of compound **A**/Propane

*Die intermolekulêre kragte van verbinding **C**/Propan-1-ol is sterker as dié van verbinding **A**/Propaan.*

(2)

**[13]**

**QUESTION/VRAAG 4**

4.1.1 Addition ✓/Hydrogenation  
Addisie/Hidrogenasie/Hidrogenering (1)

4.1.2 Substitution ✓/Halogenation/Bromination  
Substitusie/Halogenasie/Halogenering/Bromogenering (1)

4.2  $C_3H_6 + H_2 \checkmark \rightarrow C_3H_8 \checkmark$   
(Balanced ✓/ Gebalanseerd)

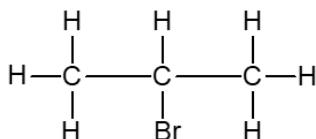
**Marking criteria/Nasienkriteria:**

- 1 mark for the reactants/ 1 punt vir reaktanse
- 1 mark for product/1 punt vir produkte
- 1 mark for balancing/1 punt vir balansering

**NOTE/LET WEL:** Penalise 1 mark if incorrect formulae (e.g. structural/condensed structural) is used./ Penaliseer met 1 punt indien verkeerde formules (bv. struktuur/gekondenseerde struktuurformule) gebruik word.

(3)

4.3 2-bromopropane / 2-bromopropaan /  $C_3H_7Br$  /  $CH_3CHBrCH_3$

**OR/OF****Marking criteria/Nasienkriteria:**

- 1 mark for 2-bromo (or 1-bromo) / 1 punt vir 2-bromo (of 1-bromo)
- 1 mark for propane/ 1 punt vir propaan

Accept / Aanvaar:

1-bromopropane / 1-bromopropaan

**OR/OF**

$CH_3CH_2CH_2Br$

**OR/OF**

(2)

4.4 Mild heat ✓/Matige hitte (1)

4.5.1 A molecule that consists of a large number of atoms. ✓✓  
'n Molekuul wat 'n groot aantal atome bestaan. (2)


4.5.2 A chemical reaction in which monomer molecules join✓ to form a polymer.✓  
'n Chemiese reaksie waarin monomeermolekule verbind om 'n polimeer te vorm. (2)

**[12]**

**QUESTION/VRAAG 5**

5.1 A solution/liquid/dissolved substance that conducts electricity ✓  
through the movement of ions. ✓  
*'n Ooplossing/vloeistof/opgeloste stof wat elektrisiteit deur die beweging van ione gelei.* (2)

5.2 Electrical (energy) to chemical (energy). ✓✓  
*Elektriese (energie) na chemiese (energie).* (2)

5.3 • Non-spontaneous ✓/Nie-spontaan  
  
• The power source/battery/cell provides energy ✓ so that the reaction can take place./Die kragbron/battery/sel voorsien energie sodat die reaksie kan plaasvind. (2)

5.4.1 Reduction ✓ *Reduksie* (1)

5.4.2  $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$  ✓✓

**Marking criteria/Nasienkriteria:**

**NOTE/LET WEL:** Do not penalise if the phases are omitted./  
*Moenie penaliseer indien fases weggelaat word nie.*

5.5 • Prevents corrosion/rusting. ✓/Voorkom korosie/roes.  
• Increases the value. ✓/Verhoog die waarde.  
• Durability / Duursaamheid (2)

5.6 • Easy to use ✓/Maklik om te gebruik  
• Reduces pollution ✓/Lowers exhaust emissions/ Environmentally friendly / Verminder besoedeling/Verlaag uitlaatgasse/ Omgewingsvriendelik  
• Non-toxic/Nie-toksies  
• Slightly cheaper than petroleum diesel/Effens goedkoper as petroleumdiesel.  
• Safer to handle than petroleum diesel/Veiliger om te hanteer as petroleumdiesel.  
• It is renewable/Dit is herwinbaar  
• Economic advantages in agricultural sector/Ekonomiese voordele in die landbousektor.

(ANY TWO/ENIGE TWEE) (2)

[13]



**QUESTION/VRAAG 6**

- 6.1 The loss of electrons. ✓✓ / Increase in oxidation number.  
*Die verlies aan elektrone. / Toename in oksideergetal* (2)
- 6.2 Cu ✓/Copper/Koper (1)
- 6.3 Cu to/na Ag ✓ (1)
- 6.4 A layer of silver ✓ is formed/deposited. (Accept: Increase in mass)  
*'n Dun laag silwer word gevorm/gedeponeer. (Aanvaar: Toename in massa)* (1)
- 6.5  $\text{Cu(s)} / \text{Cu}^{2+}(\text{aq})(1 \text{ mol}\cdot\text{dm}^{-3}) \checkmark // \checkmark \text{Ag}^{+}(\text{aq})(1 \text{ mol}\cdot\text{dm}^{-3}) / \text{Ag(s)} \checkmark$

**Marking criteria/Nasienkriteria:**

**NOTE/LET WEL:** Do not penalise if phases/concentration are omitted./*Moenie penaliseer indien fases/konsentrasie weggelaat word nie.*

- 6.6  $E^{\theta}_{\text{cell/sel}} = E^{\theta}_{\text{cathode/katode}} - E^{\theta}_{\text{anode/anode}} \checkmark$   
 $= 0,80 - 0,34 \checkmark$   
 $= 0,46 \text{ V} \checkmark$   
 (0,46 V < 2,5 V)

Thus, bulb will NOT glow. ✓  
*Dus, gloeilamp sal NIE brand nie.*

**Accept/Aanvaar:** No/Nee

**Marking criteria/Nasienkriteria:**

- Penalise once if unconventional or incomplete formula is used./*Penaliseer eenmalig indien nie-konvensionele of onvolledige formules gebruik is.*
- *Accredit any of the relevant formulae taken from the data sheet./Krediteer enige van die toepaslike formules geneem vanuit die gewensblad.*

(4)

**[12]****TOTAL/TOTAAL: 75**