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PHYSICAL SCIENCES

GRADE: 12

ORGANIC CHEMISTRY SOLUTIONS

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KWV 01

QUESTION 2/VRAAG 2

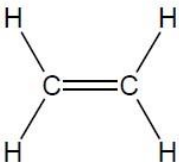
2.1

2.1.1 Alkynes / Alkyne ✓ (1)

2.1.2 Hydroxyl group / Hidroksielgroep ✓ (1)

2.1.3 C ✓ (1)

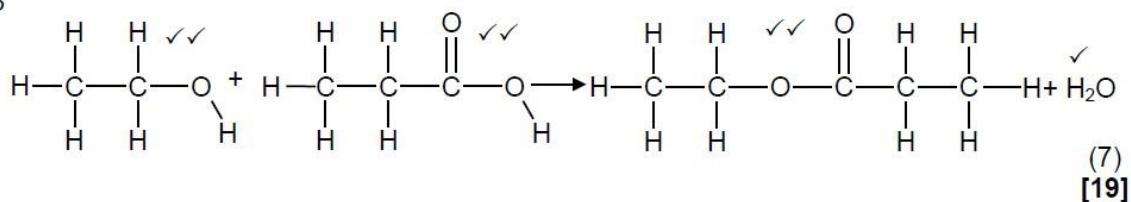
2.1.4 2-methylpentan-3-one / 2-metielpentan-3-oon ✓✓ (2)

2.1.5  ✓✓ (2)

2.1.6 $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$ ✓ Bal. ✓ (3)

2.2 Same molecular formula, ✓
but different positions of the functional group. ✓
Dieselfde molekulêre formule,
maar verskillende posisies van die funksionele groep. (2)

2.3



QUESTION 3/VRAAG 3

3.1 Temperature ✓ at which the vapour pressure of the substance equals atmospheric pressure. ✓
Temperatuur waar die dampdruk van die stof gelyk is aan atmosferiese druk. (2)

3.2

3.2.1 Boiling point increases as the chain length / molecular mass increases. ✓
Kookpunt neem toe soos wat die kettinglengte / molekulêre massa toeneem.

OR/OF

Boiling point increases from methane to butane.
Kookpunt neem toe van metaan na butaan. (1)

3.2.2

- Chain length increases from methane to butane. ✓
Kettinglengte neem toe van metaan na butaan.
- Strength of London forces / induced dipole forces increases from methane to butane. ✓
Sterkte van Londonkragte / geïnduseerde dipoolkragte neem toe van metaan na butaan.
- More energy needed to overcome intermolecular forces in butane than in methane. ✓
Meer energie benodig om intermolekulêre kragte in butaan as in metaan te oorkom. (3)

3.3 Between molecules of the alkanes are weak London forces or induced dipole forces. / *Tussen molekule van alkane is swak Londonkragte of geïnduseerde dipoolkragte.* ✓
Between alcohol molecules are, in addition to weak London forces or induced dipole forces, also strong hydrogen bonds. / *Tussen alkoholmolekule is sterk waterstofbindings bykomend by tot swak Londonkragte of geïnduseerde dipoolkragte.* ✓ (2)

[8]

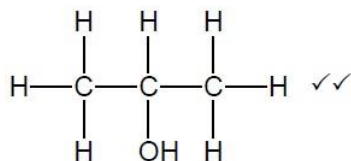
QUESTION 4/VRAAG 4

4.1 Alkenes / Alkene ✓ (1)

4.2

4.2.1 Addition / Hydrohalogenation / Hydrochlorination ✓
Addisie / Hidrohalogeneging / Hidrochloronering (1)

4.2.2



Propan-2-ol ✓ (3)

4.2.3 Elimination / Dehydration ✓
Eliminasie / Dehidrasie (1)

4.2.4 Catalyst / Katalisator ✓ (1)

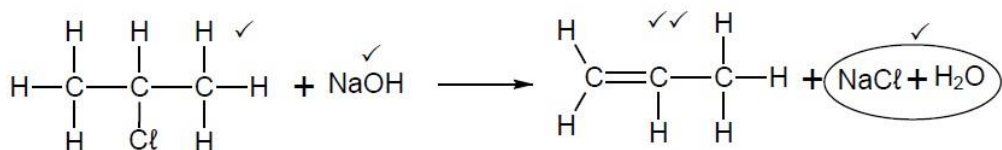
4.3

4.3.1 Sodium hydroxide / Potassium hydroxide ✓
Natriumhidroksied / Kaliumhidroksied (1)

4.3.2 Dissolve base in ethanol. / Concentrated (strong) base) ✓
Heat strongly. ✓

Los basis op in etanol. / Gekonsentreerde (sterk) basis
Verhit sterk. (2)

4.3.3



(5)
[15]

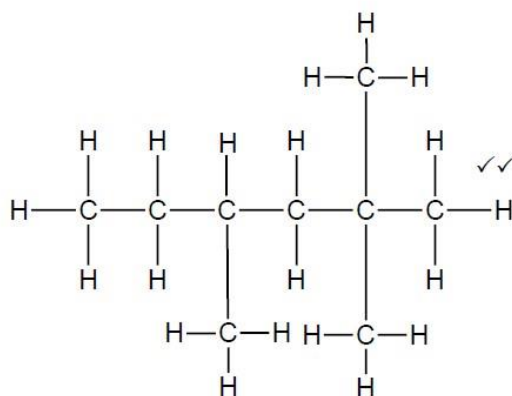
KWV 02

QUESTION 2 / VRAAG 2

- 2.1
- 2.1.1 B ✓ (1)
- 2.1.2 E ✓ (1)
- 2.1.3 F ✓ (1)
- 2.2
- 2.2.1 2-bromo-3-chloro-4-methylpentane
2-bromo-3-chloro-4-metielpentaa / 2-broom-3-chloor-4-metielpentaa
- Marking criteria / Nasienriglyne:**

 - Correct stem i.e. pentane. / Korrekte stam d.i. pentaan. ✓
 - All substituents correctly identified. / Alle substituenten korrek geïdentifiseer. ✓
 - Substituents correctly numbered, in alphabetical order, hyphens and commas correctly used. ✓
Substituenten korrek genommer, in alfabetiese volgorde, koppeltekens en kommas korrek gebruik.
- (3)
- 2.2.2 Ethene / Eteen ✓ (1)

2.3
2.3.1



Marking criteria / Nasienriglyne:

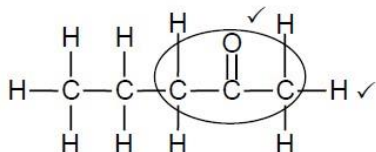
- Six saturated C atoms in longest chain i.e. hexane. ✓
Ses versadigde C-atome in langste ketting d.i. hekasaan.
- Three methyl substituents on second C and fourth C. ✓
Drie metielsubstituente op tweede C en vierde C.

Notes / Aantekeninge:

- If correct structure, but H atoms omitted / Indien korrekte struktuur, maar H-atome weggelaat: Max / Maks. $\frac{1}{2}$
- Condensed or semi-structural formula: Gekondenseerde of semistruktuurformule: Max./Maks. $\frac{1}{2}$
- Molecular formula / Molekulêre formule: $\frac{0}{2}$

(2)

2.3.2



Marking criteria / Nasienriglyne:

- Whole structure correct / Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct / Slegs funksionele groep korrek: $\frac{1}{2}$

Notes / Aantekeninge:

- If two or more functional groups/Indien twee of meer funksionele groepe: $\frac{0}{2}$
- Condensed or semi-structural formula: Gekondenseerde of semistruktuurformule: Max / Maks $\frac{1}{2}$
- Molecular formula / Molekulêre formule: $\frac{0}{2}$

(2)

2.4

2.4.1 (Compounds with) the same molecular formula ✓ but different functional groups / different homologous series. ✓
(Verbindings met) dieselfde molekulêre formule, maar verskillende funksionele groepe / verskillende homoloë reekse.

(2)

2.4.2 B & F ✓

(1)

[14]

QUESTION 3 / VRAAG 3

3.1 ANY ONE / ENIGE EEN:

- Alkanes have ONLY single bonds. ✓
Alkane het SLEGS enkelbindings.
- Alkanes have single bonds between C atoms.
Alkane het enkelbindings tussen C-atome.
- Alkanes have no double OR triple bonds OR multiple bonds.
Alkane het geen dubbel- OF trippelbindings OF meervoudige bindings nie.
- Alkanes contain the maximum number of H atoms bonded to C atoms.
Alkane bevat die maksimum getal H-atome gebind aan C-atome.

(1)

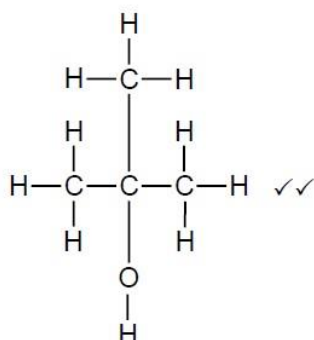
3.2

3.2.1 ANY ONE / ENIGE EEN:

$\begin{array}{c} \\ -C-O-H \checkmark \\ \end{array}$	$\begin{array}{c} \\ -C-OH \\ \end{array}$	$-OH$	$-O-H$
$R-OH$	$R-O-H$		

(1)

3.2.2



Marking criteria / Nasienriglyne:

- OH group on second C atom of longest chain. ✓
- OH-groep op tweede C-atoom van langste ketting.
- Tertiary group consisting of four C atoms with methyl group on 2nd C atom. ✓
Tersiêre groep bestaande uit vier C-atome met metielgroep op 2de C-atoom.
- If two or more functional groups / Indien twee of meer funksionele groepe: $\frac{0}{2}$

Notes / Aantekeninge:

- Accept / Aanvaar – OH
- If correct structure and number of bonds, but H atoms omitted / Indien korrekte struktuur en getal bindings, maar H-atome weggelaat: Max / Maks. $\frac{1}{2}$
- Condensed or semi-structural formula / Gekondenseerde of semistruktuurformule: Max / Maks. $\frac{1}{2}$
- Molecular formula / Molekulêre formule: $\frac{0}{2}$

(2)

3.3
3.3.1

Criteria for investigative question / Riglyne vir ondersoekende vraag:	
The dependent and independent variables are stated. <i>Die afhanklike en onafhanklike veranderlikes is genoem.</i>	✓
Ask a question about the relationship between the independent and dependent variables. <i>Vra 'n vraag oor die verwantskap tussen die onafhanklike en afhanklike veranderlikes.</i>	✓

Examples / Voorbeelde:

- How does an increase in chain length / molecular size / molecular structure / molecular mass / surface area influence boiling point?
Hoe beïnvloed 'n toename in kettinglengte / molekulêre grootte / molekulêre struktuur / molekulêre massa / reaksieoppervlak die kookpunt?
- What is the relationship between chain length / molecular size / molecular structure / molecular mass / surface area and boiling point?
Wat is die verwantskap tussen kettinglengte / molekulêre grootte / molekulêre struktuur / molekulêre massa / oppervlakte en kookpunt? (2)

3.3.2

- **Structure / Struktuur:**
The chain length / molecular size / molecular structure / molecular mass / surface area increases. ✓
Die kettinglengte / molekulêre grootte / molekulêre struktuur / molekulêre massa / oppervlakte neem toe.
 - **Intermolecular forces / Intermolekulêre kragte:**
Increase in strength of intermolecular forces / induced dipole / London / dispersion / Van der Waals forces. ✓
Toename in sterkte van intermolekulêre kragte / geïnduseerde dipoolkragte / London-kragte / dispersiekragte / Van der Waalskragte.
 - **Energy / Energie:**
More energy needed to overcome / break intermolecular forces. ✓
Meer energie benodig om intermolekulêre kragte te oorkom / breek.
- OR / OF
- **Structure / Struktuur:**
From propane to methane the chain length / molecular size / molecular structure / molecular mass / surface area decreases. ✓
Van propaan na metaan neem die kettinglengte / molekulêre grootte / molekulêre struktuur / molekulêre massa / oppervlakte af.
 - **Intermolecular forces / Intermolekulêre kragte:**
Decrease in strength of intermolecular forces / induced dipole forces / London forces / dispersion forces. ✓
Afname in sterkte van intermolekulêre kragte / geïnduseerde dipoolkragte / London-kragte / dispersiekragte.
 - **Energy / Energie:**
Less energy needed to overcome / break intermolecular forces. ✓
Minder energie benodig om intermolekulêre kragte te oorkom / breek. (3)

- 3.4
- Between propane molecules are London forces / dispersion forces / induced dipole forces. ✓
Tussen propaanmolekule is Londonkragte / dispersiekragte / geïnduseerde dipoolkragte.
 - Between propan-1-ol molecules are London forces / dispersion forces / induced dipole forces and hydrogen bonds. ✓
Tussen propan-1-ol molekule is Londonkragte / dispersiekragte / geïnduseerde dipoolkragte en waterstofbindings.
 - Hydrogen bonds / Forces between alcohol molecules are stronger or need more energy than London forces / dispersion forces / induced dipole forces. ✓
Waterstofbindings / Kragte tussen alkoholmolekule is sterker of benodig meer energie om oorkom te word as Londonkragte / dispersiekragte / geïnduseerde dipoolkragte.

OR/OF

Between propane molecules are weak London forces / dispersion forces / induced dipole forces ✓ and between propan-1-ol molecules are strong hydrogen bonds. ✓✓
Tussen propaanmolekule is swak Londonkragte / dispersiekragte / geïnduseerde dipoolkragte en tussen propan-1-olmolekule is sterk waterstofbindings.

(3)
[12]

QUESTION 4 / VRAAG 4

4.1

4.1.1 Substitution / chlorination / halogenation ✓
Substitusie / chlorering / halogenering / halogenasie

(1)

4.1.2 Substitution / hydrolysis ✓
Substitusie / hidrolise

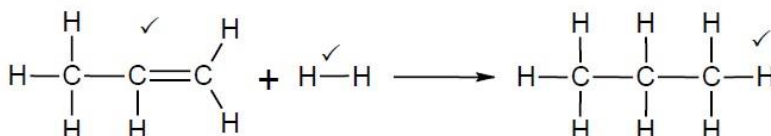
(1)

4.2

4.2.1 Hydrogenation / Hidrogenasie / Hidrogenering ✓

(1)

4.2.2



Notes / Aantekeninge:

- Ignore/Ignoreer ⇌
- Accept H₂ if condensed. / Aanvaar H₂ as gekondenseerd.
- Any additional reactants and/or products

Enige addisionele reaktanse en / of produkte:

Max./Maks. $\frac{2}{3}$

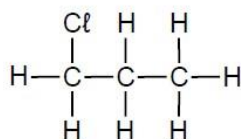
- Accept coefficients that are multiples.
Aanvaar koëffisiënte wat veelvoude is.
- Molecular / condensed formulae

Molekulêre-/ gekondenseerde formule:

Max./Maks. $\frac{2}{3}$

(3)

4.3

**Marking criteria / Nasienriglyne:**

- Whole structure correct: / Hele struktuur korrek: $\frac{2}{2}$
- Only ONE Cl atom as functional group. / Slegs EEN Cl-atoom as funksionele groep: $\frac{1}{2}$

Notes / Aantekeninge:

- Condensed or semi-structural formula
Gekondenseerde of semistruktuurformule: Max./Maks. $\frac{1}{2}$
- Molecular formula. / Molekulêre formule: $\frac{0}{2}$
- If functional group is incorrect. / Indien funksionele groep verkeerd is: $\frac{0}{2}$

(2)

4.4

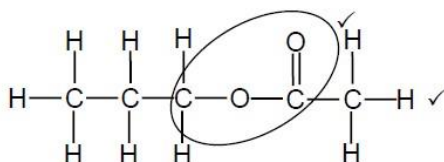
4.4.1 Esterification / Condensation ✓
Verestering / Esterifikasie / Kondensasie

(1)

4.4.2 (Concentrated) H_2SO_4 / (Concentrated) sulphuric acid ✓
(Gekonsentreerde) H_2SO_4 / (Gekonsentreerde) swawelsuur of swaelsuur

(1)

4.4.3

**Marking criteria / Nasienriglyne:**

- Whole structure correct / Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct / Slegs funksionele groep korrek: $\frac{1}{2}$

Notes / Aantekeninge:

- If two or more functional groups / Indien twee of meer funksionele groepe: $\frac{0}{2}$
- Condensed or semi-structural formula:
Gekondenseerde of semistruktuurformule: Max./Maks. $\frac{1}{2}$
- Molecular formula / Molekulêre formule: $\frac{0}{2}$
- If functional group is incorrect / Indien funksionele groep verkeerd is: $\frac{0}{2}$

(2)

4.4.4 Propyl ✓ ethanoate ✓
Propieletanoaat

(2)

4.5 Sulphuric acid / H_2SO_4 / Phosphoric acid / H_3PO_4 ✓
Swawelsuur / Swaelsuur / H_2SO_4 / Fosforsuur / H_3PO_4

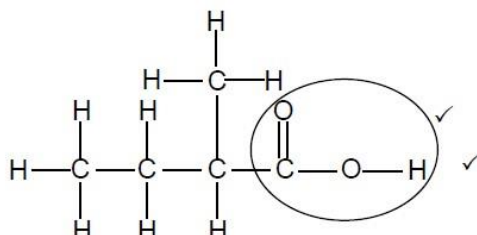
(1)
[15]

KWV 03

QUESTION 2/VRAAG 2

- 2.1.
- 2.1.1 Carboxyl (group)/Karboksiel(groep) ✓ (1)
- 2.1.2 Ketones/Ketone ✓ (1)
- 2.1.3 Addition/Addisie ✓ (1)
- 2.2
- 2.2.1 Ethene/Eteen ✓ (1)
- 2.2.2 4-methyl✓-hexan-3-one ✓
4-metielheksan-3-oon
- OR/OF**
4-methyl✓-3-hexanone ✓
4-metiel-3-heksanoon
- Notes/Aantekeninge:**
IF/INDIEN:
Correct IUPAC name, but one or more of the following errors: omitting hyphens and/or commas; including extra spaces and/or hyphens
Korrekte IUPAC-naam, maar een of meer van die volgende foute: weglating van koppeltekens en/of kommas; insluiting van ekstra spasies en/of koppeltekens
Max./Maks. $\frac{1}{2}$
4 methyl hexan 3 one ✓
4 metiel 3 heksanoon ✓
- (2)
- 2.2.3 4-ethyl-2,2-dimethyl✓hexane ✓
4-etiel-2,2-dimetielheksaan
- Notes/Aantekeninge:**
IF/INDIEN:
Correct IUPAC name, but one or more of the following errors: omitting hyphens and/or commas; including extra spaces and/or hyphens
Korrekte IUPAC-naam, maar een of meer van die volgende foute: weglating van koppeltekens en/of kommas; insluiting van ekstra spasies en/of koppeltekens
Max./Maks. $\frac{1}{2}$
4 ethyl 2,2 dimethylhexane ✓
4 etiel 2,2 dimetielheksaan ✓
- (2)
- 2.3 Carbon dioxide/CO₂/Koolstofdioksied ✓
Water/H₂O ✓ (2)

2.4
2.4.1



Notes/Aantekeninge

Whole structure correct/*Hele struktuur*

korrek: $\frac{2}{2}$

Only functional group correct/*Slegs*

funksionele groep korrek: $\frac{1}{2}$

Notes/Aantekeninge:

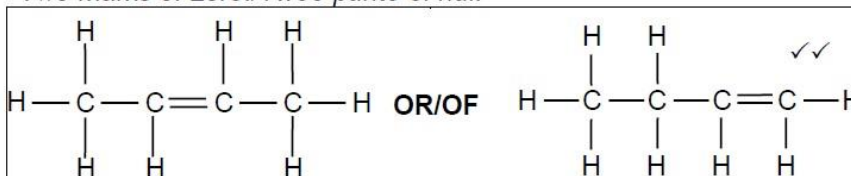
- Condensed or semi-structural formula: $\frac{1}{2}$
Gekondenseerde of semistruktuurformule: $\frac{1}{2}$
- Molecular formula/*Molekulêre formule*: $\frac{0}{2}$

(2)

2.4.2

ANY ONE/ENIGE EEN:

Two marks or zero./*Twee punte of nul.*



Notes/Aantekeninge:

- Condensed or semi-structural formula: Max. $\frac{1}{2}$
Gekondenseerde of semistruktuurformule: Maks. $\frac{1}{2}$
- Molecular formula/*Molekulêre formule*: $\frac{0}{2}$

(2)

2.5

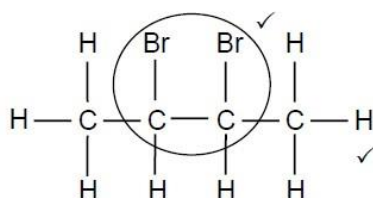
2.5.1 E ✓

(1)

2.5.2 Substitution/halogenation/bromination ✓
Substitusie/halogenering/brominerig

(1)

2.5.3



Notes/Aantekeninge

Whole structure correct/*Hele struktuur*

korrek: $\frac{2}{2}$

Only functional group correct/*Slegs*

funksionele groep korrek: $\frac{1}{2}$

Notes/Aantekeninge:

- Condensed or semi-structural formula: $\frac{1}{2}$
Gekondenseerde of semistruktuurformule: $\frac{1}{2}$
- Molecular formula/*Molekulêre formule*: $\frac{0}{2}$

(2)
[18]

QUESTION 3/VRAAG 3

- 3.1 C ✓ (1)
- 3.2
- 3.2.1 Chain length/molecular size/molecular mass/number of carbon atoms in the chain. ✓
Kettinglengte/molekulêre grootte/molekulêre massa/aantal koolstof-atome in die ketting. (1)
- 3.2.2 Boiling point ✓
Kookpunt (1)
- 3.3 London (forces)/induced dipole (forces)/dispersion (forces) ✓
London (kragte)/geïnduseerde dipool (kragte)/dispersie (kragte) (1)
- 3.4 Higher than ✓
Hoër as (1)
- 3.5 Lower than/Laer as ✓
- Both compounds D and E have hydrogen bonding between molecules. ✓
Beide verbindings D en E het waterstofbinding tussen molekule.
 - Compound D has one site for hydrogen bonding whilst compound E has two sites for hydrogen bonding/forms dimers
OR
Compound D has less sites for hydrogen bonding/weaker hydrogen bonding than compound E. ✓
Verbinding D het een punt vir waterstofbinding terwyl verbinding E twee punte het vir waterstofbinding./vorm dimere
OF
Verbinding D het minder punte vir waterstofbinding/swakker waterstofbinding as verbinding E.
 - More energy needed to overcome intermolecular forces in compound E/less energy needed to overcome intermolecular forces in compound D. ✓
Meer energie nodig om die intermolekulêre kragte te oorkom in verbinding E/minder energie nodig om die intermolekulêre kragte in verbinding E te oorkom.
- (4)
[9]

QUESTION 4/VRAAG 4

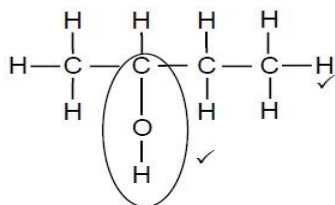
4.1 Unsaturated ✓

Onversadig

Contains a double bond/multiple bond (between C atoms). ✓
Bevat 'n dubbelbinding/meervoudige binding (tussen C-atome).

(2)

4.2.1



Notes/Aantekeninge

Whole structure correct /Hele struktuur korrek:

$\frac{2}{2}$

Only functional group correct/Slegs funksionele groep korrek: $\frac{1}{2}$

(2)

4.2.2 Addition/hydration ✓

Addisie/hidrasie

(1)

4.3

4.3.1 2-chlorobutane ✓✓

2-chlorobutaan

Notes/Aantekeninge:

IF/INDIEN:

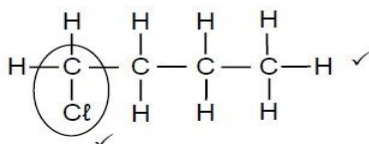
Correct IUPAC name, but one or more of the following errors: omitting hyphens and/or commas; including extra spaces and/or hyphens

Korrekte IUPAC-naam, maar een of meer van die volgende foute: weglating van koppeltekens en/of kommas; insluiting van ekstra spasies en/of koppeltekens

Max./Maks. $\frac{1}{2}$

(2)

4.3.2



Notes/Aantekeninge

Whole structure correct/Hele struktuur korrek:

$\frac{2}{2}$

Only functional group correct/Slegs funksionele groep korrek: $\frac{1}{2}$

(2)

4.4 NO POSITIVE MARKING FROM QUESTION 4.3.1.

4.4.1 GEEN POSITIEWE NASIEN VANAF VRAAG 4.3.1.

- H_2O OR dilute NaOH/KOH ✓
 H_2O OF verdunde NaOH/KOH
- Mild heat/Matige hitte ✓

(2)

4.4.2 Substitution/hydrolysis ✓

Substitusie/hidrolise

(1)

4.4.3 $\text{C}_4\text{H}_9\text{Cl} + \text{NaOH} \rightarrow \text{C}_4\text{H}_{10}\text{O} + \text{NaCl}$ ✓ bal. ✓

OR/OF

$\text{C}_4\text{H}_9\text{Cl} + \text{H}_2\text{O} \rightarrow \text{C}_4\text{H}_{10}\text{O} + \text{HCl}$ ✓ bal. ✓

Notes/Aantekeninge

- Reactants ✓ Products ✓ Balancing ✓
Reaktanse ✓ Produkte ✓ Balansering ✓
- Do not penalise if $\text{C}_4\text{H}_9\text{OH}$ instead of $\text{C}_4\text{H}_{10}\text{O}$. Moenie penaliseer indien $\text{C}_4\text{H}_9\text{OH}$ in plaas van $\text{C}_4\text{H}_{10}\text{O}$
- Ignore/Ignoreer =
- Marking rule 6.3.10/Nasienreël 6.3.10
- Condensed structural formulae or structural formulae:
Gekondenseerde struktuurformules of struktuurformules: Max./Maks. $\frac{2}{3}$

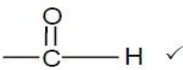
(3)

[15]

KWV 04

QUESTION 2/VRAAG 2

2.1
2.1.1 B ✓ (1)

2.1.2  ✓ (1)

2.1.3 C_nH_{2n-2} ✓ (1)

2.1.4 4-ethyl-5-methylhept-2-yne / 4-ethyl-5-methyl-2-heptyne

4-etiel-5-metielhept-2-yn / 4-etiel-5-metiel-2-heptyn

Marking criteria/Nasienriglyne:

- 4-ethyl / 4-etiel ✓ **OR/OF** 4 ethyl / 4 etiel
- 5-methyl / 5-metiel ✓ **OR/OF** 5 methyl / 5 metiel
- hept-2-yne / 2-heptyne / hept-2-yn / 2-heptyn ✓
OR/OF hept 2 yne / 2 heptyne / hept 2 yn / 2 heptyn

IF/INDIEN:

Any error e.g. hyphens omitted and/or incorrect sequence:

Enige fout bv. koppeltekens weggelaat en/of verkeerde volgorde: Max./Maks. $\frac{2}{3}$ (3)

2.1.5 Butan-2-one / 2-butanone / Butanone
Butan-2-oon / 2-butanoon / Butanoon

Marking criteria/Nasienriglyne:

- Functional group / Funksionele groep ✓
- Whole name correct / Hele naam korrek ✓

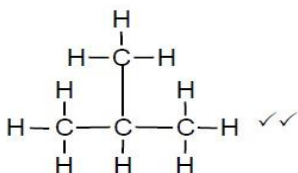
(2)

2.2
2.2.1 Alkanes / Alkane ✓ (1)

2.2.2 2-methylpropane
2-metielpropaan

OR/OF

Methylpropane
Metielpropaan



Notes/Aantekeninge:

IF/INDIEN:

2 methylpropane / 2 metielpropaan ✓ $\frac{1}{2}$

IF sequence incorrect/**INDIEN** volgorde verkeerd: Max./Maks. $\frac{1}{2}$

Marking criteria structural formula:

Nasienriglyne struktuurformule:

- Three carbons in longest chain. ✓
Drie koolstowwe in die langste ketting.
- Methyl group on second carbon.
Metielgroep op tweede koolstof. ✓

Notes/Aantekeninge:

- One or more H atoms omitted:
Een of meer H-atome uitgelaat: $\frac{1}{2}$
- Condensed or semi-structural formula:
Gekondenseerde of semi-struktuur-formule: $\frac{1}{2}$

(4)

2.2.3 Chain / Ketting ✓ (1)

2.3
2.3.1 Haloalkanes / Alkyl halides ✓
Haloalkane / Alkielhaliede (1)

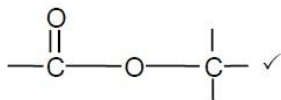
2.3.2 Substitution / halogenation / bromonation ✓
Substitusie / halogenering / halogenasie / bromonering (1)
[16]

QUESTION 3/VRAAG 3

3.1

3.1.1 Esterification / Condensation ✓
Esterifikasie / Verestering / Kondensasie (1)

3.1.2



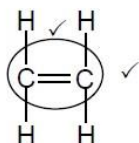
(1)

3.1.3 Propanoic acid / *Propanoësuur* ✓ (1)

3.1.4 Dehydration / elimination ✓
Dehidrasie / dehidratering / eliminasie (1)

3.1.5 (Concentrated) H_2SO_4 / sulphuric acid / H_3PO_4 / phosphoric acid ✓
(Gekonsentreerde) H_2SO_4 / swaelsuur / swawelsuur / H_3PO_4 / fosforsuur (1)

3.1.6



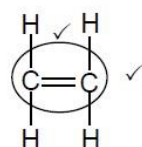
Notes/Aantekeninge

- Functional group: ✓
Funksionele groep:
- Whole structure correct: ✓
Hele struktuur korrek:

(2)

3.2

3.2.1



Notes/Aantekeninge

- Functional group: ✓
Funksionele groep:
- Whole structure correct: ✓
Hele struktuur korrek:

(2)

3.2.2 Addition / *Addisie* ✓

(1)
[10]

QUESTION 4/VRAAG 4

4.1 A bond/an atom or a group of atoms ✓ that determine(s) the (physical and chemical) properties of a group of organic compounds. ✓
'n Binding of 'n atoom of 'n groep atome wat die (fisiese en chemiese) eienskappe van 'n groep organiese verbindings bepaal. (2)

4.2

4.2.1 D / ethanoic acid / etanoësuur ✓



Lowest vapour pressure. ✓
Laagste dampdruk. (2)

4.2.2 A / butane / butaan ✓ (1)

- 4.3
- Between molecules of **A** / butane / alkanes are London / induced dipole / dispersion forces. ✓
*Tussen molekule van **A** / butaan / alkane is London / geïnduseerde dipole / dispersiekrigte.*
 - Between molecules of **B** / propan-2-one / ketones are dipole-dipole forces ✓ in addition to London / induced dipole / dispersion forces.
*Tussen molekule van **B** / propan-2-oon / ketone is dipool-dipool-krigte tesame met London / geïnduseerde dipool / dispersiekrigte.*
 - Intermolecular forces in **A** are weaker than those in **B**. / Less energy is needed in **A** to break/overcome intermolecular forces. ✓
*Intermolekulêre kragte in **A** is swakker as die in **B**. / Minder energie word by **A** benodig om intermolekulêre kragte te breek/oorkom.*

OR/OF

Intermolecular forces in **B** are stronger than those in **A**. / More energy is needed in **B** to break/overcome intermolecular forces.
*Intermolekulêre kragte in **B** is sterker as die in **A**. / Meer energie word by **B** benodig om intermolekulêre kragte te breek/oorkom.*

OR/OF

- Between molecules of **A** / butane / alkanes are weak London / induced dipole / dispersion forces.
*Tussen molekule van **A** / butaan/alkane is swak London / geïnduseerde dipool / dispersiekrigte.*
- Between molecules of **B** / propan-2-one / ketone are strong(er) dipole-dipole forces in addition to London/induced dipole / dispersion forces.
*Tussen molekule van **B** / propan-2-oon / ketone is sterk(er) dipool-dipool/dispersiekrigte.* (3)

4.4 London forces/dispersion forces/induced dipole forces/dipole-dipole forces. ✓
Londonkrigte/dispersiekrigte/geïnduseerde dipoolkrigte/dipool-dipoolkrigte.

OR/OF

A and **B** do not have hydrogen bonding. / **C** and **D** have hydrogen bonding.
***A** en **B** het nie waterstofbinding nie. / **C** en **D** het waterstofbinding.* (1)

4.5 **OPTION 1/OPSIE 1**

- D has more sites for hydrogen bonding than C / forms dimers / is more polar than C. ✓
D het meer punte vir waterstofbinding as C / vorm dimere / is meer polêr as C.
- D has stronger / more intermolecular forces / dipole-dipole forces. ✓
D het sterker / meer intermolekulêre kragte / dipool-dipoolkragte.

OR/OF

D needs more energy to overcome/break the intermolecular forces.
D het meer energie nodig om die intermolekulêre kragte te oorkom/breek.

OPTION 2/OPSIE 2

- C has less sites for hydrogen bonding than D. / C does not form dimers / C is less polar.
C het minder plekke vir waterstofbinding as D. / C vorm nie dimere nie / C is minder polêr.
- C has weaker / less intermolecular forces / dipole-dipole forces. / C needs less energy to overcome/break intermolecular forces / dipole-dipole forces.
C het swakker / minder intermolekulêre kragte / dipool-dipoolkragte. / C benodig minder energie om intermolekulêre kragte / dipool-dipoolkragte te oorkom/breek.

(2)

4.6

Marking criteria/Nasienriglyne

- Mole ratio for $V(\text{CO}_2)$ correctly used. / *Molverhouding vir $V(\text{CO}_2)$ korrek gebruik.*
- Mole ratio for $V(\text{H}_2\text{O})$ correctly used. / *Molverhouding vir $V(\text{H}_2\text{O})$ korrek gebruik.*
- Mole ratio for $V(\text{O}_2 \text{ reacted})$ correctly used. / *Molverhouding vir $V(\text{O}_2 \text{ reageer})$ korrek gebruik.*
- $V(\text{O}_2 \text{ excess/oormaat}) = V(\text{O}_2 \text{ initial/aanvanklik}) - V(\text{O}_2 \text{ change/verandering})$.
- $V_{\text{tot}} = 80 \text{ cm}^3$

OPTION 1/OPSIE 1

$$\begin{aligned} V(\text{CO}_2) &= 4V(\text{C}_4\text{H}_{10}) \\ &= (4)(8) \checkmark \\ &= 32 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} V(\text{H}_2\text{O}) &= 5V(\text{C}_4\text{H}_{10}) \\ &= (5)(8) \checkmark \\ &= 40 \text{ cm}^3 \end{aligned}$$

$V(\text{O}_2 \text{ reacted/reageer})$:

$$\begin{aligned} V(\text{O}_2) &= \frac{13}{2} V(\text{C}_4\text{H}_{10}) \\ &= \left(\frac{13}{2}\right)(8) \checkmark = 52 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} V(\text{O}_2 \text{ excess/oormaat}): \\ V(\text{O}_2) &= 60 - 52 \checkmark = 8 \text{ cm}^3 \end{aligned}$$

$$V_{\text{tot}} = 32 + 40 + 8 = 80 \text{ cm}^3 \checkmark$$

OPTION 2/OPSIE 2

	C_4H_{10}	O_2	CO_2	H_2O
Initial V (cm^3)	8	60	0	0
Begin V (cm^3)	8	60	0	0
Change in V (cm^3)	8	52 ✓	32 ✓	40 ✓
Verandering V (cm^3)	8	52 ✓	32 ✓	40 ✓
Final V (cm^3)	0	8 ✓	32	40
Finale V (cm^3)	0	8 ✓	32	40

$$\text{Total/totale volume} = 8 + 32 + 40 = 80 \text{ cm}^3 \checkmark$$

OPTION 3/OPSIE 3

	C_4H_{10}	O_2	CO_2	H_2O
Initial V (dm^3)	0,008	0,06	0	0
Begin V (dm^3)	0,008	0,06	0	0
Change in V (dm^3)	0,008	0,052 ✓	0,032 ✓	0,04 ✓
Verandering V (dm^3)	0,008	0,052 ✓	0,032 ✓	0,04 ✓
Final V (dm^3)	0	0,008 ✓	0,032	0,04
Finale V (dm^3)	0	0,008 ✓	0,032	0,04

$$\text{Total/totale volume} = 0,008 + 0,032 + 0,04 = 0,08 \text{ dm}^3 \checkmark$$

(5)
[16]

KWV 05

QUESTION 2/VRAAG 2

2.1

2.1.1 Ketones/ketone ✓

(1)

2.1.2 3,5-dichloro✓-4-methyl✓octane ✓

3,5-dichloor-4-metieloktaan OF 3,5-dichloro-4-metieloktaan

Marking criteria/Nasienriglyne

- 3,5-dichloro **OR/OF** 3,5 dichloro ✓
- -4-methyl/-4-metiel **OR/OF** 4 methyl/4 metiel ✓
- octane/oktaan ✓

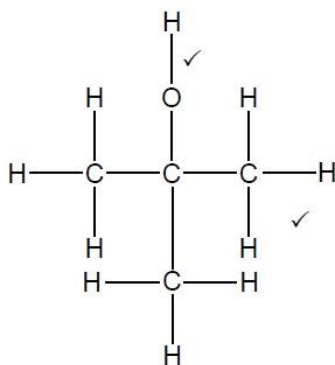
IF/INDIEN:

Any error, e.g. hyphens omitted and/or incorrect sequence. Max $\frac{2}{3}$

Enige fout, bv. uitlaat van koppeltokens en/of verkeerde volgorde. Maks $\frac{2}{3}$

(3)

2.1.3



Notes/Aantekeninge:

- Functional group (-OH) on **second C atom.** ✓
Funksionele groep (-OH) op tweede C-atoom.
- Whole structure correct ✓
Hele struktuur korrek

(2)

2.2

2.2.1 Acts as catalyst./Increases the rate of reaction./Act as dehydrating agent. ✓
Tree as katalisator op./Verhoog die tempo van die reaksie./Tree as dehidreermiddel op.

(1)

2.2.2 Water/H₂O ✓

(1)

2.2.3 mol C : mol H : mol O
 $\frac{40}{12} \checkmark : \frac{6,67}{1} \checkmark : \frac{53,33}{16} \checkmark$

$\frac{3,33}{1} : \frac{6,67}{2} : \frac{3,33}{1} \checkmark$

Empirical formula/Empiriese
 formule:
 CH₂O ✓

Marking criteria/Nasienriglyne:

- % divide by M(C). ✓
 % gedeel deur M(C).
- % divide by M(H). ✓
 % gedeel deur M(H).
- % divide by M(O). ✓
 % gedeel deur M(O).
- Simplest mole ratio. ✓
 Eenvoudigste molverhouding.
- CH₂O ✓

(5)

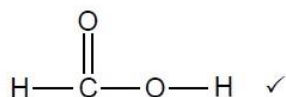
2.2.4 M(CH₂O) = 30 g·mol⁻¹ ✓
 Formula-units/Formule-eenhede:
 $\frac{60}{30} = 2 \checkmark$
 Molecular formula/Molekulêre
 formule: C₂H₄O₂ ✓

Marking criteria/Nasienriglyne:

- 30 (g·mol⁻¹) ✓
- Formula-units = 2 ✓
 Formule-eenhede = 2
- C₂H₄O₂ ✓

(3)

2.2.5



Notes/Aantekeninge:

- Accept -OH as condensed.
 Aanvaar -OH as gekondenseerd.

(1)

2.2.6 Methyl ✓ methanoate ✓
 Metielmetanoaat

(2)

[19]

QUESTION 3/VRAAG 3

3.1 Temperature ✓ at which the vapour pressure equals atmospheric pressure. ✓
Temperatuur waar die dampdruk gelyk is aan atmosferiese druk. (2)

3.2 The stronger the intermolecular forces, the higher the boiling point./The boiling point is proportional to the strength of intermolecular forces. ✓
Hoe sterker die intermolekulêre kragte, hoe hoër die kookpunt./Die kookpunt is eweredig aan die sterkte van intermolekulêre kragte.

Notes/Aantekeninge:

IF/INDIEN

Boiling point is directly proportional to strength of intermolecular forces:

Kookpunt direk eweredig aan sterkte van intermolekulêre kragte:

$\frac{0}{1}$

(1)

3.3

3.3.1 • In A/propane/alkanes: London forces/dispersion forces/induced dipole forces ✓
In A/propan/alkane: Londonkragte/dispersiekragte/geïnduseerde dipoolkragte

• In B/propan-2-one/ketones: dipole-dipole forces ✓ in addition to London forces/dispersion forces/induced dipole forces
In B/propan-2-oon/ketone: dipool-dipoolkragte tesame met Londonkragte/dispersiekragte/geïnduseerde dipoolkragte

• Intermolecular forces in A are weaker ✓ than in B./Intermolecular forces in B are stronger ✓ than in A./London forces are weaker than dipole-dipole forces.
Intermolekulêre kragte in A swakker as in B./Intermolekulêre kragte in B sterker as in A./Londonkragte is swakker as dipool-dipoolkragte. (3)

3.3.2 • Both C and D: hydrogen bonding ✓
Beide C en D: waterstofbinding

• D has two/more sites for hydrogen bonding./D forms dimers./D is more polar./C has one/less sites for hydrogen bonding. ✓
D het twee/meer plekke vir waterstofbinding./D vorm dimere./D is meer polêr./C het een/minder plekke vir waterstofbinding.

• D has stronger intermolecular forces than C./C has weaker intermolecular forces than D. ✓
D het sterker intermolekulêre kragte as C./C het swakker intermolekulêre kragte as D. (3)

3.4 Liquid/Vloeistof ✓ (1)
[10]

QUESTION 4/VRAAG 4

4.1

4.1.1 Addition/Addisie ✓ (1)

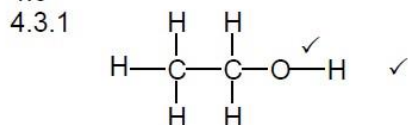
4.1.2 Polyethene/polythene/polyethelene ✓
Polieteen/politeen/polietileen (1)

4.2.

4.2.1 Chloro✓ethane✓
Chloroetaan/chlooretaan (2)

4.2.2 Hydrohalogenation/hydrochlorination ✓
Hidrohalogenering/hidrochloronering (1)

4.3



Notes/Aantekeninge:

- Functional group. ✓
Functional group.
- Whole structure correct ✓
Hele struktuur korrek

(2)

4.3.2 HCl/hydrogen chloride/waterstofchloried ✓ (1)

4.4

4.4.1 Saturated/Versadig ✓



There are no double/multiple bonds between C atoms./Carbon atoms are bonded to the maximum number of H atoms. ✓
Daar is geen dubbel- of meervoudige bindings tussen C-atome./Koolstof-atome gebind aan maksimum aantal H-atome.

(2)

4.4.2 H₂/hydrogen (gas)/waterstof(gas) ✓ (1)

4.4.3 $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$

Notes/Aantekeninge

- | | | |
|---|------------|---------------|
| • Reactants ✓ | Products ✓ | Balancing ✓ |
| Reaktanse ✓ | Produkte ✓ | Balansering ✓ |
| • Ignore/Ignoreer ⇌ and phases/en fases | | |
| • Marking rule 6.3.10./Nasienreël 6.3.10. | | |

(3)

[14]

KWV 06

QUESTION 2/VRAAG 2

2.1

2.1.1 A OR/OF D ✓

(1)

2.1.2 B ✓

(1)

2.1.3 E ✓

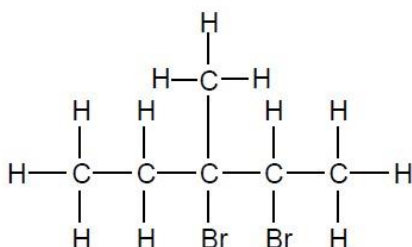
(1)

2.1.4 D ✓

(1)

2.2

2.2.1

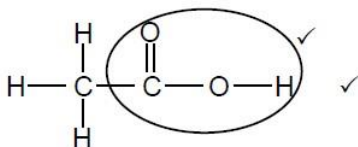


Marking criteria/Nasienriglyne:

- Five C atoms in longest chain. ✓
Vyf C-atome in langste ketting.
- Two Br and one methyl substituents. ✓
Twee Br- en een metielsubstituente.
- Whole structure correct. ✓
Hele struktuur korrek. ✓

(3)

2.2.2



Marking criteria/Nasienriglyne:

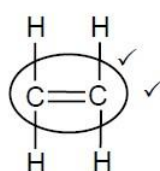
- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct:/Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$
- Accept -OH as condensed.
Aanvaar -OH as gekondenseerd.

IF/INDIEN:

More than one functional group/Meer as een funksionele groep $\frac{0}{2}$

(2)

2.2.3



Marking criteria/Nasienriglyne:

- Whole structure correct:/Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct/Slegs funksionele groep korrek Max: $\frac{1}{2}$

IF/INDIEN:

More than one functional group/Meer as een funksionele groep $\frac{0}{2}$

(2)

2.3

2.3.1 Hydrogen (gas)/Waterstof(gas) ✓

(1)

2.3.2 Addition / Hydrogenation ✓
Addisie / Hidrogenasie / Hidrogenering

(1)
[13]

QUESTION 3/VRAAG 3

3.1 Compounds with the same molecular formula ✓ but different structural formulae. ✓ / Verbindings met dieselfde molekulêre formule maar verskillende struktuurformules. (2)

3.2 Chain/Ketting ✓ (1)

3.3 **From A to C/Van A na C:**

- **Structure/Struktuur:**
Less branched / less compact / less spherical/longer chain length / larger surface area (over which intermolecular forces act). ✓
Minder vertak / minder kompak / minder sferies / langer kettinglengte / groter oppervlak (waaroor intermolekulêre kragte werk).
- **Intermolecular forces/Intermolekulêre kragte:**
Stronger / more intermolecular forces / Van der Waals forces / London forces / dispersion forces.
Sterker / meer intermolekulêre kragte / Van der Waalskragte / London-kragte / dispersiekragte. ✓
- **Energy/Energie:**
More energy needed to overcome or break intermolecular forces / Van der Waals forces. ✓
Meer energie benodig om intermolekulêre kragte / Van der Waalskragte/ dispersiekragte / London-kragte te oorkom.

OR/OF

From C to A/Van C na A:

- **Structure/Struktuur:**
More branched / more compact / more spherical / smaller surface area (over which intermolecular forces act). ✓
Meer vertak / meer kompak / meer sferies / kleiner oppervlak (waaroor intermolekulêre kragte werk).
- **Intermolecular forces/Intermolekulêre kragte:**
Weaker / less intermolecular forces / Van der Waals forces / London forces / dispersion forces. ✓
Swakker/minder intermolekulêre kragte / Van der Waalskragte / Londonkragte / dispersiekragte.
- **Energy/Energie:**
Less energy needed to overcome or break intermolecular forces / Van der Waals forces. ✓
Minder energie benodig om intermolekulêre kragte / Van der Waalskragte/ dispersiekragte / Londonkragte te oorkom. (3)

3.4 A / 2,2-dimethylpropane / 2,2-dimetielpropaan ✓



Lowest boiling point. / Laagste kookpunt. ✓ (2)

3.5 $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$ ✓ Bal ✓

Notes/Aantekeninge:

- Reactants ✓ Products ✓ Balancing ✓
Reaktanse Produkte Balansering
- Ignore double arrows and phases. / Ignoreer dubbelpyle en fases.
- Marking rule 6.3.10 / Nasienreël 6.3.10.
- If condensed structural formulae used: / Indien gekondenseerde struktuurformules gebruik: Max/Maks. $\frac{2}{3}$

(3)
[11]

QUESTION 4/VRAAG 4

4.1

4.1.1 High temperature / heat / high energy / high pressure ✓
Hoë temperatuur / hitte / hoë energie / hoë druk (1)

4.1.2 C_6H_{12} ✓

Accept/Aanvaar:

Condensed structural formula and structural formula.

Gekondenseerde struktuurformule en struktuurformule.

E.g./Bv: $CH_3CH_2CH_2CH_2CHCH_2$

(1)

4.1.3 Alkenes/Alkene ✓

(1)

4.2 X / C_6H_{12} / Alkene / Alkeen / Hexene / Hekseen ✓



OPTION 1/OPSIE 1

- X is an alkene / has a double bond / unsaturated. ✓
X is 'n alkeen / het 'n dubbelbinding / onversadig.
- X can undergo addition. ✓
X ondergaan addisie.
- X will react without light / heat / is more reactive. ✓
X sal sonder lig / hitte reageer / is meer reaktief.

OPTION 2/OPSIE 2

- Butane is an alkane **OR** butane is saturated. ✓
Butaan is 'n alkaan **OF** butaan is versadig.
- Butane can only undergo substitution. ✓
Butaan kan slegs substitusie ondergaan.
- Butane will only react in the presence of light / heat **OR** butane is less reactive. ✓
Butaan sal slegs in die teenwoordigheid van lig / hitte reageer **OF** butaan is minder reaktief.

(4)

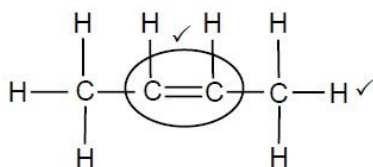
4.3

4.3.1 2-chloro✓butane ✓
2-chlorobutaan (2)

4.3.2 Substitution / Hydrolysis ✓
Substitusie / Hidrolise

(1)

4.3.3



Marking criteria/Nasienriglyne:

- Whole structure correct/Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct/Slegs funksionele groep korrek: $\frac{1}{2}$

IF/INDIEN:

More than one functional group/Meer as een funksionele groep

$\frac{0}{2}$

4.3.4 Hydration / Hidrasie / Hidratering ✓

(1)
[13]

KWV 07

QUESTION 3/VRAAG 3

- 3.1 The temperature at which the vapour pressure equals atmospheric (external) pressure. ✓✓ (2 or 0)
Die temperatuur waar die dampdruk gelyk is aan atmosferiese (eksterne) druk. (2 of 0) (2)
- 3.2 Flammable / Catch fire easily. / Volatile ✓
Vlambaar / Vat maklik vlam. / Vlugtig (1)
- 3.3
- 3.3.1 Use straight chain ✓ primary alcohols ✓
Gebruik reguitketting primêre alkohole (2)
- 3.3.2. **OPTION 1/OPSIE 1**
- **Structure/Struktuur:**
Chain length / more C atoms in chain / molecular size / molecular mass / surface area increases from top to bottom / butan-1-ol to hexan-1-ol. ✓
Kettinglengte / meer C-atome in ketting) / molekulêre grootte / molekulêre massa / oppervlak neem toe van bo na onder / butan-1-ol na heksan-1-ol.
 - **Intermolecular forces/Intermolekulêre kragte:**
Intermolecular forces / Van der Waals forces / London forces / dispersion forces increases from top to bottom / butan-1-ol to hexan-1-ol. ✓
Intermolekulêre kragte / Van der Waalskragte / Londonkragte / dispersiekragte neem toe van bo na onder / butan-1-ol na heksan-1-ol.
 - **Energy/Energie:**
Energy needed to overcome / break intermolecular forces increases from top to bottom / butan-1-ol to hexan-1-ol.
Energie benodig om intermolekulêre kragte te oorkom / breek neem toe van bo na onder / butan-1ol na heksan-1ol. ✓

OPTION 2/OPSIE 2

- **Structure/Struktuur:**

Chain length / number of C atoms in the chain / molecular size / molecular mass/surface area decreases from bottom to top / hexan-1-ol to butan-1-ol. ✓

Kettinglengte / aantal C-atome in ketting / molekulêre grootte / molekulêre massa / oppervlak neem af van onder na bo / heksan-1-ol na butan-1-ol.

- **Intermolecular forces/Intermolekulêre kragte:**

Intermolecular forces / Van der Waals forces/London forces / dispersion forces decreases from bottom to top/hexan-1-ol to butan-1-ol. ✓

Intermolekulêre kragte / Van der Waalskragte / Londonkragte / dispersiekragte neem af van bo na onder / heksan-1-ol na butan-1-ol.

- **Energy/Energie:**

Energy needed to overcome / break intermolecular forces decreases from bottom to top / hexan-1-ol to butan-1-ol.

Energie benodig om intermolekulêre kragte te oorkom / breek neem af vanonder na bo / heksan-1-ol na butan-1-ol. ✓

(3)

3.4 Remains the same / Bly dieselfde ✓

(1)

3.5

3.5.1 Functional group / Type of homologous series ✓

Funksionele groep / Soort homologe reeks

(1)

3.5.2

- **Type of intermolecular forces/Tipe intermolekulêre kragte:**

Between molecules of aldehyde / hexanal are dipole-dipole forces. ✓

Tussen molekule van aldehyde / heksanaal is dipool-dipoolkragte.

- Between molecules of alcohols / hexan-1-ol are (in addition to dipole-dipole forces and London forces) hydrogen bonds. ✓

Tussen molekule van alkohole / heksan-1-ol is (in toevoeging tot dipool-dipoolkragte en Londonkragte) waterstofbindings.

- **Strength of intermolecular forces/Sterkte van intermolekulêre kragte:**

Dipole-dipole forces are weaker than hydrogen bonds. ✓

Dipool-dipoolkragte is swakker as waterstofbindings.

OR/OF

Hydrogen bonds are stronger than dipole-dipole forces.

Waterstofbindings is sterker as dipool-dipoolkragte.

- **Energy/Energie:**

More energy needed to overcome / break intermolecular forces in hexan-1-ol. ✓

Meer energie benodig om intermolekulêre kragte in heksan-1-ol te oorkom / breek.

OR/OF

Less energy needed to overcome / break intermolecular forces in hexanal. ✓

Minder energie benodig om intermolekulêre kragte in heksanaal te oorkom / breek

(4)
[14]

QUESTION 4/VRAAG 4

4.1

4.1.1 Substitution / hydrolysis ✓
Substitusie / hidrolise (1)

4.1.2 H₂O/water ✓

OR/OF

Dilute sodium hydroxide /NaOH(aq) / *Verdunde natriumhidroksied*

OR/OF

Dilute potassium hydroxide/KOH(aq) / *Verdunde kaliumhidroksied* (1)

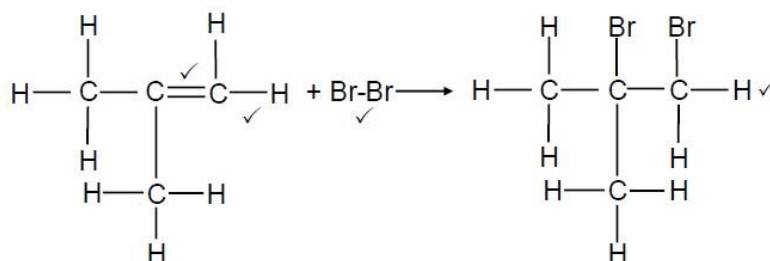
4.1.3 Tertiary / *Tersiër* ✓ (1)

4.1.4 Elimination / dehydrohalogenation / dehydrobromination ✓
Eliminasie / dehidrohalogenering / dehidrohalogenasie / dehydrobrominering / dehidrobrominasie (1)

4.1.5 2-methylprop-1-ene ✓ / methylpropene / 2-methylpropene
2-metielprop-1-ene / metielpropeen / 2-metielpropeen (2)

4.1.6 Halogenation / bromination ✓
Halogenering / halogenasie / brominering / brominasie (1)

4.1.7



- Whole structure correct. ✓✓
Hele struktuur korrek.
- Only functional group correct. ✓
Slegs funksionele groep korrek.

Notes/Aantekeninge:

- Ignore/Ignoreer ⇌
- Accept Br₂ if condensed./Aanvaar Br₂ as gekondenseerd.
- Marking rule 3.9/Nasienreël 3.9
- Condensed or semi-structural formula:

Gekondenseerde of semi-struktuurformule: Max./Maks. $\frac{3}{4}$

- Molecular formula/Molekulêre formule: $\frac{1}{4}$

- Any additional reactants or products:
Enige addisionele reaktanse of produkte: Max./Maks. $\frac{3}{4}$

- Everything correct, arrow in equation omitted:
Alles korrek, pyltjie in vergelyking uitgelaat is: Max./Maks. $\frac{3}{4}$

(4)

4.2

4.2.1 Monomers / Monomere ✓

(1)

4.2.2 Alkenes / Alkene ✓

(1)

4.2.3 Addition (polymerisation) / Addisie (polimerisasie) ✓

(1)

[14]

KWV 08

QUESTION/VRAAG 2

2.1

2.1.1 Esters ✓

(1)

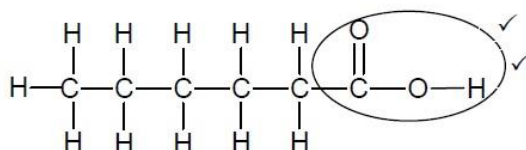
2.1.2 Ethyl ✓ butanoate ✓ / *Etielbutanoaat*

(2)

2.1.3 Butanoic acid / *Butanoësuur* ✓

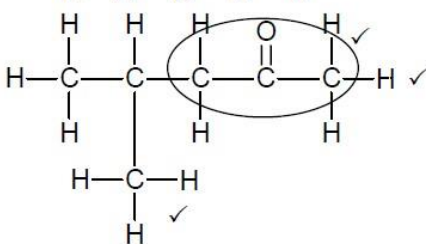
(1)

2.1.4



(2)

2.2



(3)

2.3

2.3.1 C_nH_{2n-2} ✓

(1)

2.3.2 5-ethyl-2,6-dimethylhept-3-yne / 5-ethyl-2,6-dimethyl-3-heptyne
5-*etiel*-2,6-*dimetiel*hept-3-yn / 5-*etiel*-2,6-*dimetiel*-3-heptyn

(3)
[13]

QUESTION/VRAAG 3

3.1 **ANY ONE/ENIGE EEN:**

- They have ONLY single bonds. ✓
Hulle het SLEGS enkelbindings.
 - They have single bonds between C atoms.
Hulle het enkelbindings tussen C-atome.
 - They have no double OR triple bonds OR multiple bonds.
Hulle het geen dubbel- OF trippelbindings OF meervoudige bindings nie.
 - They contain the maximum number of H atoms bonded to C atoms.
Hulle bevat die maksimum getal H-atome gebind aan C-atome.
 - Each C atom is bonded to four other atoms.
Elke C-atoom is gebind aan vier ander atome.
- (1)

- 3.2 The pressure exerted by a vapour in equilibrium with its liquid ✓ in a closed system. ✓
Die druk uitgeoefen deur 'n damp in ewewig met sy vloeistof in 'n geslote sisteem.
-
- (2)

- 3.3
3.3.1 Increases/Verhoog ✓ (1)

- 3.3.2 Q ✓
It is the temperature where the graph intercepts the dotted line. ✓
Dit is die temperatuur waar die grafiek die stippellyn sny.

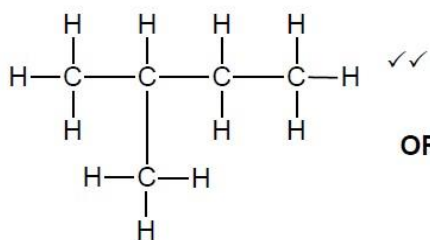
OR/OF

It is the temperature where the vapour pressure of compound **Q** equals atmospheric pressure/is equal to 760 mmHg.
*Dit is die temperatuur waar die dampdruk van verbinding **Q** gelyk is aan atmosferiese druk/gelyk is aan 760 mmHg.*

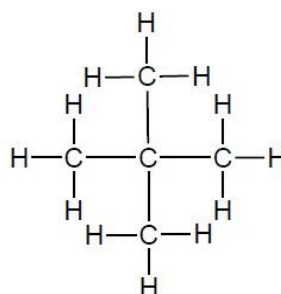
(2)

- 3.3.3 S ✓
- At a given temperature, **S** has the lowest vapour pressure/highest boiling point. ✓
*By 'n gegewe temperatuur het **S** die laagste dampdruk/hoogste kookpunt.*
 - Strongest intermolecular forces/London forces/dispersion forces/induced dipole forces. ✓
Sterkste intermolekulêre kragte/London-kragte/dispersiekragte/geïnduseerde dipoolkragte.
 - Highest energy needed to overcome/break the intermolecular forces. ✓
Hoogste energie benodig om intermolekulêre kragte te oorkom/breek.
- (4)

3.4
3.4.1



OR/OF



2-methylbutane ✓
2-metielbutaan

2,2-dimethylpropane ✓
2,2-dimetielpropaan

(3)

3.4.2 Higher than/Hoër as ✓

(1)
[14]

QUESTION/VRAAG 4

4.1 Secondary/Sekondêre ✓
The C atom bonded to the –OH group is bonded to TWO other C atoms. ✓
Die C-atoom gebind aan die –OH-groep is aan TWEE ander C-atome gebind. (2)

4.2
4.2.1 Dehydration ✓
Dehidrasie/dehidratering (1)

4.2.2 Hydration ✓
Hidrasie/hidratering (1)

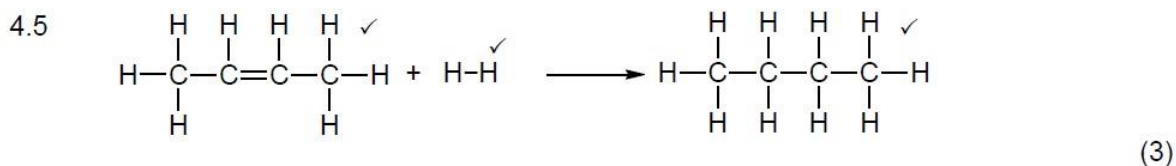
4.2.3 Dehydrohalogenation/dehydrobromination ✓
Dehidrohalogenasie/dehidrohalogenering/dehidrobrominasie/
dehidrobrominerig (1)

4.3
4.3.1 Substitution/Hydrolysis ✓
Substitusie/Hidrolise (1)

4.3.2 • Dilute base/sodium hydroxide/NaOH ✓
Verdunde basis/natriumhidroksied/NaOH
• Moderate temperature/(mild) heat ✓
Matige temperatuur/(matige) hitte (2)

4.3.3 2-✓bromobutane ✓/2-bromobutaan (2)

4.4 NaOH/KOH ✓ (1)



4.6 Butane/Butaan (1)
[15]

KWV 09

QUESTION 2/VRAAG 2

- 2.1
- 2.1.1 A ✓ (1)
- 2.1.2 B ✓ (1)
- 2.1.3 D ✓ (1)
- 2.1.4 D ✓ (1)
- 2.2
- 2.2.1 Butanal/Butanaal ✓ (1)
- 2.2.2 5-ethyl-6,6-dimethyloctan-3-ol/5-etiel-6,6-dimetieloktan-3-ol

OR/OF

5-ethyl-6,6-dimethyl-3-octanol/5-etiel-6,6-dimetiel-3-oktanol

Marking criteria/Nasienriglyne:

- Stem, i.e. octan./Stam d.i. oktan. ✓
- Correct functional group, i.e. -ol./Korrekte funksionele groep d.i. -ol. ✓
- Two methyl groups and one ethyl group.
Twee metielgroepe en een etielgroep. ✓
- Correct numbering of substituents and functional group ✓
Korrekte nommering van substituenten en funksionele groep.

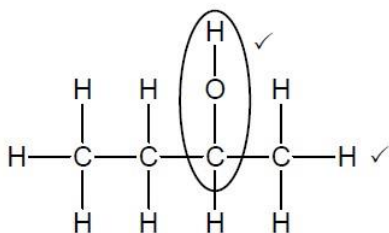
IF/INDIEN:

Any error e.g. hyphens omitted and/or incorrect sequence:

Enige fout bv. koppeltekens weggelaat en/of verkeerde volgorde: Max./Maks. $\frac{3}{4}$ (4)

- 2.3 Compounds with the same molecular formula, ✓ but different positions of the side chain/substituents/functional groups on parent chain. ✓
Verbindings met dieselfde molekulêre formule, maar verskillende posisies van die syketting/substituente/funksionele groepe op die stamketting. (2)

2.4
 2.4.1



Marking criteria/Nasienriglyne:

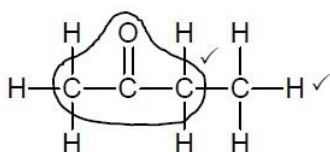
- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct: /Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN:

- More than one functional group:
Meer as een funksionele groep: $\frac{0}{2}$

(2)

2.4.2



Marking criteria/Nasienriglyne:

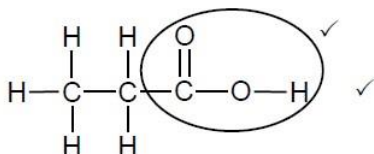
- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct: /Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN:

- More than one functional group:
Meer as een funksionele groep: $\frac{0}{2}$

(2)

2.4.3



Marking criteria/Nasienriglyne:

- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct: /Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN:

- More than one functional group:
Meer as een funksionele groep: $\frac{0}{2}$

(2)

[17]

QUESTION 3/VRAAG 3

3.1 150 kPa ✓ (1)

3.2

3.2.1 The temperature at which the vapour pressure equals atmospheric/external pressure. ✓✓ (2 or 0)
Die temperatuur waar die dampdruk gelyk is aan atmosferiese/eksterne druk. (2)

3.2.2 55 °C ✓ (1)

3.3

3.3.1 Z ✓ (1)

3.3.2

- Carboxylic acids have, in addition to London forces and dipole-dipole forces, two sites for hydrogen bonding between molecules. ✓
Karboksielsure het, in toevoeging tot Londonkragte en dipool-dipoolkragte, twee punte vir waterstofbinding tussen molekule.
OR/OF
Carboxylic acids can form dimers due to strong hydrogen bonding between molecules.
Karboksielsure kan dimere vorm as gevolg van sterk waterstofbindings tussen molekule.
- Alcohols have, in addition to London forces and dipole-dipole forces, one site for hydrogen bonding between molecules. ✓
Alkohole het, in toevoeging tot Londonkragte en dipool-dipoolkragte, een punt vir waterstofbinding tussen molekule.
- Ketones has, in addition to London forces, dipole-dipole forces between molecules. ✓
Ketone het, in toevoeging tot Londonkragte, dipool-dipoolkragte tussen molekule.
- Intermolecular forces in carboxylic acids is the strongest./Most energy needed to overcome/break intermolecular forces in ethanoic acid. ✓
Intermolekulêre kragte in karboksielsure is die sterkste./Die meeste energie word benodig om intermolekulêre kragte in karboksielsure te oorkom/breek. (4)

3.3.3 Propanone/Propanoon ✓

OR/OF

Propan-2-one/Propan-2-oon

OR/OF

2-propanone/2-propanoon

(1)
[10]

QUESTION 4/VRAAG 4

4.1 The chemical process in which longer chain hydrocarbon molecules are broken down ✓ to shorter more useful molecules. ✓
Die chemiese proses waarin langer ketting koolwaterstofmolekule afgebreek word in korter meer bruikbare molekule. (2)

4.2
 4.2.1 III ✓ (1)

4.2.2 II ✓ (1)

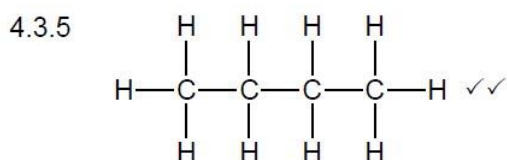
4.2.3 I ✓ (1)

4.3
 4.3.1 Heat/Light /UV light ✓
Hitte/Lig/UV Lig (1)

4.3.2 P or/of S ✓ (1)

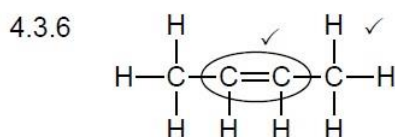
4.3.3 Ethene/Eteen ✓ (1)

4.3.4 C_8H_{18} ✓✓ (Correct Structural formula/Korrekte struktuurformule : $\frac{1}{2}$) (2)



Marking criteria/Nasienriglyne:

- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- 4 C atoms in chain:/4 C-atome in ketting: Max/Maks.: $\frac{1}{2}$
- Correct condensed formula/Korrekte gekondenseerde formule: $\frac{1}{2}$ (2)



Marking criteria/Nasienriglyne:

- Whole structure of alkene/haloalkane correct:
Hele struktuur van alkeen/haloalkaan korrek: $\frac{2}{2}$
- Only functional group correct/Slegs funksionele groep korrek: $\frac{1}{2}$
- Correct condensed structure/Korrekte gekondenseerde struktuur:
 $CH_3CH=CHCH_3$ $\frac{1}{2}$ (2)

[14]

KWV 10

QUESTION 2/VRAAG 2

2.1 ANY ONE/ENIGE EEN:

- (Alcohol/ethanol) is flammable/catches fire easily. 
(Alkohol/etanol) is vlambaar/slaan maklik aan die brand.
- To heat it evenly./Om dit eweredig te verhit.
- Water bath is used for low heat/low temperature./Waterbad word gebruik vir lae hitte/lae temperatuur.
- Alcohol/ethanol will evaporate too quickly./ (Alkohol/etanol) sal te vinnig verdamp.

Accept/Aanvaar:

(Alcohol/ethanol) is volatile./ (Alkohol/etanol) is vlugtig. (1)

2.2

2.2.1 Esterification/condensation

Verestering/esterifikasie/kondensasie (1)

2.2.2 H_2SO_4

(1)

2.2.3 Esters

(1)

2.3
$$\frac{M(\text{ester})}{M(C_4H_8O)} = \frac{144}{72} = 2$$
$$\therefore 2 \times C_4H_8O = C_8H_{16}O_2$$
 

Marking guidelines/Nasienriglyne

- If only answer given, award 2 marks on final answer./Indien slegs antwoord gegee, ken 2 punte toe vir finale antwoord.
- If $72 \text{ g}\cdot\text{mol}^{-1}$ calculated without substituting, no mark is awarded./Indien $72 \text{ g}\cdot\text{mol}^{-1}$ bereken is sonder om te vervang word geen punt toegeken nie.

(2)

2.4 Ethyl hexanoate Etielheksanoaat

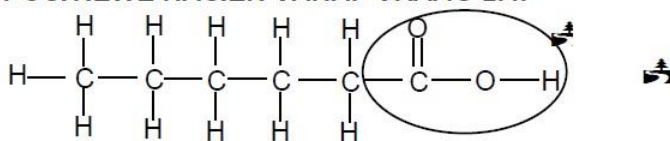
Note/Aantekening

Accept any other ethyl ESTER from QUESTION 2.3.
Aanvaar enige ander etiel ESTER vanaf VRAAG 2.3.

(2)

2.5

**POSITIVE MARKING FROM QUESTION 2.4.
POSITIEWE NASIEN VANAF VRAAG 2.4.**



Marking criteria/Nasienglyne

- Whole structure correct/*Hele struktuur korrek*: $\frac{2}{2}$
- Only functional group correct/*Slegs funksionele groep korrek*: Max/Maks.: $\frac{1}{2}$
- Accept/*Aanvaar* -OH as condensed/*gekondenseerd*.

IF/INDIEN

- More than one functional group/wrong functional group/*Meer as een funksionele groep/foutiewe funksionele groep*: $\frac{0}{2}$
- If condensed structural formulae used/*Indien gekondenseerde struktuur-formules gebruik*: Max/Maks.: $\frac{1}{2}$

(2)
[10]

QUESTION 3/VRAAG 3

3.1

Marking guidelines/Nasienglyne

If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./*Indien enige van die onderstreepte frases in die korrekte konteks uitgelaat is, trek 1 punt af.*

The temperature at which the vapour pressure of a substance equals atmospheric/external pressure.

Die temperatuur waar die dampdruk van 'n stof gelyk is aan atmosferiese/eksterne druk.

(2)

3.2

3.2.1 Carboxyl (group)/*karboksiel(groep)*

Accept/Aanvaar

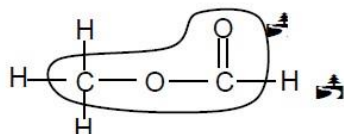
Carboxylic/*Karboksiel*

(1)

3.2.2 Propanoic acid/*propanoësuur*

(1)

3.2.3



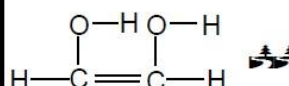
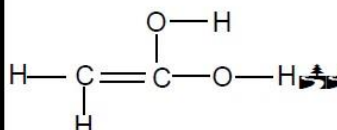
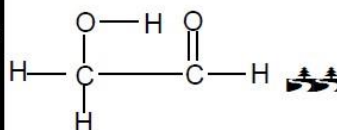
Marking criteria/Nasienriglyne

- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct:
Slegs funksionele groep korrek: Max/Maks: $\frac{1}{2}$

IF/INDIEN

- More than one functional group/wrong functional group/*Meer as een funksionele groep/foutiewe funksionele groep:* $\frac{0}{2}$
- If condensed structural formulae used/*Indien gekondenseerde struktuur-formules gebruik:* Max/Maks: $\frac{1}{2}$

ACCEPT/AANVAAR
(2 or/of 0)



(2)

3.3



- Lowest boiling point./Shortest chain length.
- Laagste kookpunt./Kortste kettinglengte.*

(2)

3.4

3.4.1

- The same molecular mass/molecular size.
- Dieselfde molekulêre massa/molekulêre grootte.*

(1)

3.4.2

Primary/*Primêre*

- OH group is bonded to a C atom bonded to one other C atom.
- OH-groep is gebind aan 'n C-atoom wat aan een ander C-atoom gebind is.*

OR/OF

- OH group is bonded to a C atom that has two H atoms.
- OH-groep is gebind aan 'n C-atoom wat twee H-atome bevat.*

(2)

3.4.3

Marking guidelines/Nasienriglyne

- BOTH have hydrogen bonding./*BEIDE het waterstofbindings.* 🇿🇦
- Compare number of sites for hydrogen bonding./*Vergelyk aantal punte vir waterstofbinding.* 🇿🇦
- Compare strength of IMFs./*Vergelyk sterkte van IMKe.* 🇿🇦
- Compare energy required./*Vergelyk energie benodig.* 🇿🇦

- Both compounds **X** and **B** have (in addition to London forces and dipole-dipole forces) hydrogen bonding./*Beide verbindings **X** en **B** het waterstofbindings (behalwe Londonkragte en dipool-dipoolkragte).* 🇿🇦
- Compound **X**/CH₃CH₂CH₂OH/propan-1-ol/alcohol has one site for hydrogen bonding and compound **B**/ethanoic acid/carboxylic acid has two/more sites for hydrogen bonding **OR** **B**/ethanoic acid/carboxylic acid has two/more sites for hydrogen bonding. 🇿🇦
Verbinding **X**/CH₃CH₂CH₂OH/propan-1-ol/alkohol het een punt vir waterstofbindings en verbinding **B**/etanoësuu/karboksielsuur het twee/meer punte vir waterstofbindings **OF** **B**/etanoësuu/karboksielsuur het twee/meer punte vir waterstofbindings.
- Intermolecular forces in compound **B**/ethanoic acid/carboxylic acid are stronger than intermolecular forces in compound **X**/CH₃CH₂CH₂OH/propan-1-ol/alcohol. 🇿🇦
*Intermolekulêre kragte in verbinding **B**/etanoësuur/karboksielsuur is sterker as die intermolekulêre kragte in verbinding **X**/CH₃CH₂CH₂OH/propan-1-ol/alkohol.*
OR/OF
Intermolecular forces in compound **X**/CH₃CH₂CH₂OH/ propan-1-ol/alcohol are weaker than intermolecular forces in compound **B**/ethanoic acid/carboxylic acid./*Intermolekulêre kragte in verbinding **X**/CH₃CH₂CH₂OH/propan-1-ol/alkohol is swakker as intermolekulêre kragte in verbinding **B**/etanoësuur/karboksielsuur.*
- More energy is needed to overcome/break intermolecular forces in compound **B**/ethanoic acid/carboxylic acid than in compound **X**/CH₃CH₂CH₂OH/ propan-1-ol/alcohol. 🇿🇦
*Meer energie word benodig om intermolekulêre kragte in verbinding **B**/etanoësuur as in verbinding **X**/CH₃CH₂CH₂OH/ propan-1-ol/alkohol te oorkom/breek.*
OR/OF
Less energy is needed to overcome/break intermolecular forces in compound **X**/CH₃CH₂CH₂OH/propan-1-ol/alcohol than in compound **B**/ethanoic acid/carboxylic acid.
*Minder energie word benodig om intermolekulêre kragte in verbinding **X**/CH₃CH₂CH₂OH/propan-1-ol/alkohol te oorkom/breek as in verbinding **B**/etanoësuur/karboksielsuur.*

(4)
[15]

QUESTION 4/VRAAG 4

4.1

- 4.1.1 (A series of organic) compounds that can be described by the same general formula/functional group. (2 or 0)
(’n Reeks organiese) verbindings wat deur dieselfde algemene formule/funksionele groep beskryf kan word. (2 of 0)

OR/OF

(A series of organic) compounds in which one member differs from the next by a CH₂ group./(’n Reeks organiese) verbindings waarin een lid van die volgende verskil met ’n CH₂-groep. (2 or/of 0)

(2)

- 4.1.2 Substitution/halogenation/bromination

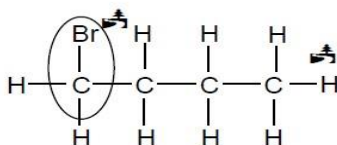
Substitusie/halogenasie/halogenering/brominasie/brominering

(1)

- 4.1.3 HBr

(1)

- 4.1.4



Marking criteria/Nasienriglyne

- Br on first C atom/Br op eerste C-atoom: Max/Maks: $\frac{1}{2}$
- Whole structure correct/Hele struktuur korrek: $\frac{2}{2}$

IF/INDIEN:

Br₂ but rest of structure correct/Br₂ maar res van struktuur korrek: $\frac{1}{2}$

(2)

- 4.1.5 $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$ Bal

Marking guidelines/Nasienriglyne

- Reactants Products Balancing
Reaktanse Produkte Balansering
- Ignore double arrows and phases./Ignoreer dubbelpyle en fases.
- Marking rule 6.3.10/Nasienreël 6.3.10.
- If condensed structural formulae used/Indien gekondenseerde struktuur-formules gebruik: Max/Maks: $\frac{2}{3}$

(3)

- 4.1.6

Marking guidelines/Nasienriglyne

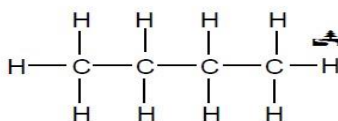
If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./Indien enige van die onderstrepte frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The (chemical) process in which longer chain hydrocarbons/longer chain alkanes are broken down to shorter/more useful hydrocarbons/molecules/chains/alkanes and alkenes.

Die (chemiese) proses waarin langketting koolwaterstowwe/langketting-alkane afgebreek word in korter/meer bruikbare koolwaterstowwe/molekule/kettings/alkane en alkene.

(2)

- 4.1.7



Marking guidelines/Nasienriglyne

- One or more H atoms omitted/Een of meer H-atome uitgelaat: Max/Maks: $\frac{1}{2}$
- Condensed or semi-structural formula: Gekondenseerde of semi-struktuur-formule: Max/Maks: $\frac{1}{2}$

(2)

- 4.2

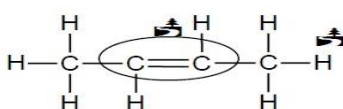
- 4.2.1 Butan-2-ol OR/OF 2-butanol

IF/INDIEN:

Butanol or/of butan-1-ol $\frac{1}{2}$

(2)

- 4.2.2



Marking criteria/Nasienriglyne

- Only functional group correct/Slegs funksionele groep korrek: Max/Maks: $\frac{1}{2}$
- Whole structure correct: Hele struktuur korrek: $\frac{2}{2}$

(2)

[17]

KWV 11

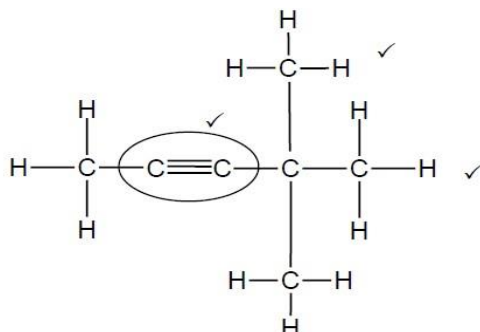
QUESTION 2/VRAAG 2

2.1

2.1.1 C_nH_{2n-2} ✓

(1)

2.1.2



Marking criteria/Nasienriglyne

- Functional group correct. ✓
Funksionele groep korrek.
- 2 methyl substituents. ✓
2 metielsubstituent.
- Whole structure correct. ✓
Hele struktuur korrek: 3/3

(3)

2.2

2.2.1 Compounds with the same molecular formula, ✓ but different positions of the side chain/substituents/functional groups ✓ on the parent chain.
Verbindings met dieselfde molekulêre formule, maar verskillende posisies van die syketting/substituent/funksionele groepe op die stamketting.

(2)

2.2.2 Pentan-3-one/3-pentanone ✓✓
Pentan-3-oon/3-pentanoon

Marking criteria/Nasienriglyne

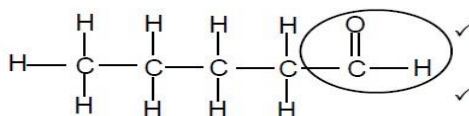
- Functional group and correct position i.e. 3 ✓
Funksionele groep en korrekte posisie nl. 3. ✓
- Whole name correct ✓
Hele naam korrek. ✓

Accept for ONE mark/Aanvaar vir EEN punt

Pentanone with the 3 in incorrect place, e.g. penta-3-none.
Pentanoon met die 3 in foutiewe plek, bv. penta-3-noon.

(2)

2.2.3

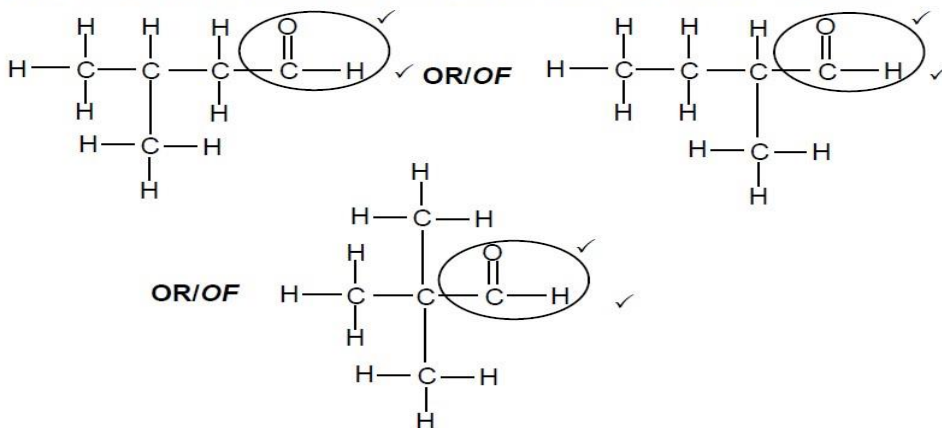


Marking criteria/Nasienriglyne

- Whole structure correct. ✓
Hele struktuur korrek: 2/2
- Only functional group correct ✓
Slegs funksionele groep korrek Max: 1/2

OR: Any correct structure of an aldehyde with five carbon atoms.

OF: Enige korrekte struktuur van 'n aldehied met vyf koolstofatome.



(2)

2.3

2.3.1 Tertiary (alcohol)/Tersiêre (alkohol) ✓

The C atom bonded to the functional group/hydroxyl (group)/-OH is bonded to three other C atoms. /The C-atom bonded to the hydroxyl (group) has no hydrogen atoms. ✓

Die C-atoom gebind aan die funksionele groep/hidroksiel(groep)/-OH is gebind aan drie ander C-atome./ Die C-atoom gebind aan die hidroksiel (groep) het geen waterstofatome nie.

(2)

2.3.2 2-methylbutan-2-ol/2-methyl-2-butanol/2-metielbutan-2-ol/2-metiel-2-butanol

Marking criteria/Nasienriglyne

- 2-methyl/2-metiel ✓
- Butan-2-ol/2-butanol ✓
- Any error e.g. hyphens omitted and/or incorrect sequence:

Enige fout, bv. koppeltekens weggelaat en/of verkeerde volgorde: Max./Maks: $\frac{1}{2}$

(2)

2.3.3 2-methylbut-2-ene/2-methyl-2-butene/2-metielbut-2-ene/2-metiel-2-buteen

Marking criteria/Nasienriglyne

- 2-methyl/2-metiel ✓
- But-2-ene/2-butene/But-2-ene/2-buteen ✓
- Any error e.g. hyphens omitted and/or incorrect sequence:

Enige fout, bv. koppeltekens weggelaat en/of verkeerde volgorde: Max./Maks: $\frac{1}{2}$

(2)

[16]

QUESTION 3/VRAAG 3

3.1

Marking guidelines/Nasienriglyne

The underlined key phrases must be used in the **CORRECT CONTEXT (pressure/boiling)**. /Die onderstreepte frases moet gebruik word in die **KORREKTE KONTEKS (druk/kook)**.

The temperature ✓ at which the vapour pressure of a substance equals atmospheric/external pressure. ✓

Die temperatuur waar die dampdruk van 'n stof gelyk is aan atmosferiese/eksterne druk.

(2)

3.2

(Q, R and S) have same molecular mass/formulae/number of carbon and hydrogen atoms/are (chain) isomers. ✓

(Q, R en S) het dieselfde molekulêre massa/formule/aantal koolstof en waterstofatome/ is (ketting)isomere.

OR/OF

The compounds are all alkanes /same homologous series and have the same number of carbon atoms.

Die verbindings is almal alkane /dieselfde homologe reeks en het die dieselfde aantal koolstofatome.

(1)

Marking guidelines/Nasienriglyne

- 55 (°C) ✓
- Compare all three compounds or Q and S in terms of branches/chain lengths / surface area. ✓
Vergelyk al drie verbindings of Q en S in terme van vertakkings/kettinglengte/ oppervlakarea.
- Compare strengths of all three or Q and S's IMF's / *Vergelyk sterkte van al drie of Q en S se IMK'e.* ✓
- Compare energy of all three / *Vergelyk energie van al drie.* ✓

3.3

55 (°C) ✓

Compare compound R with compounds Q and S:

- Compound **R** is less branched/compact/spherical/surface area than compound **Q** and more branched/compact/spherical/surface area than compound **S**. ✓

OR

Q is the most branched/compact /spherical/surface area and **S** is least branched/compact/spherical/surface area.

- Intermolecular forces in compound **R** are stronger than in compound **Q** and weaker than in compound **S**. ✓
- More energy needed to overcome intermolecular forces in compound **R** than in compound **Q** and less energy needed to overcome (break) intermolecular forces in compound **R** than in compound **S**. ✓

OR

- Compound **R** has a longer chain length than compound **Q** and a shorter chain length than compound **S**. ✓

OR

S has the longest chain length and **Q** the shortest.

- Intermolecular forces increase with increase in chain length. ✓
- More energy needed to overcome intermolecular forces as chain length increases. ✓

Vergelyk verbinding R met verbindings Q en S:

- *Verbinding **R** is minder vertak/kompak/sferieseoppervlak as verbinding **Q** en meer vertak as verbinding **S**.*

OF

Q is die meeste vertak/kompak en **S** is die minste vertak/kompak/series/oppervlak.

- *Intermolekulêre kragte in verbinding **R** is sterker as in verbinding **Q** en swakker as in verbinding **S**.*
- *Meer energie word benodig om intermolekulêre kragte in verbinding **R** te oorkom as in verbinding **Q**, en minder energie word benodig om intermolekulêre kragte in verbinding **R** te oorkom / breek as in verbinding **S**.*

OF

- *Verbinding **R** het 'n langer kettinglengte as verbinding **Q** en 'n korter kettinglengte as **S**.*

OF

S het die langste ketting en **Q** die kortste.

- *Intermolekulêre kragte neem toe met toename in kettinglengte.*
- *Meer energie word benodig om intermolekulêre kragte te oorkom wanneer kettinglengte toeneem.*

(4)

3.4

3.4.1 P ✓✓

(2)

3.4.2

Marking guidelines/Nasienriglyne

- Name type of IMFs in **P/pentanal**. ✓
Noem tipe IMK'e in P/pentanaal.
 - Name type of IMFs in/*Noem tipe IMK'e in T/pentan-1-ol.* ✓
 - Compare strength of IMFs. /*Vergelyk sterkte van IMK'e.* ✓
OR/OF
Compare energy needed to overcome IMFs./*Vergelyk energie benodig om IMK'e te oorkom.*
- In **P/ pentanal**/aldehydes: dipole-dipole forces. ✓ (in addition to London forces/dispersion forces/induced dipole forces).
 - In **T/pentan-1-ol**: Hydrogen bonding. ✓ (in addition to London forces/dispersion forces/induced dipole forces).
 - Intermolecular forces in P/pentanal are weaker. ✓ than in **T/pentan-1-ol**
OR dipole-dipole forces are weaker than hydrogen bonds **OR**
intermolecular forces in **T/pentan-1-ol** are stronger than in **P/pentanal**.
OR
More energy needed to overcome/break intermolecular forces in T.
 - In **P/pentanaal**/aldehyede: dipool-dipoolkragte (tesame met Londonkragte/ dispersiekragte/geïnduseerde dipoolkragte).
 - In **T/pentan-1-ol**: Waterstofbinding. (tesame met Londonkragte/ dispersiekragte/geïnduseerde dipoolkragte).
 - Intermolekulêre kragte in P swakker as in T/pentan-1-ol **OF**
intermolekulêre kragte in **T/pentan-1-ol** sterker as in **P/pentanaal** **OF**
dipool-dipoolkragte is swakker as waterstofbindings.
OF
Meer energie benodig om intermolekulêre kragte te oorkom/breek in T.

(3)

[12]

QUESTION 4/VRAAG 4

4.1 Haloalkane/alkyl halide ✓
Haloalkaan/alkielhalied (1)

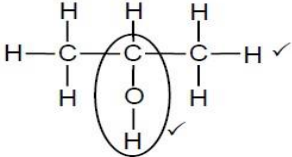
4.2
4.2.1 Elimination/dehydrohalogenation ✓
Eliminasie/dehidrohalogenering (1)

4.2.2 Substitution/hydrolysis ✓
Substitusie/hidrolise (1)

4.2.3 Esterification/condensation ✓
Esterifikasie/kondensasie/verestering (1)

4.3
4.3.1 • (Mild) heat/Heating/(matige) hitte/verhitting ✓
• Dilute (strong base)/Verdunde (sterk basis)/(NaOH/KOH/LiOH) ✓
OR/OR
Add water/H₂O/Voeg water/H₂O by (2)

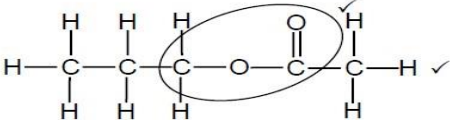
4.3.2 Propan-1-ol/1-propanol ✓✓
Marking criteria/Nasienriglyne:
• Correct stem and functional group i.e. propanol/Korrekte stam en funksionele groep, d.i. propanol. ✓
• Whole name correct:/Hele naam korrek: propan-1-ol ✓ (2)

4.4  **Marking criteria/Nasienriglyne**
• Whole structure correct:/Hele struktuur korrek: 2/2
• Only functional group correct/Slegs funksionele groep korrek: 1/2

Notes/Aantekeninge

- Accept -OH as condensed. /Aanvaar -OH as gekondenseerd.
- Condensed or semi-structural formula:
Gekondenseerde of semi-struktuurformule: Max./Maks. 1/2
- Molecular formula/Molekulêre formule: 0/2
- If functional group is incorrect/Indien funksionele groep verkeerd is: 0/2
- If more than one functional group:
Indien meer as een funksionele groep: 0/2 (2)

4.5 **POSITIVE MARKING FROM Q4.3.2 ONLY IF THE COMPOUND IN Q4.3.2 IS AN ALCOHOL. /POSITIEWE NASIEN VANAF V4.3.2 SLEGS INDIEN DIE VERBINDING IN Q4.3.2 'N ALKOHOL IS.**

4.5.1  **Marking criteria/Nasienriglyne**
• Whole structure correct:/Hele struktuur korrek: 2/2
• Only functional group correct/Slegs funksionele groep korrek: 1/2

Notes/Aantekeninge

- Condensed or semi-structural formula:
Gekondenseerde of semistruktuurformule: Max./Maks. 1/2
- Molecular formula/Molekulêre formule: 0/2
- If functional group is incorrect/Indien funksionele groep verkeerd is: 0/2 (2)

4.5.2 (Concentrated) sulphuric acid/(Gekonsentreerde) swawelsuur/H₂SO₄ ✓ (1)
[13]

KWV 12

QUESTION 2/VRAAG 2

2.1 ☒ Unsaturated/Onversadig ✓



ANY ONE/ENIGE EEN:

- C/It has a triple/multiple bond. ✓
C/Dit het 'n trippelbinding/meervoudige-binding.
- C/It has a triple/multiple bond between C atoms.
C/Dit het 'n trippelbinding/meervoudige-binding tussen C-atome.
- C/It does NOT contain the maximum number of H atoms bonded to C atoms.
C/Dit bevat NIE die maksimum getal H-atome gebind aan C-atome nie.
- Compound C is an alkyne./Verbinding C is 'n alkyn. (2)

2.2

2.2.1 D ✓ (1)

2.2.2 B ✓ (1)

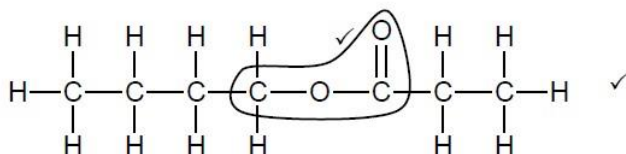
2.2.3 C ✓ (1)

2.2.4 E ✓ (1)

2.3

2.3.1 $\text{—C}\equiv\text{C—}$ ✓ (1)

2.3.2



(2)

Marking criteria/Nasienriglyne:

- Whole structure correct:

Hele struktuur korrek: $\frac{2}{2}$

- Only functional group correct:/Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

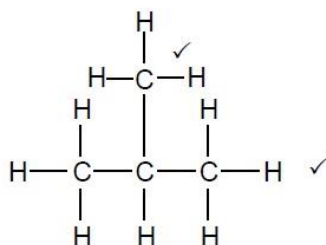
IF/INDIEN:

- More than one functional group/Meer as een funksionele groep: $\frac{0}{2}$

- If condensed or semi structural formula used:/Indien gekondenseerde of semi-struktuurformule gebruik:

Max/Maks. $\frac{1}{2}$

2.3.3

**Marking criteria/Nasienriglyne:**

- Three C atoms in longest chain. ✓
Drie C-atome in langste ketting.
- One methyl substituent on C2. ✓
Een metielsubstituent op C2.

IF/INDIEN

Any error e.g. omission of H atoms, condensed or semi structural formula/*Enige fout bv weglating van H-atome, gekondenseerde of semi-struktuurformule.* Max/Maks.: $\frac{1}{2}$

(2)

2.4

2.4.1 2,3-dibromo-5-methylheptane/2,3-dibromo-5-metielheptaan

Marking criteria/Nasienriglyne:

- Correct stem i.e. heptane. /Korrekte stam d.i. heptaan. ✓
- All substituents (bromo and methyl) correctly identified. /*Alle substituenten (bromo en metiel) korrek geïdentifiseer.* ✓
- IUPAC name completely correct including numbering, sequence, hyphens and commas. /*IUPAC-naam heeltemal korrek insluitende nommering, volgorde, koppeltekens en kommas.* ✓

(3)

2.4.2 $2C_4H_{10} + 13O_2 \checkmark \rightarrow 8CO_2 + 10H_2O \checkmark$ Bal ✓**Notes/Aantekeninge:**

- Reactants ✓ Products ✓ Balancing ✓
Reaktanse Produkte Balansering
- Ignore double arrows and phases. /*Ignoreer dubbelpyle en fases.*
- Marking rule 6.3.10/Nasienreël 6.3.10.
- If condensed structural formulae used: /*Indien gekondenseerde struktuurformules gebruik:* Max/Maks. $\frac{2}{3}$
- Accept coefficients that are multiples. /*Aanvaar koëffisiënte wat veelvoude is.*

(3)

[17]**QUESTION 3/VRAAG 3**

3.1

3.1.1 Yes/Ja ✓

**ANY ONE/ENIGE EEN:**

- Compounds have the same molecular mass. ✓
Verbindings het dieselfde molekulêre massa.
- Only one independent variable. /*Slegs een onafhanklike veranderlike.*

(2)

3.1.2 Functional group/Homologous series/Type of (organic) compound ✓
Funksionele groep/Homoloë reeks/Tipe (organiese) verbinding

(1)

3.2 A/butane/butaan ✓



- Lowest boiling point/weakest intermolecular forces. ✓
Laagste kookpunt/swakste intermolekulêre kragte.

(2)

3.3

Marking guidelines/Nasienriglyne

- Type of IMF in A./Tipe IMK in A.
- BOTH B and C have hydrogen bonding./BEIDE B en C het waterstofbinding.
- Compare number of sites for hydrogen bonding in B and C./Vergelyk aantal punte vir waterstofbinding in B en C.
- Compare strength of IMFs./Vergelyk sterkte van IMKe.
- Compare energy required./Vergelyk energie benodig.
- Between molecules of butane/compound A are London forces/dispersion forces/induced dipole forces. ✓
- Molecules of compound B/propan-1-ol have one site for hydrogen bonding. ✓
- Molecules of compound C/ethanoic acid have two/more sites for hydrogen bonding. ✓
- Strength of intermolecular forces increases from compound A/butane to compound B/propan-1-ol to compound C/ethanoic acid. ✓
- OR
- Intermolecular forces in compound A/butane are the weakest and intermolecular forces in compound C/ethanoic acid are the strongest.
- More energy is needed to overcome/break intermolecular forces in compound C than in the other two compounds. ✓
- Tussen molekule van butaan/verbinding A is Londonkragte/dispersie-kragte/geïnduseerde dipoolkragte. ✓
- Molekule van verbinding B/propan-1-ol het een punt vir waterstof-bindings. ✓
- Molekule van verbinding C/etanoësuur het twee punte vir waterstof-bindings. ✓
- Sterkte van intermolekulêre kragte neem toe van verbinding A/butaan na verbinding B/propan-1-ol na verbinding C/etanoësuur. ✓
- OF
- Intermolekulêre kragte tussen propaan is die swakste en intermolekulêre kragte in verbinding C is die sterkste.
- Meer energie word benodig om intermolekulêre kragte in verbinding C as in die ander twee verbindings te oorkom/breek. ✓

(5)

3.4 Butan-1-ol ✓

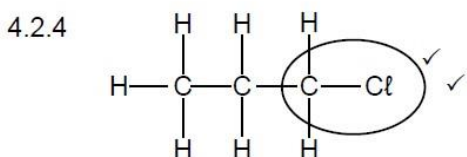


- Longer chain length./Larger molecule./Larger molecular mass./Larger molecular size./Stronger intermolecular forces./Larger surface area. ✓
- Langer kettinglengte./Groter molekule./Groter molekulêre massa/Groter molekule./Sterker intermolekulêre kragte./Groter oppervlakte.

(2)
[12]

QUESTION 4/VRAAG 4

- 4.1
- 4.1.1 Addition (polymerisation)/Addisie-(polimerisasie) ✓ (1)
- 4.1.2 Ethene/eteen ✓ (1)
- 4.1.3 Polyethene/polythene ✓
Poli-eteen/politeen (1)
- 4.2
- 4.2.1 Dehydration/elimination ✓
Dehidrasie/dehidratering/eliminasië (1)
- 4.2.2 Catalyst/dehydrating agent/causes dehydration/removes water molecules ✓
Katalisator/dehidreermiddel/veroorzaak dehidrasie/verwyder watermolekule (1)
- 4.2.3 Prop-1-ene/propene/1-propene ✓✓ (2 or 0)
Prop-1-een/propeen/1-propeen (2 of 0) (2)



Marking criteria/Nasienriglyne:

- Whole structure correct:
Hele struktuur korrek: $\frac{2}{2}$
 - Only functional group correct:/Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$
- IF/INDIEN:**
- More than one functional group/Meer as een funksionele groep: $\frac{0}{2}$
 - If condensed or semi structural formula used:/Indien gekondenseerde of semi-struktuurformule gebruik:
Max/Maks. $\frac{1}{2}$

- 4.2.5 Addition/Hydration ✓
Addisie/Hidrasie/Hidratering (1)

- 4.2.6 Propan-2-ol/2-propanol ✓✓

Marking criteria/Nasienriglyne:

- Correct stem and functional group i.e propanol/Korrekte stam en funksionele groep d.i propanol ✓
- Name completely correct/Naam volledig korrek: Propan-2-ol/2-propanol ✓✓

(2)
[12]

KWV 13

QUESTION 2/VRAAG 2

2.1.1 Ketones/Ketone ✓ (1)

2.1.2 Pentanal/Pentanaal ✓✓

ACCEPT/AANVAAR

2,2-dimethylpropanal/2,2-dimethylpropanaal

2-methylbutanal/2-metielbutanaal

3-methylbutanal/3-metielbutanaal

Marking criteria/Nasienriglyne

- Correct functional group, i.e. – al / Korrekte funksionele groep d.i. al ✓
- Whole name correct/Hele naam korrek ✓

(2)

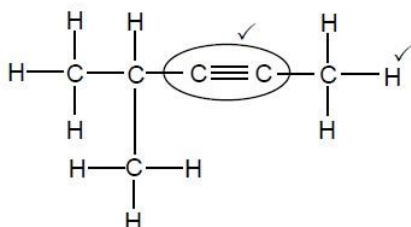
2.2.1 5 – bromo-2,3 – dimethylhexane/5 – bromo-2,3 – dimetielheksaan

Marking criteria/Nasienriglyne:

- Correct stem i.e. hexane. /Korrekte stam d.i. heksaan. ✓
- All substituents (bromo and dimethyl) correctly identified. /Alle substituenten (bromo en dimetiel) korrek geïdentifiseer. ✓
- IUPAC name completely correct including numbering, sequence, hyphens and commas. /IUPAC-naam heeltemal korrek insluitende volgorde, koppeltekens en kommas. ✓

(3)

2.2.2



Marking criteria/Nasienriglyne

- Whole structure correct/Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct./Slegs funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN

More than one functional group/Meer as een funksionele groep $\frac{0}{2}$

(2)

IF/INDIEN

Molecular formula/Molekulêre formule $\frac{0}{2}$

Condensed structural formula /Gekondenseerde struktuurformule $\frac{1}{2}$

- 2.3.1 The C atom bonded to the hydroxyl group is bonded to only one other C-atom. ✓✓ (2 or 0)
Die C-atoom wat aan die hidroksielgroep gebind is, is aan slegs een ander C-atoom gebind. (2 or 0)

OR/OF

The hydroxyl group/-OH/ is bonded to a C atom which is bonded to two hydrogens atoms. (2 or 0)

Die hidroksielgroep/funksionele groep is gebind aan 'n C-atoom wat aan twee waterstofatome gebind is. (2 of 0)

OR/OF

The hydroxyl group/functional group/-OH is bonded to:

a primary C atom / the first C atom (2 or 0)

Die hidroksielgroep/funksionele groep/-OH aan

'n primêre C-atoom gebind / die eerste C-atoom gebind (2 of 0)

OR/OF

The functional group ($\begin{array}{c} | \\ -\text{C} - \text{OH} \\ | \end{array}$) is bonded to only one other C-atom.

Die funksionele groep ($\begin{array}{c} | \\ -\text{C} - \text{OH} \\ | \end{array}$) is aan slegs een ander C-atoom gebind.

(2)

- 2.3.2 Esterification/condensation ✓
Verestering/esterifikasie/kondensasie

(1)

- 2.3.3 Butanoic acid/Butanoësuur ✓

(1)

[12]

QUESTION 3/VRAAG 3

3.1

Marking criteria/Nasienriglyne

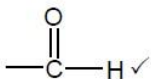
If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./Indien enige van die onderstreepte frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The temperature at which the vapour pressure equals atmospheric (external) pressure. ✓✓

Die temperatuur waar die dampdruk gelyk is aan atmosferiese (eksterne) druk.

(2)

3.2



(1)

3.3

- Increase in the number of C-atoms increases molecular mass/size/chain length/surface area. ✓
- Strength of the intermolecular forces increases/More sites for London forces. ✓
- More energy is needed to overcome/break intermolecular forces. ✓
- Toename in aantal C-atome verhoog molekulêre massa/molekulêre grootte/kettinglengte/reaksie-oppervlak.
- Sterkte van die intermolekulêre kragte verhoog/Meer punte vir Londonkragte.
- Meer energie benodig om intermolekulêre kragte te oorkom/breek.

(3)

3.4.1

C ✓

(1)

3.4.2

B ✓

Marking criteria/Nasienriglyne

- Compare strength of intermolecular forces of A, B and C. ✓
- Compare boiling points/energy required to overcome intermolecular forces of alcohols/A and aldehydes/B. ✓

OR

Alcohols have the highest boiling point.

- Compare boiling points/ energy required to overcome intermolecular force of aldehydes/B and alkanes/C. ✓

OR

Alkanes have the lowest boiling point.

- Vergelyk sterkte van intermolekulêre kragte van A, B en C. ✓
- Vergelyk kookpunte /energie benodig om intermolekulêre kragte van alkohole/A en aldehyede/B te oorkom. ✓

OF

Alkohole het die hoogste kookpunt.

- Vergelyk kookpunte /energie benodig om intermolekulêre kragte van aldehyede/B en alkane/C. ✓

OF

Alkane het die laagste kookpunt.

Aldehydes/B have (in addition to London forces) dipole-dipole forces which are stronger than London forces, but weaker than hydrogen bonds. ✓
Therefore aldehydes/B have lower boiling points/require less energy to overcome intermolecular forces than alcohols/A, ✓ but higher boiling points / require more energy to overcome intermolecular forces than alkanes/C. ✓

Aldehiede/B het (in toevoeging tot Londonkragte) dipool-dipoolkragte wat sterker is as Londonkragte, maar swakker is as waterstofbinding.
Dus het aldehiede/B laer kookpunte/benodig minder energie om intermolekulêre kragte te oorkom as alkohole/A, maar hoër kookpunte/benodig meer energie om intermolekulêre kragte te oorkom as alkane/C.

OR/OF

Aldehydes/B have stronger intermolecular forces than alkanes, but weaker intermolecular forces than alcohols/A. ✓
Therefore aldehydes/B have higher boiling points/ more energy required to overcome intermolecular forces than alkanes/C, ✓ but lower boiling points/ less energy to overcome intermolecular forces than alcohols/A. ✓

Aldehiede/B het sterker intermolekulêre kragte as alkane/C, maar swakker intermolekulêre kragte as alkohole/A.
Dus het aldehiede/B laer kookpunte/ benodig minder energie om intermolekulêre kragte te oorkom as alkohole/A, maar hoër kookpunte/ benodig meer energie om intermolekulêre kragte te oorkom as alkane/C.

(4)

3.5 Butanal ✓✓
 Butanaal

Marking criteria/Nasienriglyne

- Correct stem, i.e. but/Korrekte stam d.i. but ✓
- Whole name correct/Hele naam korrek ✓

(2)

3.6 Pentan-1-ol ✓✓
OR/OF
 1-pentanol ✓✓

(2)

[15]

QUESTION 4/VRAAG 4

4.1

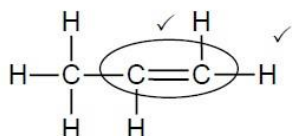
Marking criteria/Nasienriglyne

- Addition reaction / reaction of alkene / reaction of C – C double bond /reaction of unsaturated hydrocarbon✓
 Addisie reaksie / reaksie van 'n alkeen /reaksie van C – C dubbelbinding/reaksie van 'n onversadigde koolwaterstof.
- (Addition of) hydrogen halide/HX/ hydrogen and halide. ✓
 (Addisie van) waterstofhalied/HX/waterstof en halied.

The addition ✓ of a hydrogen halide/HX ✓ to an alkene.
 Die addisie van 'n waterstofhalied/HX aan 'n alkeen.

(2)

4.2

**Marking criteria/Nasienriglyne**

- Whole structure correct:

Hele struktuur korrek: $\frac{2}{2}$

- Only functional group correct/Slegs funksionele groep korrek: Max/Maks: $\frac{1}{2}$

(2)

4.3.1 Cracking/Kraking ✓

(1)

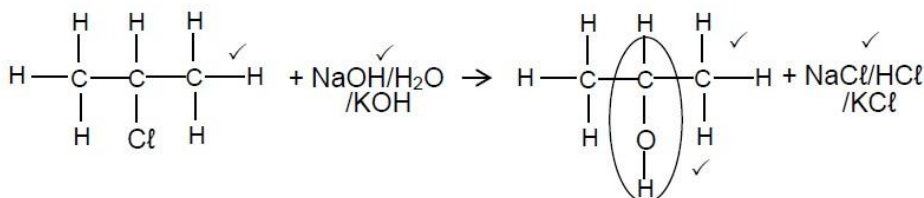
4.3.2 C_8H_{18} ✓

(1)

4.4 1,2-dibromo ✓ propane ✓
1,2-dibromopropaan/1,2-dibroompropaan

(2)

4.5.1

**Marking criteria for the alcohol/Nasienriglyne vir die alkohol**

- Whole structure of alcohol correct/Hele struktuur van alkohol korrek: $\frac{2}{2}$
- Only functional group correct/Slegs funksionele groep korrek: $\frac{1}{2}$

Notes/Aantekeninge:

- If 1-chloropropane used as reactant, 2 marks for the primary alcohol.
Indien 1-chloropropaan as reaktanse gebruik is, 2 punte vir die primêre alkohol.
- Condensed or semi-structural formula: Max. $\frac{4}{5}$
Gekondenseerde of semistruktuurformule: Maks. $\frac{4}{5}$
- Molecular formula/Molekulêre formule: $\frac{2}{5}$
- Any additional reactants or products: Max. $\frac{4}{5}$
Enige addisionele reaktanse of produkte: Maks. $\frac{4}{5}$
- If arrow in completely correct equation omitted: Max. $\frac{4}{5}$
Indien pyltjie in volledige korrekte vergelyking uitgelaat is: Maks. $\frac{4}{5}$
- The product NaCl/KCl/HCl must be marked in conjunction with reactant NaOH/KOH/H₂O.
Die produk NaCl/KCl/HCl moet in samehang met die reaktans NaOH/KOH / H₂O nagesien word.

(5)

4.5.2

- (Mild) heat/(Matige) hitte ✓
- Dilute strong base/NaOH/LiOH/KOH OR water/H₂O ✓
Verdunde sterk basis/NaOH/LiOH/KOH OF water/H₂O

(2)
[15]

KWV 14

QUESTION 2/VRAAG 2

- 2.1
- 2.1.1 F ✓ (1)
- 2.1.2 B & F ✓ (1)
- 2.1.3 C ✓ (1)
- 2.2
- 2.2.1 Haloalkane / alkyl halide ✓
Haloalkaan/alkielhalied (1)
- 2.2.2 3,5-dibromooctane ✓✓✓
3,5-dibroomoktaan
- Marking criteria/Nasienkriteria:**

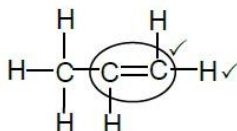
 - Octane/Oktaan ✓
 - Dibromo/Dibroom ✓
 - Substituents (dibromo) correctly numbered, hyphens, commas correctly used./
Substituente (dibroom) korrek genommer, koppeltekens en kommas korrek gebruik. ✓
- (3)
- 2.3
- 2.3.1 Pentan-3-one ✓✓
Pentan-3-oon
OR/OF
3-pentanone ✓✓
3-pentanoon
- Marking criteria/Nasienkriteria:**

 - Pentanone/pentanoon ✓
 - Correct position of functional group. ✓
Korrekte posisie van funksionele groep.
- (2)
- 2.3.2 3-methyl✓butan-2-one✓/3-metielbutan-2-oon
OR/OF
3-methyl✓butanone✓/3-metielbutanoon
OR/OF
methyl✓butanone✓/metielbutanoon
OR/OF
3-methyl✓- 2-butanone✓/3-metiel-2-butanoon (2)
- 2.4
- 2.4.1 Hexyl✓ methanoate ✓
Heksielmetanoaat (2)
- 2.4.2
- $$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{O}-\text{C}- \\ | \end{array}$$

OR/OF

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{O}-\text{R} \end{array}$$
- (1)
- 2.5
- 2.5.1 Cracking/Elimination ✓
Kraking/eliminasië (1)
- 2.5.2 C₇H₁₆ ✓✓ (2)

2.5.3



Notes/Aantekeninge

- Functional group/Funksionele groep: ✓
- Whole structure correct/Hele struktuur korrek: ✓

(2)
[19]

QUESTION 3/VRAAG 3

3.1

Marking guidelines/Nasienkriteria:

If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./Indien enige van die onderstreepte frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The pressure exerted by a vapour at equilibrium with its liquid in a closed system. ✓✓

Die druk uitgeoefen deur 'n damp in ewewig met sy vloeistoffase in 'n geslote sisteem.

(2)

3.2

Functional group/Type of intermolecular forces/Homologous series ✓
Funksionele groep/Tipe intermolekulêre kragte/Homoloë reeks

(1)

3.3

B ✓

(1)

3.4

Marking criteria/Nasienkriteria

- State hydrogen bonding in **A**./Noem waterstofbinding in **A**. ✓
- State dipole-dipole forces in **B**./Noem dipool-dipoolkragte in **B**. ✓
- Compare strengths of IMFs./Vergelyk sterktes van IMKe. ✓
- Compare energies required./Vergelyk energieë benodig. ✓

- Compound A/butan-1-ol has hydrogen bonding (dipole-dipole and London forces) between molecules. ✓
- Compound B/butan-2-one has dipole-dipole forces (and London forces) between molecules. ✓
- Intermolecular forces in compound A/butan-1-ol are stronger than intermolecular forces in compound B/butan-2-one. ✓

OR

Intermolecular forces in compound B/butan-2-one are weaker than intermolecular forces in compound A/butan-1-ol. ✓

- More energy is needed to overcome/break intermolecular forces in compound A/butan-ol than in compound B/butan-2-one. ✓

- Verbinding A/butan-1-ol het waterstofbindings (dipool-dipoolkragte en Londonkragte) tussen molekule.

- Verbinding B/butan-2-oon het dipool-dipoolkragte (en London kragte) tussen molekule. ✓

- Intermolekulêre kragte in verbinding A/butan-1-ol is sterker as intermolekulêre kragte in verbinding B/butan-2-oon.

OF

Intermolekulêre kragte in verbinding B/butan-2-oon is swakker as intermolekulêre kragte in verbinding A/butan-1-ol.

- Meer energie is nodig om intermolekulêre kragte te oorkom/breek in verbinding A/butan-1-ol as in verbinding B/butan-2-oon.

(4)

3.5

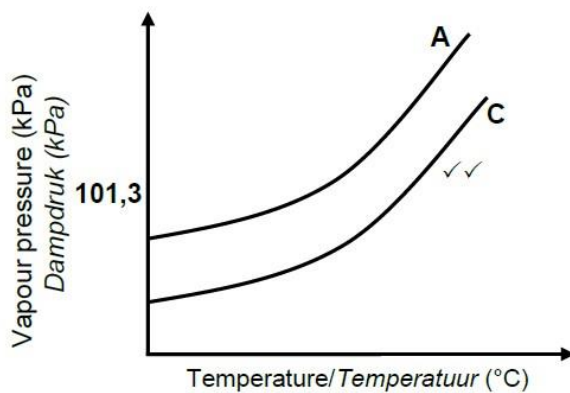
3.5.1 Boiling point (of compound **A**/butan-1-ol) ✓
Kookpunt (van verbinding **A**/butan-1-ol)

(1)

3.5.2 Gas ✓

(1)

3.5.3



Marking criteria/Nasienkriteria:

- Curve **C** starts below curve **A**/Kurwe **C** begin onder kurwe **A**. ✓
- Curve **C** remains below curve **A**/ Kurwe **C** bly onder kurwe **A**. ✓

Accept/Aanvaar

- If **C** is labelled as **B** / Indien **C** as **B** benoem is
- If graph below graph **A** is unlabelled /Indien grafiek onder grafiek **A** nie benoem is nie

Note/Let Wel

If both graphs unlabelled / Indien beide grafiek nie benoem is nie:
0 marks / 0 punte

(2)
[12]

QUESTION 4/VRAAG 4

4.1

4.1.1 Heat/sunlight/ultraviolet light/radiation/light ✓
Hitte/sonlig/ultravioletlig/straling/lig (1)

4.1.2 HBr/hydrogen bromide/waterstofbromied ✓ (1)

4.1.3 Hydrolysis/hidrolise ✓ (1)

4.1.4 H₂O/water ✓
Accept/Aanvaar
hydrogen oxide/waterstofoksied

OR/OF

NaOH/KOH/LiOH/sodium hydroxide/potassium hydroxide/lithium hydroxide
NaOH/KOH/LiOH/Natriumhidroksied/kaliumhidroksied/litiumhidroksied (1)

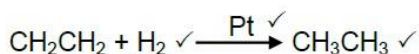
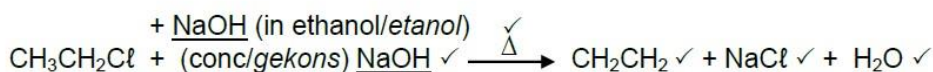
4.1.5 2-bromo ✓ propane ✓
2-bromopropaan (2)

4.2

Marking criteria/Nasienkriteria:

(Mark bullets independently. / Sien kolpunte onafhanklik na.)

- React chloroethane with (conc) NaOH or NaOH in ethanol. ✓
- Indicate heat/Δ (on the arrow) or as a reactant in the reaction of chloroethane. ✓
- Correct condensed formula for ethene as product. ✓
- Product NaCl in the reaction of chloroethane. ✓
- Product H₂O in the reaction of chloroethane. ✓
- React ethene with H₂. ✓
- Indicate Pt on the arrow of / at the reaction of ethene with H₂. ✓
- Correct condensed formula of ethane as product. ✓
- Reageer chloroetaan met (gekons) NaOH of NaOH in etanol. ✓
- Dui hitte/Δ (op die pyl) of as 'n reaktant in die reaksie van chloroetaan. ✓
- Korrekte gekondenseerde formule vir eteen as produk. ✓
- Produk NaCl in die reaksie van chloroetaan. ✓
- Produk H₂O in die reaksie van chloroetaan. ✓
- Reageer eteen met H₂. ✓
- Dui Pt aan op die pyl / by die reaksie van eteen met H₂. ✓
- Korrekte gekondenseerde formule vir etaan as produk. ✓



Note/Let wel

Any additional reactants or products: Deduct one mark per reaction
Enige addisionele reaktanse of produkte: Trek een punt af per reaksie

(8)
[14]

KWV 15

QUESTION 2/VRAAG 2

2.1 A compound that contains a double bond/multiple bond/does NOT contain only single bonds (between C atoms). ✓✓ (2 or 0)
'n Verbinding wat dubbelbindings/meervoudige bindings/NIE net enkelbindings (tussen C-atome) bevat NIE. (2 of 0) (2)

2.2
2.2.1 B / E ✓ (1)

2.2.2 Carbonyl (group bonded to two C atoms) ✓
Karboniel(groep gebind aan twee C-atome)

ACCEPT/AANVAAR Ketone/Ketoon
--

 (1)

2.2.3 F ✓✓ (2)

2.2.4 2,5-dichloro-3-methylhexane/2,5-dichloro-3-metielheksaan

Marking criteria:

- Correct stem i.e. hexane. ✓
- All substituents (dichloro and methyl) correctly identified. ✓
- IUPAC name completely correct including numbering, sequence, hyphens and commas. ✓

Nasienkriteria:

- Korrekte stam d.i. heksaan. ✓
- Alle substituenten (dichloro en metiel) korrek geïdentifiseer. ✓
- IUPAC-naam heeltemal korrek insluitende nommering, volgorde, koppeltekens en kommas. ✓

(3)

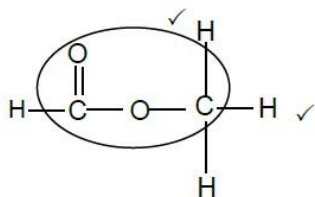
2.2.5 C_nH_{2n} ✓ (1)

2.3 Compounds with the same molecular formula, ✓ but different functional groups/homologous series. ✓
Verbindings met dieselfde molekulêre formule, maar verskillende funksionele groepe/homoloë reekse. (2)

2.4

2.4.1 Carboxylic acids/Karboksielsure ✓ (1)

2.4.2



Marking criteria/Nasienkriteria:

- Whole structure correct/
Hele struktuur korrek: $\frac{2}{2}$
- Only functional group correct/Slegs
funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN

- More than one functional group:
Meer as een funksionele groep: $\frac{0}{2}$

IF/INDIEN

- Molecular formula/Molekulêre formule $\frac{0}{2}$
- Condensed structural formula /Gekondenseerde struktuurformule $\frac{1}{2}$ (2)

2.5

2.5.1 Ethanol/Etanol ✓ (1)

2.5.2 E ✓ **ACCEPT/AANVAAR:** C_2H_4 (1)

2.5.3 (Concentrated) sulphuric acid/ H_2SO_4 /(concentrated) phosphoric acid/ H_3PO_4 ✓
 (Gekonsentreerde) swawelsuur/ H_2SO_4 /(gekonsentreerde) fosforsuur/ H_3PO_4 (1)
[18]

QUESTION 3/VRAAG 3

- 3.1 **Marking criteria/Nasienkriteria:**
If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./Indien enige van die onderstreepte frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.
The temperature at which solid and liquid phases are in equilibrium. ✓✓
Die temperatuur waarby die vastestof- en vloeistoffases van 'n stof in ewewig is. (2)
- 3.2 **Marking criteria**
• Identification of independent variable. ✓
• Stating the relationship between dependent and independent variable. ✓
Nasienkriteria
• Identifikasie van onafhanklike veranderlike. ✓
• Stel verwantskap tussen afhanklike en onafhanklike veranderlikes. ✓
• As the chain length/number of C atoms/molecular mass/surface area/strength of the intermolecular forces ✓ increases, the melting points increase. ✓
OR
• As the chain length/ number of C atoms/molecular mass/surface area/strength of the intermolecular forces ✓ decreases, the melting points decrease. ✓
• Wanneer die kettinglengte/aantal C-atome/molekulêre massa/oppervlak-area/sterkte van intermolekulêre kragte ✓ toeneem, neem die smeltpunte toe.
OF
• Wanneer die kettinglengte/aantal C-atome/molekulêre massa/oppervlak-area/sterkte van intermolekulêre kragte afneem, neem die smeltpunte af. (2)
- 3.3 London forces ✓
Londonkragte **ACCEPT/AANVAAR**
Dispersion forces/induced dipole forces
Dispersiekragte/geïnduseerde dipoolkragte (1)
- 3.4
3.4.1 Liquid/Vloeistof ✓ (1)
- 3.4.2 Solid/Vaste stof ✓ (1)
- 3.5
3.5.1 Equal to/Gelyk aan ✓
Same molecular formula/Isomers/same number and types of atoms/same number of C and H atoms ✓
Dieselfde molekulêre formule/Isomere/dieselfde aantal en soort atome/dieselfde aantal C- en H-atome (2)
- 3.5.2 Lower than/Laer as ✓ (1)

3.5.3

Marking criteria:

- Compare structures. ✓
- Compare the strength of intermolecular forces. ✓
- Compare the energy required to overcome intermolecular forces. ✓

2,2-dimethylbutane:

- **Structure:**
More branched/more compact/more spherical/smaller surface area (over which intermolecular forces act). ✓
- **Intermolecular forces:**
Weaker/less intermolecular forces/Van der Waals forces/London forces/dispersion forces. ✓
- **Energy:**
Lesser energy needed to overcome or break intermolecular forces/Van der Waals forces. ✓

OR

Hexane

- **Structure:**
Longer chain length/unbranched/less compact/less spherical/larger surface area (over which intermolecular forces act). ✓
- **Intermolecular forces:**
Stronger/more intermolecular forces/Van der Waals forces/London forces/dispersion forces. ✓
- **Energy:**
More energy needed to overcome or break intermolecular forces/Van der Waals forces. ✓

Nasienkriteria:

- Vergelyk strukture ✓
- Vergelyk die sterkte van intermolekulêre kragte. ✓
- Vergelyk die energie benodig om intermolekulêre kragte te oorkom. ✓

2,2-dimetielbutaan:

- **Struktuur:**
Meer vertak/meer kompak/meer sferies/kleiner oppervlak (waaroor intermolekulêre kragte werk). ✓
- **Intermolekulêre kragte:**
Swakker/minder intermolekulêre kragte/Van der Waalskragte/Londonkragte/dispersiekragte. ✓
- **Energie:**
Minder energie benodig om intermolekulêre kragte/Van der Waalskragte/dispersiekragte/Londonkragte te oorkom/breek. ✓

OF

Heksaan

- **Struktuur:**
Langer kettinglengte/onvertak/minder kompak/minder sferies/groter oppervlak (waaroor intermolekulêre kragte werk). ✓
- **Intermolekulêre kragte:**
Sterker/meer intermolekulêre kragte/Van der Waalskragte/Londonkragte/dispersiekragte. ✓
- **Energie:**
Meer energie benodig om intermolekulêre kragte/Van der Waalskragte/dispersiekragte/Londonkragte te oorkom/breek. ✓

(3)
[13]

QUESTION 4/VRAAG 4

4.1

4.1.1 Substitution/Hydrolysis ✓
Substitusie/Hidrolise

(1)

4.1.2 Primary (alcohol) ✓

ANY ONE:

- The C atom of the functional group is the terminal C atom.
- The C-atom bonded to the hydroxyl/-OH is bonded to (only) one other C-atom. ✓
- The hydroxyl/-OH is bonded to a C-atom which is bonded to two hydrogen atoms.
- The hydroxyl/-OH is bonded to a primary C atom/terminal C atom/first C atom.

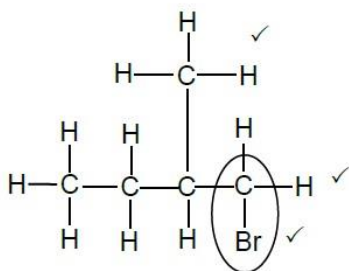
Primêre (alkohol) ✓

ENIGE EEN:

- Die C-atoom van die funksionele groep is die terminale C-atoom.
- Die C-atoom wat aan die hidroksiel/-OH gebind is, is aan (slegs) een ander C-atoom gebind. ✓
- Die hidroksiel/-OH is gebind aan 'n C-atoom wat aan twee waterstofatome gebind is.
- Die hidroksiel/-OH is aan 'n primêre C-atoom/terminale C-atoom/eerste C-atoom gebind.

(2)

4.1.3



Marking criteria:

- Four C atoms in longest chain. ✓
- One methyl substituent on C2. ✓
- Bromo substituent on C1. ✓

Nasienkriteria:

- Vier C-atome in langste ketting. ✓
- Een metielsubstituent op C2. ✓
- Broomsustituent op C1. ✓

IF/INDIEN

Any error e.g. omission of H atoms, condensed or semi structural formula/Enige fout bv. weglating van H-atome, gekondenseerde of semi-struktuurformule. Max/Maks.: $\frac{2}{3}$

(3)

4.1.4 Elimination/dehydrohalogenation/dehydrobromination ✓
Eliminasie/dehidrohalogenering/dehidrohalogenasie/dehidrobrominasie/dehidrobromonering

(1)

4.1.5 Alkenes/Alkene ✓

(1)

4.1.6 Addition/Addisie ✓

(1)

4.1.7 2-bromo-2-methylbutane ✓
2-bromo-2-metielbutaan ✓

(2)

4.2

NOTE/LET WEL:

- Penalise only once for the use of structural formulae or molecular formulae.
- *Penaliseer slegs een keer vir die gebruik van struktuurformules of molekulêre formules.*

4.2.1

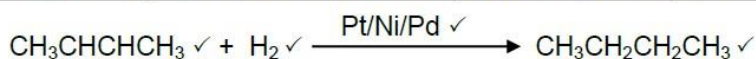
Marking criteria:

- Correct condensed structure for but-2-ene. ✓
- React but-2-ene with $H_2/H - H$. ✓
- Indicate the catalyst Pt/Ni/Pd on arrow/at the equation. ✓
- Correct condensed formula for butane as product. ✓

IF: Any additional products or reactants - minus 1 mark

Nasienkriteria:

- *Korrekte gekondenseerde struktuur vir but-2-ene.* ✓
- *Reageer but-2-ene met $H_2/H - H$.* ✓
- *Dui die katalisator Pt/Ni/Pd op die pyl/by die vergelyking aan.* ✓
- *Korrekte gekondenseerde formule vir butaan as produk.* ✓

INDIEN: Enige addisionele reaktanse of produkte – minus 1 punt**ACCEPT/AANVAAR**As reactant/reaktans: $CH_3(CH)_2CH_3$ / $CH_3CH = CHCH_3$ / $CH_3 - CH = CH - CH_3$ As product/produk: $CH_3(CH_2)_2CH_3$ / $CH_3 - CH_2 - CH_2 - CH_3$ / $CH_3 - (CH_2)_2 - CH_3$

(4)

4.2.2

Elimination/Cracking ✓

Eliminasie/Kraking

(1)

4.2.3

Propene/1-propene/prop-1-ene ✓✓

Propeen/1-propeen/prop-1-ene

(2)

4.2.4

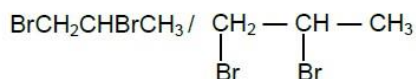
Marking criteria:

- Correct condensed formula for propene as reactant. ✓
- React (propene) with $Br_2/Br - Br$. ✓
- Correct condensed formula for 1,2-dibromopropane as product. ✓

IF: Any additional products or reactants - minus 1 mark

Nasienkriteria:

- *Korrekte gekondenseerde formule vir propen as reaktans.* ✓
- *Reageer (propen) met $Br_2/Br - Br$.* ✓
- *Korrekte gekondenseerde formule vir 1,2-dibromopropaan as produk.* ✓

INDIEN: Enige addisionele reaktanse of produkte – minus 1 punt**ACCEPT/AANVAAR:**As reactant/reaktans: $CH_3CH = CH_2$ / $CH_2 = CHCH_3$ As product/produk: $CH_3CHBrCH_2Br$ / $CH_3 - \underset{\substack{| \\ Br}}{CH} - \underset{\substack{| \\ Br}}{CH_2}$ /

(3)

[21]

KWV 16

QUESTION 2/VRAAG 2

2.1

2.1.1 E ✓

(1)

2.1.2 F ✓

(1)

2.1.3 C ✓

(1)

2.1.4 H ✓

(1)

2.2

2.2.1 2-bromo-2,4,5-trimethylhexane/2-broom-2,4,5-trimetielheksaan

Marking criteria:

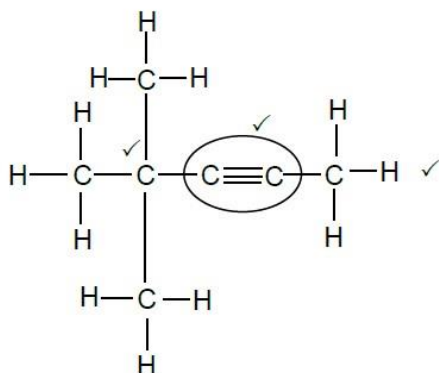
- Correct stem i.e. hexane. ✓
- All substituents (bromo and trimethyl) correctly identified. ✓
- IUPAC name completely correct including numbering, sequence, hyphens and commas. ✓

Nasienkriteria:

- Korrekte stam d.i. heksaan. ✓
- Alle substituenten (bromo and trimetiel) korrek geïdentifiseer. ✓
- IUPAC-naam heeltemal korrek insluitende volgorde, koppeltekens en kommas. ✓

(3)

2.2.2



Marking criteria/Nasienkriteria:

- Five C atoms in longest chain + triple bond. ✓
Vyf C-atome in langste ketting + drievoudige binding.
- Two methyl substituents. ✓
Twee metielsubstituente.
- Whole structure correct. ✓
Hele struktuur korrek.

IF/INDIEN

- More than one functional group/wrong functional group:
Meer as een funksionele groep/foutiewe funksionele groep: 0/3
- If condensed structural formulae used/*Indien gekondenseerde struktuurformules gebruik:* Max/Maks.: 2/3

(3)

2.3

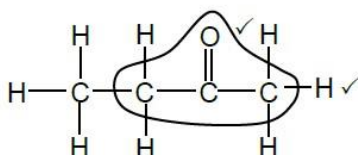
2.3.1 Aldehyde/Aldehyd ✓

(1)

2.3.2 Formyl/Formiel ✓

(1)

2.3.3



Marking criteria/Nasienkriteria:

- Functional group. ✓
Funksionele groep.
- Whole structure correct. ✓
Hele struktuur korrek.

IF/INDIEN

- More than one functional group/wrong functional group:
Meer as een funksionele groep/foutiewe funksionele groep: 0/2
- If condensed structural formulae used/*Indien gekondenseerde struktuurformules gebruik:* Max/Maks.: 1/2

(2)

2.4

2.4.1 Methylpropane ✓ / 2-methylpropane / Metielpropan / 2-metielpropan

(2)

2.4.2 $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ ✓ Bal. ✓

Ignore phases./Ignoreer fases.

Marking criteria/Nasienkriteria:

- Reactants ✓ Products ✓ Balancing: ✓
Reaktanse Produkte Balansering
- Ignore double arrows./Ignoreer dubbelpyle.
- Marking rule 6.3.10/Nasienreël 6.3.10.

IF: Structural formula for C_4H_{10} Max. 2/3

INDIEN: Structural formula for C_4H_{10} Max. 2/3

(3)

[19]

QUESTION 3/VRAAG 3

3.1

Marking criteria/Nasienkriteria

If any one of the underlined key phrases in the **correct context** is omitted, deduct 1 mark./Indien enige van die onderstreepte frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The temperature at which the vapour pressure of a substance equals atmospheric/external pressure. ✓✓

Die temperatuur waar die dampdruk van 'n stof gelyk is aan atmosferiese/ eksterne druk.

(2)

3.2

3.2.1 Increases/Neem toe ✓

(1)

3.2.2 **From A to C:**

- Increase in molecular mass/size/chain length/surface area/number of C atoms. ✓
- Strength of the intermolecular forces increases/More sites for London forces. ✓
- More energy is needed to overcome/break intermolecular forces. ✓

OR

From C to A:

- Decrease in molecular mass/size/chain length/surface area/number of C atoms. ✓
- Strength of the intermolecular forces decreases/Less sites for London forces. ✓
- Less energy is needed to overcome/break intermolecular forces. ✓

Van A na C:

- Verhoging in molekulêre massa/molekulêre grootte/kettinglengte/reaksie-oppervlak/aantal C-atome. ✓
- Sterkte van die intermolekulêre kragte verhoog/Meer punte vir Londonkragte. ✓
- Meer energie benodig om intermolekulêre kragte te oorkom/breek. ✓

OF

Van C na A:

- Verlaging in molekulêre massa/molekulêre grootte/kettinglengte/reaksie-oppervlak/aantal C-atome. ✓
- Sterkte van die intermolekulêre kragte verlaag/Minder punte vir Londonkragte. ✓
- Minder energie benodig om intermolekulêre kragte te oorkom/breek. ✓

(3)

3.3 No / Nee ✓

More than one independent variable./Molar mass and chain length (surface area) are changing. ✓

Meer as een onafhanklike veranderlike./Molêre massa (reaksie-oppervlak) en kettinglengte verander.

(2)

QUESTION 4/VRAAG 4

4.1

4.1.1 Dehydrohalogenation/elimination/dehydrobromination ✓
Dehidrohalogenering/eliminasi/dehidrobrominerings (1)

4.1.2 2-methylbut-2-ene / 2-methyl-2-butene ✓✓
2-metielbut-2-een / 2-metiel-2-buteen ✓✓

Marking criteria/Nasienkriteria
Methylbutene/metielbuteen ✓
IUPAC name correct/IUPAC-naam
korrek ✓

(2)

IF/INDIEN

Any error, e.g. hyphens omitted and/or incorrect sequence/Enige fout, bv.
koppeltekens weggelaat en/of verkeerde volgorde: Max/Maks: $\frac{1}{2}$

4.1.3 Water/H₂O ✓

(1)

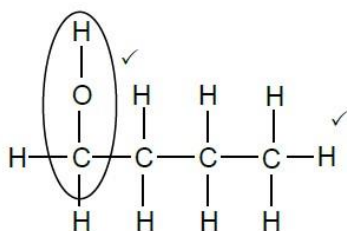
4.1.4 Heat/Hitte ✓
(Concentrated) sulphuric acid/catalyst ✓
(Gekonsentreerde) swawelsuur/katalisator

ACCEPT/AANVAAR:

High temperature/
Hoë temperatuur

(2)

4.1.5



Marking criteria/Nasienkriteria

- Whole structure correct/Hele struktuur
korrek: $\frac{2}{2}$
- Only functional group correct:/Slegs
funksionele groep korrek: Max/Maks.: $\frac{1}{2}$

IF/INDIEN

More than one functional group/Meer as een
funksionele groep $\frac{0}{2}$

(2)

4.2

4.2.1 Catalyst/Lowers the activation energy./Increases the rate of the reaction. ✓
Katalisator/Verlaag die aktiveringsenergie./Laat reaksietempo toeneem. (1)

- 4.2.2 The bromine water/ Br_2 /solution decolourises. ✓
Die broomwater/ Br_2 /oplossing ontkleur.

OR/OF

Bromine water/ Br_2 /solution changes from brown/reddish to colourless.
Broomwater/ Br_2 /oplossing verander van bruin/rooi na kleurloos.

(1)

- 4.2.3 Addition/halogenation/bromination ✓
Addisie/halogenering/brominerig

(1)

- 4.2.4 C_2H_6 ✓✓✓ (3 or/of 0) **OR/OF** C_4H_{10} **OR/OF** C_6H_{14}

IF structural/condensed formulae: (2 or 0)

INDIEN struktuurformules/gekondenseerde formules gebruik: (2 of 0)

(3)

- 4.2.5

Marking criteria

- Correct functional group i.e. double bond. ✓
- Correct number of C atoms in relation to answer in Q4.2.4. ✓
- Whole structure correct. ✓

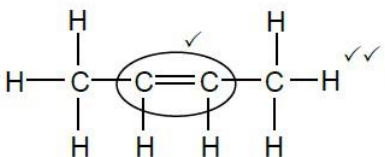
IF condensed/molecular formulae used: Max. $\frac{2}{3}$

Nasienkriteria

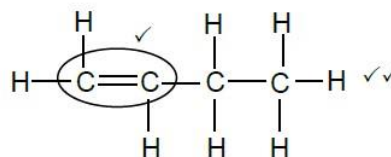
- Korrekte funksionele groep d.i. dubbelbinding. ✓
- Korrekte aantal C-atome na aanleiding van antwoord in V4.2.4. ✓
- Hele struktuur korrek. ✓

INDIEN gekondenseerde/molekulêre formules gebruik: Maks. $\frac{2}{3}$

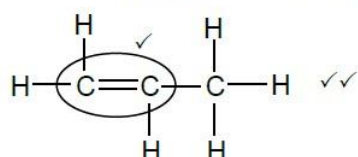
IF C_2H_6 in QUESTION 4.2.4/INDIEN C_2H_6 in VRAAG 4.2.4:



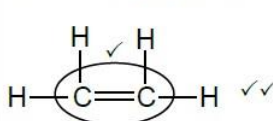
OR/OF



IF C_4H_{10} in QUESTION 4.2.4/INDIEN C_4H_{10} in VRAAG 4.2.4:



IF C_6H_{14} in QUESTION 4.2.4/INDIEN C_6H_{14} in VRAAG 4.2.4:



(3)
[17]

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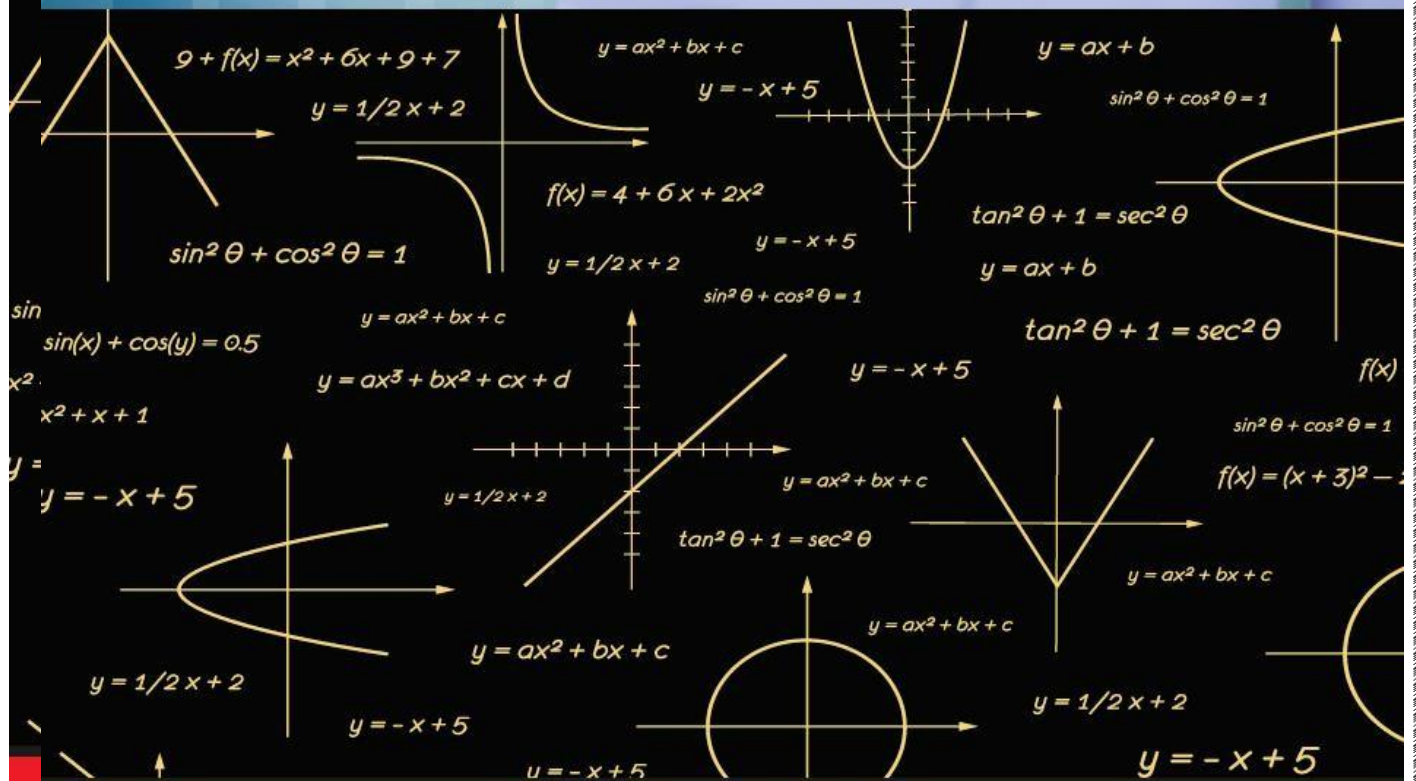
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