



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR
CERTIFICATE/NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

JUNE/JUNIE 2018

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

MARKS/PUNTE: 150

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

QUESTION / VRAAG 1

1.1	B ✓✓	(2)
1.2	C ✓✓	(2)
1.3	B ✓✓	(2)
1.4	D ✓✓	(2)
1.5	D ✓✓	(2)
1.6	C ✓✓	(2)
1.7	C ✓✓	(2)
1.8	A ✓✓	(2)
1.9	B ✓✓	(2)
1.10	C ✓✓	(2)
		[20]

QUESTION / VRAAG 2

2.1.1	B ✓	(1)
2.1.2	A ✓	(1)
2.1.3	E ✓	(1)
2.1.4	B ✓	
	C ✓	(2)
2.1.5	D ✓	(1)
2.2.1	Alkane / Alkaan ✓	(1)
2.2.2	Ester OR Carboxylic acid <i>Ester OF karboksielsuur</i> ✓	(1)
2.3.1	Butan-2-one / 2-butanone / butanone ✓✓ <i>Butan-2-oon / 2-butanoon / butanoon</i> ✓✓	(2)
2.3.2	4-ethyl-5-methylhex-2-yne / 4-ethyl-5-methyl-2-hexyne <i>4-etiel-5-metielheks-2-yn / 4-etiel-5-metiel-2-heksyn</i>	

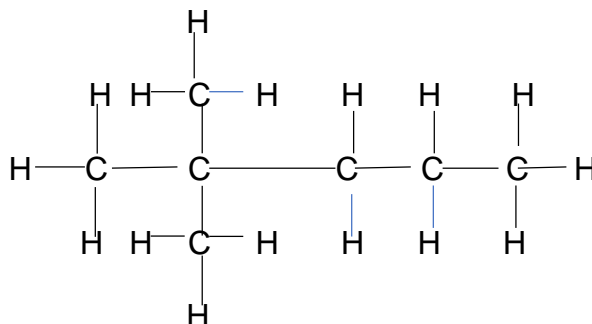
Marking criteria: / Nasienkriteria

- Stem (hexyne) / *Hooftak (heksye)* ✓
- Two methyl groups and one ethyl group
Twee metielgroepe en een etielgroep ✓
- Correct numbering of substituents and functional group
Korrekte nommering van sytakke en funksionele groep ✓

IF / INDIEN:

Any error e.g. hyphens omitted and/or incorrect sequence: <i>Enige fout met koppeltekens en/of verkeerde volgorde:</i>	} Max. $\frac{3}{4}$ Maks. $\frac{3}{4}$	(3)

2.4.1

**Marking Criteria****Nasienkriteria**

Whole structure correct 2/2

Hele struktuur korrek 2/2

5 Carbon atoms in longest chain ½

5 Koolstofatome in langste ketting ½

(2)

2.4.2 CH₃CH₂CH₂CH₂OH ✓

(1)

2.5.1 Compounds with the same molecular formula ✓ but different structural formula ✓*Verbindings met dieselfde molekulêre formules ✓ maar met verskillende struktuurformules ✓*

(2)

2.5.2 Esterification / Esterifikasie ✓

(1)

2.5.3 Catalyst /Speeds up reaction/Dehydrating agent ✓

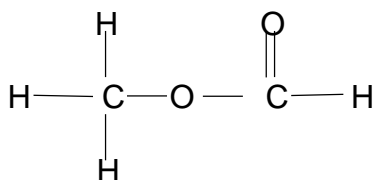
Katalisator / Versnel reaksie / Dehidrateermiddel ✓

(1)

2.5.4 methanoic acid / metanoësuur ✓✓

(2)

2.5.5

**Marking Criteria****Nasienkriteria**

Whole structure: 2/2

Hele struktuur 2/2

Only functional group correct: ½

Slegs funksionele groep korrek ½

Methyl ✓ methanoate ✓ / metiel ✓ metanoaat ✓

(4)

[26]

QUESTION / VRAAG 3

3.1.1 Measure of resistance to flow / *Meet die weerstand teen vloei* (2)

3.1.2 (Contains) single bonds only ✓✓
(Bevat) slegs enkelbindings ✓✓ (2)

3.1.3 Chain length/Surface area/Molecular size (Any one) ✓
Kettinglengte / Oppervlakarea / Molekulêre grootte (Enige een) ✓ (1)

3.1.4 The longer the (carbon) chain ✓ the higher the viscosity ✓ OR
The shorter the chain the lower the viscosity OR
The longer the chain the lower the viscosity OR
The shorter the chain the higher the viscosity
Hoe langer die (koolstof)ketting ✓, hoe hoër die viskositeit OF ✓
Hoe korter die ketting, hoe laer die viskositeit OF
Hoe langer die ketting, hoe laer die viskositeit OF
Hoe korter die ketting, hoe hoër die viskositeit (2)

3.1.5 From **A** to **C** / *Van A na C*

- Chain length/Surface area/Molecular size increases ✓
Kettinglengte / Oppervlakarea / Molekulêre grootte neem toe ✓
- Strength of intermolecular forces /London/induced dipole forces/dispersion forces increases ✓
Sterkte van intermolekulêre kragte / London / geïnduseerde dipoolkragte / dispersiekragte neem toe ✓
- More energy needed to overcome intermolecular forces ✓
Meer energie benodig om intermolekulêre kragte te oorkom ✓ (3)

OF

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

- Chain length/Surface area/Molecular size decreases ✓
Kettinglengte / Oppervlakarea / Molekulêre grootte neem af ✓
- Strength of intermolecular forces /London/induced dipole forces/dispersion forces decreases ✓
Sterkte van intermolekulêre kragte / London / geïnduseerde dipoolkragte / dispersiekragte neem af ✓
- Less energy needed to overcome intermolecular forces ✓
Minder energie benodig om intermolekulêre kragte te oorkom ✓

3.1.6 **C** ✓
Highest viscosity / *Hoër viskositeit* ✓ (2)

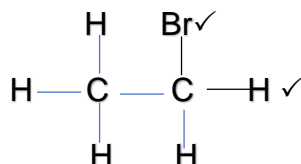
3.1.7 $2\text{C}_6\text{H}_{14} + 19\text{O}_2 \checkmark \longrightarrow 12\text{CO}_2 + 14\text{H}_2\text{O} \checkmark$
Balancing / *Balansering* ✓ (3)

3.2.1 Thermometer / *Termometer* ✓ (1)

- 3.2.2 The longer the (carbon) chain ✓ the higher the boiling point ✓
 OR The shorter the (carbon) chain the lower the boiling point
Hoe langer die (koolstof) ketting, ✓ hoe hoër die kookpunt ✓
OF Hoe korter die (koolstof)ketting, ✓ hoe laer die kookpunt ✓ (2)
- 3.2.3 -42 and / en -0,5 ✓ (°C) (1)
- 3.2.4 Position of -OH ✓✓ /hydroxyl group is the same (at position 1)
Posisie van -OH ✓✓ / hidroksielgroep is dieselfde (by posisie 1) (2)
- 3.3 Alcohols have (London forces, dipole-dipole forces) hydrogen bonds ✓
Alkohole het (Londonkragte, dipool-dipoolkragte) waterstofbindings ✓
 Alkanes have London forces / *Alkane* het Londonkragte ✓
 Hydrogen bonds are stronger than London forces /
Waterstofbindings is sterker as Londonkragte ✓ (3)
- [24]

QUESTION / VRAAG 4

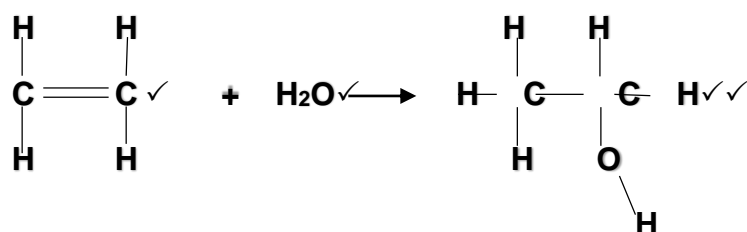
- 4.1.1 Addition /Hydrogenation ✓
Addisie / Hidrogenasie (1)
- 4.1.2 Hydration / *Hidrasie* ✓ (1)
- 4.1.3 Substitution/Hydrolysis ✓
Substitusie / Hidrolise (1)
- 4.1.4 C₂H₆ ✓ (1)
- 4.1.5 Platinum /*Palladium* ✓ (1)
- 4.1.6



Marking Criteria /Nasienkriteria Whole structure correct 2/2 Hele struktuur korrek 2/2 Only functional group ½ Slegs funksionele groep ½

(2)

4.1.7



(4)

- 4.1.8 KOH or /of NaOH ✓ (1)
- 4.1.9 Br₂ / Bromine / *Broom* ✓ (1)

- 4.1.10 Sunlight / (mild) Heat / *Sonlig / (matige) hitte* ✓ (1)
- 4.2.1 Molecule containing large number of covalently bonded monomer units
Molekule bevat groot aantal kovalentgebonde monomeer-eenhede ✓✓ (2)
- 4.2.2 Make plastic containers / Electrical insulation (Any correct answer) ✓
Maak plastiese houers / Elektriese insulasie (Enige korrekte antwoord) ✓ (1)
- 4.2.3
- $$\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{C} & = & \text{C} \\ | & & | \\ \text{H} & & \text{H} \end{array}$$

Marking Criteria / Nasienkriteria:
 Whole structure correct: 2/2
Hele struktuur korrek: 2/2
 Only functional group correct ½
Slegs funksionele groep korrek ½
- Ethane / Eteen* ✓ (3)
- 4.2.4 Addition / *Addisie* ✓ (1)
- [21]**

QUESTION / VRAAG 5

- 5.1.1 Angle of incidence / *Invalshoek* ✓ (1)
- 5.1.2 Angle of emergence / *Uitvalshoek* ✓ (1)
- 5.2 35° ✓ (1)
- 5.3.1 PQ incident ray / *invalstraal* ✓ (1)
- 5.3.2 QR refracted ray / *gebreekte straal* ✓ (1)
- 5.3.3 RS emergent ray / *uitvalstraal* ✓ (1)
- 5.4.1 **B** ✓
- 5.4.2 Refracted ray towards normal / *Gebreekte straal na die normaal* ✓✓ (3)
- [9]**

QUESTION / VRAAG 6

- 6.1.1 (Phenomenon whereby) light breaks up into its component colours ✓✓
(Verskynsel waarby) lig opbreek in sy samestellende kleure (2)
- 6.1.2 (a) Violet ✓ (1)
- (b) Red / *Rooi* ✓ (1)
- 6.1.3 DECREASES / *VERMINDER* ✓
Frequency is constant ✓ $v = f\lambda$ Therefore $v \propto \lambda$ ✓
Frekwensie is konstant ✓ $v = f\lambda$. *Dus* $v \propto \lambda$ (3)
- 6.2.1 Accelerating charge / *Versnellende lading* ✓✓ (2)

- 6.2.2 Red / Rooi ✓ (1)
- 6.2.3 (a) X-rays / X-strale ✓ (1)
 (b) Radio waves / Radiogolwe ✓ (1)
 (c) UV ✓ (1)
- 6.2.4 (a) Radio waves ✓ X-rays ✓ Infra-red ✓
 Radiogolwe ✓ / X-strale ✓ / Infrarooi ✓ (3)
 (b) Radio waves Infra-red X-rays ✓✓ (Correct order)
 Radiogolwe Infra-rooi X-strale ✓✓ (Korrekte volgorde) (2)
- 6.2.5 Quantum of energy / Kwantumenergie ✓✓ (2)
- 6.2.6 (a) $v = f \lambda$
 $3 \times 10^8 \text{ v} = f (400 \times 10^{-9})$
 $7,5 \times 10^{14} \text{ Hz} = f$ ✓ (3)
- (b) $v = f \lambda$
 $3 \times 10^8 \text{ v} = f (10^{-2} \times 10^{-9})$
 $3 \times 10^{19} \text{ Hz} = f$
 $E = hf$
 $= 6,63 \times 10^{-34} \times 3 \times 10^{20}$
 $= 1,99 \times 10^{-14} \text{ J}$ (4)

[27]**QUESTION / VRAAG 7**

- 7.1 Reflection when light bounces off a surface ✓✓
 Weerkaatsing as lig van 'n oppervlakte af bons ✓✓ (2)
- 7.2 Angle of incidence = angle of reflection ✓
 Invalshoek = weerkaatsingshoek
 The incident ray, reflected ray and normal lie in the same plane ✓
 Invalsstraal, weerkaatsingstraal en normaal is in dieselfde vlak (2)
- 7.3.1 SAME SIZE / DIESELFDE GROOTTE ✓ (1)
- 7.3.2 12 cm ✓ (1)
- 7.3.3 VIRTUAL / VIRTUEEL ✓ (1)
- 7.4.1 Total internal reflection / Totale interne weerkaatsing ✓ (1)
- 7.4.2 Light must travel from a denser to a less dense medium ✓
 Angle of incidence greater than critical angle ✓
 Lig moet beweeg van digter medium na minder digte medium ✓
 Invalshoek moet groter wees as die grenshoek ✓ (2)
- 7.4.3 Endoscope / Endoskoop ✓ (1)

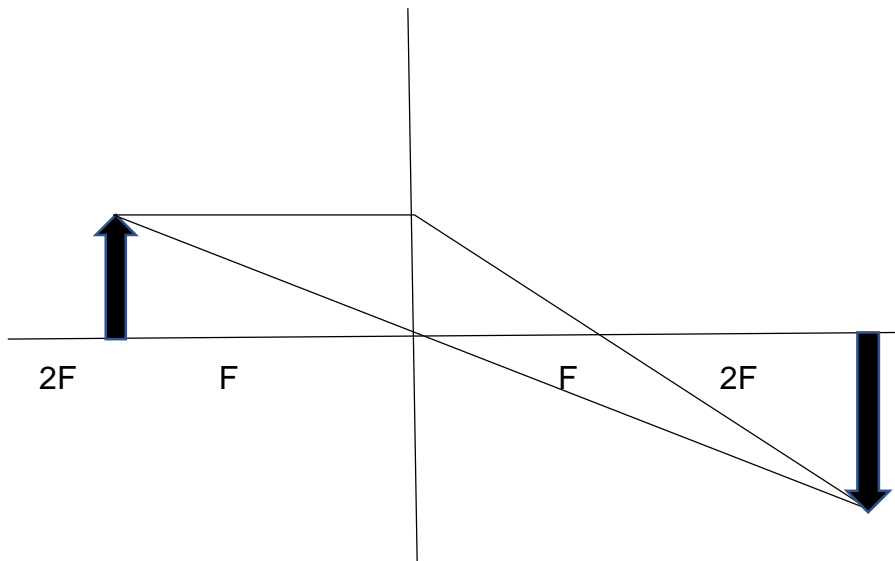
[11]

QUESTION / VRAAG 8

8.1 CONVEX / KONVEKSE ✓
Light rays converge / Ligstrale konvergeer ✓

(2)

8.2.1

**Marking criteria / Nasienkriteria**

- Object between F and 2F / Voorwerp tussen F en 2F ✓
- Image formed beyond 2F / Beeld verder as 2F gevorm ✓
- Image larger than object / Beeld groter as voorwerp ✓
- Ray through optical centre / Straal gaan deur optiese middelpunt ✓
- Ray from principal axis to image / Straal van hoofas na beeld ✓
- Horizontal rays / Horisontale strale ✓

(6)

8.2.2 The image is always smaller than the object (for a concave lens) ✓✓
Die beeld is altyd kleiner as die voorwerp (vir 'n konkawe lens)

(2)

8.3.1 Camera / Kamera ✓

(1)

8.3.2 Projector / Projektor ✓

(1)

[12]**TOTAL/TOTAAL: 150**