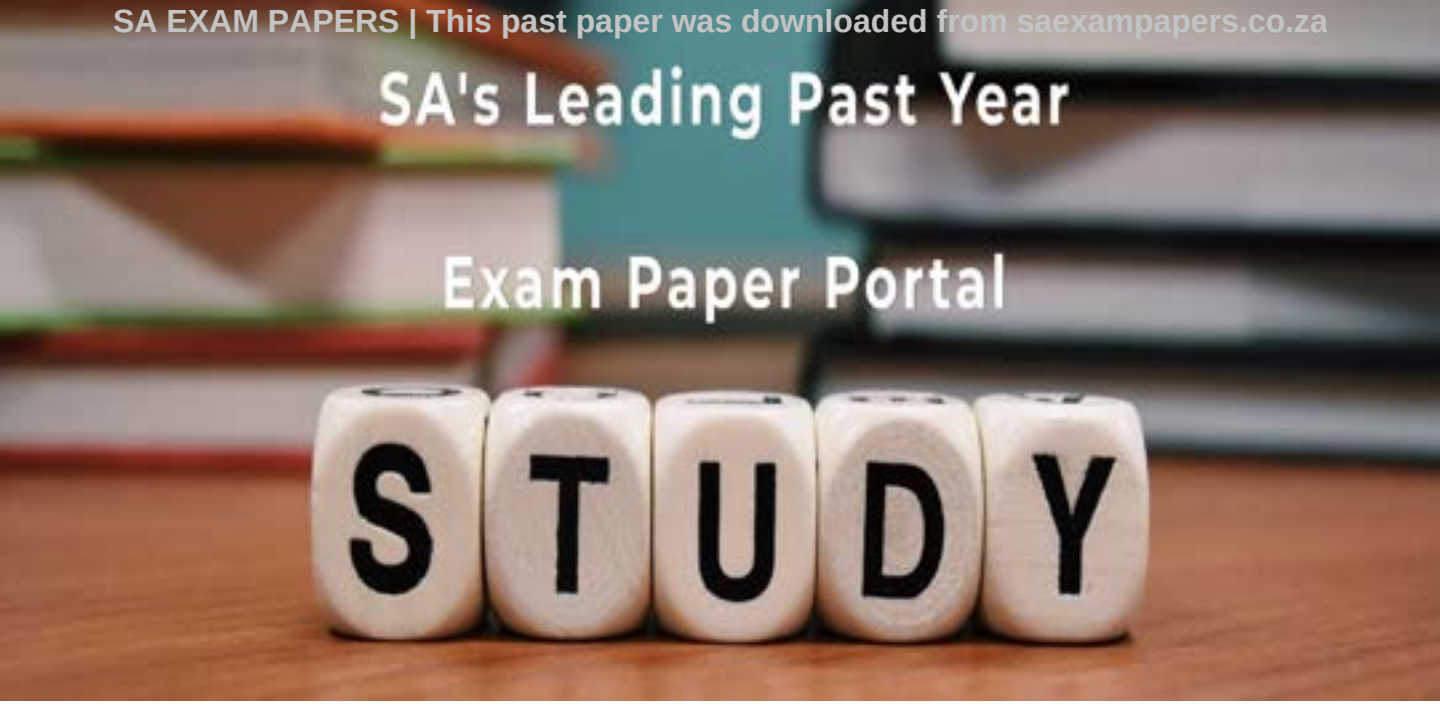

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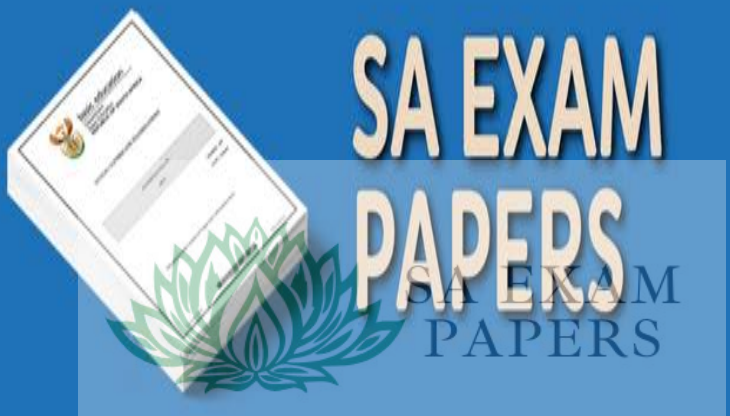


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION/ *JUNIE EKSAMEN* GRADE/*GRAAD* 12

2024

MARKING GUIDELINES/*NASIENRIGLYNE*

TECNICAL SCIENCES/ *TEGNIESE WETENSKAPPE*

(PAPER/*VRAESTEL* 2)

7 pages/*bladsye*

QUESTION/*VRAAG* 1

1.1 D ✓✓ (2)

1.2 D ✓✓ (2)

1.3 When learner commit to answer accept any answer. ✓✓
(If question is left open 0/2) (2)

1.4 B ✓✓ (2)

1.5 C ✓✓ (2)
[10]

QUESTION/*VRAAG* 2

2.1 **Functional group:** An atom or a group of atoms that determine(s) the chemistry of a molecule
OR
An atom or a group of atoms that determine(s) the physical and chemical properties of a group of organic compounds. ✓✓

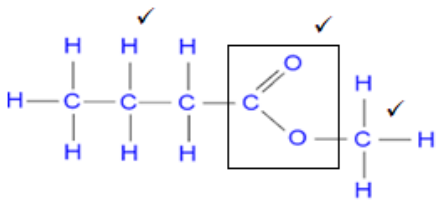
Funksionele groep: *'n Atoom of 'n groep atome wat die chemie van 'n molekule bepaal*
OF
'n atoom of 'n groep atome wat die fisiese en chemiese eienskappe van 'n groep organiese verbindings bepaal. (2)

2.2 2.2.1 carboxylic acid/*karboksielsuur* ✓ (1)

2.2.2 ketone/*ketoon* ✓ (1)

2.2.3 alkane/*alkaan* ✓ (1)

2.3 2.3.1



MARKING CRITERIA/ *NASIENKRITERIA*
- Functional group/*Funksionele groep* ✓
- Alkyl group/*alkielgroep* ✓
- Rest of structure/*res van struktuur* ✓
(If a hydrogen/bomd is omitted, penalise once/*As 'n waterstof/binding weggelaat word, penaliseer een keer*) (3)

2.3.2 butanoic acid/*butanoësuur* ✓ (1)

2.4 2.4.1 pentan – 2✓ – one **or**
2 – pentanone ✓
Pentan-2-oon of 2-pentanoon

MARKING CRITERIA/ *NASIENKRITERIA*
- Correct carbon chainlength and functional group/*Korrekte koolstofkettinglengte en funksionele groep* ✓
- Position of functional group/*Posisie van funksionele groep* ✓
(If hyphen is omitted/*As koppelteken weggelaat word* – 1) (2)

2.4.2 2 – methyl✓propane ✓/
methylpropane

2 – metielpropaan/metielpropaan

MARKING CRITERIA/ *NASIENKRITERIA*
- Propane/*Propaan* ✓
- Methyl group with position/*Metielgroep* ✓ (2)

2.5 Structural isomers are organic molecules with the same molecular formula, but different structural formulae./*Struktuur isomere is organiese molekules met dieselfde molekulêre formule, maar verskillende struktuurformules.* ✓✓ (2)

2.6 Chain (isomers)/*Ketting-(isomere)* ✓ (1)

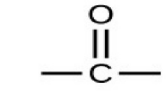
2.7 Saturated hydrocarbons contain ONLY single (covalent) bonds between carbon atoms./*Versadigde koolwaterstowwe bevat SLEGS enkel (kovalente) bindings tussen koolstofatome.* ✓✓
Unsaturated compounds contain covalent double or triple bonds between the carbon atoms./*Onversadigde verbindings bevat kovalente dubbel- of drievoudige bindings tussen die koolstofatome.* ✓✓

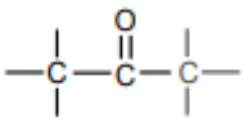
(No marks if the underlined phrase is left out/*Geen punte as die onderstreepte frase uitgelaat word nie*) (4)

2.8 F ✓ (1)

2.9 $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$

Marking criteria/*Nasienkriteria*
- Reactants/*Reaktante* ✓
- Products/*Produkte* ✓
- Balancing/*balansering* ✓ (3)

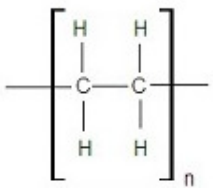
2.10  ✓✓ OR/*OF*



Marking criteria/*Nasienkriteria*
If hydrogens are added – no marks./ *As waterstof bygevoeg word – geen punte nie.*

(2)

2.11 2.11.1 Small organic molecules that can be covalently bonded in a repeated pattern./*Klein organiese molekules wat kovalent verbind kan word in 'n herhalende patroon.* ✓✓ (2)

2.11.2  ✓✓ (2)

[30]

QUESTION/*VRAAG* 3

3.1 The temperature at which the vapour pressure equals the atmospheric pressure./*Die temperatuur waarby die dampdruk gelyk is aan die atmosferiese druk.* ✓✓ (2)

3.2 C ✓ (If the learner did not commit to a answer continue marking the respons, if the learner committed with wrong answer then don't mark respons.)
The compound with the lowest boiling point will have the weakest intermolecular force./*Die verbinding met die laagste kookpunt sal die swakste intermolekulêre krag hê.* ✓ (2)

3.3 3.3.1 propanoic acid/*propanoë suur* ✓ (1)

3.3.2 propan-1-ol/*propan-1-ol* ✓ (1)

3.3.3 propane/*propaan* ✓ (1)

3.4 Hydrogen bonds./*Waterstofbindings*. ✓✓ **(Positive marking from/*Positiewe nasien vanaf* – 3.3.2)** (2)

3.5 B ✓ (If the learner did not commit to a answer continue marking the respons, if the learner committed with wrong answer then don't mark respons.)
Both compounds contain strong hydrogen bonds ✓ but compound B hydrogen bonds are weaker than compound A ✓, and less energy is needed to overcome these intermolecular forces therefore the boiling point is lower. Vapour pressure is inversely proportional to boiling point ✓/
Beide verbindings bevat sterk waterstofbindings ✓maar verbinding B waterstofbindings is swakker as verbinding A ✓, en minder energie is nodig om hierdie intermolekulêre kragte te oorkom, daarom is die kookpunt laer. Dampdruk is omgekeerd eweredig aan kookpunt ✓

OR

Both compounds contain strong hydrogen bonds ✓ but compound A hydrogen bonds are stronger than compound B ✓, and more energy is needed to overcome these intermolecular forces therefore the boiling point is higher. Vapour pressure is inversely proportional to boiling point ✓/ (4)

Beide verbindings bevat sterk waterstofbindings ✓maar verbinding A waterstofbindings is sterker as verbinding B ✓, en meer energie is nodig om hierdie intermolekulêre kragte te oorkom, daarom is die kookpunt hoër. Dampdruk is omgekeerd eweredig aan kookpunt ✓

[13]

QUESTION/*VRAAG* 4

4.1 4.1.1 Hydrogenation/*Hidrogenering* ✓ (1)

4.1.2 Hydrohalogenation/*Hidrohalogenering* ✓ (1)

4.2 Strong dilute base/*Sterk verdunde basis* (KOH/NaOH) ✓
Mild heat/*matige hitte* ✓
Dissolve in ethanol/*opgelos in etanol*
Alternative/*Alternatief*:
Excess water/*oormatige water* (2)

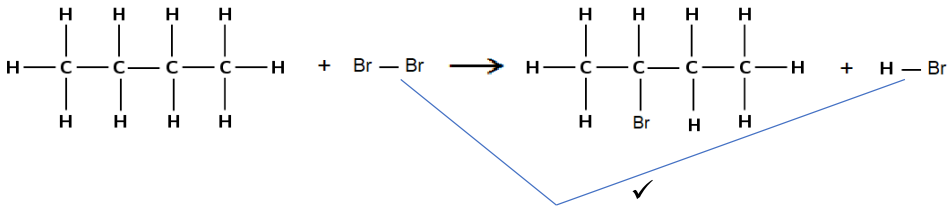
4.3 4.3.1 But✓ane✓/*butaan* (2)

MARKING CRITERIA/ *NASIENKRITERIA*
- Number of carbons correct ✓
- Functional group ✓

4.3.2 butan✓-2-ol ✓ or 2 – butanol
Butan-2-ol of 2-butanol (2)

MARKING CRITERIA/ *NASIENKRITERIA*
- Correct carbon chainlength and functional group/*Korrekte koolstofkettinglengte en funksionele groep* ✓
- Position of functional group/*Posisie van funksionele groep* ✓
(If hyphen is omitted/*As koppelteken weggelaat word* – 1)

4.4 ✓ ✓



✓ (3)

4.5 CO_2. ✓ (Award mark) (1)

[12]

QUESTION/VRAAG 5

5.1 A semiconductor is a material that has electrical conductivity between that of a conductor and an insulator. ✓✓/
'n Halfgeleier is 'n materiaal wat elektriese geleidingsvermoë het tussen dié van 'n geleier en 'n isolator. (2)

5.2 5.2.1 Process of adding impurities to intrinsic semiconductors ✓✓/
Proses om onsuiwerhede by intrinsieke halfgeleiers te voeg (2)

5.2.2 one/*een*/1 ✓ (1)

5.2.3 Electrons are the majority charge carriers on the n-side ✓ and the holes are the majority charge carriers on the p-side ✓/
Elektrone is die meerderheid ladingdraers aan die n-kant en die gate is die meerderheid ladingdraers aan die p-kant. (2)

5.2.4 n-type semiconductor✓/
n-tipe halfgeleier (1)

5.3 The Phosphorus is a group 15 element and has five electrons in its valence shell. ✓ Upon doping silicon with phosphorus, after forming four bonds with neighbouring silicon atoms, the fifth extra electron is free which increases the conductivity of silicon. ✓
Die Fosfor is 'n groep 15-element en het vyf elektrone in die valensieskil. Tydens dotering van silikon met fosfor, nadat vier bindings met naburige silikonatome gevorm is, is die vyfde ekstra elektron vry wat die geleidingsvermoë van silikon verhoog. (2)
[10]

TOTAL/*TOTAAL*: 75