GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

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

2023

MARKING GUIDELINES/*NASIENRIGLYNE*

TECNICAL SCIENCES/ *TEGNIESE WETENSKAPPE*

(PAPER/*VRAESTEL* 2)

5 pages/*bladsye*

QUESTION/*VRAAG* 1

1.1 D✓✓ (2)

1.2 B✓✓ (2)

1.3 C✓✓ (2)

1.4 A✓✓ (2)

1.5 B✓✓ (2)

[10]

QUESTION/*VRAAG* 2

2.1 Is a series of similar compounds which have the same general formula ✓ and functional group, in which each member differs from the previous one by a single CH_2-group. ✓/*Is 'n reeks soortgelyke verbindings wat dieselfde algemene formule en funksionele groep het, waarin elke lid met 'n enkele CH_2-groep van die vorige een verskil.*✓✓ (2)

2.2.1 Alkanes /*Alkane*✓ (1)

2.2.2 Ketones/*Ketone*✓ (1)

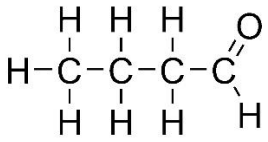
2.2.3 Esters✓ (1)

2.2.4 Carboxylic acids/*Karboksielsure*✓ (1)

2.3.1 Sulphuric acid/*Swaelsuur*✓ (1)

2.3.2 Ethanol/*Etanol*✓ (1)

2.3.3



Functional group/*Funksionele groep* ✓
Whole structure/*Hele struktuur* ✓✓

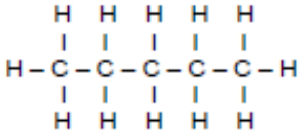
Butanal (3)

2.3.4 F✓ (1)

2.3.5 C_2H_6✓✓ (2)

2.3.6

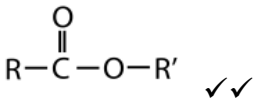
- All single bonds/*Alle enkele bindings* ✓
- Whole structure/*Hele struktuur* ✓✓



(3)

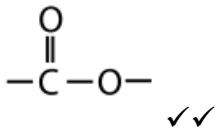
2.3.7 Butan-2-one/*butan-2-one*✓✓ (2)

2.3.8



✓✓

OR/OF



✓✓

(2)

[21]

QUESTION/*VRAAG* 3

3.1 3.1.1 Increase in molecular mass implies increase in strength of intermolecular forces/Boiling point increased (as more energy is required to overcome the intermolecular forces.)/ ✓✓/*Toename in molekulêre massa impliseer toename in sterkte van intermolekulêre kragte/kookpunt sal toeneem (aangesien meer energie benodig word om die intermolekulêre kragte te oorkom.)* ✓✓ (2)

3.1.2 Homologous series-CH_2 must be added to get each successive member. ✓✓/*Homoloë reeks -CH_2 moet bygevoeg word om elke opeenvolgende lid te kry.* ✓✓ (2)

3.1.3 London forces ✓✓/London kragte ✓✓ (2)

3.1.4 The pressure exerted by vapour on the surface of the liquid. ✓✓/*Die druk wat deur damp op die oppervlak van die vloeistof uitgeoefen word.* ✓✓ (2)

3.2 Vapour pressure decreases as the number of atoms increase. ✓ As the molar mass increases, intermolecular forces become stronger. ✓More energy is required to overcome intermolecular forces. Vapour pressure, therefore, becomes lesser and molecules are bonded strongly by intermolecular forces. ✓/*Dampdruk neem af soos die aantal atome toeneem.* ✓*Soos die molêre massa toeneem, word intermolekulêre kragte sterker.* ✓*Meer energie word benodig om intermolekulêre kragte te oorkom. Dampdruk word dus minder en molekules word sterk gebind deur intermolekulêre kragte.* ✓ (3)

[**11**]

QUESTION/*VRAAG* 4

4.1 Due to the presence of an OH group, ✓ alcohols can form hydrogen bonds. Water contains hydrogen bonds ✓ as well and because the strength of the intermolecular forces are similar, ethanol is completely soluble in water. ✓/*As gevolg van die teenwoordigheid van 'n OH-groep, ✓kan alkohole waterstofbindings vorm. Water bevat ook waterstofbindings ✓en omdat die sterkte van die intermolekulêre kragte soortgelyk is, is etanol heeltemal oplosbaar in water.* ✓ (3)

4.2 4.2.1

$$2C_6H_{14} + 19O_2 \rightarrow 12CO_2 + 14H_2O$$

- Reactants/*Reaktante* ✓✓
- Products/*Produkte* ✓
- Balancing/*Balansering* ✓

(4)

4.2.2 The heating of the planet due to the absorption of infrared radiation by greenhouse gases in the atmosphere. ✓✓/*Die verhitting van die planeet as gevolg van die absorpsie van infrarooi straling deur kweekhuisgasse in die atmosfeer.* ✓✓ (2)

4.2.3 It produces greenhouse gases like CO_2 and N_2O. ✓✓/*Dit produseer kweekhuisgasse soos CO_2 en N_2O.* ✓✓ (2)

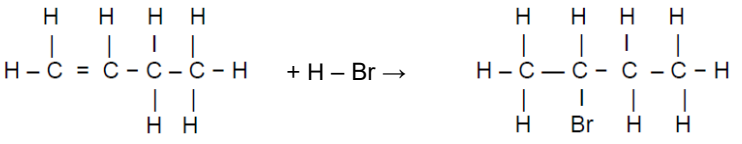
[11]

QUESTION/*VRAAG* 5

5.1 Butan-2-ol/*Butan-2-ol* ✓✓ (2)

5.2. Catalyst of strong acid H_2SO_4 in excess water. ✓/Katalisator van sterk suur H_2SO_4 in oormaat water. ✓ (1)

5.3 5.3.1



- Reactants/*Reaktante* ✓✓
- Product/*Produkte* ✓
- Balancing/*Balansering* ✓

(4)

[7]

QUESTION/*VRAAG* 6

6.1 6.1.1 A phosphorus atom has 5 valence electrons. ✓ When phosphorus is added to silicon, the phosphorus atom can form four covalent bonds✓ with four neighbouring Si atoms. The fifth electron is only slightly bound to P atom and can be excited to a conduction band with little energy. ✓ Therefore, impure atoms of phosphorus provide extra electrons that move into the conduction band of the crystal. This makes energy levels available that are just lower energy than that of a conduction band. Silicon becomes an n-type semiconductor. ✓/*'n Fosforatoom het 5 valens-elektrone*. ✓ *Wanneer fosfor by silikon gevoeg word, kan die fosforatoom vier kovalente bindings vorm ✓met vier naburige Si-atome. Die vyfde elektron is net effens aan P-atoom gebind en kan met min energie tot 'n geleidingsband opgewek word. ✓Daarom verskaf onsuiwer atome van fosfor ekstra elektrone wat in die geleidingsband van die kristal beweeg. Dit maak energievlakke beskikbaar wat net laer energie is as dié van geleidingsband. Silikon word in n-tipe halfgeleier.* ✓ (4)

6.1.2 Temperature must be increased. ✓✓/*Temperatuur moet verhoog word.* ✓✓ (2)

6.1.3 At high temperature, electrons can break away from atoms. ✓ This automatically decreases the resistance ✓of the substance and electrons are released into the conduction band of the semi-conductor. ✓/*By hoë temperatuur kan elektrone van atome wegbreek.* ✓*Dit verminder outomaties die weerstand* ✓*van die stof en elektrone word vrygestel in die geleidingsband van die halfgeleier.* ✓ (3)

6.1.4 Boron atom has 3 valence electrons. ✓ When it is added to silicon, it can form only three covalent bonds ✓ with three neighbouring silicon atoms. A hole develops ✓ that can move from one position to another as electrons can break away from neighbouring covalent bonds to fill the hole. ✓/ *Boor atoom het 3 valenselektrone.* ✓*wanneer dit by silikon gevoeg word, kan dit slegs drie kovalente bindings vorm* ✓*met drie naburige silikonatome. 'n Gat ontwikkel* ✓*wat van een posisie na 'n ander kan beweeg aangesien elektrone van naburige kovalente bindings kan wegbreek om die gat te vul.* ✓ (4)

6.1.5 Doping/*Dotering* ✓✓ (2)

[15]

TOTAL/*TOTAAL*: [75]