



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

**GAUTENG DEPARTMENT OF EDUCATION/
GAUTENGSE DEPARTEMENT VAN ONDERWYS**

**PREPARATORY EXAMINATION/
VOORBEREIDENDE EKSAMEN**

2021

MARKING GUIDELINES/NASIENRIGLYNE

11102

**TECHNICAL SCIENCES/TEGNIESE WETENSKAPPE
(PAPER/VRAESTEL 2)**

6 pages/bladsye

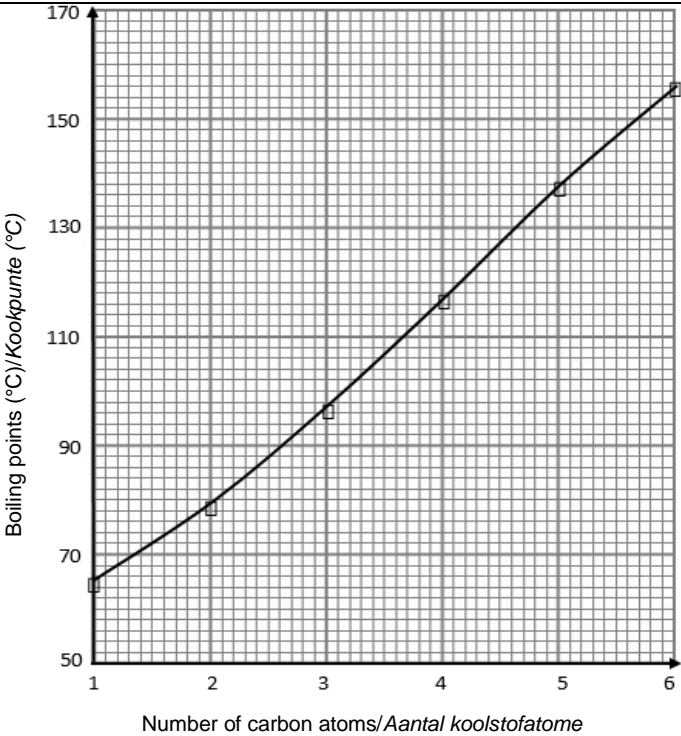
QUESTION/VRAAG 1

| | | |
|-----|-----|-------------|
| 1.1 | C✓✓ | (2) |
| 1.2 | A✓✓ | (2) |
| 1.3 | A✓✓ | (2) |
| 1.4 | C✓✓ | (2) |
| 1.5 | C✓✓ | (2) |
| 1.6 | C✓✓ | (2) |
| | | [12] |

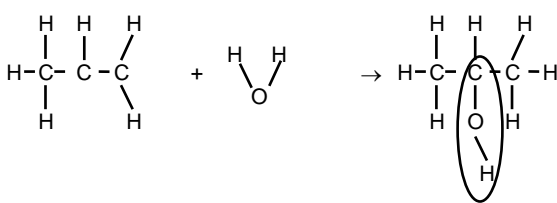
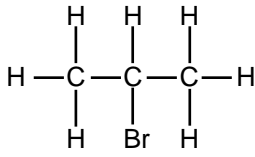
QUESTION/VRAAG 2

| | | | |
|-------|--|---|-----|
| 2.1 | A series of organic compounds that can be described by the same general formula and where each member differs from the next by CH ₂ group. ✓✓/ <i>'n Reeks organiese verbindings wat deur dieselfde algemene formule beskryf word en waarin die een lid van die volgende verskil met 'n CH₂-groep.</i> | (2) | |
| 2.2.1 | E✓ | (1) | |
| 2.2.2 | A✓ | (1) | |
| 2.2.3 | A✓ | (1) | |
| 2.2.4 | F✓ | (1) | |
| 2.2.5 | A OR/OF D✓ | (1) | |
| 2.3.1 | $ \begin{array}{ccccccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & & & \\ \text{H} & -\text{C} & -\text{C} & =\text{C} & -\text{C} & -\text{C} & -\text{H} & & \\ & & & & & & & & \\ & \text{H} & & & \text{H} & \text{H} & & & \end{array} $ | <p>Criteria for marking/ Nasienkriteria</p> <ul style="list-style-type: none"> • Double bond on correct position ✓✓/ <i>Dubbelband op die regte posisie.</i> • 5 carbon & 10 H atoms ✓/5 koolstof- en 10 H-atome. | (3) |
| 2.3.2 | $ \begin{array}{ccccccc} & & & & \text{H} & & \\ & & & & & & \\ & & & & \text{H}-\text{C}-\text{H} & & \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ & & & & \text{H}-\text{C}-\text{H} & & \\ & & & & & & \\ & & & & \text{H} & & \end{array} $ | <p>Criteria for marking/ Nasienkriteria</p> <ul style="list-style-type: none"> • 6 carbon and 12 hydrogen atoms ✓✓/ <i>6 koolstof- en 12 waterstofatome</i> • Correct side chains on the right positions ✓/Korrekte sykettings op die regte posisies | (3) |
| 2.4.1 | Carbonyl (group) ✓/Karboniel (groep) | (1) | |
| 2.4.2 | Propan-2-ol OR 2-propanol ✓✓/Propaan-2-ol OF 2-propanol | (2) | |
| | | [16] | |

QUESTION/VRAAG 3

| 3.1 | High energy of combustion./Combustion releases huge amounts of energy./ Highly exothermic. ✓✓/Hoë verbrandingsenergie./Verbranding stel groot hoeveelhede energie vry./Baie eksotermies. | (2) | | | | | | | | | | | | | | | |
|------------------------|---|------------------------|--------------------|---|----|---|----|---|----|---|-----|---|-----|---|-----|--|-----|
| 3.2 |  <table border="1"> <caption>Data points from the boiling point graph</caption> <thead> <tr> <th>Number of carbon atoms</th> <th>Boiling point (°C)</th> </tr> </thead> <tbody> <tr><td>1</td><td>65</td></tr> <tr><td>2</td><td>78</td></tr> <tr><td>3</td><td>90</td></tr> <tr><td>4</td><td>102</td></tr> <tr><td>5</td><td>115</td></tr> <tr><td>6</td><td>128</td></tr> </tbody> </table> | Number of carbon atoms | Boiling point (°C) | 1 | 65 | 2 | 78 | 3 | 90 | 4 | 102 | 5 | 115 | 6 | 128 | <p>Marking criteria/ Nasienkriteria</p> <ul style="list-style-type: none"> • Appropriate scale on both axes ✓✓/Toepaslike skaal op beide asse • Both axes labelled correctly ✓/Beide asse is korrek gemerk • Line/curve of best fit drawn through the points ✓/Lyn/kurwe van beste pas deur die punte getrek | (4) |
| Number of carbon atoms | Boiling point (°C) | | | | | | | | | | | | | | | | |
| 1 | 65 | | | | | | | | | | | | | | | | |
| 2 | 78 | | | | | | | | | | | | | | | | |
| 3 | 90 | | | | | | | | | | | | | | | | |
| 4 | 102 | | | | | | | | | | | | | | | | |
| 5 | 115 | | | | | | | | | | | | | | | | |
| 6 | 128 | | | | | | | | | | | | | | | | |
| 3.3 | <u>Boiling point increases</u> with number of carbon atoms. ✓✓/Kookpunt neem toe met die aantal koolstofatome. | (2) | | | | | | | | | | | | | | | |
| 3.4 | Van der Waals forces between alcohol molecules increase with increase in molecular size. ✓✓/Van der Waals-kragte tussen alkoholmolekules neem toe met toename in molekulêre grootte. | (2) | | | | | | | | | | | | | | | |
| 3.5 | Hydrogen bonds between alcohol molecules are stronger than Van der Waals forces between molecules of alkanes. ✓✓/Waterstofbindings tussen alkoholmolekules is sterker as Van der Waals-kragte tussen molekules van alkane. | (2) | | | | | | | | | | | | | | | |
| 3.6 | Petrol has a low boiling point, vaporises easily/is volatile/explosive/flammable/easily combustible/vapours have a higher density than oxygen and when swallowed vapours can cause suffocation. ✓✓/Petrol het 'n lae kookpunt, verdamp maklik/is vlugtig/plofbaar/vlambaar/maklik brandbaar/dampe het 'n hoër digtheid as suurstof en dampe kan verswelg indien dit ingesluk word. | (2) | | | | | | | | | | | | | | | |
| | | [14] | | | | | | | | | | | | | | | |

QUESTION/VRAAG 4

| | | | |
|-------|---|---|-------------|
| 4.1 | Addition✓/Addisie | | (1) |
| 4.2 |  <p>Note: If condensed formula used: -1 mark/Opmerking: Indien gekondenseerde formule gebruik word: -1 punt</p> | <p>Marking criteria/ Nasienkriteria</p> <ul style="list-style-type: none"> • Correct structural formula of reactants✓✓/Korrekte struktuurformule van reaktante • Correct structural formula of product✓/Korrekte struktuurformule van produk | (3) |
| 4.3 | H ₂ O✓ | | (1) |
| 4.4.1 |  | <p>Marking Criteria/Nasienkriteria</p> <ul style="list-style-type: none"> • Br atom on carbon number 2 ✓/ Br-atoom op koolstofgetal 2 | (1) |
| 4.4.2 | Substitution ✓/Substitusie | | (1) |
| 4.5.1 | Addition ✓/Addisie | | (1) |
| 4.5.2 | Substitution ✓/Substitusie | | (1) |
| 4.5.3 | The reaction takes place in the presence of an inert solvent✓/Die reaksie vind plaas in die teenwoordigheid van 'n inerte oplosmiddel | | (1) |
| | | | [10] |

QUESTION/VRAAG 5

| | | |
|------|---|------|
| 5.1 | Concentration/ <i>Konsentrasie</i> = $1 \text{ mol} \cdot \text{dm}^{-3}$ ✓ Temperature/ <i>Temperatuur</i> = 298 K/25 °C ✓ | (2) |
| 5.2 | Zn to/na Cu ✓ | (1) |
| 5.3 | From chemical to electrical energy ✓✓ / <i>Van chemiese tot elektriese energie</i> | (2) |
| 5.4 | It completes the circuit ✓ or It maintains electrical neutrality in the electrolytes (Accept any one.) / <i>Dit voltooi die stroombaan of Dit handhaaf elektriese neutraliteit in die elektroliete (Aanvaar enige een.)</i> | (1) |
| 5.5 | A substance that is oxidised/loses electrons OR a substance that undergoes oxidation / <i>'n Stof wat geoksideer word/verlies aan elektrone OF 'n stof wat oksidasie ondergaan</i> | |
| 5.6 | $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^{-}$ ✓ | (2) |
| 5.7 | $\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$ ✓ | (2) |
| 5.8 | $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ ✓ balanced reaction equation / <i>gebalanseerde reaksievergelyking</i> ✓ | (3) |
| 5.9 | Anode: Zinc electrode ✓ / <i>Sinkelektrode</i> OR/OF Zn(s) Cathode / <i>Katode</i> : copper electrode ✓ / <i>koper elektrode</i> OR/OF Cu(s) | (2) |
| 5.10 | Zn/Zn ²⁺ //Cu ²⁺ /Cu ✓✓ (✓ for //) | (3) |
| 5.11 | $E_{\text{cell}/\text{sel}}^{\theta} = E_{\text{cathode}/\text{katode}}^{\theta} - E_{\text{anode}/\text{anode}}^{\theta}$ ✓ $E_{\text{cell}/\text{sel}}^{\theta} = 0,34 - (-0,76)$ ✓ $E_{\text{cell}/\text{sel}}^{\theta} = 1,1 \text{ V}$ ✓ | (3) |
| | | [23] |

TOTAL/TOTAAL: 75