GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2025

MARKING GUIDELINES

TECHNICAL SCIENCES (PAPER 2) (11102)

7 pages

QUESTION 1

1.1 B ✓✓ (2)

1.2 C ✓✓ (2)

1.3 D ✓✓ (2)

1.4 B ✓✓ (2)

1.5 D ✓✓ (2)

[10]

QUESTION 2

2.1 An atom or a group of atoms that determine the chemistry of a molecule. ✓✓
(0 or 2 marks)

OR

An atom or a group of atoms that determine(s) the physical and chemical properties of a group of organic compounds. (2)

2.2 2.2.1 E ✓ (1)

2.2.2 Halo alkane/Alkyl halide ✓ (1)

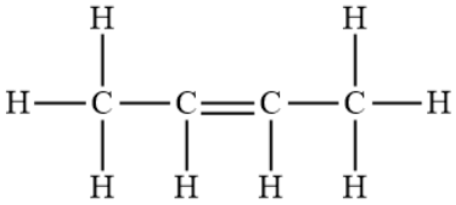
2.2.3 Formyl ✓ (1)

2.2.4 Ethyl ethanoate

Marking criteria

- Ethyl ✓
- Ethanoate ✓ (2)

2.3 2.3.1



Marking criteria

- Functional group ✓
- Whole structure correct ✓

Note:

- Any hydrogen bond or atom missing MAX 1 mark (2)

2.3.2 $CH_2BrCH(CH_3)CH_3$ ✓ (The bracket must be present) (1)

2.3.3 $C_6H_{12}O$ ✓ (1)

2.4 Organic molecules with the same molecular formula but different structural formulae ✓✓ (0 or 2 marks) (2)

2.5 2.5.1 Positional ✓ (1)

2.5.2 Functional ✓ (1)

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QUESTION 3

3.1 The temperature at which the vapour pressure equals atmospheric pressure ✓✓ (0 or 2 marks)

Marking criteria

- If the learner referred to POINT, then 0 marks (2)

3.2 Stop watch/wall clock/wrist watch ✓ (any applicable answer) (1)

3.3 A ✓ (1)

3.4 **Negative marking from 3.3**

- Propane has only weak London/dispersion/induced dipole forces ✓
- Propan-2-ol has weak London/dispersion/induced dipole forces and strong Hydrogen bonds ✓
- More energy is needed to overcome the intermolecular forces of propan-2-ol thus it has a higher boiling point. ✓

OR

- Propane has only weak London/dispersion/induced dipole forces
- Propan-2-ol has weak London/dispersion/induced dipole forces and strong Hydrogen bonds
- Less energy is needed to overcome the intermolecular forces of propane thus it has a lower boiling point and propan-2-ol the higher boiling point

Marking criteria

- Identify the intermolecular forces of propane and propan-2-ol
- Compare the strength of the intermolecular forces (Hydrogen bonds are stronger than London forces)
- Refer to how much energy is needed to OVERCOME the intermolecular forces

(3)

3.5

- Viscosity has to do with the resistance of a fluid ✓
- Because propan-2-ol has the strongest intermolecular forces, it means it has a higher viscosity. ✓
- This means it has a bigger resistance to flow thus taking longer to form droplets to pour ✓

OR

- Viscosity has to do with the resistance of a fluid
- Because propane has the weakest intermolecular forces, it means it has a lower viscosity.
- This means it has a smaller resistance to flow thus forming droplets quicker to pour

OR

- Viscosity has to do with the resistance of a fluid
- It is proportional to the boiling point and since propan-2-ol has the highest boiling point, it means it has a higher viscosity.
- This means it has a bigger resistance to flow thus taking longer to form droplets to pour

OR

- Viscosity has to do with the resistance of a fluid
- It is proportional to the boiling point and since propane has the lowest boiling point, it means it has a lower viscosity.
- This means it has a smaller resistance to flow thus forming droplets quicker to pour

(3)

[10]

QUESTION 4

4.1 4.1.1 Addition / Hydrogenation ✓ (1)

4.1.2 H_2 ✓ (It must be the MOLECULAR FORMULA and not the name). (1)

4.1.3 $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O + (E)$

Marking criteria
- $C_2H_6 + O_2$ ✓
- $CO_2 + H_2O + (E)$ ✓
- Balancing ✓ (3)

4.2 4.2.1 Chloroethane / 1-chloroethane

Marking criteria
- Chloro ✓
- Ethane ✓ (2)

4.2.2 No water must be present during the reaction ✓ (1)

4.3 4.3.1 Water ✓ (It must be the NAME and not the molecular formula). (1)

4.3.2 Addition / Hydration ✓ (1)

4.4 4.4.1 A chemical reaction in which monomer molecules joins to form a polymer. ✓✓ (0 or 2 marks) (2)

4.4.2 Unsaturated ✓ (1)

4.4.3
- Plastic bottles ✓
- Plastic bags
- Plastic toys
- Plastic lids
- Plastic pipes
- Insulation tape (any applicable example) (1)

4.5 4.5.1  ✓

Marking criteria
- Must be drawn with the arrow (anode) pointing from left to right and the line (cathode) on the right (1)

4.5.2 Forward ✓ (1)

4.5.3
- Converts AC current to DC current for electronic devices to protect them from damage ✓
- Regulates voltage in circuits by ensuring constant voltage (any applicable reason) (1)

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QUESTION 5

5.1 It is the loss in electrons ✓✓ (0 or 2 marks)

OR

It is an increase in oxidation number. (2)

5.2 5.2.1 Gas bubbles are formed ✓

Marking criteria
- MUST refer to the bubbles and not chlorine gas is forming or chlorine is smelled) (1)

5.2.2 $2Cl^-_{(aq)} \rightarrow Cl_{2(g)} + 2e^-$ ✓✓

Marking criteria
- $Cl_2 + 2e^- \leftarrow 2Cl^-$ (2/2)
- $2Cl^- \rightleftharpoons Cl_2 + 2e^-$ (1/2)
- $2Cl^- \leftarrow Cl_2 + 2e^-$ (0/2)
- $2Cl^- + 2e^- \rightleftharpoons Cl_2$ (0/2)

NOTE:
- Do not penalise if the phases are not included or an electron charge is omitted. (2)

5.3 5.3.1 Negative ✓ (1)

5.3.2
- Copper wire ✓
- Coins
- Jewellery (any acceptable example) (1)

5.4
- The switch is open meaning there is a break in the circuit so no current can flow. ✓
- The key will not be able to undergo reduction (because it can't be charged negatively) ✓
- It will not be able to attract the copper ions (cations) to create a solid copper coating on it. ✓

5.5 Electroplating ✓ (3)

5.6 Cathode ✓ (1)

5.7
- Prevents it from rusting ✓
- To increase its value (any applicable reason) (1)

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QUESTION 6

6.1 It is an <u>electrochemical cell</u> that converts <u>chemical energy</u> into <u>electrical</u> <u>energy</u> ✓✓ (0 or 2 marks) (2)

6.2 Salt bridge ✓ (1)

6.3 Temperature = 25 ^{0}C / 298 K✓ (1)

6.4 $E^{\theta}_{cell} = E^{\theta}_{cathode} - E^{\theta}_{anode}$ ✓

2,7 ✓ = 0,34 ✓ – E^{θ}_{anode}

E^{θ}_{anode} = <u>-2,36 V</u> ✓

∴ Mg / Magnesium ✓

<u>Marking criteria</u>

- No unit for the emf -1 mark
- If there is no θ or if any other formula using unconventional abbreviations, e.g., $E_{cell} = E_{OA} – E_{RA}$, followed by correct substitutions then -1 mark

Note:

- Accept any other formula from the data sheet
- No marks if ONLY the formula is written and no substitution is made

(5)

6.5 Right to left ✓ (1)

[10]

TOTAL: 75