GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2024

MARKING GUIDELINES

TECHNICAL SCIENCES (PAPER 2) (11102)

6 pages

QUESTION 1

1.1 C ✓✓ (2)

1.2 B ✓✓ (2)

1.3 C ✓✓ (2)

1.4 D ✓✓ (2)

1.5 D ✓✓ (2)

[10]

QUESTION 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. ✓✓ (0 or 2 marks)

OR

A series of organic compounds that can be described by the same general formula.

OR

A series of organic compounds where each member differs from the next by CH_2 group. (2)

2.2 2.2.1 B ✓ (1)

2.2.2 E ✓ (1)

2.2.3 H ✓ (1)

2.3 2.3.1 Pent-2-ene **OR** 2-Pentene

Marking criteria:
- Pentene ✓
- Position of functional group ✓

NOTE:
- If the hyphen was omitted then only ½
- If the position was omitted ½

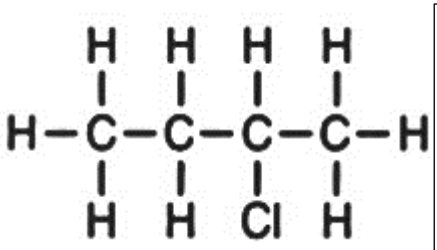
(2)

2.3.2 Ethyl butanoate

Marking criteria:
- Ethyl ✓
- Butanoate ✓

(2)

2.4 2.4.1

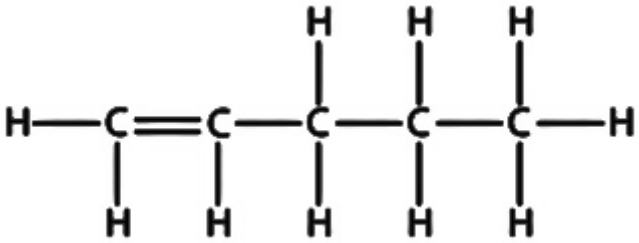


Marking criteria:
- Position of functional group ✓
- Whole structure correct ✓

NOTE:
- Any hydrogen bond or atom missing MAX ½
- Cl can either be on the second carbon from the left OR right

(2)

2.4.2

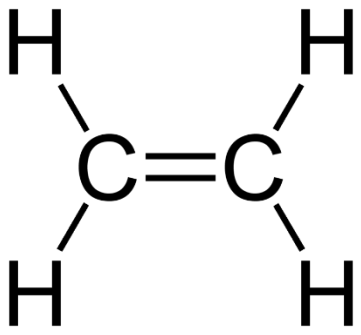


Marking criteria:
- Whole structure ✓

NOTE: The double bond can either be on Carbon 1 from left OR carbon 1 from right

(1)

2.4.3



Marking criteria:
- Double bond ✓
- Whole structure correct ✓

NOTE:
- Any hydrogen bond or atom missing MAX ½

(2)

[14]

QUESTION 3

3.1 The property of a fluid to oppose relative motion between the two adjacent layers. ✓✓ (0 or 2 marks) (2)

3.2 Flow time or Viscosity ✓ (1)

3.3 A ✓ **OR** Propane (1)

3.4 London forces ✓ (1)

3.5 C ✓ **OR** Pentane (1)

3.6 Pentane has the longest chain length ✓which means that the London forces are stronger ✓ so more energy is required to overcome the intermolecular forces ✓

Marking criteria:
- Negative marking from QUESTION 3.5
- If the learner says BREAK the intermolecular forces then MAX ⅔

(3)

[9]

QUESTION 4

4.1 4.1.1 Saturated. ✓ It is a hydrocarbon with **only** single (covalent) bonds between the carbon atoms. ✓

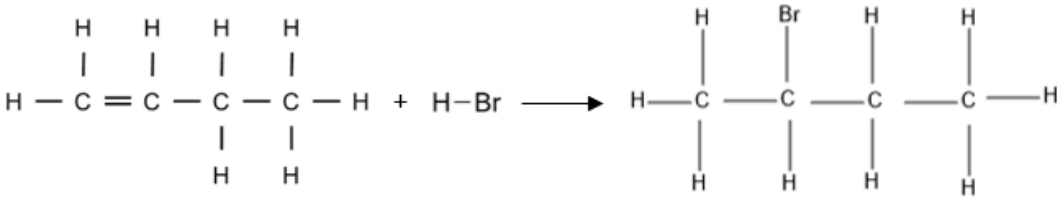
OR

Saturated. It is hydrocarbons that have no multiple bonds between the carbon atoms. (2)

4.1.2 4.1.2.1 Addition ✓ **OR** Hydrogenation (1)

4.1.2.2 Substitution ✓ **OR** Hydrolysis (1)

4.1.3



Marking criteria:
- Structural formula of Butene ✓
- Structural formula of Hydrogen bromide ✓
- Structural formula of 2-Bromobutane ✓
- If the learner used molecular formula then MAX ⅔

(3)

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

4.1.5 Water ✓ (1)

4.1.6 $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ + Energy

Marking criteria:
- $C_4H_{10} + O_2$ ✓
- $CO_2 + H_2O$ + (E) ✓
- Balancing ✓

(3)

4.1.7 Combustion **OR** Oxidation ✓ (1)

4.2 4.2.1 Semiconductor ✓ **OR** Metalloid (1)

4.2.2 Doping ✓ (1)

4.2.3 n-type ✓ (1)

4.2.4 Reverse bias ✓ (1)

4.3 Increase ✓ (1)

[18]

QUESTION 5

5.1 A solution/liquid/dissolved substance that conducts electricity through the movement of ions. ✓✓ (0 or 2) (2)

5.2 Non-spontaneous✓ (1)

5.3 Power Source✓/Battery/(Accept) Energy is added (1)

5.4



Must be negative left and positive right. (2)

5.5 NO_3^-✓ (1)

5.6 $Sn^{2+} + 2e^- \rightarrow Sn$ ✓✓

Marking criteria:

- $Sn \leftarrow Sn^{2+} + 2e^-$ (2/2)
- $Sn^{2+} + 2e^- \leftrightharpoons Sn$ (1/2)
- $Sn^{2+} + 2e^- \leftarrow Sn$ (0/2)

NOTE:

- Do not penalise if the phases are not included or an electron charge is omitted.
- Penalise 1 mark if the charge on the tin ion is omitted.

(2)

5.7 The rate of oxidation is equal to the rate of reduction. ✓
OR
Tin dissolves into tin ions so it is not used up (1)
[10]

QUESTION 6

6.1 A substance that is reduced/gains electrons✓✓ (0 or 2 marks)

OR

A substance that undergoes reduction. (2)

6.2 Pb^{2+} and Zn^{2+} ✓ (Must list both) (1)

6.3 Temperature 25 °C✓/298K, (Initial) Concentration = 1mol.dm^{-3} (1)

6.4 To complete the circuit ✓/<u>To maintain</u> (electrical) <u>neutrality</u> through the movement of ions (1)

6.5 $Zn + Pb^{2+}$✓ $\rightarrow$ $Zn^{2+} + Pb$✓✓

Marking criteria:
- Reactants ✓
- Products ✓
- Balancing ✓

(3)

6.6 $E^{\theta}_{cell} = E^{\theta}_{cathode} - E^{\theta}_{anode}$ ✓

$E^{\theta}_{cell} = -0,13$✓ $- (-0,76)$✓

$E^{\theta}_{cell} = 0,63\ V$ ✓

Marking criteria:
- Positive marking from QUESTION 6.5 MAX 3/4
- No unit for the emf -1 mark

NOTE:
- Any other formula using unconventional abbreviations, e.g., $E_{cell} = E_{OA} - E_{RA}$, followed by correct substitutions: Max 3/4

(4)

6.7 V = 0(V)✓, the circuit will be incomplete ✓ (2)

[14]

TOTAL: 75