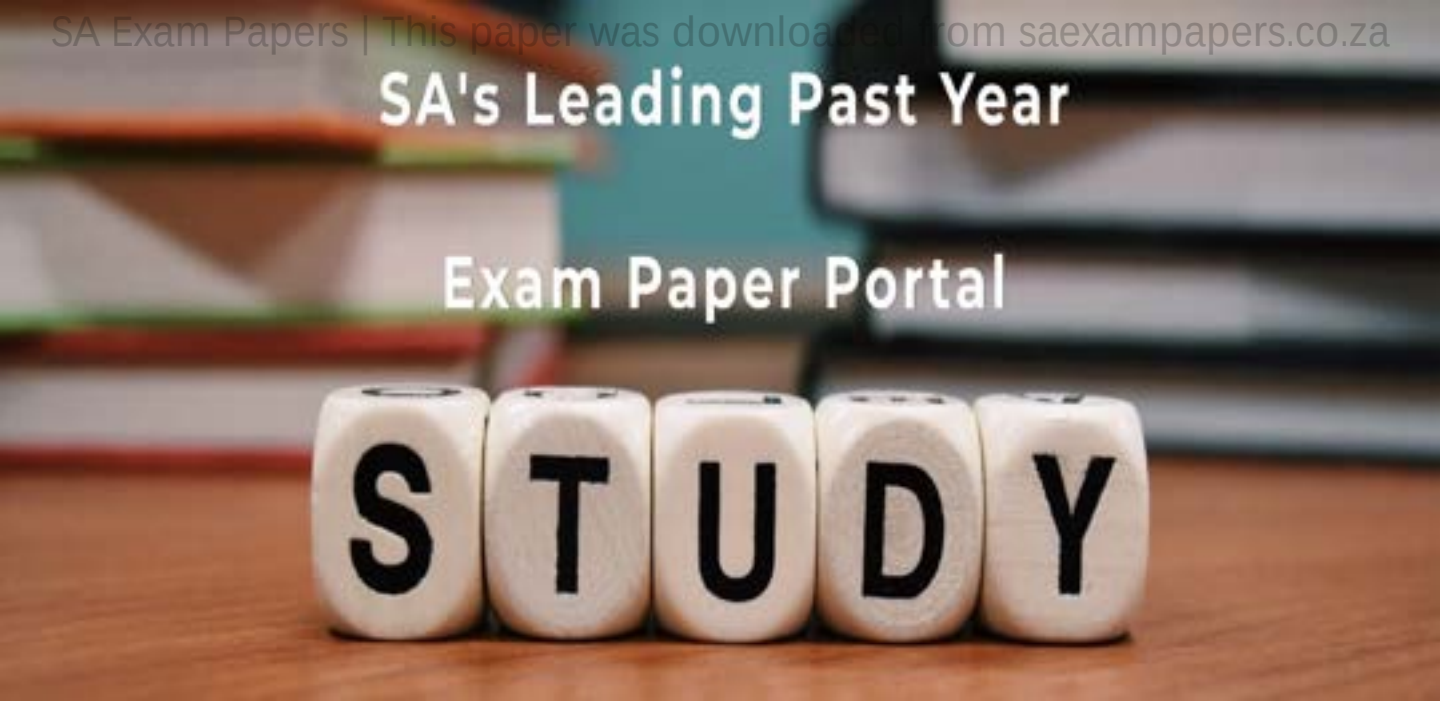

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EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2023

MARKING GUIDELINES

TECHNICAL SCIENCES (PAPER 2) (11102)

5 pages

QUESTION 1

1.1 B ✓✓ (2)

1.2 B ✓✓ (2)

1.3 B ✓✓ Award 2 mark (2)

1.4 D ✓✓ (2)

1.5 C ✓✓ (2)

1.6 D ✓✓ (2)

[12]

QUESTION 2

2.1 Homologous series is a series of organic compounds that can be described by the same general formula and where each member differs from the next by a CH_2-group. ✓✓ (2)

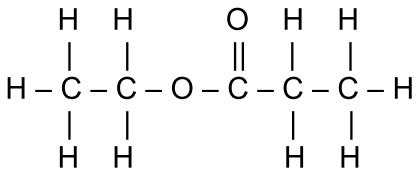
2.2 2.2.1 E ✓ (1)

2.2.2 C ✓ (1)

2.2.3 D ✓ (1)

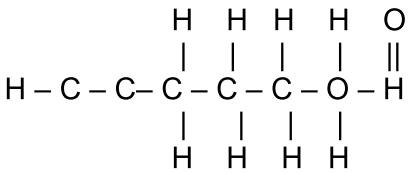
2.2.4 A & F ✓✓ or nothing (2)

2.3 2.3.1



Ester ✓
Correct carbon structure ✓
Correct number and positions of H ✓ (3)

2.3.2



Or Pentenioc acid

Carboxylic acid ✓
Correct carbon structure ✓
Correct number and positions of H ✓
Accept structural formula (3)

[13]

QUESTION 3

3.1 Boiling point is the temperature at which the vapour pressure equals atmospheric pressure. ✓✓ (The stronger the intermolecular forces, the higher the boiling point) (2)

3.2 Compound C has a longer carbon chain than compound B ✓ and compound B has a longer carbon chain than compound A. ✓

OR

Different in carbon chain

OR

Chain length increase frm A to C (2)

3.3 Both compounds have (London)- and dipole-dipole forces, ✓ but compound C has a longer carbon chain than compound A, which means compound C has stronger London forces, ✓ more energy is needed to overcome these intermolecular forces. ✓ (3)

3.4 A ✓ (1)

3.5 Compound A has the weakest intermolecular forces because it has the shortest carbon chain, ✓ less energy is needed to overcome these intermolecular forces ✓✓

OR

Vapour pressure is inversely proportional to boiling point, ✓the higher Vapour pressure the lower the melting point or boiling point✓✓ (3)

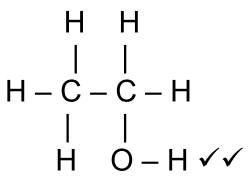
[11]

QUESTION 4

4.1 Addition ✓ (1)

4.2 H_2O or Water ✓ (1)

4.3



(2)

4.4 Hydrohalogenation ✓ /Addition (1)

4.5 Bromoethane ✓✓ (2)

4.6 $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

Marking Criteria:
- Reactants ✓
- Products ✓
- Balancing ✓

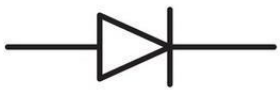
(3)

[10]

QUESTION 5

5.1 An intrinsic semiconductor is a pure semiconductor. ✓✓ (2)

5.2 Metalloids ✓/Semi-metal/ Semi-conductor (1)

5.3  ✓✓ (2)

[5]

QUESTION 6

6.1 *Electrolytic* ✓ (1)

6.2 Battery/cell/power source/two electrodes are in the same container ✓ (1)

6.3 Electroplating ✓ (1)

6.4 P (Anode) is made up of an active copper electrode and Q (cathode) is made up of an inactive carbon electrode (unreactive) ✓/ **Any relavent response** (1)

6.5 Decoration/to prevent corrosion/ to increase appearance/**Any relavent response** (1)

6.6 Chloride ion (Cl^-) (1)

6.7 $Cu^{2+} + 2e^- \rightarrow Cu$ ✓✓

Note:	**Marking criteria:/*Nasienriglyne:***	
Penalise once if charge if left out on copper ion *Penaliseer eenmalig indien lading op koperioon uitgelaat is*	$Cu^{2+} + 2e^- \rightarrow Cu$	2/2
	$Cu^{2+} + 2e^- \rightleftharpoons Cu$	1/2
	$Cu \rightleftharpoons Cu^{2+} + 2e^-$	0/2
	$Cu^{2+} + 2e \leftarrow Cu$	0/2

(2)

6.8 Chlorine gas/$C\ell_2$ (1)

6.9 Decreases ✓
$C\ell^-$ is oxidised to $C\ell_2$ ✓and Cu^{2+} is reduced to Cu. ✓
OR
$C\ell^-$ changes to $C\ell_2$ ✓ and Cu^{2+} changes to Cu. ✓ (3)

[12]

QUESTION 7

7.1 An electrochemical cell that converts the chemical energy into electrical energy ✓✓ (2)

7.2 Pressure applies to gases./There is no gas. ✓ (1)

7.3 $E^{\theta}_{cell} = E^{\theta}_{reduction} - E^{\theta}_{oxidation}$ ✓
= +0,34✓ – (-0,76) ✓
= +1,1 V ✓

Note:
Accept any other correct formula from the data sheet.
Any other formula using unconventional abbreviations, e.g., $E_{cell} = E_{OA} – E_{RA}$
Followed by correct substitutions: Max. $^{2}/_{3}$

(4)

7.4 $Zn \rightarrow Zn^{2+} + 2e^-$
$Cu^{2+} + 2e^- \rightarrow Cu$
$Zn + Cu^{2+}$✓ $\rightarrow Zn^{2+} + Cu$ ✓✓

Marking criteria:
Reactants✓ Products✓ Balancing✓

(3)

7.5 No, ✓ emf of the bulb is greater than emf of the cell. ✓

OR

Reaction rate does not provide enough current/ energy✓ (2)

[12]

TOTAL: 75