

# Chemistry Model Paper 2025

**Time Allowed: 2 Hours**

**Total Marks: 75**

You must bring a soft pencil (preferably type B or HB), a clean eraser, and a dark blue or black pen.

Before attempting the paper, write your name, candidate number, centre name, and centre number clearly in the designated spaces.

## Instructions for Candidates

- **Section A** contains multiple choice questions. You are required to attempt all questions by selecting the most appropriate option and marking it on the separate MCQ answer sheet using a soft pencil.
- **Section B** comprises both theoretical questions and a practical component. All questions in this section are compulsory. Answers must be written in the space provided on the question paper using a dark blue or black pen. You may use an HB pencil for any diagrams or graphs.
- You may use a simple calculator if needed.
- You should show all your working and use appropriate units.
- Do not use an erasable pen or correction fluid.
- Avoid writing over any barcodes printed on the paper.

## Information for Candidates

- This paper consists of a total of **75 marks**.
- **Section A** includes **20 multiple choice questions**, each carrying **1 mark**. There is no negative marking for incorrect answers.
- **Section B** carries a total of **55 marks**, divided as follows:  
**Theoretical Questions:** 30 marks  
**Practical Component:** 25 marks
- The number of marks for each question or part question is shown in brackets [ ].
- A copy of the periodic table will be provided with this paper.

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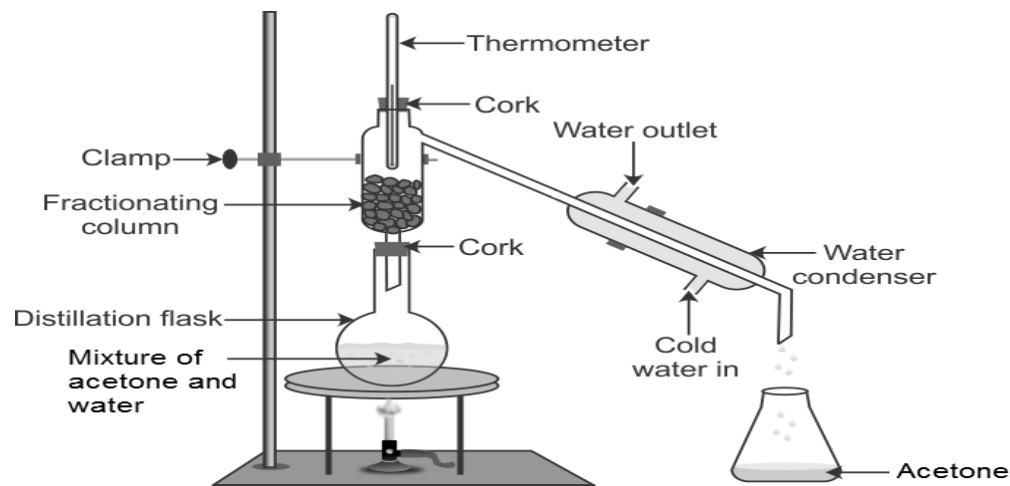
Please read all questions carefully and follow the instructions exactly to ensure your responses are properly evaluated.



## Section A: Multiple Choice Questions (20 questions)

### Question 1

The following figure represents the process of distillation of acetone and water mixture:

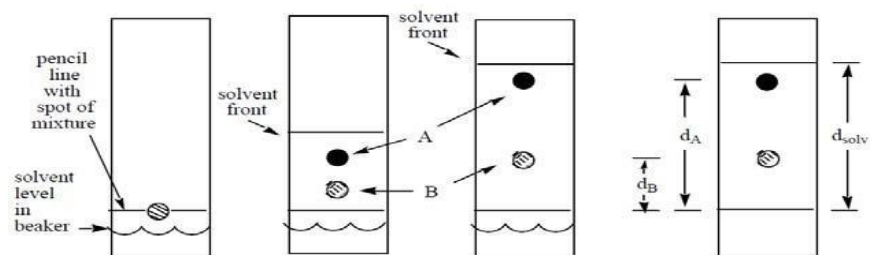


All of these are applications of the fractional distillation process **EXCEPT**:

- A. It is used in the purification of many organic compounds such as ethers, amide and nitrile.
- B. It is used to separate volatile substances from non volatile solvents.
- C. It is used in the preparation of drug extracts such as alcohols.
- D. It is used for the purification of noble metals.

### Question 2

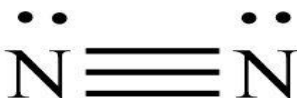
Which of the following separation techniques is given in the diagram?



- A. Filtration
- B. Crystallization
- C. Distillation
- D. Chromatography

### Question 3

In terms of bonding, what do the three lines between the two nitrogen atoms represent?



- A. One pair of shared electrons
- B. Two pairs of shared electrons
- C. Three pairs of shared electrons
- D. A pair of unshared electrons (lone pair)

### Question 4

Which of the following is the correct way to represent an exothermic reaction in a chemical equation?

- A. Reactants  $\rightarrow$  Products - Energy
- B. Reactants + Energy  $\rightarrow$  Products
- C. Reactants  $\rightarrow$  Products + Energy
- D. Reactants  $\rightleftharpoons$  Products

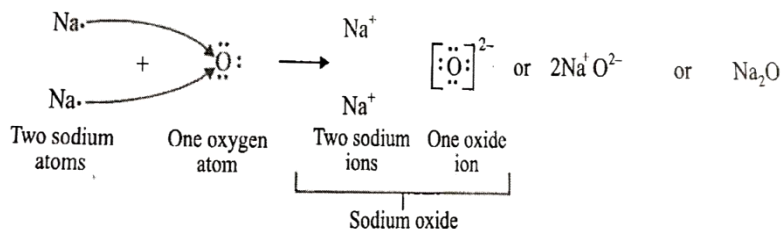
### Question 5

Which of the following conditions is essential for the fermentation process to produce ethanol?

- A. High temperature (above 300°C)
- B. Presence of yeast and anaerobic conditions
- C. Presence of oxygen
- D. Addition of steam to ethane

### Question 6

With the help of given representation, identify the specie in which the oxidation takes place.



A	Na
B	O·
C	Na <sup>+</sup>
D	O <sup>-2</sup>

### Question 7

Which pair of compounds are structural isomers of each other?

- A.  $C_2H_6$  and  $C_3H_8$
- B.  $CH_3CH_2CH_2OH$  and  $CH_3CH(OH)CH_3$
- C.  $CH_3CH_2OH$  and  $CH_3OH$
- D.  $C_2H_4$  and  $C_2H_6$

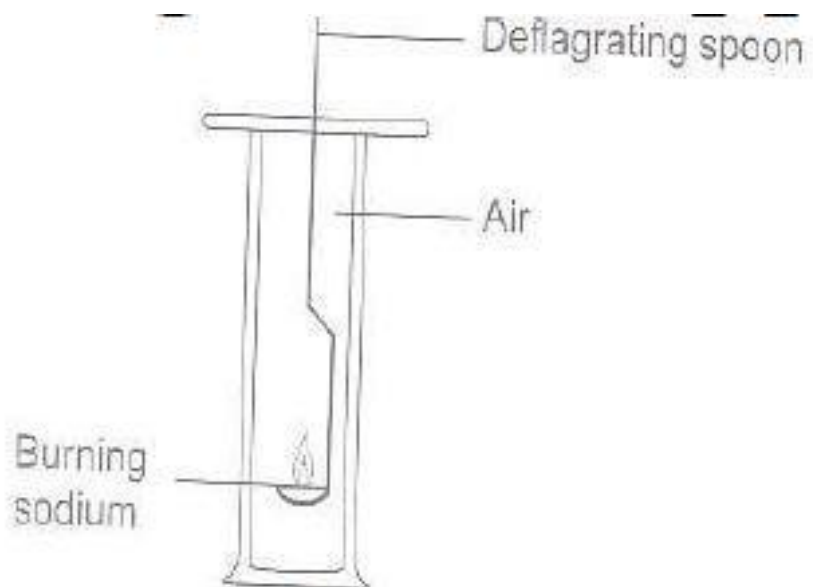
### Question 8

Hydrochloric acid + Y  $\rightarrow$  salt + water + carbon di oxide. What is the reactant Y?

- A. Calcium carbonate
- B. Calcium chloride
- C. Calcium oxide
- D. Calcium hydroxide

### Question 9

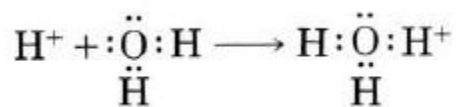
What will happen when a small piece of burning sodium metal on a combustion spoon is introduced in a gas jar containing oxygen gas?



- A. It will not react with oxygen gas.
- B. It will react violently to form oxide.
- C. It will react slowly to form superoxide.
- D. It will react violently to form hydroxide.

**Question 10**

In the given reaction,  $\text{H}^+$  acts as a/an



- A. neutral species
- B. acceptor
- C. carrier
- D. donor

**Question 11**

In the reversible reaction:



What will happen to the position of equilibrium if you increase the pressure?

- A. It will shift to the left (toward the reactants)
- B. It will shift to the right (toward the products)
- C. There will be no change
- D. The reaction will stop

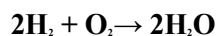
**Question 12**

Which device is used in factories to remove sulphur dioxide ( $\text{SO}_2$ ) from exhaust gases?

- A. Electrostatic precipitator
- B. Catalytic converter
- C. Flue gas desulphurisation unit
- D. Air filter

**Question 13**

The equation for the reaction when hydrogen is used as a fuel is:

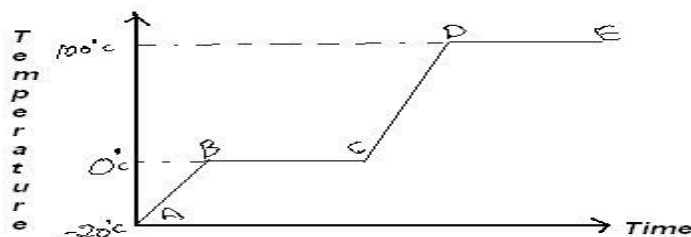


Which statement about this reaction is correct?

- A. Energy is given out so the temperature of the surroundings decreases.
- B. Energy is taken in so the temperature of the surroundings increases.
- C. The reaction is endothermic so the temperature of the surroundings decreases.
- D. The reaction is exothermic so the temperature of the surroundings increases

#### Question 14

Consider the following heating curve of a hypothetical substance



At which stage does liquid convert into gas?

- A. A to B
- B. B to C
- C. C to D
- D. D to E

#### Question 15

Which of the following equations correctly represents the complete combustion of methane ( $\text{CH}_4$ )?

- A.  $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO} + \text{H}_2\text{O}$
- B.  $\text{CH}_4 + 3\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- C.  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- D.  $\text{CH}_4 + \text{O}_2 \rightarrow \text{C} + 2\text{H}_2\text{O}$

#### Question 16

What do scrubbers do in the context of air pollution control?

- A. Convert nitrogen dioxide into oxygen
- B. Filter out solid waste from sewage
- C. Remove or neutralize harmful particles and gases from industrial emissions
- D. Add oxygen to factory chimneys

### Question 17

What is a potential consequence of water scarcity?

- A. Increased access to clean drinking water
- B. Reduced risk of waterborne diseases
- C. Economic prosperity
- D. Limited access to water for agriculture

### Question 18

This process is functional in removing carbon dioxide from the atmosphere

- A. lightning
- B. deforestation
- C. burning of fossil fuels
- D. photosynthesis

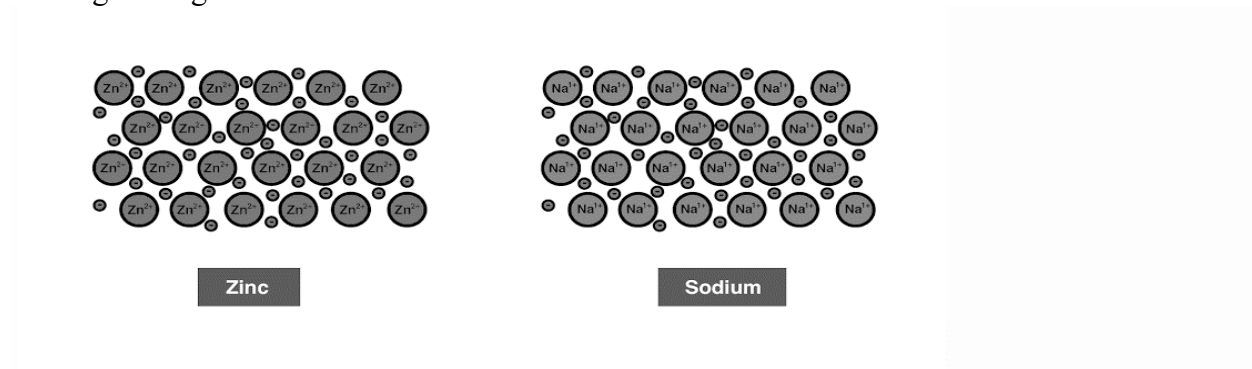
### Question 19

Which of the following is the primary ore from which aluminum is extracted?

- A. Copper
- B. Iron
- C. Bauxite
- D. Gold

### Question 20

In the given figure the Zinc cations are shown with the:



- A. localized electron pair
- B. delocalized electron pair
- C. localized electrons
- D. delocalized electrons



**Section B: Theoretical Questions****(Total marks: 30)**

Q1. Oxygen has several isotopes, including oxygen-16, oxygen-17, and oxygen-18.

a. Define the term isotope.

..... [1]

b. Complete the table below to show the number of neutrons in the given isotope of oxygen.

[1]

Isotope	Neutrons
Oxygen-18	

c. This question is about compounds that contain magnesium and oxygen.

The formula for an **oxide ion** can be written as



i. Identify the number of electrons in this oxide ion

[1]

Electrons: .....

ii. State why the formula for a magnesium ion is **Mg<sup>2+</sup>** rather than **Mg<sup>+</sup>** or **Mg<sup>3+</sup>**

[1]

.....  
.....

iii. Draw the structure of magnesium oxide.

[1]

iv. Calculate the percentage by mass of oxygen in magnesium oxide (MgO).

Give your answer to two significant figures.

Percentage by mass: .....

[2]

**[Total 7marks]**

Q2. The Haber process is a key industrial method used to manufacture ammonia, a vital chemical in the production of fertilizers.

The balanced equation for the process is:



Answer the following questions:

a. The reaction is reversible and exothermic in the forward direction.

Explain why the temperature used in industry is around 450°C, rather than a lower temperature which gives a higher yield [2]

.....  
.....

b. State the purpose of using iron as a catalyst in the Haber process. [1]

.....

[Total 3 marks]

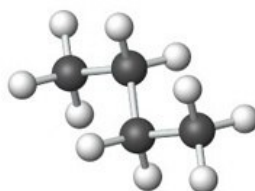
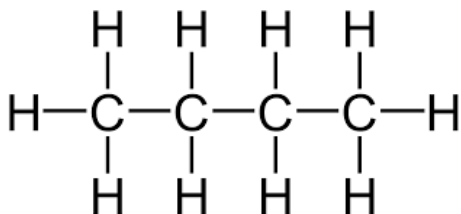
Q3. This question is about alkanes and alkenes.

i. Butane belongs to the alkane homologous series. Members of the same homologous series have the same functional group and the same general formula.

State **TWO** other characteristics of a homologous series. [2]

.....  
.....

(Fig shows the displayed formula of butane)



ii. Explain how the above figure shows that butane is a saturated compound. [1]

.....

iii. Nonane,  $C_9H_{20}$ , is present in the naphtha fraction from the distillation of petroleum. When nonane is cracked, shorter hydrocarbon molecules are formed. Construct the symbol equation for a reaction in which nonane is cracked and the only products are propane and ethene. [2]

.....  
.....

[Total 5 marks]

Q4.

a. A chemist has two clear liquids, called **Liquid A** and **Liquid B**. To find out what they are, he/she adds some aqueous bromine solution to each one.

- When she adds bromine to **Liquid A**, the brown color quickly disappears.
- When she adds bromine to **Liquid B**, the brown color stays the same.

i. What can you say about whether each liquid is a saturated or unsaturated hydrocarbon? Explain your reasoning. [2]

.....  
.....

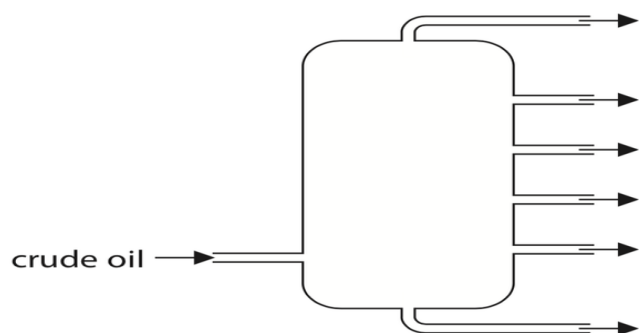
ii. What does this tell you about the kinds of carbon-carbon bonds in each liquid? [2]

.....  
.....

iii. Why does the bromine solution lose its color in one liquid but not the other? [1]

.....  
.....

b.



i. Why are fractions with lower boiling points collected at the top of the fractionating column?

.....

[1]

ii. How does fractional distillation separate the components of crude oil. Include the importance of boiling points and temperature in your explanation.

[1]

.....

iii. Give **ONE** product obtained from fractional distillation of crude oil and give one common use for the product.

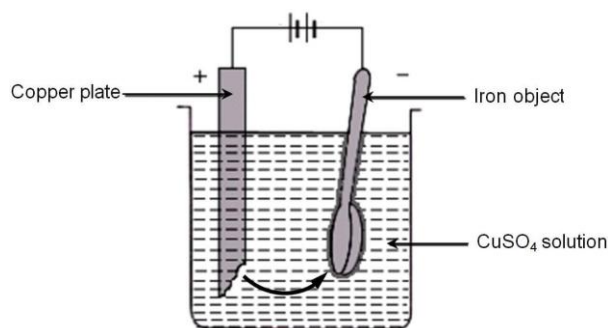
[1]

.....

[Total 8 marks]

Q5a.i.A student electroplates a key with copper. She connects the key to the negative terminal of a battery. Give a suitable reason.

[1]



ii. Write the ionic half-cell equations for the reactions at cathode and anode.

[2]

.....

.....

iii. Which factors affect the thickness of Copper layer during electroplating?

[1]

.....

.....



Q5 b. Peter wants to take care of his grandfather's vintage car. The outer body of the car is almost rusted.

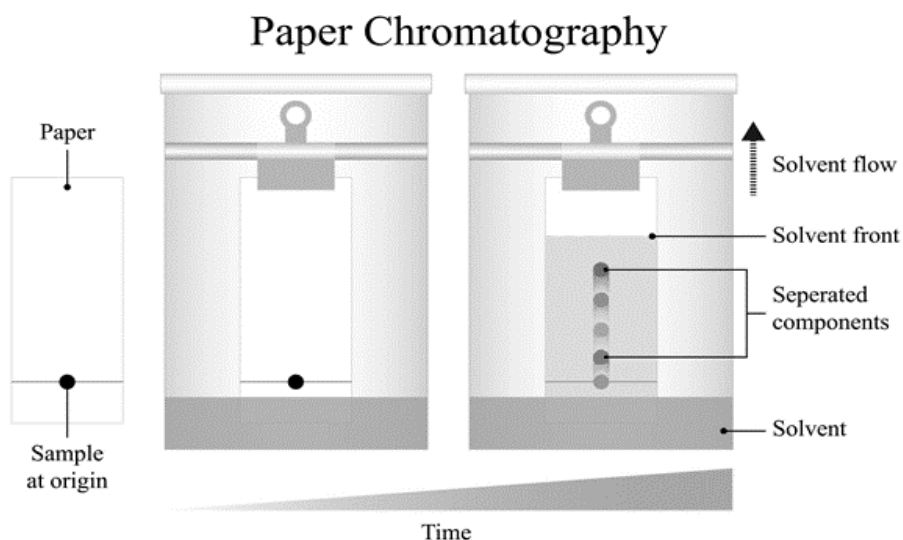
i. Name **TWO** conditions which help in the process of rusting. [2]

.....

ii. What **ONE** preventive measure does Peter have to take to stop the process of rusting. [1]

.....  
.....

[Total 7 marks]



Q1a. In paper chromatography, why should the ink spot be placed above the solvent level?

[1]

.....

b. What type of mixtures can be separated using chromatography? Give an example.

[1]

.....

c. Why is a pencil used to draw the baseline in paper chromatography instead of a pen?

[1]

.....

d. How can you identify the number of components in a mixture using paper chromatography?

[1]

.....

e. What are the advantages of paper chromatography? [2]

.....  
.....

f. Two dyes, A and B, were tested on the same strip of chromatography paper. Dye A travelled 3 cm, and Dye B travelled 6 cm. The solvent front moved 9 cm. Which dye is more soluble in the solvent? [4]

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**Show your working using Rf values.**

**[Total 10 marks]**

**Q2.** a. A student added dilute hydrochloric acid to a test tube containing zinc granules. Bubbles were observed. Identify the gas produced in this reaction. How can the gas be tested?

.....  
.....

[2]

b. Vinegar (which contains acetic acid) is spilled on a marble floor. After some time, fizzing is observed. Write a chemical equation of the reaction. Name the gas released. [2]

.....  
.....

c. A teacher asks students to differentiate between sodium carbonate and sodium chloride using dilute acid. Which test could be done? [2]

.....  
.....

**[Total 6 marks]**

**Q3a.** You are given three unknown metal salt solutions. On adding metal hydroxide **Solution A** gives green precipitates, **Solution B** gives brown precipitates and **Solution C** gives blue precipitates. Identify the metal ions present in each solution. [3]

.....

.....

.....

b. Explain why iron (III) salts can be distinguished from iron (II) salts using sodium hydroxide.

[2]

.....  
.....

c. During a practical, a student added Sodium hydroxide solution and aluminium foil to a sample and heated it. A gas was produced that turned red litmus blue. Identify the gas and the anion present in the original compound. [2]

.....

.....

d. A student is preparing magnesium sulphate by reacting magnesium oxide with dilute sulphuric acid. He uses 4.00 grams of magnesium oxide and obtains 9.0 grams of magnesium sulphate crystals. [2]

i. Calculate the theoretical yield of magnesium sulphate.

ii. Calculate the percentage yield.

(Relative formula mass:  $\text{MgO} = 40$  ,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O} = 246$ )

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.....

[Total 9 marks]

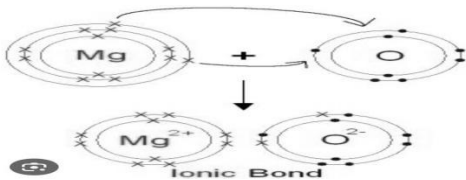


# **Chemistry Model Paper -Answer Key**

## **Section A: Multiple Choice Questions (20 marks)**

<b>Question Number</b>	<b>Answer Key</b>
<b>1</b>	<b>D</b>
<b>2</b>	<b>D</b>
<b>3</b>	<b>C</b>
<b>4</b>	<b>C</b>
<b>5</b>	<b>B</b>
<b>6</b>	<b>A</b>
<b>7</b>	<b>B</b>
<b>8</b>	<b>A</b>
<b>9</b>	<b>B</b>
<b>10</b>	<b>B</b>
<b>11</b>	<b>B</b>
<b>12</b>	<b>C</b>
<b>13</b>	<b>D</b>
<b>14</b>	<b>C</b>
<b>15</b>	<b>C</b>
<b>16</b>	<b>C</b>
<b>17</b>	<b>D</b>
<b>18</b>	<b>D</b>
<b>19</b>	<b>C</b>
<b>20</b>	<b>D</b>

**Section B: (55 marks) Theoretical (30 marks)**

<b>Q1a.</b>	same number of protons <b>but</b> different numbers of neutrons/ <b>same protons</b>	1
<b>Q1b.</b>	Number of neutrons = Mass number – atomic number = 18 – 8 = 10 / Neutrons 10	1
<b>Q1c.i</b>	Oxygen atomic number = 8 (number of protons)/Charge = 2– means 2 extra electrons/Number of electrons = 8 + 2 = <b>10</b>	1
<b>Q1.c.ii</b>	Magnesium loses <b>two electrons</b> to achieve a stable noble gas electron configuration, so it forms a <b>2+ ion</b> ( $\text{Mg}^{2+}$ ).	1
<b>Q1.c. iii</b>		1
<b>Q1.c. iv</b>	<ul style="list-style-type: none"> <li>• Molar mass of Mg = 24.3 g/mol</li> <li>• Molar mass of O = 16.0 g/mol</li> <li>• Molar mass of MgO = 24.3 + 16.0 = 40.3 g/mol</li> </ul>	1
	Percentage of O = $\frac{16.0}{40.3} \times 100 = 39.7\%$ Answer: 40%	1
<b>Q2.a</b>	lower temperature would give a higher yield of ammonia/ At lower temperatures, the reaction rate is too slow/temperature (around 450°C) is used to balance a reasonable yield with a practical reaction rate.	2
<b>Q2.b</b>	Iron catalyst increases the rate of reaction without being used up.	1
<b>Q3.i</b>	i. They have similar chemical properties	1

	ii. Consecutive members differ by a CH <sub>2</sub> unit	1
Q3.ii.	single bonds between carbon atoms and contains the maximum number of hydrogen atoms/saturated/only single bonds	1
Q3.iii	$C_9H_{20} \rightarrow C_3H_8 + C_2H_4 + C_4H_8$ / $C_9H_{20} \rightarrow C_3H_8 + 3C_2H_4$	2
Q4.a.i	The brown color of bromine disappears with Liquid A, which shows it reacts with bromine. This is characteristic of unsaturated hydrocarbons that contain double or triple bonds.	1
	Liquid B does not decolorize bromine, showing it is <b>saturated</b> and unreactive in this test.	1
Q4.a.ii	Liquid A contains carbon–carbon double bonds (C=C) or possibly triple bonds.	1
	Liquid B contains only carbon–carbon single bonds (C–C).	1
Q4.a.iii	Because bromine reacts with the carbon–carbon double bonds in Liquid A. In Liquid B, no such reaction occurs because there are only single bonds.	1
Q4b.i.	lower boiling point fractions rise higher and condense at the top	1
Q4b.ii.	Crude oil is heated and vaporized; as the vapor rises up the column, the temperature decreases, so components condense at different heights based on their boiling points, separating them into fractions.	1
Q4b.iii.	gasoline	1

<b>Q5.a.i</b>	it acts as the <b>cathode</b> , where copper ions gain electrons and are deposited as copper metal on the key.	1
<b>Q5.a.ii.</b>	$\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$ (copper metal deposited) cathode equation	1
<b>Q5a.ii.</b>	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^{-}$ anode equation	1
<b>Q5.a.iii.</b>	Amount of current passed/Duration of electroplating (time)/Concentration of copper ions in the electrolyte  (Any one factor is sufficient.)	1
<b>Q5b.i</b>	Water/moisture	1
	Oxygen/air	1
<b>Q5b.ii</b>	Painting the metal surface/Applying oil or grease/Galvanizing (coating with zinc)/Electroplating/Using stainless steel (rust-resistant alloy)	1

**Section B: Practical Component (Total: 25 marks)**

<b>Q1a.</b>	prevents ink from dissolving into solvent directly	1
<b>Q1b.</b>	coloured mixtures / ink” or “food colorings	1
<b>Q1c.</b>	pencil marks are made of graphite, which is insoluble, while pen ink may dissolve in the solvent and interfere with results	1
<b>Q1d.</b>	by counting the number of separate spots formed on the chromatogram.	1
<b>Q1e.</b>	Can separate complex mixtures	1
	Can identify substances based on Rf values	1
<b>Q1f.</b>	<ul style="list-style-type: none"> <li>• Rf=Distance travelled by dye/Distance travelled by solvent front</li> <li>• Rf for Dye A Rf=93=0.33</li> <li>• Rf=96=0.67</li> <li>• Dye B is more soluble</li> </ul>	4
<b>Q2a.</b>	a.The gas produced is hydrogen gas (H <sub>2</sub> ).	1
	b. The gas can be tested by bringing a burning splint near the mouth of the test tube. If hydrogen is present, it will burn with a 'pop' sound.	1
<b>Q2b.</b>	2CH <sub>3</sub> COOH+CaCO <sub>3</sub> →Ca(CH <sub>3</sub> COO) <sub>2</sub> +CO <sub>2</sub> +H <sub>2</sub> O	1
	Gas released: Carbon dioxide (CO <sub>2</sub> )	1
<b>Q2c.</b>	adding dilute acid fizzing with carbonate	1
	Correct observation, no reaction with chloride	1
<b>Q3a.</b>	<b>A:</b> Iron(II) ion — Fe <sup>2+</sup>	1
	<b>B:</b> Iron(III) ion — Fe <sup>3+</sup>	1
	<b>C:</b> Copper(II) ion — Cu <sup>2+</sup>	1
<b>Q3b.</b>	Iron(II) salts form a <b>green precipitate</b> of iron(II) hydroxide.	1
	Iron(III) salts form a <b>brown precipitate</b> of iron(III) hydroxide	1

<b>Q3c.</b>	<b>Gas:</b> Ammonia (NH <sub>3</sub> )	1
	<b>Anion:</b> Ammonium ion (NH <sub>4</sub> <sup>+</sup> )	1
<b>Q3d.</b>	<b>Theoretical yield:</b> 24.6 g	1
	<b>Percentage yield:</b> 37%	1

<b>Table of Specification –SSC (A) P1-Model Paper</b>							
<b>No.</b>	<b>Chapter Title</b>	<b>MCQs ( 1 mark)</b>	<b>AO</b>	<b>Theoretical Questions</b>	<b>AO</b>	<b>Practical Component</b>	<b>AO</b>
1.	<b>States of matter and methods of separation</b>	2	AO1 (1) AO2 (1)	---	---	10	AO1 (3) AO2 (5) AO3 (2)
2.	<b>Atoms and the Periodic Table</b>	1	AO1 (1)	5	AO1 (1) AO2 (2) AO3 (2)	-----	
3.	<b>Chemical Bonding</b>	3	AO1 (1) AO2 (1) AO3 (1)	----		6	AO1 (3) AO2 (3)
4.	<b>Qualitative Chemistry</b>	1	AO2 (1)	2	AO1 (1)  AO2 (1)	3	AO3 (3)
5.	<b>Chemical Changes</b>	5	AO1 (1) AO2 (2) AO3 (2)	4	AO1 (1) AO3 (3)	6	AO1 (2) AO2 (2) AO3 (2)
6.	<b>Reversible Reactions and Rate of Reactions</b>	2	AO1 (1) AO2 (1)	3	AO1 (1) AO3 (2)	-----	

Table of specifications –Chemistry SSC – A

7.	<b>Organic Chemistry</b>	<b>3</b>	<b>AO1 (1) AO2 (1) AO3 (1)</b>	<b>13</b>	<b>AO1 (8) AO2 (5)</b>	<b>-----</b>	
8.	<b>Air and Water Chemistry</b>	<b>3</b>	<b>AO2 (1) AO3 (2)</b>	<b>3</b>	<b>AO1 (1) AO3 (2)</b>	<b>-----</b>	
		<b>Total =20</b>	<b>AO1= 6 AO2 =8 AO3 = 6</b>	<b>Total = 30</b>	<b>AO1= 9 AO2 =12 AO3 = 9</b>	<b>Total = 25</b>	<b>AO1= 8 AO2 =10 AO3 = 7</b>



Table of specifications –Chemistry SSC – A

Question- wise Breakdown			
Section	Question	Related Chapter	AO
MCQs	1	1	1
	2	1	2
	3	3	3
	4	5	1
	5	7	2
	6	2	3
	7	7	1
	8	5	2
	9	5	3
	10	3	2
	11	6	3
	12	6	1
	13	5	2
	14	4	1
	15	7	2
	16	8	3
	17	8	1
	18	8	2
	19	5	2
	20	3	3
Theoretical Questions	1	2,3	1,2,3
	2	6	1,2
	3	7	1,2
	4	3,7	1,2
	5	8	1,2,3

Table of specifications –Chemistry SSC – A

<b>Practical Component</b>	<b>1</b>	<b>1</b>	<b>1, 2,3</b>
	<b>2</b>	<b>5</b>	<b>1, 2,3</b>
	<b>3</b>	<b>3</b>	<b>1, 2,3</b>
	<b>4</b>	<b>4</b>	<b>1, 2,3</b>

<b>Marks for AO1</b>		<b>Percentage</b>
<b>MCQS</b>	<b>6</b>	<b>30%</b>
<b>Theory</b>	<b>9</b>	
<b>Practical</b>	<b>8</b>	
<b>Total</b>	<b>23</b>	

<b>Marks for AO2</b>		<b>Percentage</b>
<b>MCQS</b>	<b>8</b>	<b>40%</b>
<b>Theory</b>	<b>12</b>	
<b>Practical</b>	<b>10</b>	
<b>Total</b>	<b>30</b>	

<b>Marks for AO3</b>		<b>Percentage</b>
<b>MCQS</b>	<b>6</b>	<b>30%</b>
<b>Theory</b>	<b>9</b>	
<b>Practical</b>	<b>7</b>	
<b>Total</b>	<b>22</b>	