



ICSE 2027 EXAMINATION
SPECIMEN QUESTION PAPER
CHEMISTRY
(SCIENCE PAPER – 2)

Maximum Marks: 80

Time allowed: Two hours

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during first 15 minutes.*
3. *This time is to be spent in reading the question paper.*
4. ***The time given at the head of this Paper is the time allowed for writing the answers.***

5. ***Section A*** is compulsory. Attempt ***any four*** questions from ***Section B***.
6. *The intended marks for questions or parts of questions are given in brackets [].*

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

NOTE:

The Specimen Question Paper in the subject provides a realistic format of the Board Examination Question Paper and should be used as a practice tool. The questions for the Board Examination can be set from any part of the syllabus. However, the format of the Board Examination Question Paper will remain the same as that of the Specimen Question Paper.

SECTION A (40 Marks)

(Attempt **all** questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options.

[15]

(Do not copy the question, write the correct answers only.)

- (i) **X** and **Y** are diatomic elements. **X** is less reactive than **Y**.

What are elements **X** and **Y**?

- (a) **X** - chlorine, **Y** - iodine
- (b) **X** - fluorine, **Y** - nitrogen
- (c) **X** - iodine, **Y** - bromine
- (d) **X** - oxygen, **Y** - nitrogen

[Understanding]

- (ii) The diagram given below represents the industrial process for the manufacture of concentrated sulphuric acid by the **Contact process**.



What is used in step **R** to obtain sulphuric acid from sulphur trioxide?

- (a) vanadium pentoxide
- (b) water only
- (c) water followed by concentrated sulphuric acid
- (d) concentrated sulphuric acid followed by water

[Understanding]

- (iii) Which statement given below is correct with reference to the flow of electric current?

- (a) In all aqueous solutions, current is carried by electrons.
- (b) In all acidic solutions, current is carried by ions.
- (c) In molten electrolytes, current is carried by electrons.
- (d) In metal wires, current is carried by ions.

[Understanding]

(iv) The following statements are related to the properties of sulphuric acid:

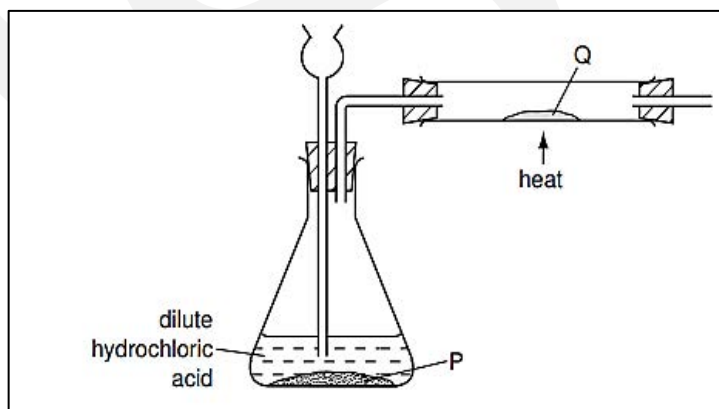
1. Barium chloride reacts with sulphuric acid to give a white precipitate.
2. Sulphur dioxide gas is evolved when sulphuric acid reacts with carbon.
3. Sulphuric acid has a pH value of less than 7.0.
4. Copper (II) oxide reacts with sulphuric acid to form a blue solution.

Which **two** statements confirm the **acidic** nature of sulphuric acid?

- (a) 1 and 2
- (b) 1 and 3
- (c) 3 and 4
- (d) 2 and 4

[Understanding]

(v) The diagram given below shows that **P** reacts with dilute hydrochloric acid to produce a gas which when passed through substance **Q**, reduces it.



What are substances **P** and **Q**?

- (a) P - copper, Q - lead (II) oxide
- (b) P - lead, Q - magnesium oxide
- (c) P - magnesium, Q - calcium oxide
- (d) P - zinc, Q - copper (II) oxide

[Application]

(vi) Non-metals like chlorine and iodine on reaction with hydrogen give:

- (a) acid
- (b) base
- (c) salt
- (d) metal

[Recall]

(vii) **Statement I:** Halogens are very reactive.

Statement II: Halogens have high electron affinity.

- (a) Both the statements are true.
- (b) Both the statements are false.
- (c) Statement I is true, and statement II is false.
- (d) Statement I is false, and statement II is true.

[Understanding]

(viii) **Assertion (A):** Ionic compounds have high melting points.

Reason (R): A strong electrostatic force of attraction exists between the oppositely charged ions.

- (a) (A) is true but (R) is false.
- (b) (A) is false but (R) is true.
- (c) Both (A) and (R) are true, and (R) is the correct explanation of (A).
- (d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

[Analysis]

(ix) A student tested the nature of *four* different solutions **P**, **Q**, **R**, and **S** using pH paper. He noted the following observations:

	P	Q	R	S
Colour of the pH paper after testing	Blue	Green	Red	Violet

Which of the above solutions is *neutral* in nature?

- (a) P
- (b) Q
- (c) R
- (d) S

[Application]

(x) Identify the organic compound(s) with the molecular formula C_3H_8O .

1. propanol
2. propanal
3. propanoic acid

- (a) Only 1
(b) Only 2
(c) Both 2 and 3
(d) Both 1 and 2

[Application]

(xi) An organic compound **X** containing carbon and hydrogen only has Vapour Density (V.D.) 14. The molecular formula of **X** is _____. (At. wt. of C=12, H=1)

- (a) CH
(b) C_2H_4
(c) C_2H_2
(d) CH_2

[Application]

(xii) Identify the ion that contains *one* lone pair of electrons.

- (a) OH^{-1}
(b) H_3O^{+}
(c) NH_4^{+}
(d) H^{+}

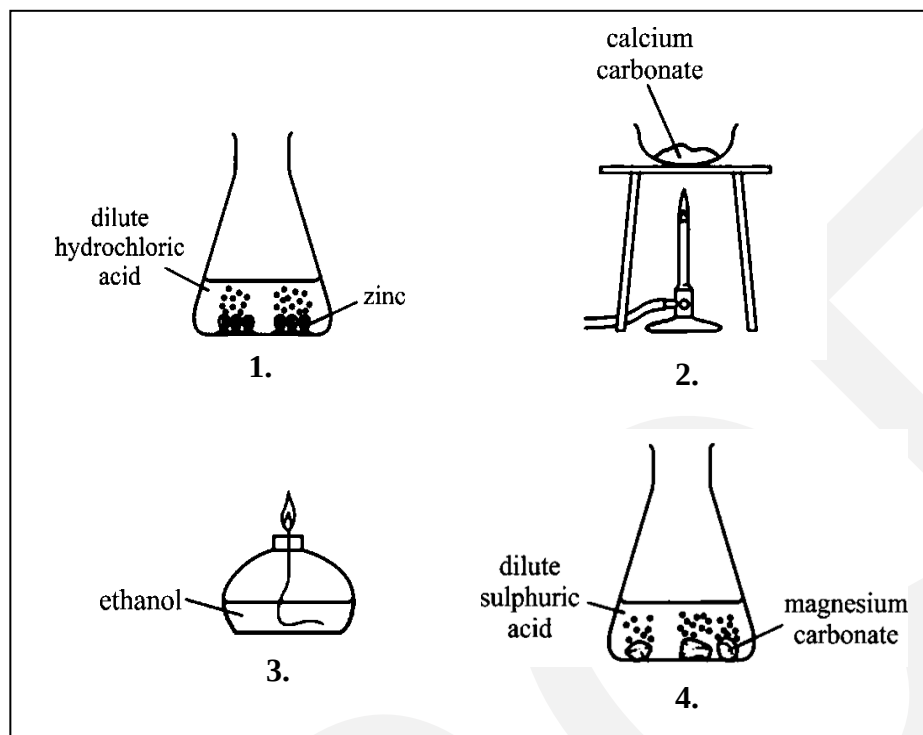
[Understanding]

(xiii) When compound **X** reacts with dilute hydrochloric acid, it releases a gas that turns moist lead acetate paper black and decolourises acidified potassium permanganate solution. Which of the following is compound **X**?

- (a) Sodium nitrate
(b) Sodium sulphide
(c) Sodium carbonate
(d) Sodium sulphite

[Application]

- (xiv) A teacher demonstrated four different reactions as shown in the diagram below:



Which reactions will produce water?

- (a) 1 and 2
- (b) 1 and 3
- (c) 3 and 4
- (d) 2 and 3

[Analysis]

- (xv) The volume occupied by 0.2 moles of a gas at S.T.P. is:

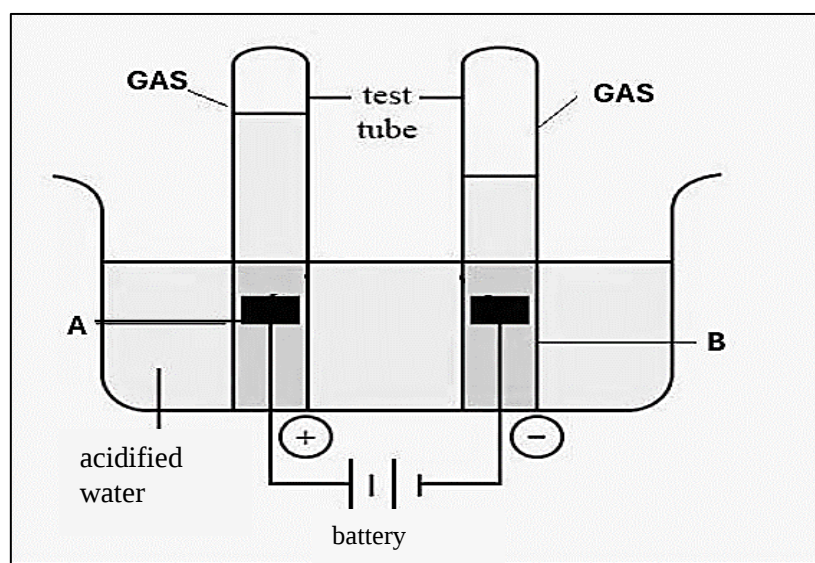
- (a) 22.4 litres
- (b) 2.24 litres
- (c) 44.8 litres
- (d) 4.48 litres

[Application]

Question 2

- (i) The diagram given below shows the electrolysis of acidulated water. With reference to the diagram, answer the following questions:

[5]



- (a) Write an equation for the reaction that takes place at A.
- (b) Give a test to confirm the product formed at A.
- (c) Which gas is liberated at B?
- (d) Why is water acidified for electrolysis?
- (e) What is the ratio by volume of the gases liberated at A and B?

[Application]

[Recall]

[Recall]

[Understanding]

[Application]

- (ii) Write balanced chemical equations for the following:

[5]

- (a) Chlorination of chloroform in the presence of diffused sunlight.
- (b) Hydrated aluminium oxide is treated with caustic soda.
- (c) Zinc oxide is treated with caustic alkali.
- (d) Copper reacts with cold dilute nitric acid.
- (e) Laboratory preparation of nitric acid using sodium nitrate.

[Application]

[Application]

[Application]

[Application]

[Application]

(iii) Complete the following sentences by choosing the correct option from the brackets: [5]

(a) The general formula of an alkyl group is _____ [Recall]
(C_nH_{2n+1}/C_nH_{2n-1}).

(b) The aqueous solution of _____ (zinc chloride/ sodium sulphate) gives white precipitate with barium nitrate. [Application]

(c) The gas liberated when alkalis are heated with ammonium salts is _____ (N_2/NH_3). [Recall]

(d) The alloy that contains a non-metal as one of its constituents is _____ (bronze/steel). [Recall]

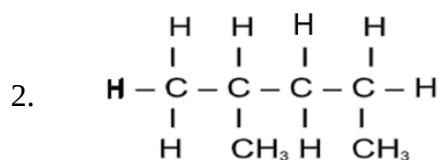
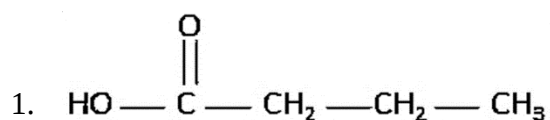
(e) A salt prepared by neutralization in which titration is involved is _____ ($CaCl_2/ NH_4Cl$). [Application]

(iv) Match **Column A** with **Column B**: [5]

	Column A		Column B
(a)	$CuO + C \longrightarrow Cu + CO$	1.	Oxidation
(b)	$Al^{3+} + 3e^- \longrightarrow Al$	2.	Ionization
(c)	$PbBr_2 \longrightarrow Pb^{2+} + 2Br^{1-}$	3.	Reduction
(d)	$2O^{2-} - 4e^- \longrightarrow O_2$	4.	Redox
(e)	$HCl \longrightarrow H^+ + Cl^{1-}$	5.	Electrolytic dissociation

[Understanding]

- (v) (a) Give the IUPAC name of the following organic compounds: [5]



[Application]

- (b) Draw the structural diagram for the following compounds:

1. diethyl ether
2. isopentane
3. propanone

[Application]

SECTION B (40 Marks)

(Attempt *any four* questions.)

Question 3

- (i) A compound commonly used in the laboratory has formula H_2P . [2]

H represents hydrogen, **P** represents a non-metal.

Draw a *dot and cross* structure for the formation of the compound H_2P .

[Application]

- (ii) Give *one* significant observation when: [2]

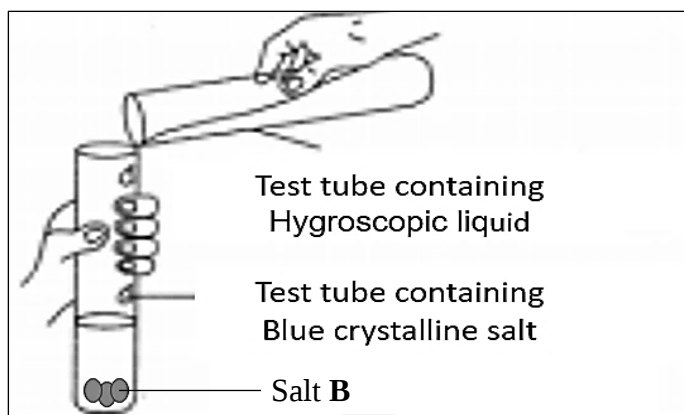
(a) Excess of chlorine gas reacts with ammonia.

[Recall]

(b) Zinc nitrate is strongly heated in a test tube.

[Recall]

- (iii) A student was given a crystalline salt '**B**' for analysis which was blue in colour. He added a few drops of dense oily hygroscopic liquid to it and observed a colourless neutral gas/vapour being released and the salt turning white. [3]



- (a) Identify the blue crystalline salt **B**. [Analysis]
- (b) Which property of the hygroscopic liquid is demonstrated in this reaction? [Understanding]
- (c) Write a balanced chemical equation for the above reaction. [Application]

- (iv) **N** is a metal which forms a basic oxide. [3]
N has atomic no. 11.

- (a) What is the molecular formula of the oxide of **N**? [Application]
- (b) Write the balanced equation for the reaction that takes place when the oxide of **N** is treated with water. [Application]
- (c) State the formula of the product obtained other than water when sulphuric acid is added to the product obtained in (b) above. [Application]

Question 4

- (i) Name the following: [3]
- (a) The non-metallic element which is used as the anode during electrolytic reduction of fused alumina in Hall Heroult's process. [Recall]
 - (b) An alloy which is made up of aluminium and magnesium only. [Recall]
 - (c) The process of heating the concentrated ore in a limited supply of air or in the absence of air. [Recall]
- (ii) Rohit has three solutions **X**, **Y** and **Z** that have pH 2, 7 and 13 respectively. Which solution out of **X**, **Y** or **Z** will: [3]
- (a) liberate sulphur dioxide gas when heated with sodium sulphite? [Application]
 - (b) liberate ammonia gas when reacted with ammonium chloride? [Application]
 - (c) not have any effect on litmus paper? [Understanding]
- (iii) A chloride of iron '**R**', when treated with sodium hydroxide gives **P** and **Q** as a product. **Q** is a reddish-brown precipitate. [4]
- (a) Identify **R**. [Analysis]
 - (b) State the formula of the compounds **P** and **Q** formed after the reaction. [Application]
 - (c) What do you observe when excess NaOH is added to **Q**? [Recall]

Question 5

- (i) 20 grams of a gas M_2P has **lesser** number of moles than 20 grams of the gas MP . [2]
- Justify the above statement using mathematical calculations.
- [At.wt. $M=14$, $P=16$] [Application]

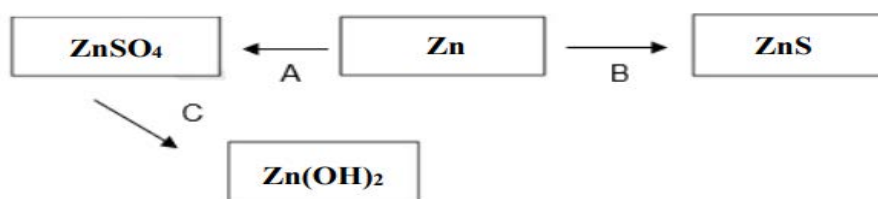
(ii) State giving reasons if: [2]

(a) Zinc metal and aluminium metal can be distinguished by heating the metal powders separately in two different test tubes with concentrated sodium hydroxide solution. [Analysis]

(b) Zinc nitrate and lead nitrate can be distinguished by adding ammonium hydroxide solution to the salt solution. [Analysis]

(iii) Write balanced chemical equations for the following conversions [3]

(A to C):



[Application]

(iv) An element 'P' has 3 valence electrons in its L - shell and an element 'Q' has 7 valence electrons in its M - shell. Using this information, answer the following questions: [3]

(a) Identify the **exact** position of element 'Q' in terms of **group** and **period** in the Modern Periodic Table. [Application]

(b) The atomic radius of P is _____ (more/less) than that of Q. [Understanding]

Question 6

(i) Identify the reactants P, Q and R in the following reactions: [3]

(a) Copper (II) oxide + P $\longrightarrow$ Copper + Water + Nitrogen [Analysis]

(b) Iron pyrite + Q $\longrightarrow$ Iron oxide + Sulphur dioxide [Understanding]

(c) Ammonia + R $\longrightarrow$ Nitrogen + Water [Analysis]

- (ii) Solid ammonium dichromate decomposes as under: [3]



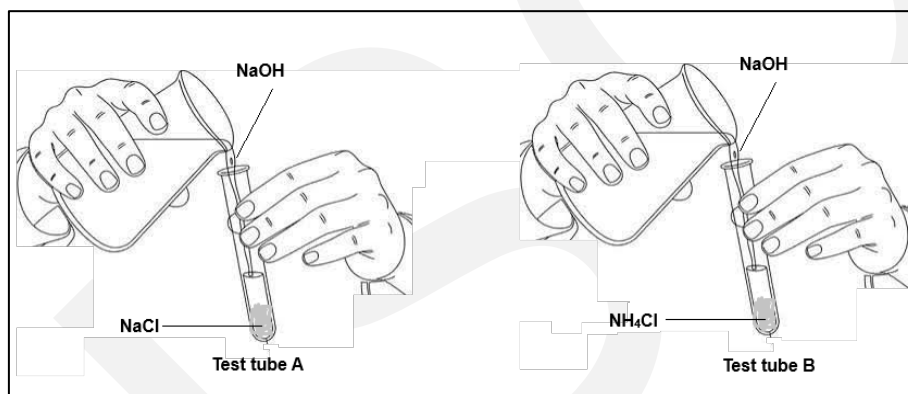
If 126 g of ammonium dichromate decomposes, calculate:

- (a) the number of moles of ammonium dichromate that undergoes decomposition.
- (b) the mass of chromic oxide formed at the same time.
- (c) the volume of nitrogen gas evolved at STP.

[At wt: $N = 14$, $Cr = 52$, $O = 16$, $H = 1$]

[Application]

- (iii) Rohan has two test tubes, **A** containing sodium chloride and **B** containing ammonium chloride as shown in the diagram below. He adds sodium hydroxide solution to both the test tubes and warms them gently. [4]



Answer the following questions:

- (a) In which test tube (A or B) will Rohan observe the evolution of a gas?
- (b) Name the gas that is evolved.
- (c) What will be the colour of the flame when this gas burns in oxygen?
- (d) Write an equation for the reaction that occurs in the test tube in which the gas has evolved.

[Understanding]

[Recall]

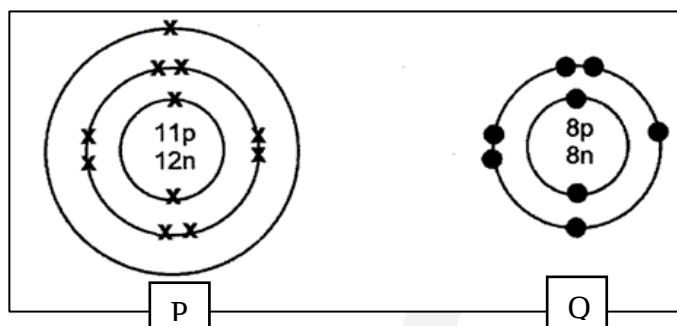
[Recall]

[Application]

Question 7

- (i) What is the ratio of methane to the acidic gaseous product obtained when methane undergoes complete combustion? Give a balanced equation for the above reaction. [2] [Application]

- (ii) The diagram below illustrates the structures of *two* atoms **P** and **Q**. [2]



What is the **formula** and **mass** of *one* mole of the compound formed when **P** and **Q** react together?

[At. wt of P is 23 and Q is 16]

[Application]

- (iii) Give balanced equations for each of the following: [3]

(a) Action of warm water on calcium carbide. [Recall]

(b) Oxidation of sulphur with conc. nitric acid. [Recall]

(c) Laboratory preparation of ethane by using sodium propionate and soda lime. [Application]

- (iv) In a round bottom flask, a mixture of ethanol, acetic acid and concentrated sulphuric acid was heated. [3]

Answer the following questions:

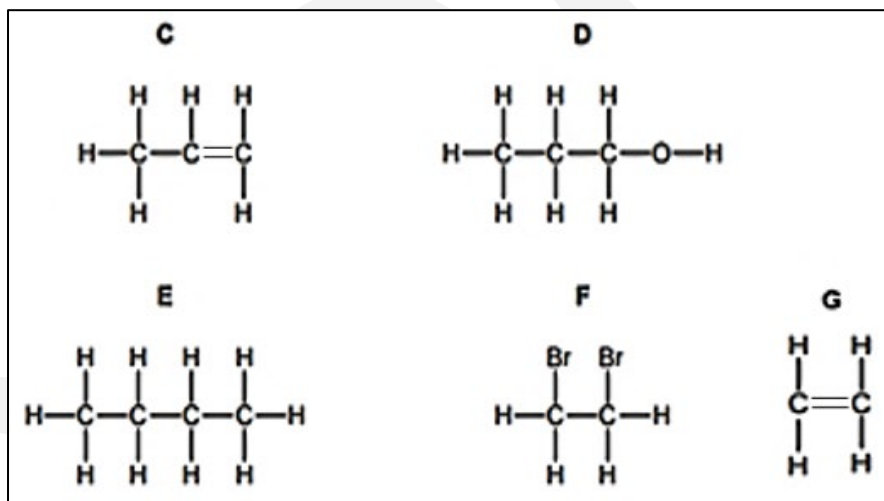
(a) Name the type of reaction occurring in the above set up. [Understanding]

(b) What is the role of sulphuric acid in this reaction? [Understanding]

(c) State *one* observation that takes place during the reaction. [Recall]

Question 8

- (i) In the reactivity series of metals, **Z** is a metal above hydrogen and its oxide has the formula **ZO**. It was found that **ZO** reacted with water and formed a hydroxide as the product. With reference to the above context, answer the following questions: [3]
- (a) State the number of valence electrons present in element **Z**. [Recall]
- (b) Name the group which **Z** belongs to. [Recall]
- (c) What will be the formula of the hydroxide of **Z**? [Application]
- (ii) Draw the electron dot structure of: [3]
- (a) ammonium ion (also label the co-ordinate bond) [Application]
- (b) nitrogen molecule [Application]
- [Atomic No.: N = 7, H = 1]
- (iii) The structures of five organic compounds, **C**, **D**, **E**, **F** and **G** are shown. [4]



Answer the following questions about these compounds.

(Each compound may be used once, more than once or not at all.)

State which compound, **C**, **D**, **E**, **F** or **G**:

- (a) on halogenation will form **F**. [Analysis]
- (b) is an alcohol. [Understanding]
- (c) is an isomer of 2-methyl propane. [Analysis]
- (d) is in the same homologous series as ethene. [Analysis]

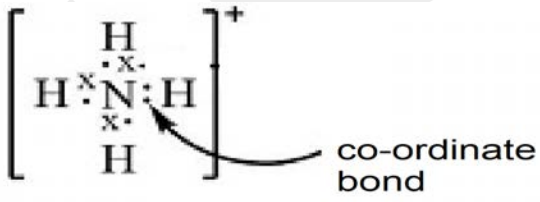
ICSE 2027 SPECIMEN
DRAFT MARKING SCHEME – CHEMISTRY (SCIENCE PAPER 2)

Question 1		[15x1]
(i)	(c) X - iodine, Y - bromine	
(ii)	(d) concentrated sulphuric acid followed by water	
(iii)	(b) In acidic solutions, current is carried by ions.	
(iv)	(c) 3 and 4	
(v)	(d) P - zinc, Q - copper (II) oxide	
(vi)	(a) acid	
(vii)	(a) Both the statements are true.	
(viii)	(c) Both (A) and (R) are true and (R) is the correct explanation of (A).	
(ix)	(b) Q	
(x)	(a) Only 1	
(xi)	(b) C ₂ H ₄	
(xii)	(b) H ₃ O ⁺	
(xiii)	(b) Sodium sulphide	
(xiv)	(c) 3 and 4	
(xv)	(d) 4.48 litres	
Question 2		
(i)	(a) $\text{OH}^{-1} - e \rightarrow \text{OH}$; $4\text{OH} \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ (b) The gas rekindles a glowing splinter / turns alkaline pyrogallol brown (c) Hydrogen (d) Pure water does not conduct electricity, to produce ions, sulphuric acid is added to water. (e) The ratio of A : B is 1 : 2.	[5x1]
(ii)	(a) $\text{CHCl}_3 + \text{Cl}_2 \rightarrow \text{CCl}_4 + \text{HCl}$ (b) $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O} + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + 3\text{H}_2\text{O}$ (c) $\text{ZnO} + 2\text{NaOH} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2\text{O}$	[5x1]

	(d) $3\text{Cu} + 8\text{HNO}_3 \rightarrow 3\text{Cu}(\text{NO}_3)_2 + 4\text{H}_2\text{O} + 2\text{NO}$ (e) $\text{NaNO}_3 + \text{H}_2\text{SO}_4 \xrightarrow{\text{Below } 200^\circ\text{C}} \text{NaHSO}_4 + \text{HNO}_3$											
(iii)	(a) $\text{C}_n\text{H}_{2n+1}$ (b) Zinc chloride (c) NH_3 (d) Steel (e) NH_4Cl	[5x1]										
(iv)	<table border="1"><tr><td>A</td><td>4. Redox</td></tr><tr><td>B</td><td>3. Reduction</td></tr><tr><td>C</td><td>5. Electrolytic dissociation</td></tr><tr><td>D</td><td>1. Oxidation</td></tr><tr><td>E</td><td>2. Ionization</td></tr></table>	A	4. Redox	B	3. Reduction	C	5. Electrolytic dissociation	D	1. Oxidation	E	2. Ionization	[5x1]
A	4. Redox											
B	3. Reduction											
C	5. Electrolytic dissociation											
D	1. Oxidation											
E	2. Ionization											
(v)	(a) 1) butan-1-oic acid / butanoic acid/ 1-butanoic acid 2) 2 - methyl pentane (b) 1) diethyl ether $\begin{array}{ccccccc} & \text{H} & \text{H} & & \text{H} & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & \text{H} & \text{H} & \end{array}$ 2) isopentane $\begin{array}{ccccccc} & & & \text{H} & & & \\ & & & & & & \\ & \text{H} & & \text{H} - \text{C} - \text{H} & & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{C} - \text{H} \\ & & & & & & \\ & \text{H} & & \text{H} & & \text{H} & \end{array}$ 3) propanone $\begin{array}{ccccccc} & \text{H} & & & \text{H} & & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & & \text{O} & & \text{H} & \end{array}$	[5x1]										

Question 3						
(i)	$\text{H} \cdot + \text{x} \overset{\text{xx}}{\underset{\text{xx}}{\text{P}}} \text{x} + \cdot \text{H} \rightarrow \text{H} \cdot \text{x} \overset{\text{xx}}{\underset{\text{xx}}{\text{P}}} \text{x} \cdot \text{H}$		[2]			
(ii)	(a) Yellow oily liquid is formed which is explosive (b) Reddish-brown gas/ a gas which rekindles a glowing splinter/ a residue which is yellow when hot and white when cold is formed	[2]				
(iii)	(a) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ / copper sulphate pentahydrate (b) Dehydrating property (c) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CuSO}_4 + 5\text{H}_2\text{O}$	[3]				
(iv)	(a) N_2O (b) $\text{N}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NOH}$ (c) N_2SO_4	[3]				
Question 4						
(i)	(a) Carbon (b) Magnalium (c) Calcination	[3]				
(ii)	(a) X (b) Z (c) Y	[3]				
(iii)	(a) R=Ferric chloride (b) P=NaCl Q= $\text{Fe}(\text{OH})_3$ (c) The ppt. remains insoluble in excess of NaOH	[1] [2] [1]				
Question 5						
(i)	<table><tr><th>M_2P</th><th>MP</th></tr><tr><td>44g of M_2P = 1 Mole 20 g of M_2P = $1 \times 20 / 44 = 0.44$ moles</td><td>30 g of MP = 1mole 20g of MP= $1 \times 20 / 30 = 0.66$ moles</td></tr></table> Therefore, M_2P has a lesser number of moles.	M_2P	MP	44g of M_2P = 1 Mole 20 g of M_2P = $1 \times 20 / 44 = 0.44$ moles	30 g of MP = 1mole 20g of MP= $1 \times 20 / 30 = 0.66$ moles	[2]
M_2P	MP					
44g of M_2P = 1 Mole 20 g of M_2P = $1 \times 20 / 44 = 0.44$ moles	30 g of MP = 1mole 20g of MP= $1 \times 20 / 30 = 0.66$ moles					

(ii)	(a) No, both will liberate hydrogen gas which burns with a pop sound. (b) Yes, with zinc nitrate white ppt. will be formed which is soluble in excess of ammonium hydroxide but with lead nitrate white ppt. is formed which remains insoluble in excess.	[2]
(iii)	A = $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$ B = $\text{Zn} + \text{S} \rightarrow \text{ZnS}$ C = $\text{ZnSO}_4 + 2\text{NaOH} \rightarrow \text{Zn(OH)}_2 + \text{Na}_2\text{SO}_4$ or with NH_4OH	[3]
(iv)	(a) Period 3, Group 17 (b) less	[2] [1]
Question 6		
(i)	(a) P- Ammonia (b) Q- Oxygen (c) R- Oxygen	[3]
(ii)	(a) 252 g of Ammonium dichromate = 1mole 126 g of Ammonium dichromate = 0.5 moles (b) 252 g of ammonium dichromate gives 152 g of chromic oxide 126 g of ammonium dichromate provides $152 \times 126 / 252 = \mathbf{76 \text{ g}}$ of chromic oxide (c) 252 g of ammonium dichromate produces 22.4 l of nitrogen 126 g of ammonium dichromate produces $22.4 \times 126 / 252 = \mathbf{11.2 \text{ l}}$ of nitrogen	[3]
(iii)	(a) Test tube B (b) Ammonia gas (c) Green / Greenish yellow (d) $\text{NH}_4\text{Cl} + \text{NaOH} \rightarrow \text{NaCl} + \text{NH}_3 + \text{H}_2\text{O}$	[4]
Question 7		
(i)	Ratio is 1:1 $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$	[2]

(ii)	Formula - P_2Q Molecular mass - $2 \times 23 + 16$ $= 46 + 16$ $= 62$ So, 1 mole of the compound = 62 g	[2]
(iii)	(a) $CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$ (b) $S + \text{conc. } 6HNO_3 \rightarrow H_2SO_4 + 6NO_2 + 2H_2O$ (c) $C_2H_5COONa + NaOH \xrightarrow{CaO} C_2H_6 + Na_2CO_3$	[3]
(iv)	(a) Esterification (b) dehydrating agent (c) Fruity smell is obtained	[3]
Question 8		
(i)	(a) 2 (b) Group 2 / Alkaline earth metals (c) $Z(OH)_2$	[3]
(ii)	(a) ammonium ion  (b) nitrogen molecule [Atomic No.: N = 7, H = 1] 	[2] [1]
(iii)	(a) G (b) D (c) E (d) C	[4]