ICSE 2025 EXAMINATION

SPECIMEN QUESTION PAPER

CHEMISTRY

(SCIENCE PAPER – 2)

Maximum Marks: ***80***

Time allowed: ***Two hours***

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during first ***15*** *minutes.*

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Section A *is compulsory. Attempt* ***any four*** *questions from* ***Section B****.*

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.

SECTION A

*(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) An aqueous solution of copper sulphate turns colourless on electrolysis.

Which of the following could be the electrodes?

P. anode: copper; cathode: copper

Q. anode: platinum; cathode: copper

R. anode: copper; cathode: platinum

(a) only P

(b) only Q

(c) only R

(d) both Q and R **[Understanding]**

(ii) A compound P is heated in a test tube with sodium hydroxide solution. A red litmus paper held at the mouth of the test tube turns blue.

Which of the following could compound P be?

(a) zinc sulphate

(b) copper sulphate

(c) ferrous sulphate

(d) ammonium sulphate **[Understanding]**

(iii) Which of the following would weigh the least?

(Atomic masses C=12, O=16, Na=23)

(a) 2 gram atoms of oxygen

(b) one mole of sodium

(c) 22.4 litres of carbon dioxide at STP

(d) 6.023×10^{22} atoms of carbon **[Applications]**

(iv) The equation below shows the reaction between element 'X' and dilute sulphuric acid.

$$X(s) + H_2SO_4\,(aq.) \rightarrow XSO_4\ (aq.) + H_2\,(g)$$

Which particles are responsible for conducting electricity in dilute sulphuric acid and compound XSO_4?

(a) Electrons

(b) Only positive ions

(c) Only negative ions

(d) Both positive and negative ions **[Understanding]**

(v) **Assertion (A):** Dry hydrogen chloride gas is collected by the upward displacement of air.

Reason (R): Hydrogen chloride gas is lighter than air.

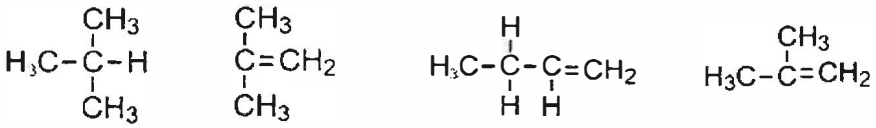
(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true **[Understanding]**

(vi) The structures of four hydrocarbons are shown below:



How many isomers of butene are there?

(a) 1

(b) 2

(c) 3

(d) 4 **[Analysis]**

(vii) Element 'P' has electronic configuration 2,8,8,1. The number of chlorine atoms present in the chloride of 'P' is:

(a) 2

(b) 1

(c) 3

(d) 4

[Understanding & Application]

(viii) $_1H^2$ is an isotope of hydrogen. In the modern Periodic Table it will:

(a) be placed before hydrogen

(b) be placed after hydrogen

(c) be placed at the same position as hydrogen

(d) not have any position in the Periodic Table **[Understanding]**

(ix) A nitrate which forms a precipitate with ammonium hydroxide and is also soluble in excess of it:

(a) ferrous nitrate

(b) ferric nitrate

(c) lead nitrate

(d) copper nitrate **[Understanding]**

(x) Which of the following electronic configuration represents the most electropositive element?

(a) 2, 1

(b) 2, 8, 1

(c) 2, 2

(d) 2, 8, 2 **[Understanding]**

(xi) **Assertion (A):** Alkali metals do not form dipositive ions.

Reason (R): After loss of one electron alkali metals achieve stable electronic configuration of noble gases.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true **[Understanding]**

(xii) The ratio between the volumes occupied by 4.4 grams of carbon dioxide and 2 grams of hydrogen gas is:

(a) 2.2 :1

(b) 1: 2.2

(c) 1:10

(d) 10:1 **[Application]**

(xiii) Aqueous lead (II) nitrate can be distinguished from aqueous zinc nitrate by adding any of the following solution in excess, except:

(a) aqueous potassium chloride

(b) aqueous sodium sulphate

(c) dilute sulphuric acid

(d) sodium hydroxide solution **[Understanding]**

(xiv) Which of the following about oxides is correct?

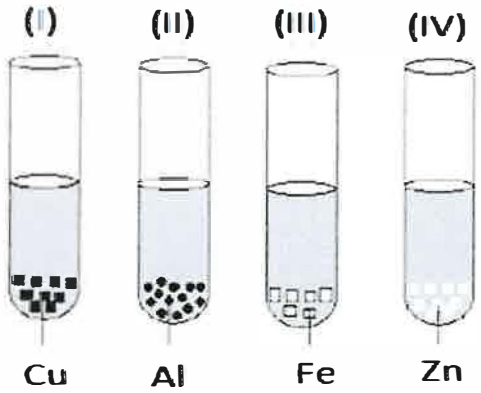
(a) A basic oxide is an oxide of a non-metal

(b) Acidic oxides contain ionic bonds

(c) Amphoteric oxides contain a metal

(d) Basic oxides are always gases **[Understanding]**

(xv) A student takes Cu, Al, Fe and Zn strips, separately in four test tubes labeled as I, II, III and IV respectively. He adds 10 ml of freshly prepared ferrous sulphate solution to each test tube and observes the colour of the metal residue in each case.



He would observe a black residue in the test tubes:

(a) (I) and (II)

(b) (I) and (III)

(c) (II) and (III)

(d) (II) and (IV)

[Understanding & Application]

Question 2

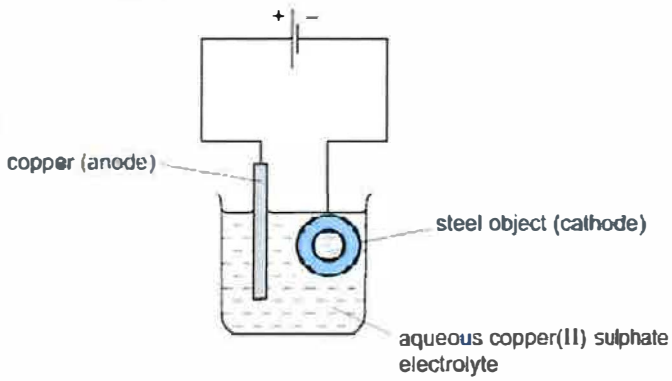
(i) Electroplating steel objects with silver involves a three-step process. [5]

step 1 A coating of copper is applied to the object.

step 2 A coating of nickel is applied to the object.

step 3 The coating of silver is applied to the object.

(a) A diagram of the apparatus used for step 1 is shown.



1. The chemical process taking place on the surface of the object is $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$
   What is the observation seen on the surface of the object?

2. Explain why the concentration of copper ions in the electrolyte remains constant throughout step1.

(b) Give two changes which would be needed in order to coat nickel onto the object in step 2.

(c) Write down the reaction taking place at the positive electrode during step 3. **[Analysis & Application]**

(ii) Match the following Column A with Column B. [5]

	Column A		Column B
(a)	Aluminium	1.	Covalent compound
(b)	Sulphuric acid	2.	Carbonate ore
(c)	Calcination	3.	Hall Heroult's process
(d)	Calcium Chloride	4.	Contact Process
(e)	Carbon tetrachloride	5.	Electrovalent compound

[Recall & Understanding]

(iii) Complete the following by choosing the correct answers from the bracket: [5]

(a) If an element has one electron in the outermost shell, then it is likely to have the _____ *[smallest/ largest]* atomic size amongst all the elements in the same period.

(b) _____ *[sulphuric acid/ hydrochloric acid]* does not form an acid salt.

(c) A _____ *[reddish brown/ dirty green]* coloured precipitate is formed when ammonium hydroxide is added to a solution of ferrous chloride.

(d) Alkynes undergo _____ *[addition / substitution]* reactions.

(e) An _____ *[alkaline/acidic]* solution will turn methyl orange solution pink or red. **[Recall & Understanding]**

(iv) Identify the following: [5]

(a) A bond formed between two atoms by sharing of a pair of electrons, with both electrons being provided by the same atom.

(b) A salt formed by the complete neutralization of an acid by a base.

(c) A reaction in which the hydrogen of an alkane is replaced by a halogen.

(d) The energy required to remove an electron from a neutral gaseous atom.

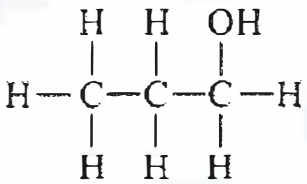
(e) A homogenous mixture of two or more metals or a metal and a non-metal in a definite proportion in their molten state. **[Recall]**

(v) (a) Draw the structural diagram for the following compounds: [5]

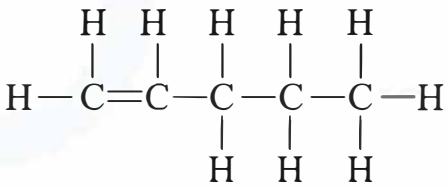
1. propanoic acid
2. pentan-2-ol
3. 2, 2 dibromo butane

(b) Give the IUPAC name of the following organic compounds:

1.



2.



[Understanding]

SECTION B (40 Marks)

*(Attempt **any four** questions.)*

Question 3

(i) Identify the **reactant** and write the balanced equation for the following: [2]

Nitric acid reacts with compound Q to give a salt $Ca(NO_3)_2$, water and carbon dioxide.

[Understanding]

(ii) What property of Sulphuric acid is exhibited in each of the following cases: [2]

(a) In the preparation of HCl gas when it reacts with Sodium chloride.

(b) When concentrated Sulphuric acid reacts with Copper to produce Sulphur dioxide gas.

[Understanding]

(iii) The electron affinity of an element X is greater than that of element Y. [3]

(a) How is the oxidising power of X likely to compare with that of Y?

(b) How is the electronegativity of X likely to compare with that of Y?

(c) State whether X is likely to be placed to the left or to the right of Y in the periodic table?

[Application]

(iv) You are provided with the list of chemicals mentioned below in the box: [3]

Sodium hydroxide solution, copper carbonate, zinc, hydrochloric acid, copper, dilute sulphuric acid, chlorine, iron

Using suitable chemicals from the list given, write balanced chemical equation for the preparation of the salts mentioned below:

(a) copper sulphate

(b) sodium zincate

(c) ferric chloride

[Understanding & Application]

Question 4

(i) The following questions relate to the extraction of Aluminium by electrolysis. [2]

(a) Name the other aluminium containing compound added to alumina.

(b) Give a balanced equation for the reaction that takes place at the cathode. **[Recall]**

(ii) Pratik heated 11.2 grams of element 'M' (atomic weight 56) with 4.8 grams of element 'N' (atomic weight 16) to form a compound. Find the empirical formula of the compound obtained by Pratik. [2] **[Application]**

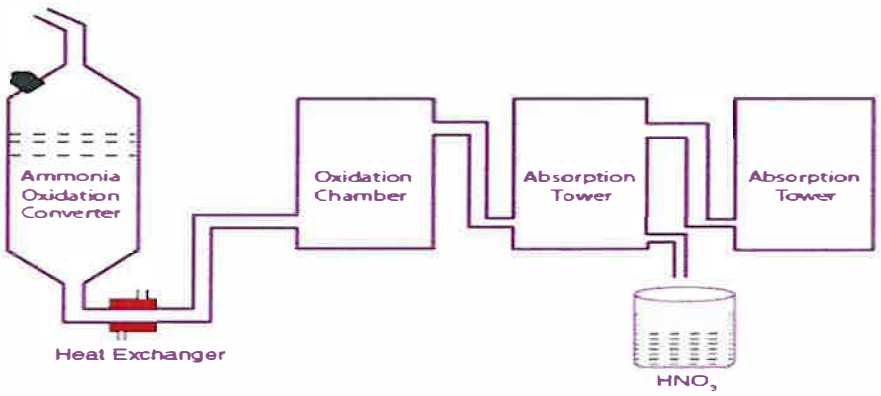
(iii) Give balanced equations for each of the following: [3]

(a) Action of warm water on Aluminium nitride.

(b) Oxidation of carbon with conc. Nitric acid.

(c) Laboratory preparation of ethanol by using chloroethane and aqueous sodium hydroxide. **[Recall & Understanding]**

(iv) The diagram given below is a representation of the Industrial preparation of Nitric acid by Ostwald's process. With respect to the process answer the following questions: [3]



(a) Write the temperature and the catalyst required during the catalytic oxidation of ammonia.

(b) Give balanced chemical equation for the reaction occurring during the conversion of nitrogen dioxide to nitric acid. **[Recall]**

Question 5

(i) (a) Ranjana wants to prove that ammonia is a reducing agent. To demonstrate this, she passes ammonia gas over heated copper oxide. What will she observe? [2]

(b) Write a balanced chemical equation for the above reaction. **[Understanding]**

(ii) Name the alloy which is made up of: [2]

(a) Copper, Zinc and Tin

(b) Lead and Tin **[Recall]**

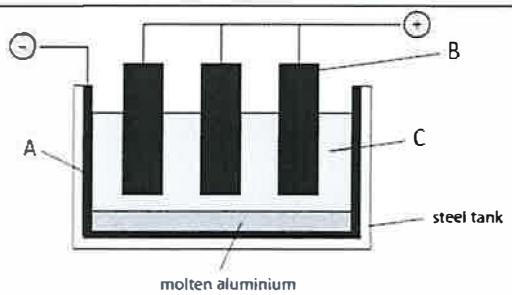
(iii) Abhishek was given a salt 'X' which was white in colour for analysis. On strong heating it produced a yellow residue, a colourless gas and also a reddish-brown gas. The solution of the salt 'X' when tested with excess of ammonium hydroxide produced a chalky white insoluble precipitate. [3]

(a) Name the coloured gas evolved when Abhishek heated the salt strongly.

(b) Which cation was present in the sample given to Abhishek?

(c) Identify the salt given to Abhishek for analysis. **[Understanding]**

(iv) Given below in column A is a schematic diagram of the electrolytic reduction of alumina. Identify the parts labelled as A, B and C with the correct options from the Column B. [3]

Column A		Column B
	1.	Platinum
	2.	Anode
	3.	Cathode
	4.	Electrolyte mixture
	5.	Bauxite

[Understanding]

Question 6

(i) Element 'X' forms an oxide with the formula X_2O_3 which is a solid with high melting point. 'X' would most likely be placed in the group of the Periodic Table as: [2]

1. (a) Na

   (b) Mg

   (c) Al

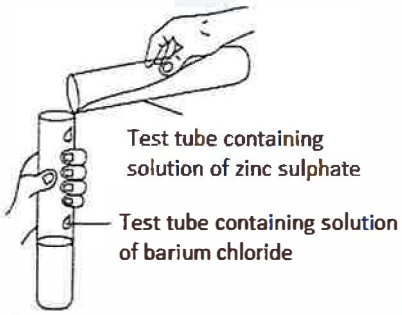
   (d) Si

2. Justify your answer in the above question (1). **[Application]**

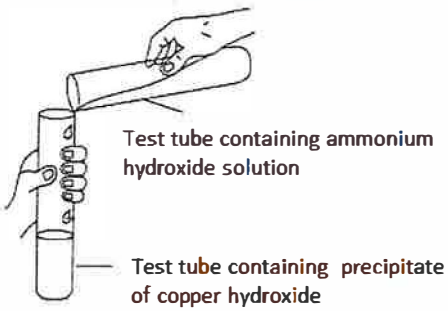
(ii) A student was asked to perform two experiments in the laboratory based on the instructions given: [2]

Observe the picture given below and state one observation for each of the Experiments 1 and 2 that you would notice on mixing the given solutions.

(a) Experiment 1



(b) Experiment 2



[Understanding]

(iii) Copper sulphate solution is electrolysed using copper electrodes. [3]

(a) Which electrode [cathode or anode] is the oxidizing electrode? Why?

(b) Write the equation for the reaction occurring at the above electrode. **[Understanding]**

(iv) X [2, 8, 7] and Y [2, 8, 2] are two elements. Using this information complete the following: [3]

(a) _____ is the metallic element.

(b) Metal atoms tend to have a maximum of _____ electrons in the outermost shell.

(c) _____ is the reducing agent. **[Understanding]**

Question 7

(i) One variety of household fuel is a mixture of propane (60%) and butane (40%). If 20 litres of this mixture is burnt, find the total volume of carbon dioxide added to the atmosphere. The combination reactions can be represented as: [3]

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

$2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ **[Application]**

(ii) Rohit has solution X, Y and Z that has pH 2, 7 and 13 respectively. [3]

Which solution.

(a) will liberate sulphur dioxide gas when heated with sodium sulphite

(b) will liberate ammonia gas when reacted with ammonium chloride

(c) will not have any effect on litmus paper? **[Application]**

(iii) 8.2 grams of calcium nitrate is decomposed by heating according to the equation [4]

$2Ca(NO_3)_2 \rightarrow 2CaO + 4NO_2 + O_2$

Calculate the following:

(a) Volume of nitrogen dioxide obtained at STP

(b) Mass of CaO formed

[Atomic weights: Ca –40 , N—14, O—16] **[Understanding]**

Question 8

(i) State giving reasons if: [2]

(a) zinc and aluminium can be distinguished by heating the metal powder with concentrated sodium hydroxide solution.

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

(ii) Draw the electron dot diagram of ammonium ion. [2] **[Recall & Understanding]**

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

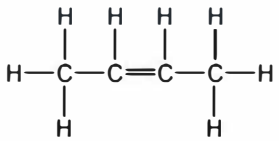
(a) Laboratory preparation of ethyne from calcium carbide.

(b) Conversion of acetic acid to ethyl acetate.

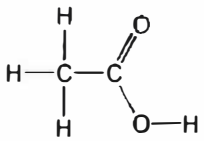
(c) Laboratory preparation of nitric acid. **[Recall]**

(iv) The structures of six organic compounds are shown: [3]

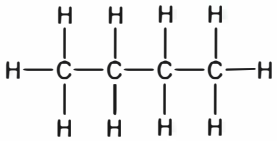
A



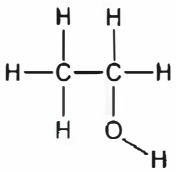
B



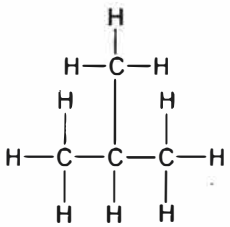
C



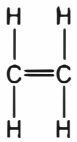
D



E



F



(a) Identify two of the compounds that are members of the same homologous series but are **not** isomers.

(b) Which two compounds are isomers of each other? **[Understanding & Application]**

(c) F can be prepared from D. Give a chemical equation for the reaction.

ICSE 2025 SPECIMEN

DRAFT MARKING SCHEME – CHEMISTRY (SCIENCE PAPER 2)

Question 1 [15x1]

(i)	(b)	only Q
(ii)	(d)	ammonium sulphate
(iii)	(d)	6.023×10^{22} atoms of carbon
(iv)	(d)	Both positive and negative ions
(v)	(c)	A is true but R is falseww
(vi)	(b)	2
(vii)	(b)	1
(viii)	(c)	be placed at the same position as hydrogen
(ix)	(d)	copper nitrate
(x)	(b)	2,8,1
(xi)	(a)	Both A and R are true and R is the correct explanation of A
(xii)	(c)	1:10
(xiii)	(d)	sodium hydroxide solution
(xiv)	(c)	Amphoteric oxides contain a metal
(xv)	(d)	(II) and (IV)

Question 2

(i) (a) (1) reddish brown deposit/ pink deposit/ mass increases [2+2+1]

(2) As anode released Copper ions the concentration of copper ions does not decrease

(b) Anode should be made up of Nickel and the electrolyte should be aq. Nickel sulphate or any salt solution of Nickel

(c) $Ag \rightarrow Ag^+ + e^-$

(ii) (a) 3 [5x1]

(b) 4

(c) 2

(d) 5

(e) 1

(iii) (a) largest [5x1]

(b) hydrochloric acid

(c) dirty green

(d) addition

(e) acidic

(iv) (a) Coordinate bond [5x1]

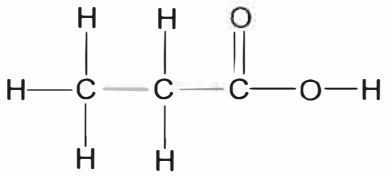
(b) Normal salt

(c) Substitution

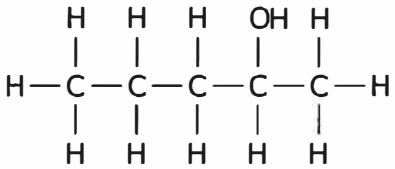
(d) ionisation potential

(e) alloy

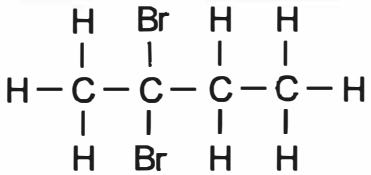
(v) (a) 1. [3+2]



2.



3.



(b) 1. 1- propanol

2. pentene/ pent-1-ene

Question 3

(i) Q is Calcium carbonate/ calcium bicarbonate [2]

$CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$

or

$Ca(HCO_3)_2 + 2HNO_3 \rightarrow Ca(NO_3)_2 + 2H_2O + 2CO_2$

(ii) (a) Non volatile property [2]

(b) Oxidising property

(iii) (a) X has more oxidising power than Y [3]

(b) X will be more electronegative than Y

(c) X will be placed to the right of Y

(iv) (a) $CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + H_2O + CO_2$ [3]

(b) $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$

(c) $2Fe + 3Cl_2 \rightarrow 2FeCl_3$

Question 4

(i) (a) Cryolite [2]

(b) $Al^{+3} + 3e^- \rightarrow Al$

(ii) M = 11.2/56= 0.2 [2]

N = 4.8/16 = 0.3

or

M:N = 2:3

Empirical formula is M_2N_3

(iii) (a) $AlN + 3H_2O \rightarrow Al(OH)_3 + NH_3$ [3]

(b) $C + 4HNO_3 \rightarrow CO_2 + 2H2O + 4NO_2$

(c) C_2H_5Cl + aq. NaOH → C_2H_5OH + NaCl

(iv) (a) 800^0C and Pt [3]

(b) $4NO_2 + 2H_2O + O_2 \rightarrow 4HNO_2$

Question 5

(i) (a) Black copper oxide changes to reddish brown/ pink copper [2]

(b) $CuO + 2NH_3 \rightarrow Cu + 3H_2O + N_2$

(ii) (a) Bronze [2]

(b) Solder

(iii) (a) Nitrogen dioxide [3]

(b) Lead ions

(c) Lead nitrate

(iv) A- Cathode [3]

B- Anode

C- Electrolytic mixture

Question 6

(i) 1. c/Al [2]

2. It has 3 electrons in the outer most shell/ valency 3 like that of Al

(ii) (a) White ppt. [2]

(b) Blue ppt. dissolves to form an inky blue/deep blue solution.

(iii) (a) Anode; electrons are lost by copper [3]

(b) $Cu \rightarrow Cu^{+2} + 2e^-$

(iv) (a) Y [3]

(b) 3

(c) Y

Question 7

(i) Mixture contains 12 lit of propane and 8 lit of butane [3]

Carbon dioxide released by propane is 36 lit

Carbon dioxide released by butane is 32 lit

Total volume of carbon dioxide added to the atmosphere is 68 lit.

(ii) (a) X [3]

(b) Z

(c) Y

(iii) (a) 328 g of calcium nitrate liberated 4x22.4 lit of NO_2 [4]

8.2 g of calcium nitrate liberated 4x22.4x 8.2/328 =0.224 lit of NO_2.....

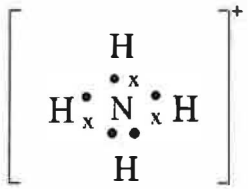
(b) 328 g of calcium nitrate produces 2x56 g of CaO

8.2g of calcium nitrate produces 2x56x8.2/328= 2.8g of CaO

Question 8

(i) (a) No, both will form a white ppt which is soluble in excess of sodium hydroxide [2]

(b) Yes, white ppt. will be formed with lead nitrate but no ppt. is formed with calcium nitrate/ or no visible reaction

(ii)  [2]

(iii) (a) $CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$ [3]

(b) $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

(c) $NaNO_3 + \text{conc. } H_2SO_4 \rightarrow NaHSO_4 + 2HNO_3$

(iv) (a) A and F [3]

(b) C and E

(c) $C_2H_5OH \xrightarrow[\text{conc. } H_2SO_4]{170^oC} C_2H_4 + H_2O$