SECTION A (40 Marks)

Compulsory: Attempt all questions.

Question 1

(a) Directions: Each question in this part is followed by four possible choices of answers. Choose the correct answer with key and write it in the space provided in the question booklet. **[15]**

(i) The elements of group VII A in the Periodic Table are called

A alkaline earth metals.
B alkali metals.
C inert gases.
D halogens.

Answer:……

(ii) The number of molecules present in one mole of sulphur dioxide is

A 6.023×10^{21} molecules.
B 6.023×10^{22} molecules.
C 6.023×10^{23} molecules.
D 6.023×10^{24} molecules.

Answer:……

(iii) On moving down a group in the Periodic Table, the electro negativity of the elements

A increases.
B decreases.
C remains same.
D decreases and then increases.

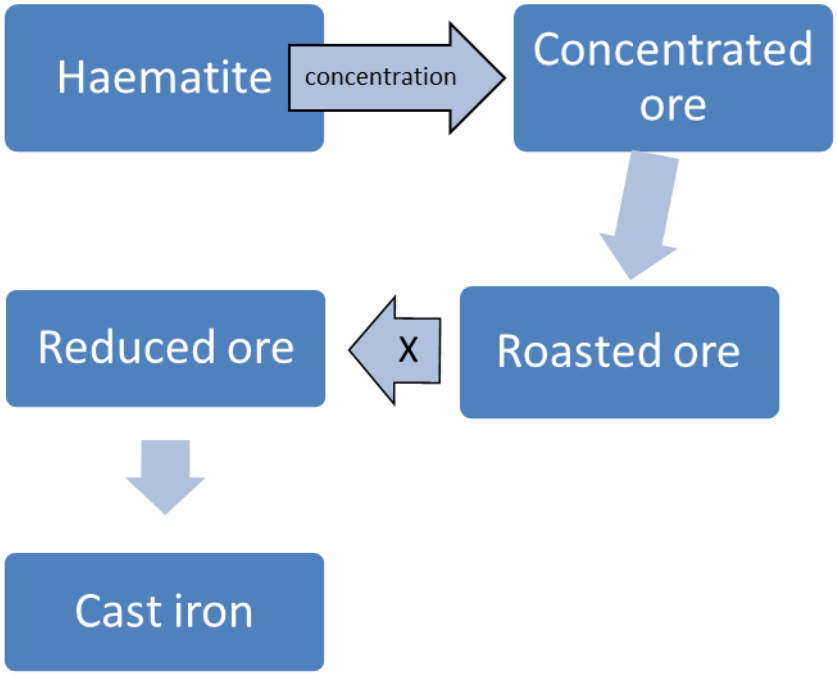
Answer:……

(iv) The percentage composition of calcium in calcium sulphate [$CaSO_4$] is

A 47.05%.
B 29.4%.
C 28.5%.
D 23.5%.

Answer:……

(v) The flow chart given below shows the extraction of iron.



In the above process, what happens in stage X?

A smelting
B aluminothermy
C reducing by heating
D electrolytic reduction

Answer:……

(vii) When Bikash added ammonium hydroxide to an aqueous salt solution X, a pale blue precipitate is formed. This pale blue precipitate shows the presence of

A ferrous ion.
B copper ion.
C ferric ion.
D zinc ion.

Answer:…….

(viii) From the following, which has a co-ordinate bond?

A NH_3
B H_3O^+
C H_2O
D CO_3^{2-}

Answer:…….

(ix) Ions get discharged according to their position in the electrochemical series during electrolysis. Which of the following will be discharged the least?

A Ca^{2+}
B Al^{3+}
C Zn^{2+}
D Ag^+

Answer:…….

(x) In the reaction $ZnO + C \rightarrow Zn + CO$, the reducing agent is

A ZnO.
B CO_2.
C Zn.
D C.

Answer:…….

(xi) The ratio of hydrogen and nitrogen gases in Haber's process is

A 1:3.
B 3:1.
C 1:10.
D 10:1.

Answer:…….

(xii) Which one of the following weighs the least?

A 1 mole of NH_3
B 1mole of H_2O
C 1 mole of CO_2
D 1 mole of SO_2

Answer:…….

(xiii) While carrying out an investigation, a class X student confirmed that the orange colour of bromine solution in CCl_4 disappears upon adding it to an alkene due to the formation of ethylene dibromide. She concluded that this chemical reaction shows the

A presence of unsaturation in an alkene.
B substitution reaction of alkene with bromine.
C presence of saturation in an unknown alkene.
D presence of single covalent bond between combining atoms.

Answer:…….

(xiv) A compound has the following structural formula $CH_3CH=CH_2$. The IUPAC name of the compound is

A methyl propene.
B propene.
C butane.
D ethane.

Answer:…….

(xv) Lily conducted an experiment to find out the presence of Fe^{2+} ions in a compound by adding NaOH. Which of the observations given below confirms this?

A A dirty green ppt. is formed which is insoluble in excess of NaOH.
B A reddish brown ppt. is formed which is insoluble in excess of NaOH.
C A dull white ppt. is formed which is soluble in excess of NaOH.
D A dirty green ppt. is formed which is soluble in excess of NaOH.

Answer:…….

(b) Fill in the blanks with appropriate words. **[6]**

(i) The group number of an element is equal to the number of …….. electrons.

(ii) The molecular formula of CHO_2 will be…….. when n = 2.

(iii) Cation is formed by …….. of electrons.

(iv) When …….. reacts with conc. hydrochloric acid, it produces dense white fumes.

(v) Magnesium chloride reacts with ammonium hydroxide to form a dull white precipitate of ……

(vi) An object to be electroplated should be always made as ……

(c) ***Match each item under Column A with the most appropriate item in Column B. Rewrite the correct matching pairs in the spaces provided below.*** **[6]**

Column A	**Column B**
i. $MgSO_4.7H_2O$	a) 44.8 litres
ii. NH_4OH	b) haematite
iii. Iron	c) alkene
iv. 34g of NH_3	d) 22.4 litres
v. Sulphuric acid	e) epsom salt
vi. C_nH_{2n}	f) cryolite
	g) Contact process
	h) non-electrolyte
	i) alkane
	j) weak electrolyte

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(d) Correct the following statements by changing only the underlined words. Rewrite the correct statements. **[6]**

(i) The number of moles in 88g of CO_2 is <u>1·5</u>.

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(ii) When copper turnings react with concentrated nitric acid, brown fumes of <u>sulphur dioxide</u> gas is produced.

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(iii) During electrolysis of water, hydrogen gas evolved is collected at anode.

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(iv) In the extraction of aluminium from bauxite, the purification process is carried out by Ostwald's process.

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(v) Substance which on exposure to air absorbs moisture without any change in its state is called as deliquescent substance.

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(vi) The process of extracting metals from their ore is called electrolysis.

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(e) (i) Calcium carbonate decomposes according to the equation given below:

$$CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$$

Calculate the weight of CaO formed when 225gm of limestone decomposes on heating. **[2]**

(ii) Elements X and Y can be represented as $_{11}X^{23}$ and $_{17}Y^{35\cdot5}$. Study the elements carefully and answer the following questions:

1. Which period and group does element X belong to? **[1]**

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2. What is the formula of the compound formed by X and Y? **[1]**

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(iii) Use the equation given below to answer the questions that follow:

$Ca(OH)_2$ (lime water) + $SO_2 \longrightarrow CaSO_3 \downarrow + H_2O$

1. Which chemical property of SO_2 is shown in the above equation? **[1]**

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2. What change would you observe, if CO_2 is passed instead of SO_2? **[1]**

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(iv) Why is spurious alcohol not fit for human consumption? Give a reason. **[1]**

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SECTION B (40 Marks)

Attempt any four questions.

Question 2

(a) (i) Refer to the table given below and answer the questions that follow:

Elements	**Atomic number**
A	3
B	8
C	10
D	16

1. Write the electronic configuration of element B. **[½]**

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2. What is the valency of the element D? **[½]**

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3. Which element is an inert gas? **[½]**

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4. Which element is a metal? **[½]**

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(ii) Differentiate between the following in the table given below:

1. **[1]**

Concentrated acid	Dilute acid

2. **[1]**

Strong base	Weak base

(b) An organic compound has the following percentage composition by mass:
Carbon = 40%, hydrogen = 6.67% and oxygen = 53.33%.

(i) Calculate the empirical formula of the organic compound. **[2]**

(ii) Calculate the molecular formula when the molecular mass of the organic compound is 180. **[2]**

(c) (i) Name the catalyst used for the industrial preparation of ammonia by Haber's process. **[1]**

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(ii) Complete the table given below. **[1]**

Sl. No.	**Homologous series**	**Functional group**
1.	Alcohol	……
2.	Alkyne	……

Question 3

(a) (i) Dry ammonia does not affect litmus. Why? **[1]**

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(ii) Which process is used to obtain zinc oxide from concentrated zinc blende? **[1]**

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(iii) Give reasons for the following:

1. The ionisation potential of elements decreases on moving down a group. **[1]**

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2. The metallic character of elements decreases on moving from left to right across a period. **[1]**

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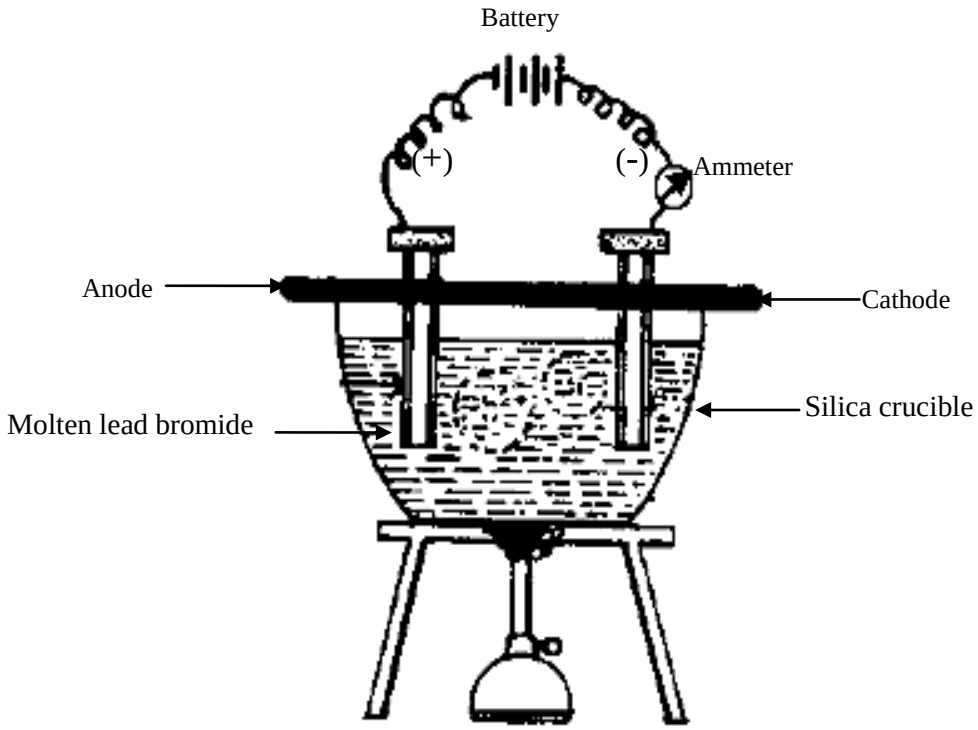
(b) (i) Study the diagram given below and answer the questions that follow:



1. Why is a silica crucible used for the electrolysis of $PbBr_2$? **[1]**

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2. Name the ions that migrate to the cathode and the anode. **[1]**

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(ii) Study the reaction given below:

$HCl + NaOH \rightarrow NaCl + H_2O$

1. Name the type of reaction. **[1]**

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2. Rewrite the balanced equation by using H_2SO_4 instead of HCl. **[1]**

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(c) Complete the following table: **[2]**

Sl. No.	Gas	Drying agent	Collection of gas
1.	NH_3	…….	……..
2.	SO_2	……	…….

Question 4

(a) (i) Study the elements given below and answer the questions that follow:

$_{15}A^{31}$ $_{12}B^{24}$ $_{14}C^{28}$ $_{13}D^{27}$

1. Arrange the above elements in the increasing order of atomic size. **[1]**

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2. Draw the atomic structure of the element that belongs to group II A. **[1]**

(ii) State ***two*** factors that influence the ionisation potential of an element. **[1]**

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(iii) Give reasons for the following:

1. Hydrochloric acid is a polar covalent compound. **[1]**

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2. Ionic compounds in their molten state are good conductors of electricity. **[1]**

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(b) (i) 1. State Avogadro's law **[1]**

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2. Define the term 'Gram atomic mass'. **[1]**

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3. What is a flux? **[1]**

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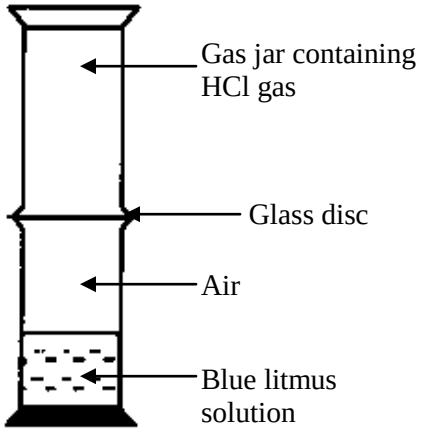
(ii) Study the diagram shown below and answer the questions that follow:



1. What change will you observe in the blue litmus solution upon removing the glass disc? **[1]**

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2. What can you conclude from the above experiment? **[1]**

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Question 5

(a) (i) Mention any ***two*** conditions for the formation of an ionic compound. **[1]**

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(ii) Complete the table given below: **[2]**

Sl. No.	**Salt solution of**	**Colour of precipitate with NaOH**	**Solubility in excess of NaOH**
1	……	Reddish brown	……..
2	Aluminium	……..	…….

(b) (i) Write down the missing compounds in the reactions given below: **[2]**

1. $CH_4 + Cl_2 \xrightarrow{-HCl} ..... \xrightarrow{+Cl_2} ..... + HCl$

2. $CH_3OH \xrightarrow[H_2SO_4]{K_2Cr_2O_7} ..... \rightarrow HCOOH$

(ii) 1. Electrolysis is an example of a redox reaction. Explain. **[1]**

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2. Give ***two*** applications of electrolysis. **[1]**

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(c) (i) Calculate the molecular mass of:

1. $FeSO_4.7H_2O$, **[1]**

2. NH_4Cl. **[1]**

(ii) What happens when a mixture of methane and oxygen in the molar ratio of 9:1 is compressed to 120 atm and passed through a copper tube at 200°C? **[1]**

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Question 6

(a) (i) Define 'precipitate' in your own words. **[1]**

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(ii) Distinguish between the following:

1. **[1]**

Calcination	Smelting

2. **[1]**

Minerals	Ores

(iii) Why is limestone used in the blast furnance? **[1]**

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(b) (i) From the equation $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$,

1. Calculate the volume of oxygen required for the complete combustion of 250ml of acetylene. **[1]**

2. What volume of CO_2 will be produced? **[1]**

(ii) With reference to the electrolysis of aqueous copper sulphate solution using copper electrodes, answer the following questions:

1. Why does the blue colour of the electrolyte remain unchanged? **[1]**

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2. Give an anode reaction to justify the above reason. **[1]**

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(c) Calculate the number of molecules present in 132gm of carbon dioxide. **[2]**

Question 7

(a) (i) Study the reaction given below and answer the question that follows:

$$C_2H_6 + Cl_2 \xrightarrow[\text{sunlight}]{\text{Diffused}} C_2H_5Cl + HCl$$

Name the reaction. **[1]**

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(ii) Why are alkenes more reactive than alkanes? **[1]**

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(iii) What change will you observe in the zinc sulphate solution when:

1. A small amount of ammonium hydroxide is added? **[1]**

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2. An excess of ammonium hydroxide is added? **[1]**

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(b) (i) What happens to hydrated copper sulphate when treated with concentrated sulphuric acid? Why? **[2]**

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(ii) Give a balanced chemical equation to justify your answer. **[1]**

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(c) (i) Alkali metal nitrate like $NaNO_3$ can act as an oxidizing agent. Justify this statement. **[1]**

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(ii) What is an alloy? **[1]**

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(iii) Name the gas which is colourless, poisonous and has a foul smell of rotten eggs. **[1]**

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Atomic weights of elements

Elements	**Atomic weights**	**Elements**	**Atomic weights**
Hydrogen	**1**	Phosphorus	**31**
Helium	**4**	Sulphur	**32**
Lithium	**7**	Chlorine	**35.5**
Beryllium	**9**	Potassium	**39**
Carbon	**12**	Calcium	**40**
Nitrogen	**14**	Iron	**56**
Oxygen	**16**	Copper	**63.5**
Magnesium	**24**	Zinc	**65**
Aluminium	**27**	Bromine	**80**
Silicon	**28**		

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