Alternative No:	Index No:	0	1	0	1	1						

Supervising Examiner's/Invigilator's initial:

Paper 2 (Chemistry) **Writing Time: $1\frac{1}{2}$ Hours**

Total Marks : 80

READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. Do **not** write for the first **fifteen minutes**. This time is to be spent reading the questions. After having read the questions, you will be given **one and a half hours** to answer all questions.
2. A list of **ATOMIC WEIGHTS** of some elements **for solving numerical problems** is given at the end of the question booklet.

3. Write the remaining seven digits of your **index number** in the space provided on the **top right hand corner of this cover page only**.
4. In this paper, there are **two** sections: **A** and **B**. Section **A** is compulsory. You are expected to attempt **any four** questions from Section **B.**

5. The intended marks for questions or parts of questions, are given in brackets [ ].
6. Read the directions to each question carefully and write **all** your answers in the space provided in the **question booklet** itself.

7. Remember to write **quickly** but **neatly**.
8. **Do not** remove or tear off any pages from the question booklet.

9. **Do not** draw lines or pictures **on** or **in** the question booklet to beautify it.
10. **Do not** leave the examination hall before you have made sure that you have answered all the questions.

For Chief Marker's and Markers' Use Only

Question Number															Total	Chief Marker's Signature ↓
Award																
Markers' initial →																

This booklet contains 24 pages.

SECTION A (40 Marks)

Compulsory: To be attempted by all candidates.

Question 1

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

(i) The acid produced by the catalytic oxidation of ammonia is

A urea.
B nitric acid.
C ammonium nitrate.
D ammonium chloride.

Answer:…….

(ii) Hydrocarbons with double or triple bond are called

A alkenes.
B alkynes.
C saturated hydrocarbons.
D unsaturated hydrocarbons.

Answer:…….

(iii) The relative molecular weight of $MgSO_4$ is

A 60.
B 72.
C 120.
D 144.

Answer:…….

(iv) The precipitate formed by the action of ammonium hydroxide on copper sulphate is blue in colour. When excess ammonium hydroxide is added, the colour of the precipitate becomes

A green.
B deep blue.
C colourless.
D reddish brown.

Answer:…….

(v) Which one of the following is the correct arrangement of the elements in the increasing order of their electron affinity?

A B > C > N > O > F
B F > O > N > C > B
C B < C < N < O < F
D F < O < N < C < B

Answer:…….

(vi) The number of molecules in 14g of nitrogen is

A 3.0115×10^{22}.
B 3.0155×10^{23}.
C 6.023×10^{22}.
D 6.023×10^{23}.

Answer:……

(vii) In the Haber's process for the manufacture of ammonia, the catalyst used is

A iron.
B nickel.
C platinum.
D molybdenum.

Answer:……

(viii) In the electrolysis of $CuSO_4$ solution using copper electrodes, neither SO_4^{2-} nor OH^- get discharged at the anode because

A anode becomes inert.
B anode becomes active.
C concentration of the ions is same.
D concentration of the ions is very low.

Answer:……

(ix) Sulphuric acid reacts with sugar to give a black spongy mass. The property of sulphuric acid depicted in the above phenomenon is

A reducing in nature.
B oxidizing in nature.
C dehydrating in nature.
D hygroscopic in nature.

Answer:……

(x) The ores that are usually calcinated to convert into their oxides are

A carbonates.
B sulphides.
C sulphates.
D silicates.

Answer:……

(xi) A patient suffering from gastritis is given antacid tablets. The type of reaction that takes place is

A decomposition.
B neutralization.
C displacement.
D precipitation.

Answer:…….

(xii) A gas cylinder can hold 35.5 kg of chlorine at room temperature and pressure. What weight of sulphur dioxide can it hold under similar conditions of temperature and pressure?

A 128 kg
B 64 kg
C 32 kg
D 16 kg

Answer:…….

(xiii) The fountain experiment demonstrates a similar property of ammonia and hydrogen chloride gases. This property is the

A basic nature.
B acidic nature.
C neutral nature.
D extreme solubility.

Answer:…….

(xiv) Which of the following contains the largest number of molecules?

A 28g of iron
B 15g of sodium
C 14g of nitrogen
D 2g of hydrogen

Answer:…….

(xv) The type of bond between two equally electronegative elements is

A ionic bond.
B dative bond.
C covalent bond.
D chemical bond.

Answer:…….

(b) Fill in the blanks with appropriate words. **[5]**

(i) The type of bond formed when a pair of electrons is donated by an element in the formation of a compound is ……..

(ii) The mass number of light elements is …….. the atomic number.

(iii) The precipitate formed by ferric chloride when it reacts with sodium hydroxide is …… in colour.

(iv) When a metal carbonate reacts with a dilute acid, the products formed are ....., water and .....

(v) The preferential discharge of ion takes place at an electrode when ions are of …….. charge.

(c) Correct the following statements by changing only the underlined word/s. Rewrite the correct statements.

(i) The metallic property exhibited by graphite is <u>ductility</u>.

……

……

(ii) Sulphur dioxide is used as a <u>bleaching agent</u> to remove excess chlorine from bleached materials.

……

……

……

(iii) Two flasks are of equal volume. One flask contains 2 grams of oxygen and the other, 2 grams of hydrogen. If N molecules of hydrogen are present, the number of molecules of oxygen will be <u>6.023×10^{23}.</u>

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(iv) In the preparation of an acidic gas, the drying agent used is <u>quick lime</u>.

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(v) The type of salt produced when a metallic oxide reacts with a concentrated alkali is called <u>complex salt</u>.

……

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

Column A	**Column B**
(i) Methyl alcohol	(a) light and strong
(ii) Vapour density	(b) decorative pieces
(iii) Aircraft parts	(c) antifreeze
(iv) Electroplating	(d) tough and heavy metal
(v) Electronic configuration	(e) atomic weight
	(f) $\frac{1}{2}\times$molecular weight
	(g) atomic number
	(h) 2 $\times$molecular weight

……

……

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……

(e) What happens: **[4]**

(i) to the colour of $CuSO_4$ solution during electrolysis when copper electrodes are used?

……

……

(ii) when pyridine is added to ethyl alcohol?

……

……

(iii) to H_2S when it is bubbled through H_2O_2?

……

……

(iv) to the electronegativity value with the decrease in the atomic number in a particular period?

……

……

(f) Answer the following questions.

(i) Why are blast furnace gases burnt? **[1]**

……..

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……

……

……

(ii) In a homologous series, the formula of successive compounds differ by a - CH_2 group. If the formula of butane is C_4H_{10}, draw the structural formula of n-pentane. **[1]**

(iii) When ammonium nitrate is heated, it produces a gas which is used for anesthetic purposes. Name the gas. **[1]**

……

……

(iv) Two elements are represented as ${}_{12}X^{24}$ and ${}_{8}Y^{16}$. Write down the formula formed by X and Y. **[1]**

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……

(v) Calcium Nitrate decomposes according to the following equation:

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

If 65.6g of Ca $(NO_3)_2$ is heated, what will be the mass of CaO formed?

[Refer to Atomic weights of elements on page 22.]

SECTION B (40 Marks)

Attempt any four questions

Question 2

(a) Define the following.

(i) Isomerism **[1]**

……

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……

……

(ii) Atomicity **[1]**

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(b) During a science exhibition: two colourless solutions 'A' and ammonium hydroxide were taken. To make it interesting for the spectators, the host added ammonium hydroxi to solution A and a white gelatinous precipitate was formed. After a big round of applause, the host again added more ammonium hydroxide to the mixture to make it colourless.
A poor farmer was spell bound, but you as a science student, write the balanced chemical equations for the two reactions. **[2]**

……

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……

(c) An organic compound was found to have the following percentage composition.
C = 40%, H = 6.7%, O = 53.3 % [C=12, H=1, O=16]
Calculate:

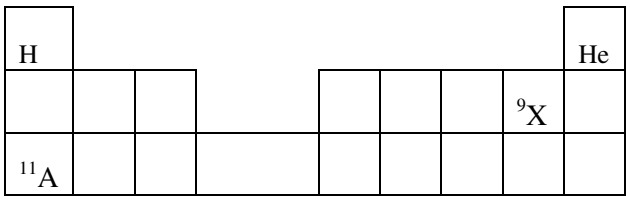
(i) the empirical formula. **[2]**

(ii) the molecular formula, if the vapour density is 60. **[2]**

(i)

(ii)

(d) The chart given below shows a part of a periodic table.



Compare and justify the properties of the elements A and X in terms of:

(i) ionization potential. **[1]**

……

……

……

……

(ii) atomic size. **[1]**

……

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Question 3

(a) With the help of dot diagrams, explain the formation of a hydronium ion. **[2]**

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(b) An electrolytic tank contains Na^+, H^+, Cl^- and OH^-. The electrodes are made of platinum. Answer the following questions with regard to the above statements.

(i) If very dilute aqueous solution of NaCl is used, what will be liberated at the anode? Why? **[1]**

……

……

……

……

(ii) If mercury is used instead of platinum, what change would be observed? **[1]**

……

……

……

(iii) If it contains 10^2 Na^+ and 10^{15} H^+, which ions will be discharged at the cathode? Why? **[1]**

……

……

……

(c) The following reactions occur under some conditions. Write down **ONE** condition for the following reactions to take place.

(i) Oxidation of SO_2 to SO_3 in Contact process. **[1]**

……

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……

……

(ii) Aluminum hydroxide with dil. H_2SO_4. **[1]**

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(d) Aluminum carbide reacts with water according to the following equation:

$Al_4C_3 + 12H_2O \rightarrow 3CH_4 + 4Al(OH)_3$ [Refer to Atomic weights of elements on page 22.]

(i) Calculate the weight of $Al(OH)_3$ produced from 28.8gm of Al_4C_3. **[1½]**

(ii) What volume of CH_4 would be formed at the same time? **[1½]**

Question 4

(a) An element X has atomic number 20.

(i) Write down the electronic configuration of X.

State whether it is a metal or a non-metal **[1]**

……..

(ii) If X reacts with $_{17}Y^{35.5}$, what will be the formula of the compound formed? **[1]**

……..

(iii) How does X combine with Y? **[1]**

……..

(iv) What is the nature of the bond formed between X and Y? **[1]**

……..

(b) Roasted iron pyrites give sulphur dioxide according to the following equation:

$4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$ [Refer to Atomic weights of elements on page 22.]

(i) What weight of iron pyrites would be required to produce 40gm of Fe_2O_3? **[2]**

(ii) What volume of SO_2 will be produced if 30 cm^3 of O_2 is used? **[2]**

(c) The reactions of zinc oxide and aluminum oxide are shown below.

$ZnO + H_2SO_4 \rightarrow ZnSO_4 + H_2O$

$ZnO + 2NaOH \xrightarrow{heat} Na_2ZnO_2 + H_2O$

$Al_2O_3 + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2O$

$Al_2O_3 + 2NaOH \xrightarrow{heat} 2NaAlO_2 + H_2O$

What can be concluded about the nature of ZnO and Al_2O_3 from the above reactions? **[2]**

……

……

……

Question 5

(a) Explain the following.

(i) Ammonia is not prepared from ammonium nitrate. Support your answer with a balanced equation. **[1]**

……..

……..

……..

……

……..

(ii) SO_2 is used to bleach delicate materials. **[1]**

……

……

……

(iii) In the laboratory preparation of HNO_3, the reactants are heated between 180°C- 200°C. **[1]**

……

……..

……

(b) Name the terms used to describe the following.

(i) The reaction between an unsaturated hydrocarbon and hydrogen. **[1]**

……..

(ii) The self linking property of carbon atom. **[1]**

……..

(c) (i) Zinc extracted by smelting process contains impurities like lead, iron and cadmium. The metal and the impurities have a large difference in their boiling points. Which method will you apply to refine the metal? **[1]**

……..

……..

(ii) Differentiate between dissociation and ionization in the table given below.

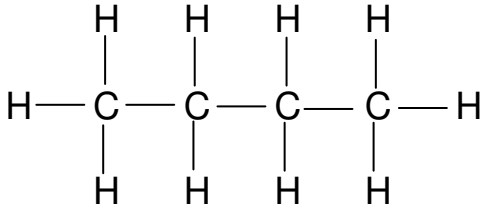
Dissociation	**Ionization**

(d) (i) Methane can be converted to formaldehyde. Write the balanced chemical equation with the conditions. **[2]**

……..

……..

(ii) The structural formula of an organic compound is given below:



Name the organic compound. **[1]**

……..

Question 6

(a) All of the following compounds contain nitrogen.

[ammonium nitrate, lead nitrate, copper nitrate, potassium nitrate]

Select a compound from the above list to fit each of the descriptions given below.

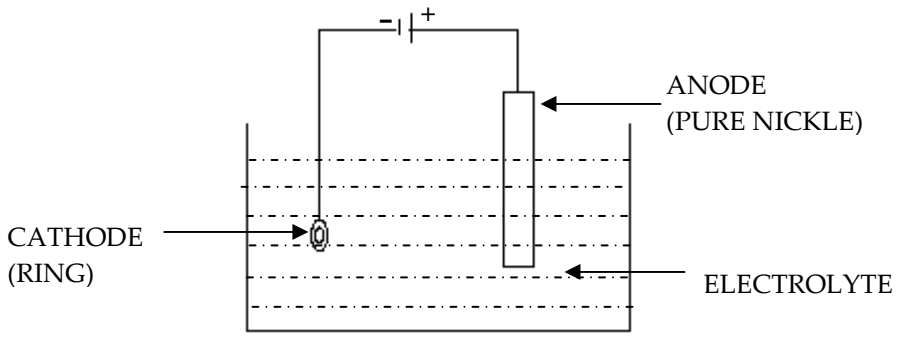
(i) The compound which gives a black residue on heating. **[1]**

……..

(ii) The compound which produces a crackling sound on heating. **[1]**

……..

(b) The diagram below shows electroplating of a ring with nickel. Study the diagram a answer the questions that follow.



(i) What ions must be present in the electrolyte? **[1]**

……..

(ii) Write down the reactions taking place at the cathode and the anode. **[1]**

……..

……..

……..

……..

(c) (i) What do you observe when caustic soda is added to ferric chloride in **[2]**

1. small amounts?
2. excess?

……

……

……..

……..

……..

……..

(ii) Name the ore generally used for the extraction of aluminum. **[1]**

……

(d) (i) Differentiate between acidic salts and normal salts with an example each in t table given below.

Acidic salts	**Normal salts**

(ii) Look at the activity series of some metals given below. They are arranged from the most reactive to the least reactive.

A > X > D >Y >U >L

Which method would you use to extract metal A from its ore? **[1]**

……..

Question 7

(a) (i) What is the vapour density of ammonia? **[1]**

……..

(ii) A gas *x* is reacted with ammonia and the product formed is dense white fumes of ammonium chloride. What gas is *x*? **[1]**

……

……

(b) The following questions relate to alloys and their uses. Name the property which best suits the alloy for a particular use.

(i) Stainless steel is used for making kitchen sinks and automobile parts. **[1]**

……

……

(ii) Tungsten steel is used for making cutting tools for high speed lathes.

……

……

(iii) Invar is used for making measuring instruments. **[1]**

……..

……..

(c) Study the following experiment and answer the questions that follow.

Yangchen added a few drops of blue litmus solution to a gas containing air and covered it with a glass disc. She inverted a jar filled with dry HCl gas over the glass disc and then removed the glass disc from in between the two gas jars.

(i) What would she observe after a while? **[1]**

……..

……..

(ii) What does the experiment show? **[1]**

……..

……..

(iii) What can you conclude on the nature of HCl solution on the basis of the observation made in (i)? **[1]**

……..

……..

(d) Study the table below and answer the questions that follow.

Elements	No. of electrons	Atomic Mass
H	1	1
Li	3	7
Na	11	23
K	19	39

(i) Write down the electronic configuration of Na. **[½]**

……..

……..

……..

(ii) Which element is the most metallic in nature?

……

……

……

(iii) What is the common name for this group of elements? **[½]**

……

……

(iv) To which period does sodium belong? **[½]**

……

Atomic weights of elements

Elements	**Atomic weights**	**Elements**	**Atomic weights**
H	**1**	K	**39**
C	**12**	Ca	**40**
N	**14**	Cr	**52**
O	**16**	Fe	**56**
Na	**23**	Cu	**63.5**
Al	**27**	Zn	**65**
S	**32**	Br	**80**
Cl	**35.5**	Pb	**207**

for Rough Work

for Rough Work