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Index No:

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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 during the first **fifteen minutes**. This time is to be spent on 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 should 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 page 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*

Section	A					B													
Question Number	1a	1b	1c	1d	1e	2	3	4	5	6	7							Total	
Award																			Chief Marker's Signature ↓
Markers' initial →																			



**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 and write it in the space provided in the question booklet.* [15]

(i) The promoter used in the Haber's process is

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

Answer:.....

(ii) As we move from left to right in the periodic table, the atomic size of the elements

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

Answer:.....

(iii) Under similar conditions of temperature and pressure, equal volumes of all gases contain equal number of molecules. The above statement describes

- A Boyle's law.
- B Charle's law.
- C Avogadro's law.
- D Gay Lussac's law.

Answer:.....

(iv) The bond formed by the complete transfer of electrons from a metallic atom to a non-metallic atom is called

- A electrovalent bond.
- B coordinate bond.
- C covalent bond.
- D polar bond.

Answer:.....

(v) Quick lime (CaO) is an example of

- A an amphoteric substance.
- B a deliquescent substance.
- C an efflorescent substance.
- D a hygroscopic substance.

Answer:.....

(vi) An alloy of steel used for making permanent magnet is

- A invar.
- B alinco.
- C stainless steel.
- D tungsten steel.

Answer:.....

(vii) The tendency of an element to attract the shared pair of electrons towards itself is called

- A ionization potential.
- B electronegativity.
- C electron affinity.
- D valency.

Answer:.....

(viii)  $3\text{Fe} + 8\text{HNO}_3 \rightarrow 3\text{Fe}(\text{NO}_3)_2 + 4\text{H}_2\text{O} + 2\text{NO}$   
In the above chemical equation, nitric acid acts as

- A a dehydrating agent.
- B an oxidising agent.
- C a reducing agent.
- D a drying agent.

Answer:.....

(ix) Alkanes are saturated hydrocarbons which can undergo

- A polymerization reaction.
- B neutralization reaction.
- C substitution reaction.
- D addition reaction.

Answer:.....

(x) Which of the following is a neutralization reaction?

- A  $2K + H_2SO_4 \rightarrow K_2SO_4 + H_2O$
- B  $HCl + NaOH \rightarrow NaCl + H_2O$
- C  $CaO + SiO_2 \rightarrow CaSiO_3$
- D  $2Mg + O_2 \rightarrow 2MgO$

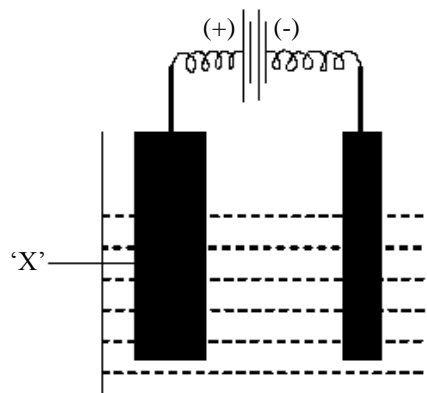
Answer:.....

(xi) The molecular mass of lead nitrate  $Pb(NO_3)_2$  is

- A 207 amu.
- B 269 amu.
- C 317 amu.
- D 331 amu.

Answer:.....

(xii) The diagram given below represents the electro refining of copper.



The part labelled 'X' in the above diagram should be made up of

- A nickel.
- B graphite.
- C pure copper.
- D impure copper.

Answer:.....

(xiii) The percentage of oxygen in magnesium nitrate crystal  $[\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  is

- A 55%.
- B 65%.
- C 75%.
- D 85%.

Answer:.....

(xiv) When methane is mixed with oxygen and passed through molybdenum oxide ( $\text{MoO}$ ) at  $350 - 500^\circ\text{C}$ , it gets oxidised to

- A methanol.
- B acetaldehyde.
- C benzaldehyde.
- D formaldehyde.

Answer:.....

(xv) Which of the following occupies maximum volume at STP?

- A  $6.023 \times 10^{22}$  molecules of  $\text{CO}_2$
- B 0.2 moles of  $\text{N}_2$
- C 17g of  $\text{NH}_3$
- D 8g of  $\text{O}_2$

Answer:.....

(b) **Choose the correct word/s given in the brackets and write them in the spaces provided. [6]**

- (i) Cations are formed by ..... (*loss/gain*) of electrons by a neutral atom.
- (ii) When  $\text{NaOH}$  solution is added to a salt solution containing aluminium ions, the colour of the precipitate formed is .....(*chalky white/gelatinous white*).
- (iii) The volume occupied by 7.1g of  $\text{Cl}_2$  at STP is ..... (*2.24 lits./22.4 lits.*).
- (iv) The chemical formula which gives the simplest whole number ratio of atoms of various elements present in one molecule of a compound is called ..... (*molecular/empirical*) formula.
- (v) During the electrolysis of acidified water, the product formed at the anode is ..... (*hydrogen/oxygen*).

(vi) The elements belonging to the same group in the periodic table have similar properties because they have the same .....

(*valence electrons/atomic numbers*).

(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) Fountain experiment	a) dull white precipitate
(ii) General formula of alkynes	b) purification of bauxite
(iii) Electroplating with nickel	c) extraction of iron
(iv) Baeyer's process	d) solubility of ammonia
(v) Glauber's salt	e) NiSO <sub>4</sub> solution
(vi) Mg(OH) <sub>2</sub>	f) C <sub>n</sub> H <sub>2n+2</sub>
	g) Na <sub>2</sub> SO <sub>4</sub> .10H <sub>2</sub> O
	h) C <sub>n</sub> H <sub>2n-2</sub>
	i) acidic nature of ammonia
	j) FeSO <sub>4</sub> .7H <sub>2</sub> O

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(d) **Give reasons for the following:** [6]

(i) The metallic character decreases as we move from left to right in the periodic table.

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(ii) Cryolite is used as an electrolyte during the electrolysis of fused alumina.

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(iii) The apparatus used in the laboratory preparation of nitric acid should be made of glass only.

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.....

(e) (i) Write the balanced equations for the following reactions: [3]

1. Zinc chloride and hydrogen sulphide

.....

2. Sugar and conc. sulphuric acid

.....

3. Ethane with oxygen in the presence of Cu tube at 200°C.

.....

(ii) What is electrolysis? [1]

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.....  
.....  
.....

(iii) What will you observe when NaOH is added to aqueous ZnSO<sub>4</sub> solution? [1]

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.....  
.....



- (iv) Calculate the mass of carbon dioxide produced when 100g of propane ( $C_3H_8$ ) is burned. The combustion equation is  $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$ .

**SECTION B (40 Marks)**  
*Attempt any four questions*

**Question 2**

- (a) A compound of carbon, hydrogen and oxygen is found to contain 40% of carbon, 6.7% of hydrogen and 53.3% of oxygen.
- (i) Determine its empirical formula. [2]

(ii) If its vapour density is 30, find its molecular formula.

(b) The electronic configuration of an element 'Q' is 2, 8, 7.

(i) What is the valency of the element 'Q'? [½]

.....  
.....

(ii) Is the element a metal or a non-metal? [½]

.....  
.....

(iii) Name the element 'Q'. [1]

.....  
.....

(c) The question below refers to the extraction of zinc from its ore.

(i) Name the most important ore of zinc. [½]

.....  
.....

(ii) Give the balanced equation for the reaction taking place during the roasting of ZnS. [1½]

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- (d) (i) What do you observe when a glass rod dipped in ammonia solution is brought near a jar containing hydrochloric acid?

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- (ii) Give the balanced equation for the above reaction. [1]

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**Question 3**

- (a) Name the following:

- (i) The process in which one or more electrons are lost from a metallic atom. [1]

.....

- (ii) A chemical reaction which involves two half reactions of oxidation and reduction. [1]

.....

- (b) (i) Differentiate between ferrous ion and ferric ion based on the properties given in the table below. [2]

Properties	Ferrous ion	Ferric ion
Colour of the salt		
Valency		

- (ii) Zinc sulphide when heated in air reacts according to the following equation,  
 $2\text{ZnS} + 3\text{O}_2 \rightarrow 2\text{ZnO} + 2\text{SO}_2$ .

Calculate the weight of ZnO formed, if 388g of ZnS is heated.

[2]

- (iii) Compare ethane and ethene based on the properties given in the table below.

[2]

Properties	Ethane	Ethene
Type of bond		
Type of reaction		

- (c) Define the following:

- (i) Alkali

[1]

.....

.....

.....

.....

(ii) Homologous series

.....  
 .....  
 .....

**Question 4**

(a) (i) What happens when [2]

1. ethane reacts with bromine?

.....  
 .....  
 .....

2. ethanol is heated with excess of conc.  $H_2SO_4$  at  $170^\circ C$ ?

.....  
 .....

(ii) Classify the following substances as efflorescent or deliquescent in the table given below. [2]

*washing soda, magnesium chloride, calcium chloride, epsom salt*

Efflorescent	Deliquescent

(b) The questions given below are with regard to the manufacture of ammonia by Haber's process.

(i) Name the reactants involved in the above process. [1]

.....  
 .....

(ii) State **four** conditions for the maximum yield of ammonia.

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.....  
.....  
.....  
.....

(c) (i) Differentiate between an electrolyte and a non-electrolyte in the table given below.

[1]

Electrolyte	Non-electrolyte

(ii) If the electrolyte used for an electrolytic process contains potassium ions and silver ions, state which ions will be discharged at the cathode. Justify your answer.

[2]

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**Question 5**

(a) Given below is a part of a periodic table. Study the table and answer the questions that follow.

1 <b>H</b>								2 <b>He</b>
3 <b>Li</b>	4 <b>Be</b>		5 <b>B</b>	6 <b>C</b>	7 <b>N</b>	8 <b>O</b>	9 <b>F</b>	10 <b>Ne</b>
11 <b>Na</b>	12 <b>Mg</b>		13 <b>Al</b>	14 <b>Si</b>	15 <b>P</b>	16 <b>S</b>	17 <b>Cl</b>	18 <b>Ar</b>
19 <b>K</b>	20 <b>Ca</b>							

As we move down from left to right, what happens to the,

[3]

(i) valence electrons?

.....  
 .....

(ii) metallic character of the elements?

.....  
 .....

(iii) ionisation potential of the elements?

.....  
 .....

(b) (i) The incomplete table given below shows the action of indicators on acids and bases. Complete it.

[2]

Indicators	Colour change in	
	Acid	Base
Phenolphthalein		
Methyl orange		

(ii) Bleaching action of  $\text{SO}_2$  is temporary but that of  $\text{Cl}_2$  is permanent. Justify.

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(c) (i) Give a reaction to illustrate the acidic nature of  $\text{SO}_2$ . [1]

.....  
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(ii) Define the following: [2]

1. Gay-lussac's law

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.....  
.....  
.....  
.....  
.....

2. Mole

.....  
.....  
.....

**Question 6**

(a) (i) Arrange the following elements in the increasing order of their atomic size. [1]

*Li, Rb, K, Cs, Na, Fr*

.....



(ii) Zinc can undergo two types of reaction as given below:



Study the above equations and answer the questions that follow.

1. State the role of zinc in equations I and II.

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.....  
.....  
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2. What conclusion can you draw on the nature of zinc from the two equations given above?

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.....

(b) (i) Give **two** examples each for the following compounds.

[2]

1. polar covalent compounds

.....  
.....

2. non-polar covalent compounds

.....  
.....  
.....

(ii) Complete the table given below.

Formula	Common name	IUPAC name
CH <sub>3</sub> OH	Methyl alcohol	1.....
2.....	Ethyl alcohol	Ethanol

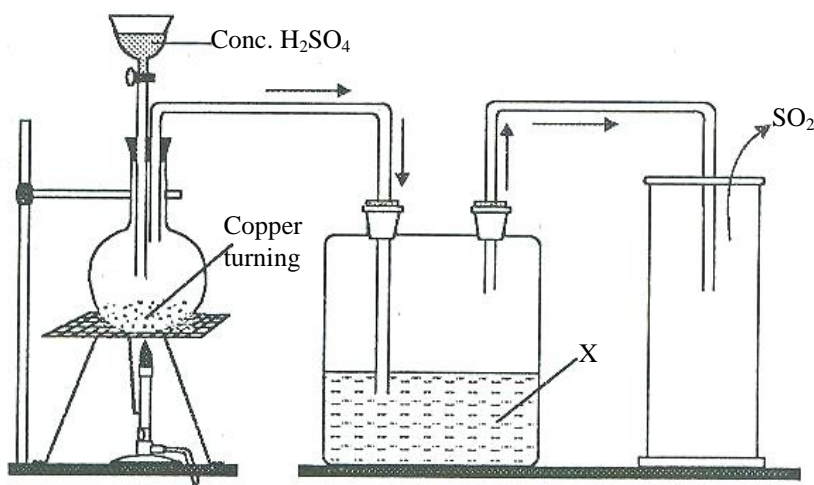
(iii) Name a salt which is white in colour.

[½]

.....

(c) The figure given below shows the laboratory preparation of sulphur dioxide. Study the diagram carefully and answer the questions that follow.

[3]



(i) Name the part labelled 'X'.

.....

(ii) What is the purpose of 'X'?

.....

.....

(iii) Name the method used for the collection of SO<sub>2</sub>.

.....

.....

(iv) Why is  $\text{SO}_2$  collected by this method?

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**Question 7**

(a) (i) Define the term electrometallurgy? [1]

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.....

(ii) What mass of the fertilizer, calcium nitrate  $[\text{Ca}(\text{NO}_3)_2]$ , is required to replace the nitrogen in 10 hectare field, if a crop of wheat removes 20 kg of nitrogen per hectare of soil? [3]

(iii) State the function of slag in the blast furnace. [1]

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.....  
.....

(b) Answer the questions given below with reference to the electrolysis of molten bromine

(i) What should be the electrodes made up of?

.....  
.....  
.....  
.....

(ii) State the products formed at [1]

1. cathode.

.....  
.....

2. anode.

.....  
.....

(iii) Give the reaction at the cathode. [½]

.....  
.....

(c) Differentiate between the following based on the properties given in the bracket. [3]

(i) Brass and bronze (*uses*)

Brass	Bronze

(ii) Quenching and tempering (*effect on steel*)

Quenching	Tempering

(iii) Coke and lime (*function in the Blast furnace*)

Coke	Lime

**Atomic weights of elements**

<b>Elements</b>	<b>Atomic weights</b>	<b>Elements</b>	<b>Atomic weights</b>
Hydrogen	<b>1</b>	Phosphorus	<b>31</b>
Helium	<b>4</b>	Sulphur	<b>32</b>
Lithium	<b>7</b>	Chlorine	<b>35.5</b>
Beryllium	<b>9</b>	Potassium	<b>39</b>
Carbon	<b>12</b>	Calcium	<b>40</b>
Nitrogen	<b>14</b>	Copper	<b>63.5</b>
Oxygen	<b>16</b>	Zinc	<b>65</b>
Magnesium	<b>24</b>	Bromine	<b>80</b>
Aluminium	<b>27</b>	Lead	<b>207</b>
Silicon	<b>28</b>		

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