

## SECTION A (40 Marks)

*Compulsory: Attempt **all** questions.*

### Question 1

- (a) **Directions:** *For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded.*

[15]

- (i) Periodicity in the properties of elements is due to the same number of  
A protons.  
B neutrons.  
C electrons.  
D valence electrons.
- (ii) Lithium, sodium, potassium and rubidium belong to the family of  
A halogens.  
B alkali metals.  
C transition metals.  
D alkaline earth metals.
- (iii) A salt formed by the complete replacement of hydrogen in an acid is  
A a basic salt.  
B a mixed salt.  
C an acidic salt.  
D a normal salt.
- (iv) What is the colour of the precipitate formed when NaOH is added to  $\text{FeSO}_4$  solution?  
A light blue  
B dirty green  
C chalky white  
D reddish green

- (v) An aqueous solution of an electro-valent compound is a good conductor of electricity because it
- A has high boiling point.
  - B contains free electrons.
  - C contains free mobile ions.
  - D undergoes fast ionic reaction.
- (vi) A compound with an empirical formula CH has a molecular mass 78. The molecular formula of the compound will be
- A  $\text{CH}_4$ .
  - B  $\text{C}_2\text{H}_2$ .
  - C  $\text{C}_2\text{H}_6$ .
  - D  $\text{C}_6\text{H}_6$ .
- (vii) Which one of the following compound has a molecular weight of 84 amu?
- A  $\text{NaHCO}_3$
  - B  $\text{Na}_2\text{CO}_3$
  - C  $\text{NaOH}$
  - D  $\text{NaCl}$
- (viii) The volume occupied by 6.4g of sulphur dioxide at STP is equal to
- A 224 L.
  - B 22.4 L.
  - C 2.24 L.
  - D 0.224 L.
- (ix) The process of oxidation is when a molecule
- A gains electrons.
  - B gains hydrogen.
  - C loses electrons.
  - D loses oxygen.
- (x) In the electrolysis of molten lead bromide, lead dissociates as
- A atoms.
  - B anions.
  - C cations.
  - D molecules.

- (xi) Bleaching action of sulphur dioxide is due to its  
A reducing property.  
B oxidizing property.  
C hydrating property.  
D dehydration property.
- (xii) The drying agent used in the laboratory preparation of hydrogen chloride gas is  
A CaO.  
B P<sub>2</sub>O<sub>5</sub>.  
C CaCl<sub>2</sub>.  
D conc. H<sub>2</sub>SO<sub>4</sub>.
- (xiii) 'A colourless gas which is neutral in the dry state but becomes alkaline when dissolved in water'. The gas is  
A CO<sub>2</sub>.  
B NH<sub>3</sub>.  
C SO<sub>2</sub>.  
D SO<sub>3</sub>.
- (xiv) Which one of the following compounds will undergo substitution reaction?  
A C<sub>2</sub>H<sub>6</sub>  
B C<sub>2</sub>H<sub>4</sub>  
C C<sub>2</sub>H<sub>2</sub>  
D C<sub>3</sub>H<sub>4</sub>
- (xv) A reagent used to distinguish between ethane and ethene is  
A chlorine.  
B bromine.  
C ammoniacal silver nitrate.  
D ammoniacal cuprous chloride.

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

- (i) In the electrolysis of water, hydrogen gas is released at the .....
- (ii) A bond formed between two atoms by sharing a pair of electrons is called .....
- (iii) An acid changes methyl orange to ..... colour.
- (iv) The light blue precipitate formed when NaOH is added to CuSO<sub>4</sub> solution is .....
- (v) ..... gas is produced on treatment of metal sulphites and bisulphites with dilute acids.

(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.*

[5]

Column A	Column B
(i) Molecular mass	a) gangue
(ii) Avogadro's number	b) valence electrons
(iii) Molar volume	c) slag
(iv) Valency	d) $6.023 \times 10^{23}$
(v) Earthy impurities	e) 22.4 L
(vi) Mg(OH) <sub>2</sub>	f) $6.023 \times 10^{21}$
	g) iron
	h) $2 \times$ vapour density

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(d) **Rewrite the following statements by changing only the underlined words.** [5]

(i) A weak attractive force known as hydrogen bond exists between non polar molecules.

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(ii) Only metals and oxygen are liberated at the cathode during electrolysis.

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(iii) Conc. H<sub>2</sub>SO<sub>4</sub> produces dense white fumes with ammonia.

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(iv) Deliquescent salts lose their water of crystallization and become powdery amorphous substance.

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(v) ZnO can be reduced to Zn by carbon monoxide.

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(e) **State true or false against each statement. Correct and rewrite the false statements.** [6]

(i) On moving down a group, the numbers of shells remain the same.

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(ii) Cu<sup>2+</sup> is discharged at the cathode in preference to Na<sup>+</sup> during electrolysis.

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(iii) Nitric oxide is produced in the catalytic oxidation of ammonia.

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(iv) The general formula of alkenes is  $C_nH_{2n+2}$ .

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(f) **Explain the following:**

**[4]**

(i) The relative atomic mass of sulphur is 32.

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(ii) Gay Lussac's law of combining volume is not applicable to solids and liquids.

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(iii) In the manufacture of ammonia by Haber's process, the temperature in the catalyst chamber should not exceed  $500^{\circ}\text{C}$ .

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(iv) Green vitriol on treatment with conc.  $\text{H}_2\text{SO}_4$  becomes white.

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### **SECTION B (40 Marks)**

**Attempt any four questions**

#### **Question 2.**

(a) Study the list of the symbols of elements given below and answer the following

questions:  ${}^{19}_9\text{A}$ ,  ${}^{39}_{19}\text{B}$ ,  ${}^{31}_{18}\text{C}$ ,  ${}^{35}_{17}\text{D}$ ,  ${}^{40}_{20}\text{E}$ ,  ${}^{32}_{16}\text{F}$

**[4]**

Which element

(i) belongs to group II A?

.....

(ii) has the largest atomic size?

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(iii) is a noble gas?

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(iv) has highest electron affinity?

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(b) The formula for a compound formed when calcium reacts with oxygen is CaO.

Support this statement with the help of an electron dot diagram.

[2]

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(c) State **one** use of the following compounds:

[2]

(i) Acetylene

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(ii) Methyl alcohol

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(d) List down **two** examples where an alkali is used to prevent the harmful effects of acids in our daily life.

[2]

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**Question 3.**

(a) Calculate the percentage composition of  $K_2MnO_4$ . [2]

(b) Answer the questions given below with reference to electrolysis of alumina.

(i) Mention *one* function of cryolite. [1]

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(ii) Why is the carbon anode replaced periodically? [2]

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(iii) Write down the reaction at the cathode. [1]

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(c) Explain the following statements: [4]

(i) 28g of nitrogen and 32g of oxygen have the same volume at STP.

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(ii) In an experiment with HCl gas, the colour of fountain appears red.

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(iii) Graphite is preferred to other electrodes for electrolysis.

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(iv) Cations get discharged at cathode during electrolysis.

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**Question 4.**

(a) Which reagent is used to distinguish between  $\text{AlCl}_3$  and  $\text{ZnSO}_4$ ? Explain. [2]

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(b) In a laboratory, a chemist mixes  $50\text{cm}^3$  of hydrogen gas with  $100\text{cm}^3$  of chlorine in presence of diffused light. Hydrogen gas reacts vigorously with chlorine giving white fumes of hydrogen chloride gas.

(i) Calculate the volume of chlorine which will react with  $50\text{cm}^3$  of hydrogen. [1]

(ii) What will be the volume of the resulting gases? [1]

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- (c) Despite the many environmental problems created by chemical industries, the use of various chemical products are a part of our lives. Do you think our government should ban the construction of chemical industries?

Support your answer with *three* reasons.

[3]

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- (d) Answer the following questions with reference to the electrolysis of sodium chloride solution using graphite electrode.

- (i) What substances are discharged at the cathode and anode respectively?

[2]

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- (ii) Sodium chloride solution becomes progressively more alkaline during electrolysis. Explain.

[1]

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### Question 5.

- (a) Many metals are more useful to us when mixed with some other elements.

Discuss this statement with respect to stainless steel.

[2]

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(b) List down *two* main factors influencing the metallic character of elements. [1]

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(c) Atoms of element X and Y have 6 and 17 electrons respectively. Draw the electron dot diagram of the compound formed. [2]

(d) Give reasons for the following: [5]

(i) Atomic number of an atom does not change when it becomes an ion.

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(ii) In the manufacture of  $\text{H}_2\text{SO}_4$  by the Contact process,  $\text{SO}_3$  formed is not directly dissolved in water.

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(iii) Gold and silver often occur in the free state in nature.

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(iv) Acetylene undergoes addition reaction.

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(v) Silica crucible is used for the electrolysis of  $\text{PbBr}_2$ .

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**Question 6.**

(a) A student carried out an analysis of oxalic acid and found out the following compositions: H=2.2%, C=26.7% and O=71.1%.

(i) Determine the empirical formula of the compound.

**[2]**

(ii) Calculate the molecular formula of oxalic acid if its molecular weight is 90. [2]

(b) Name the following: [4]

(i) a nitrate that produces nitrous oxide (laughing gas) on heating

.....

(ii) substances in their aqueous or molten state conduct electrical current

.....

(iii) electrically charged atoms

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(iv) catalyst used in the catalytic oxidation of ammonia

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(c) Distinguish between the following pairs based on what is given in the bracket. [2]

(i) Mg atom and Mg ion (*no. of shells*)

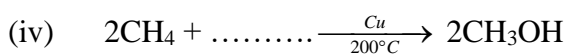
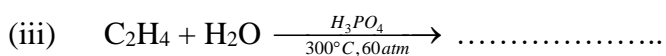
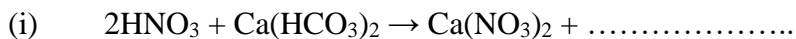
Mg atom	Mg ion

(ii) Methanol and ethanol (*structure*)

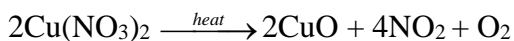
Methanol	Ethanol

**Question 7.**

(a) Complete and balance the following chemical equations: [4]



(b) Copper (II) nitrate on heating decomposes as given in the following equation: [2]



Calculate the mass of CuO obtained by heating 58.9g of  $\text{Cu}(\text{NO}_3)_2$ .

(c) Explain the mechanism of bleaching by sulphur dioxide. [2]

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(d) Sulphur dioxide bleaches coloured matter temporarily. [2]

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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	Manganese	55
Oxygen	16	Iron	56
Sodium	23	Copper	63.5
Magnesium	24	Zinc	65
Aluminium	27	Bromine	80
Silicon	28	Lead	207



*for Rough Work*

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