

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 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 CH_4 .
B C_2H_2 .
C C_2H_6 .
D C_6H_6 .

(vii) Which one of the following compound has a molecular weight of 84 amu?

A NaHCO_3
B Na_2CO_3
C NaOH
D 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 P₂O₅.
C CaCl₂.
D conc. H₂SO₄.

(xiii) 'A colourless gas which is neutral in the dry state but becomes alkaline when dissolved in water'. The gas is
A CO₂.
B NH₃.
C SO₂.
D SO₃.

(xiv) Which one of the following compounds will undergo substitution reaction?
A C₂H₆
B C₂H₄
C C₂H₂
D C₃H₄

(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_4 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) 6.023×10^{23}
(v) Earthy impurities	e) 22.4 L
(vi) Mg(OH)_2	f) 6.023×10^{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_2SO_4 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^{2+} is discharged at the cathode in preference to Na^+ 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 $500^{\circ}C$.

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(iv) Green vitriol on treatment with conc. H_2SO_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: $^{19}_9A$, $^{39}_{19}B$, $^{31}_{18}C$, $^{35}_{17}D$, $^{40}_{20}E$, $^{32}_{16}F$

[4]

Which element

(i) belongs to group II A?

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(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 AlCl_3 and ZnSO_4 ? Explain. [2]

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(b) In a laboratory, a chemist mixes 50cm^3 of hydrogen gas with 100cm^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 50cm^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.

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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 H_2SO_4 by the Contact process, 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 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

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

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(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*)

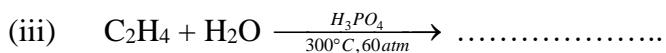
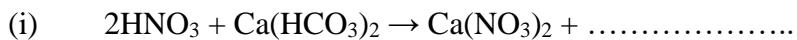
Mg atom	Mg ion

(ii) Methanol and ethanol (*structure*)

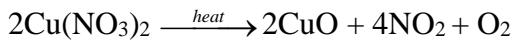
Methanol	Ethanol

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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