Federal Board SSC-II Examination
Model Question Paper Chemistry
(Curriculum 2022-23) Scheme of Studies 2006

ROLL NUMBER					
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Version No.			
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3	3	3	3
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Section - A (Marks 12)

Time Allowed: 20 minutes

Section-A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/ overwriting is not allowed. *Do not use lead pencil.*

Invigilator Sign. _____ **Candidate Sign.**_____

Q1. Fill the relevant bubble against each question according to the curriculum. Each part carries one mark.

	Question	A	B	C	D	A	B	C	D
i	A student places a piece of dry ice (solid CO_2) in a sealed container. After a while, the container expands and may even burst. What is the best explanation for this?	The dry ice melted and turned into liquid, increasing volume.	The dry ice reacted with oxygen to form new compounds	The dry ice sublimed, producing gas that increases pressure.	The container absorbed external heat, causing it to burst	O	O	O	O
ii	What is the direction of flow of electrons in an electrolytic cell?	Anode to cathode externally	Anode to cathode internally	Cathode to anode externally	Cathode to anode in the solution	O	O	O	O
iii	In the following reaction, $N_{2(g)}+3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ Which physical factor has the greatest impact on the reaction rate as the reaction progresses?	Temperature	Catalyst	Concentrations	Volume	O	O	O	O
iv	Which cations generally form soluble salts in water?	Sodium (Na^+), Potassium (K^+), and Ammonium (NH_4^+)	Silver (Ag^+), Lead (Pb^{2+}), and Mercury (Hg^{2+})	Barium (Ba^{2+}), Calcium (Ca^{2+}), and Strontium (Sr^{2+})	Iron (Fe^{2+}), Copper (Cu^{2+}), and Zinc (Zn^{2+})	O	O	O	O
v	The products of the reaction of an acid with an insoluble base are?	Salt + CO_2	Salt + O_2	Salt + H_2O	Salt + H_2	O	O	O	O
vi	What are essential conditions used in the manufacture of ammonia in Haber process?	450°C, 2 atm and V_2O_5 as a catalyst	200°C, 2 atm and Fe as a catalyst	200°C, 200 atm and V_2O_5 as a catalyst	450°C, 200 atm and Fe as a catalyst	O	O	O	O
vii	A student plotted a graph of reactant concentration versus time for a chemical reaction. What does a steeper slope indicate?	A slower reaction rate	No reaction taking place	A faster reaction rate	A decrease in activation energy	O	O	O	O

viii	What is the purpose of evaporation in salt purification?	To dissolve the salt completely in water	To remove excess reactants	To concentrate the salt solution and form crystals	To change the salt into a gas	○ ○ ○ ○
ix	How many grams of NaCl are present in 2 moles of sodium chloride? (Molar mass of NaCl = 58.5 g/mol)	58.5 g	117 g	29.25 g	235 g	○ ○ ○ ○
x	Which one of the following compounds is formed by oxidation of ethanol?	Methanoic acid	Ethanoic acid	Pentanoic acid	Butanoic acid	○ ○ ○ ○
xi	Gasohol is a mixture of?	Gas & Alcohol	Gas & Gasoline	Gasoline & Alcohol	Gasoline & aldehyde	○ ○ ○ ○
xii	Which of the following equations will take place at the anode during the electrolysis of an aqueous $CuSO_4$ solution?	$Cu^{2+} + 2e^- \rightarrow Cu$	$2H^+ + 2e^- \rightarrow H_2$	$4OH^- - 4e^- \rightarrow H_2O + O_2$	$SO_4^{2-} \rightarrow SO_2 + O_2 + 2e^-$	○ ○ ○ ○

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Time allowed: 2:40Hours | Total Marks Section B & C: 53

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted /given spaces.

SECTION – B (Marks 33)

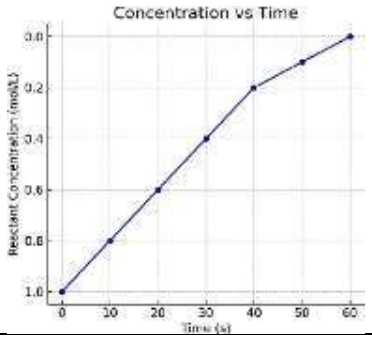
Q. 2	Attempt the following questions (11x3 = 33)				
(i)	Based on the given standard electrode potential (E°) values, arrange the following metals in order of increasing reactivity. Explain how electrode potential relates to metal reactivity. $Mg^{2+} + 2e^- \rightarrow Mg$ E°= -2.37 $Cu^{2+} + 2e^- \rightarrow Cu$ E°= +0.34 $Ni^{2+} + 2e^- \rightarrow Ni$ E°= -0.25	1+2	OR	A gas sample has a volume of 72 dm^3 at room temperature and pressure. How many moles of gas does it contain?	03
(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	1+1 +1	OR	a. What is molarity? How can you convert molarity to g/dm^3? b. What is the molarity of a solution made by dissolving 98 g of H_2SO_4 in 1 dm^3 of water? (Molar mass of H_2SO_4 = 98 g/mol)	1.5+ 1.5
(iii)	A sample of calcium carbonate ($CaCO_3$) contains 20 grams of calcium. What is the mass of carbon dioxide (CO_2) produced when the calcium carbonate is heated?	03	OR	Draw structural formula of following a. Pent-2-ene b. But-1-ol c. Pentanoic acid	1+1+ 1
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers. c. Which polymer is commonly used to make plastic bottles?	1+1 +1	OR	Draw the structure showing how protein molecule is formed, clearly highlighting the peptide linkages within the structure.	2+1
(v)	Write the chemical equations for the reactions of: a. Zinc with steam. b. Magnesium with hydrochloric acid. c. Sodium with cold water.	1+1 +1	OR	a) What are the reactants in a hydrogen-oxygen fuel cell? b) Which electrode in a hydrogen-oxygen fuel cell undergoes oxidation c) Write the overall reaction equation for a hydrogen-oxygen fuel cell.	03
(vi)	a. What is esterification? Provide a general reaction equation to illustrate the process. b. Why is esterification considered a condensation reaction?	2+1	OR	How does the lattice structure of salts contribute to their physical properties?	03
(vii)	Complete the following reactions: a. CH_3-CH_2-Br + alcoholic KOH → Y b. Y + Br_2 → Z	1.5 + 1.5	OR	Why are SO_2 and CO_2 classified as acidic oxides and CuO and CaO considered basic oxides?	1.5+ 1.5

(viii)	a. Why is petroleum considered a mixture? Give three examples of a hydrocarbon found in petroleum.	1.5 + 1.5	OR	Ethene and ethane are hydrocarbons which belong to different classes. How can they be distinguished? Write at least two tests in each case for the support of your answer.	1+2
(ix)	Give reactions to illustrate how unburned hydrocarbons contribute to the formation of peroxyacetyl nitrates (PANs) ? .	1+1 +1	OR	a. What are the primary fossil fuels used for energy production? b. Identify the fossil fuel that is mainly composed of methane. Among coal, petroleum, and natural gas, which is considered the cleanest-burning fuel	1+1 +1
(x)	Vitamins are important for our health. Summarize their sources and importance in health.	1.5 + 1.5	OR	Explain the combustion process of alcohols and discuss why they are considered cleaner fuels compared to fossil fuels?	1.5 + 1.5
(xi)	Zinc plating is carried out to prevent iron from corrosion. Describe its complete process and chemical reactions taking place at anode and cathode.	1.5 + 1.5	OR	How will you explain the formation of ethanol by: a. Fermentation and catalytic addition of steam. Explain your answer with balanced chemical equations.	1.5+ 1.5

Section – C (Marks 20)

Note: Attempt all questions. Marks for each question are given. (4 x 05=20)

Q.3	Identify the functional groups in the following compounds: a. $HCOOCH_3$ b. $CH_3\text{-}C \equiv C\text{-}CH_3$ c. C_3H_6 d. $C_4H_{11}OH$	1×4	O R	Describe the general chemical properties of metals with reference to their reactivity with: i. **Dilute acids** ii. **Cold water** iii. **Steam** iv. **Oxygen** Provide **balanced chemical equations** to illustrate each type of reaction.	1× 4
Q.4	Carbon dioxide (CO_2) is produced by the reaction of carbon monoxide (CO) with oxygen gas (O_2) according to the balanced equation: $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$ If **28 g of carbon monoxide (CO)** reacts with an excess of oxygen gas, answer the following: a. Calculate the number of moles of carbon monoxide (CO) used. b. Determine the number of moles of carbon dioxide (CO_2) produced. c. Find the mass of carbon dioxide (CO_2) formed. Calculate the volume of carbon dioxide (CO_2) produced at room temperature and pressure (RTP), where 1 mole of gas = 24 dm^3.	1.5 ×4		A student is working in a lab and has been assigned a task to examine an unknown hydrocarbon. The compound has been isolated from a crude oil sample and has a molar mass of 70 g/mol. He obtained the following data: - Mass of carbon: 10.0 g - Mass of hydrogen: 3.0 g - Mass of nitrogen: 2.0 g Calculate its empirical and molecular formula.	4+ 2

Q.5	a. What does the rate of reaction mean, and how can it be measured? b. How can a graph of "time vs. reactant concentration" be used to determine the rate of reaction? c. Interpret the given graph and explain how the reaction rate changes over time. 	2+2 +2	O R	Metals X, Y, and Z were tested for their reactivity with dilute acid and water. The results are given below: ➢ Metal X reacts with cold water, forming hydrogen gas. ➢ Metal Y does not react with water but reacts with hydrochloric acid, producing bubbles of hydrogen gas. Metal Z does not react with water or acid. A arrange these metals in order of reactivity and explain how the observations support your answer.	3+ 3
Q.6	a) Draw a schematic diagram for the electrolysis of dilute copper(II) sulphate using inert or copper electrodes. b) Label the anode, cathode, electrolyte, and the direction of ion movement. Describe the observations and products formed at each electrode	1+1 +2	O R	A polymer is formed by the reaction between a dicarboxylic acid and a diamine. a) What type of polymerization occurs in this reaction? Explain. b) Determine the structure of the repeating unit in the resulting polymer. c) Identify the functional group that forms during the polymerization process. Name a well-known synthetic polyamide and mention one of its applications.	04