DAY —— 08 SEAT NUMBER

2022	III	12	1030	J-752	(E)

CHEMISTRY (55)

Time : 3 Hrs. (7 Pages) Max. Marks : 70

General Instructions :

*The question paper is divided into **four** sections.*

(1) ***Section A :*** *Q. No. **1** contains **Ten** multiple choice type of questions carrying **One** mark each.*

*Q. No. **2** contains **Eight** very short answer type of questions carrying **One** mark each.*

(2) ***Section B :*** *Q. No. **3** to Q. No. **14** are **Twelve** short answer type of questions carrying **Two** marks each. (Attempt **any Eight**)*

(3) ***Section C :*** *Q. No. **15** to Q. No. **26** are **Twelve** short answer type of questions carrying **Three** marks each.(Attempt **any Eight**)*

(4) ***Section D :*** *Q. No. **27** to Q. No. **31** are **Five** long answer type of questions carrying **Four** marks each.(Attempt **any Three**)*

(5) Use of log table is allowed. Use of calculator is not allowed.

(6) Figures to the right indicate full marks.

(7) For each multiple choice type of question, it is mandatory to write the correct answer along with its alphabet e.g. (a)...../ (b) ..... / (c) ..... / (d) .....etc.

No mark (s) shall be given, if ONLY the correct answer or the alphabet of the correct answer is written.

Only the first attempt will be considered for evaluation.

SECTION - A

Q. 1. Select and write the correct answer for the following multiple choice type of questions : |10|

(i) The co-ordination number of atoms in body centred cubic structure (bcc) is _____.

(a) 4 (b) 6

(c) 8 (d) 12

(ii) In calculating osmotic pressure, the concentration of solute is expressed in _____.

(a) molarity (b) molality

(c) mole fraction (d) percentage mass

(iii) The enthalpy change for the chemical reaction $H_2O_{(s)} \rightarrow H_2O_{(l)}$ is called enthalpy of _____.

(a) vapourisation (b) fusion

(c) combustion (d) sublimation

(iv) Which of the following transition element shows maximum oxidation state?

(a) Sc (b) Fe

(c) Mn (d) V

(v) The correct formula for the complex compound, sodium hexacyanoferrate (III) is _____.

(a) $Na[Fe(CN)_6]$ (b) $Na_2[Fe(CN)_6]$

(c) $Na_3[Fe(CN)_6]$ (d) $Na_4[Fe(CN)_6]$

(vi) Isopropylbenzene on air oxidation followed by decomposition by dilute acid gives _____.

(a) C_6H_5OH (b) $C_6H_5COOCH_3$

(c) C_6H_5COOH (d) C_6H_5CHO

(vii) The name of metal nanoparticle which acts as highly effective bacterial disinfectant in water purification process is _____.

(a) carbon black (b) silver

(c) gold (d) copper

(viii) Acid anhydride on reaction with primary amine gives compound having a functional group _____.

(a) amide (b) nitrile

(c) secondary amine (d) imine

(ix) The standard potential of the cell in the following reaction is _____.

$$Cd_{(s)} + Cu^{2+}_{(1M)} \longrightarrow Cd^{2+}_{(1M)} + Cu_{(s)}$$

$(E^{o}_{Cd} = -0.403V, E^{o}_{Cu} = 0.334V)$

(a) -0.737 V (b) 0.737 V

(c) -0.069 V (d) 0.069 V

(x) The value of $[H_3O^+]$ in mol lit^{-1} of 0.001 M acetic acid solution ($Ka = 1.8 \times 10^{-5}$) is _____.

(a) 1.34×10^{-1} (b) 1.34×10^{-2}

(c) 1.34×10^{-3} (d) 1.34×10^{-4}

Q. 2. Answer the following questions : **[8]**

(i) Write the product formed when alkyl halide reacts with silver nitrite.

(ii) Write the name of product formed, when acetone is treated with 2, 4-dinitrophenyl hydrazine.

(iii) Write the name of biodegradable polyamide copolymer.

(iv) Identify the molecularity of following elementary reaction :

$$NO_{(g)} + O_{3(g)} \longrightarrow NO_{3(g)} + O_{(g)}$$

(v) What is the action of selenium on magnesium metal?

(vi) Write the name of isomerism in the following complexes : $[Cu(NH_3)_4][PtCl_4]$ and $[Pt(NH_3)_4][CuCl_4]$

(vii) Write the name of the alloy used in Fischer Tropsch process in the synthesis of gasoline.

(viii) Henry's law constant for $CH_3Br_{(g)}$ is 0.159 mol dm^{-3} bar^{-1} at 25°C. What is solubility of $CH_3Br_{(g)}$ in water at same temperature and partial pressure of 0.164 bar?

SECTION - B

Attempt any EIGHT of the following questions : **[16]**

Q. 3. Explain pseudo-first order reaction with suitable example.

Q. 4. Write the consequences of Schottky defect with reasons.

Q. 5. What is the action of following on ethyl bromide :
(i) Na in dry ether
(ii) Mg in dry ether

Q. 6. Explain formation of peptide linkage in protein with an example.

Q. 7. Derive an expression to calculate molar mass of non volatile solute by osmotic pressure measurement.

Q. 8. Explain monodentate and ambidentate ligands with example.

Q. 9. Explain the trends in the following atomic properties of group 16 elements :
(i) Atomic radii
(ii) Ionisation enthalpy
(iii) Electronegativity
(iv) Electron gain enthalpy

Q. 10. Write preparation of phenol from aniline.

Q. 11. Write chemical reactions to prepare ethanamine from :

(i) acetonitrile

(ii) nitroethane

Q. 12. Identify A and B from the following reaction :

$$2\,CH_3-\underset{\displaystyle CH_3}{\overset{|}{C}}=O \xrightarrow{Ba(OH)_2} A \xrightarrow{\Delta} B + H_2O$$

Q. 13. One mole of an ideal gas is expanded isothermally and reversibly from 10 L to 15 L at 300 K. Calculate the work done in the process. https://www.maharashtrastudy.com

Q. 14. How many moles of electrons are required for reduction of 2 moles of Zn^{2+} to Zn? How many Faradays of electricity will be required?

SECTION - C

Attempt any EIGHT of the following questions : **[24]**

Q. 15. Write chemical composition of haematite. Write the names and electronic configurations of first two elements of group 17.

Q. 16. Write classification of polymers on the basis of structure.

Q. 17. Define green chemistry. Write two disadvantages of nanotechnology.

Q. 18. Write commercial method for preparation of glucose. Write structure of adipic acid.

Q. 19. Write chemical reactions of following reagents on methoxyethane:

(i) hot HI

(ii) PCl_5

(ii) dilute H_2SO_4

Q. 20. Explain cationic, anionic and neutral sphere complexes with example.

Q. 21. Calculate spin only magnetic moment of divalent cation of transition metal with atomic number 25.

Salts of Ti^{4+} are colourless. Give reason.

Q. 22. What is lanthanoid contraction?

Write preparation of acetic acid from

(i) dry ice

(ii) acetyl chloride.

Q. 23. Write the classification of aliphatic ketones with example. What is the action of sodium hypoiodite on acetone?

Q. 24. Define half life of first order reaction. Obtain the expression for half life and rate constant of the first order reaction.

Q. 25. Calculate the standard enthalpy of formation of $CH_3OH_{(l)}$ from the following data

(i) $CH_3OH_{(l)} + \frac{3}{2}O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

$\Delta H^\circ = -726\,kJ\,mol^{-1}$

(ii) $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta_c H^\circ = -393\,kJ\,mol^{-1}$

(iii) $H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)}$ $\Delta_f H^\circ = -286\,kJ\,mol^{-1}$

Q. 26. Calculate the pH of buffer solution composed of 0.01 M weak base BOH and 0.02M of its salt BA.

[$K_b = 1.8 \times 10^{-5}$ for weak base]

SECTION - D

Attempt any THREE of the following questions : **[12]**

Q. 27. Define the following terms :

(i) Isotonic solution

(ii) Osmosis

Gold crystallises into face-centred cubic cells. The edge length of unit cell is 4.08×10^{-8} cm. Calculate the density of gold.
[Molar mass of gold = 197 g mol^{-1}]

Q. 28. Write the mathematical equation for the first law of thermodynamics for

(i) isothermal process

(ii) adiabatic process

Derive the relationship between pH and pOH.

Q. 29. Define reference electrode. Write functions of salt bridge.
Draw neat, labelled diagram of standard hydrogen electrode (SHE).

Q. 30. Explain metal deficiency defect with example. Write chemical equation for preparation of sulphur dioxide from sulphur. Write uses of sulphur.

Q. 31. Write chemical reactions for the following conversions :

(i) Ethyl bromide to ethyl methyl ether.

(ii) Ethyl bromide to ethene.

(iii) Bromobenzene to toluene.

(iv) Chlorobenzene to biphenyl.

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