

DAY — **08**

SEAT NUMBER

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2026	II	18	1100	J-155	(E)
CHEMISTRY (55)					
Time : 3 Hrs.		(8 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 multiple choice type questions, only the first attempt will be considered for evaluation.*
- (8) *Physical constants :*
- (i) Avogadro Number = $N_A = 6.022 \times 10^{23}$
- (ii) Gas constant = $R = 0.08206 \text{ L-atm. K}^{-1} \cdot \text{mol}^{-1}$
- (iii) 1 Faraday = $F = 96500 \text{ Coulomb}$

SECTION - A

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

- (i) The electrolyte used in $\text{H}_2 - \text{O}_2$ fuel cell is ____.
- (a) aqueous KCl (b) aqueous KOH
- (c) aqueous HCl (d) aqueous KNO_3
- (ii) The oxidation state of bromine in HOBrO_2 oxoacid is ____.
- (a) + 7 (b) + 5
- (c) + 3 (d) + 1
- (iii) Acetonitrile may be prepared by heating the following reactants :
- (a) Ethyl chloride with alcoholic KCN
- (b) Ethyl chloride with alcoholic AgCN
- (c) Methyl chloride with alcoholic KCN
- (d) Methyl chloride with alcoholic AgCN

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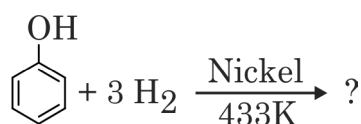
- (iv) The carbonated water is an example of ____.
- (a) solid in liquid solution
 - (b) liquid in liquid solution
 - (c) gas in liquid solution
 - (d) liquid in gas solution
- (v) The unit of rate constant is per second, the order of reaction is –
- (a) Zero
 - (b) First
 - (c) Second
 - (d) Third
- (vi) A system releases 10 kJ of heat and performs 15 kJ of work on the surrounding. Hence the change in internal energy is :
- (a) + 5 kJ
 - (b) – 5 kJ
 - (c) + 25 kJ
 - (d) – 25 kJ
- (vii) The co-ordination complex ions $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]^{2\oplus}$ and $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2\oplus}$ are ____ of each other.
- (a) ionization isomers
 - (b) solvate isomers
 - (c) linkage isomers
 - (d) co-ordination isomers
- (viii) The correct order for basic strength of amines and ammonia is ____.
- (a) $\text{NH}_3 > \text{R} - \text{NH}_2 > \text{R}_2\text{NH} > \text{R}_3\text{N}$
 - (b) $\text{NH}_3 > \text{R}_3\text{N} > \text{R}_2\text{NH} > \text{R} - \text{NH}_2$
 - (c) $\text{NH}_3 < \text{R} - \text{NH}_2 > \text{R}_3\text{N} > \text{R}_2\text{NH}$
 - (d) $\text{NH}_3 < \text{R} - \text{NH}_2 < \text{R}_2\text{NH} > \text{R}_3\text{N}$

- (ix) Amongst the following 3d-series elements, having highest value of first ionization enthalpy is ____.
- (a) Zn (b) Cu
(c) Co (d) Sc
- (x) The pOH of 0.01 M HCl solution is ____.
- (a) 1 (b) 2
(c) 11 (d) 12

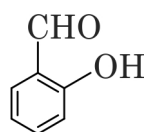
Q. 2. Answer the following questions :

[8]

- (i) Write the name of product obtained, when selenium is treated with magnesium metal.
- (ii) Write the SI unit of cell constant.
- (iii) Write the name of radioactive element in lanthanide series.
- (iv) Complete the following reaction :



- (v) Write the IUPAC name of :



- (vi) Copper has fcc structure with edge length 495 pm. What is the radius of copper atom in pm?
- (vii) Write the chemical name of Teflon.
- (viii) Write the name of nanoparticle which acts as highly effective bacterial disinfectant.

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SECTION - B

Attempt any EIGHT of the following questions :

[16]

- Q. 3. Define :
(a) Isomorphism
(b) Unit Cell
- Q. 4. Explain the trends in the following properties of group 17 elements :
(i) Atomic radii
(ii) Electronegativity
- Q. 5. Explain Homoleptic and Heteroleptic complexes with example.
- Q. 6. (a) Write the reaction of bromine water on glucose.
(b) Define – Enantiomers
- Q. 7. (i) Write example of one dimensional nanostructure of size less than 100 nm.
(ii) Write the hydrolysis reaction of ethyl methyl ether.
- Q. 8. Calculate the osmotic pressure of solution containing 0.822 gm of sucrose in 300 mL of water at 298 K.
[Given : Molar mass of sucrose 342 g/mol, $R = 0.08205 \text{ dm}^3 \cdot \text{atm} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}$]
- Q. 9. Write the mathematical equation of first law of thermodynamics for following processes :
(a) Isochoric process
(b) Adiabatic process
- Q. 10. Write two similarities and two differences between lanthanoids and actinoids.
- Q. 11. What is the action of following reagents on chlorobenzene?
(i) conc. HNO_3
(ii) fuming H_2SO_4

- Q. 12.** Explain Cannizzaro reaction with suitable example.
- Q. 13.** A chemical reaction occurs in two steps :
- (i) $\text{NO}_2\text{Cl}_{(g)} \xrightarrow{\text{slow}} \text{NO}_{2(g)} + \text{Cl}_{(g)}$
- (ii) $\text{NO}_2\text{Cl}_{(g)} + \text{Cl}_{(g)} \xrightarrow{\text{fast}} \text{NO}_{2(g)} + \text{Cl}_{2(g)}$
- (a) Write down the rate law.
- (b) Identify the reaction intermediate.
- Q. 14.** The standard potential of electrode $\text{Cu}^{++} (0.02 \text{ M}) \mid \text{Cu}_{(s)}$ is 0.337 volt. Calculate its potential in volt.

SECTION - C

Attempt any EIGHT of the following questions :

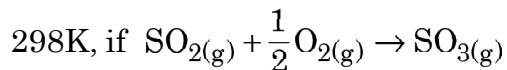
[24]

- Q. 15.**
- (i) Derive relationship between relative lowering of vapour pressure and molar mass of non volatile solute.
- (ii) Write statement of second law of thermodynamics.
- Q. 16.**
- (i) Convert, acetamide into ethyl amine.
- (ii) Explain amphoteric nature of water.
- Q. 17.** Convert the following :
- (i) Ethanol into sodium ethoxide.
- (ii) Phenol into o-phenol sulfonic acid.
- (iii) Bromomethane into methoxyethane.
- Q. 18.**
- (i) What is peptide linkage?
- (ii) Write general characteristics of interhalogen compounds.
- Q. 19.**
- (i) Write observed electronic configuration of chromium ($Z = 24$).
- (ii) Calculate magnetic moment of Ti^{3+} by using spin only formula. (Z of Ti = 22)
- (iii) Define Green chemistry.

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- Q. 20.** (i) Write examples of coordination metal complexes in biology.
(ii) Calculate the work done in oxidation of 2 moles of SO_2 at



[Given : $R = 8.314 \text{ J/K/mol}$]

- Q. 21.** (i) Write the formula to measure % atom economy according to green chemistry.
(ii) Convert :
(a) Benzene into benzaldehyde
(b) Cyclohexene into adipic acid

- Q. 22.** (i) Write a reaction for preparation of Nylon-6.
(ii) The salt of Sc^{3+} ion is colourless and the salt of Mn^{3+} ion is coloured. Explain.
[Z of $\text{Sc} = 21$ and Z of $\text{Mn} = 25$]

- Q. 23.** (i) Write the postulates of Werner's theory of co-ordination complexes.
(ii) What is the action of ethane-1, 2 – diol on acetone?

- Q. 24.** (i) Write Tollen's reagent test for acetaldehyde.
(ii) Write the structure of zwitter ion of sulfanilic acid. Write the reaction between benzene diazonium chloride and phenol in alkaline medium.

- Q. 25.** (i) Define :
Common ion effect.
(ii) Write preparation of glucose from starch.

- Q. 26.** (i) Draw the structure of 2, 4 – dinitrophenylhydrazone of acetaldehyde.
(ii) The rate of $\text{A} + \text{B} \rightarrow \text{P}$ is $3.6 \times 10^{-2} \text{ mol/dm}^3/\text{s}$. When $[\text{A}] = 0.2 \text{ M}$ and $[\text{B}] = 0.1 \text{ M}$. Calculate the rate constant if reaction is first order in B and second order in A.

SECTION - D

Attempt any THREE of the following questions :

[12]

- Q. 27.** (i) Define :
(a) Isotonic solution
(b) Molecularity of reaction
(ii) State and explain Hess's law of constant heat summation.
- Q. 28.** (i) Define :
(a) Schottky defect
(b) Ferromagnetism
(ii) Write the name of catalyst used in preparation of HDP.
(iii) Draw structure of isoprene unit of natural rubber.
- Q. 29.** (i) Calculate effective atomic number of Fe^{2+} in $[\text{Fe}(\text{CN})_6]^{4-}$
[Given : (Z = 26)]
(ii) Draw neat and labelled diagram of lead accumulator.
(iii) Write two advantages of hydrogen – oxygen fuel cell.
- Q. 30.** (i) Convert, ethanoic acid to ethanol.
(ii) Explain the mechanism of alkaline hydrolysis of bromomethane.
- Q. 31.** (i) Acetic acid is 5% ionised in its decimolar solution.
Calculate the dissociation constant of acetic acid.
(ii) Write chemical formula of epsom salt.
Give two uses of H_2SO_4 .

