



# BOARD QUESTION PAPER: JULY 2022

## CHEMISTRY

Time: 3 Hrs.

Max. Marks: 70

**General Instructions:**

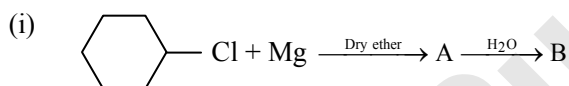
The question paper is divided into **four** sections.

- (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.

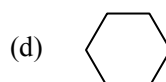
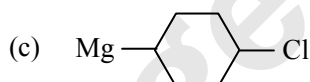
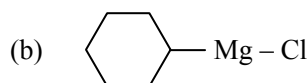
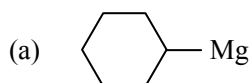
No mark(s) shall be given, if **ONLY** the correct answer or the alphabet of the correct answer is written. Only the first attempt will be considered for evaluation.

**SECTION – A**

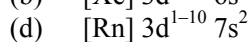
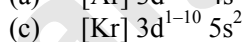
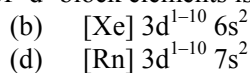
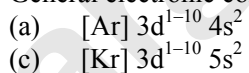
**Q.1. Select and write the correct answer for the following multiple choice type of questions:** [10]



the product 'B' is \_\_\_\_\_.



(ii) General electronic configuration of 3d series of 'd' block elements is \_\_\_\_\_.



(iii) Correct IUPAC name of tert-butyl alcohol is \_\_\_\_\_.

(a) 2-Methyl butan-1-ol

(b) 2-Methyl butan-2-ol

(c) 2-Methyl propan-2-ol

(d) 2-Methyl propan-1-ol

(iv) The standard emf of the following cell at 298K is \_\_\_\_\_.



$$E_{\text{Zn}}^{\circ} = -0.76\text{V}, E_{\text{Cr}}^{\circ} = -0.74\text{V}$$

(a)  $-0.02\text{V}$

(b)  $+0.02\text{V}$

(c)  $-0.2\text{V}$

(d)  $+0.2\text{V}$

(v) In the following oxyacid, chlorine has +7 oxidation state:

(a) HOCl

(b) HClO<sub>2</sub>

(c) HClO<sub>3</sub>

(d) HClO<sub>4</sub>

(vi) The work done during isothermal irreversible expansion of 2 moles of helium from 2 dm<sup>3</sup> to 4 dm<sup>3</sup> at 1 bar pressure and at 298K is \_\_\_\_\_.

(a) 2.0 kJ

(b)  $-2.0\text{ kJ}$

(c) 0.2 kJ

(d)  $-0.2\text{ kJ}$



- (vii) The correct relation between edge length and radius of an atom in simple cubic lattice is \_\_\_\_\_.
- (a)  $2a = r$  (b)  $\sqrt{3}a = 4r$   
(c)  $a = 2r$  (d)  $\sqrt{2}a = 4r$
- (viii) Lactose on hydrolysis gives \_\_\_\_\_.
- (a) galactose + glucose (b) 2 molecules of glucose  
(c) fructose + glucose (d) fructose + galactose
- (ix) ZWT in green chemistry stands for:
- (a) zero waiting time (b) zero waste technology  
(c) zubl water technology (d) zhen wu tang
- (x) The most basic amine amongst the following is \_\_\_\_\_.
- (a)  $\text{CH}_3 - \text{NH}_2$  (b)  $(\text{CH}_3)_2 \text{NH}$   
(c)  $(\text{CH}_3)_3 \text{N}$  (d)  $\text{C}_2\text{H}_5 - \text{NH}_2$

**Q.2. Answer the following questions:**

[8]

- (i) Write relation between molar conductivity and conductivity of solution.
- (ii) Calculate effective atomic number of  $\text{Co}^{+3}$  in  $[\text{Co}(\text{NH}_3)_6]^{3+}$  complex.
- (iii) Write the name of reaction during conversion of phenol to salicylic acid.
- (iv) Write the IUPAC name of  $\alpha$ -methylpropionic acid.
- (v) Write the formula of Hinsberg's reagent.
- (vi) Write the name of monomer used for preparation of Nylon 6.
- (vii) Write cell representation of standard hydrogen electrode.
- (viii) Write chemical composition of Ziegler-Natta catalyst.

**SECTION – B****Attempt any EIGHT of the following questions:**

[16]

**Q.3.** Define:

- (i) Osmotic pressure  
(ii) Ebullioscopic constant

**Q.4.** The pH of solution is 3.12. Calculate the concentration of  $\text{H}_3\text{O}^+$  ion.**Q.5.** State Kohlrausch Law of independent migration of ions. Write one application of Kohlrausch Law of independent migration of ions.**Q.6.** Distinguish between Schottky and Frenkel defect.**Q.7.** Derive the relationship between  $\Delta H$  and  $\Delta U$  for gas phase reactions.**Q.8.** What is the action of chlorine on the following:

- (i)  $\text{NH}_3$  (excess)  
(ii) phosphorous?

**Q.9.** Write the molecular formula of the following minerals:

- (i) chalcopyrite  
(ii) calamine

**Q.10.** Show that time required for 99.9% completion of a first order reaction is three times the time required for 90% completion.**Q.11.** Convert ethyl bromide to:

- (i) ethyl iodide  
(ii) ethyl fluoride

**Q.12.** Explain linkage isomerism in complexes with one example.



**Q.13.** What is the action of the following on carboxylic acid:

- (i)  $\text{SOCl}_2$
- (ii)  $\text{P}_2\text{O}_5$ ?

**Q.14.** Write balanced chemical reactions of the following reagents on carbolic acid:

- (i)  $\text{Br}_2$  water
- (ii) Concentrated  $\text{HNO}_3$

### SECTION – C

**Attempt any EIGHT of the following questions:**

[24]

**Q.15.** Write a note on 'aldol' condensation.

**Q.16.** What is a Lanthanoid contraction? Write similarities between lanthanoids and actinoids.

**Q.17.** Calculate the standard enthalpy of formation of  $\text{CH}_3 - \text{OH}$ , if standard heat of combustion of methyl alcohol are  $-726 \text{ kJ mol}^{-1}$ .

Given data:

- (i)  $\text{CH}_3\text{OH}_{(l)} + \frac{3}{2}\text{O}_{2(g)} \rightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)} \quad \Delta H^\circ = -726 \text{ kJ mol}^{-1}$
- (ii)  $\text{C}_{(\text{graphite})} + \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)} \quad \Delta_c H^\circ = -393 \text{ kJ mol}^{-1}$
- (iii)  $\text{H}_{2(g)} + \frac{1}{2}\text{O}_{2(g)} \rightarrow \text{H}_2\text{O}_{(l)} \quad \Delta_f H^\circ = -286 \text{ kJ mol}^{-1}$

**Q.18.** What happens when:

- (i) Ethene reacts with iodine monochloride.
- (ii) Sulphur dioxide is oxidised in presence of  $\text{V}_2\text{O}_5$ .
- (iii) Cu heated with concentrated  $\text{H}_2\text{SO}_4$

**Q.19.** Calculate the number of atoms and unit cell present in 0.5 g of Niobium if it forms body centred cubic structure. The density of Niobium is  $8.55 \text{ g cm}^{-3}$  and edge length of unit cell is 330.6 pm. Write preparation of glucose from sucrose.

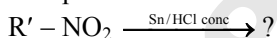
**Q.20.** Define: Nanochemistry.

What happens when vapours of  $1^\circ$  and  $2^\circ$  alcohols are passed over hot Cu metal?

**Q.21.** 5% aqueous solution of cane sugar has freezing point of 271 K. Calculate freezing point of 5% glucose solution.

[Molar mass of cane sugar =  $342 \text{ g mol}^{-1}$ ]

Complete the reaction



**Q.22.** What is denaturation of protein? Derive an expression of Ostwald's dilution law for weak acid.

**Q.23.** Define: Nanotechnology.

Write any two applications of electrochemical series.

**Q.24.** A chemical reaction occurs in the following steps:

- (i)  $\text{NO}_{2(g)} + \text{F}_{2(g)} \rightarrow \text{NO}_2\text{F}_{(g)} + \text{F}_{(g)}$  (slow)
- (ii)  $\text{F}_{(g)} + \text{NO}_{2(g)} \rightarrow \text{NO}_2\text{F}_{(g)}$  (fast)
  - (a) Write the equation of overall reaction.
  - (b) Write down rate law.
  - (c) Identify the reaction intermediate.

Write chemical reaction for preparation of teflon.

**Q.25.** Define: Elastomer.

Write two postulates of Werner theory of coordinate complexes.

**Q.26.** Write four salient features of  $\text{S}_\text{N}1$  mechanism.

Write chemical reaction for carbylamine test.



## SECTION – D

Attempt any THREE of the following questions:

[12]

**Q.27.** The normal boiling point of ethyl acetate is  $77.06^{\circ}\text{C}$ . A solution of 50 g of non-volatile solute in 150 g of ethyl acetate boils at  $84.27^{\circ}\text{C}$ . Evaluate the molar mass of solute if  $K_b$  for ethyl acetate is  $2.77 \text{ K kg mol}^{-1}$ .

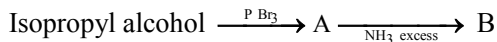
Explain pseudo first order reaction with suitable example.

**Q.28.** Why does aq.  $\text{CuSO}_4$  solution turn blue litmus red?  
Why are compounds of transition metal ions coloured?

**Q.29.** State and explain Hess's law of constant heat summation.  
What are interhalogen compounds?  
Write two uses of neon.

**Q.30.** Explain homoleptic and heteroleptic complexes with examples.  
Convert carboxylic acids to:  
(i) ester  
(ii) acid amide

**Q.31.** Define: Green chemistry.  
Complete the following reaction and identify A and B.



What is the action of hot HI on glucose?