



# TECHNO INDIA GROUP PUBLIC SCHOOL

## MOCK TEST-2 (2025-2026)

### CLASS-XII

Subject Code **043**

Roll No.

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Candidates must write the code on the title page of the answer-book.

## CHEMISTRY

Time allowed : 3 hours

Maximum Marks : 70

### General Instruction:

Read the following instructions carefully and follow them :

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short answer questions carrying 2 marks each
4. SECTION C consist of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators are not allowed.
9. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

### SECTION A

**Section A: Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to those questions**

1.	The unit of equivalent conductance is : (A) $\text{ohm}^{-1} \text{cm}^2 (\text{equiv})^{-1}$ (C) $\text{ohm cm}^2 (\text{equiv})^{-1}$	(B) $\text{ohm}^{-1} \text{cm}^2 \text{g}^{-1}$ (D) $\text{ohm}^{-1} (\text{mol})^1$	[1]
2.	Which is the strongest acid (pka value given in the bracket)? (A) HCOOH (3.77) (C) CH <sub>3</sub> COOH (4.71)	(B) C <sub>6</sub> H <sub>5</sub> COOH (4.22) (D) CH <sub>3</sub> CH <sub>2</sub> COOH(4.88)	[1]
3.	I.U.P.A.C name of CCl <sub>3</sub> CHO is : (A) Chloral (C) 1, 1, 1 - trichloro-ethanal	(B) trichloroacetaldehyde (D) 2, 2, 2 - trichloro ethanal.	[1]

4.	<p>Optical rotation of some compounds along with their structures are given below. Which of them have D-configuration?</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(i)</p> <math display="block">\begin{array}{c} \text{CHO} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{CH}_2\text{OH} \end{array}</math> <p>(+) rotation</p> </div> <div style="text-align: center;"> <p>(ii)</p> <math display="block">\begin{array}{c} \text{CHO} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{HO} - \text{C} - \text{H} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{CH}_2\text{OH} \end{array}</math> <p>(+) rotation</p> </div> <div style="text-align: center;"> <p>(iii)</p> <math display="block">\begin{array}{c} \text{CH}_2\text{OH} \\   \\ \text{HO} - \text{C} - \text{H} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{H} - \text{C} - \text{OH} \\   \\ \text{CH}_2\text{OH} \end{array}</math> <p>(+) rotation</p> </div> </div> <p>Ⓐ (i), (ii), (iii)      Ⓑ (i) &amp; (iii) only      Ⓒ (ii) &amp; (iii) only      Ⓓ (i) &amp; (ii) only</p>	[1]
5.	<p>What is the correct order of reactivity of alcohols in the following reaction ?</p> $\text{R} - \text{OH} + \text{HCl} \xrightarrow{\text{ZnCl}_2} \text{R} - \text{Cl} + \text{H}_2\text{O}$ <p>Ⓐ <math>1^\circ &gt; 2^\circ &gt; 3^\circ</math>      Ⓑ <math>1^\circ &lt; 2^\circ &lt; 3^\circ</math>      Ⓒ <math>3^\circ &gt; 2^\circ &gt; 1^\circ</math>      Ⓓ <math>3^\circ &gt; 1^\circ &gt; 2^\circ</math></p>	[1]
6.	<p>Which of the following is correctly matched ?</p> <p>(i) Pm      (A) Transition element  (ii) Os      (B) Radoactive'  (III) Cu, Fe, Cr      (C) +8</p> <p>Ⓐ (i) - B, (ii) - A, (iii) - C      Ⓑ (i) - C, (ii) - A, (iii) - B  Ⓒ (i) - B, (ii) - C, (iii) - A      Ⓓ (i) - A, (ii) - A, (iii) - C</p>	[1]
7.	<p>Which among the following is a wrong statement?</p> <p>Ⓐ Half life of a third order reaction is inversely proportional to the square of initial concentration of the reactant.  Ⓑ Molecularity of a reaction may be zero or fraction.  Ⓒ For a first order reaction, <math>t_{\frac{1}{2}} = \frac{0.093}{K}</math>  Ⓓ Rate of zero order reaction is independent of initial concentration.</p>	[1]
8.	<p>The source of nitrogen in Gabriel synthesis of amine is :</p> <p>Ⓐ sodium azide, <math>\text{NaN}_3</math>      Ⓑ sodium Nitrite, <math>\text{NaNO}_2</math>  Ⓒ potassium cyanide, KCN      Ⓓ Potassium phthalimide, <math>\text{C}_6\text{H}_4(\text{CO}_2)\text{NH}</math></p>	[1]
9.	<p>The C-O-H bond in alcohol is :</p> <p>Ⓐ slightly greater than <math>109^\circ 24'</math>      Ⓑ slightly less than <math>109^\circ 24'</math>  Ⓒ slightly greater than <math>120^\circ</math>      Ⓓ slightly less than <math>120^\circ</math></p>	[1]
10.	<p>In <math>60^\circ</math> of a first order reaction was completed in 60 min, 50% of the same reaction would be completed is approximately :</p> <p>Ⓐ 50 min      Ⓑ 45 min      Ⓒ 60 min      Ⓓ 40 min</p>	[1]
11.	<p>Which of these do not contain -COOH group :</p> <p>Ⓐ Aspirin      Ⓑ Benzoic acid      Ⓒ Ketones      Ⓓ Salicylic acid</p>	[1]
12.	<p>Which of the following is paramagnetic ?</p> <p>Ⓐ <math>\text{Ni}^{++}</math>      Ⓑ <math>\text{Cu}^+</math>      Ⓒ <math>\text{Zn}^{+++}</math>      Ⓓ <math>\text{Sc}^{+++}</math></p>	[1]



23.	<p>(a) Complete the following reaction :</p> $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{HI} \longrightarrow$ <p>(b)  <math>\xrightarrow[\text{Cone.H}_2\text{SO}_4]{\text{Cone.HNO}_3}</math></p> <p>(c) <math>\text{CH}_3\text{CH}_2\text{Br} \xrightarrow[\text{Aq.ethanol}]{\text{AgCN}}</math></p>	[3]
24.	<p>(a) Mention any two postulates of Werner's theory of co-ordination compounds.</p> <p>(b) Indicate the type of linkage isomerism with example</p>	[3]
25.	<p>How will you bring about the following conversions ?</p> <p>(a) Propanone to propane</p> <p>(b) Benzoyl chloride to Benzaldehyde</p> <p>(c) Ethanol to but-2-enal.</p>	[3]
26.	<p>(a) Write the equation for the reactions taking place at anode and cathode in the lead-storage battery.</p> <p>(b) Calculate the value of <math>\Delta_r G</math> at 298 k for the cell reaction.</p> $2\text{Mg(s)} + 2\text{Al}^{3+}(\text{aq}) \longrightarrow 3\text{Mg}^{2+}(\text{aq}) + 2\text{Al(s)}.$ <p>[Given : <math>E^\circ_{\text{Mg}} = -2.3 \text{ v}</math>, <math>E^\circ_{\text{Al}} = -2.36 \text{ v}</math>, &amp; <math>F = 96487 \text{ C}</math>]</p>	[3]
27.	<p>Identify the unknown compound in the following reaction sequence.</p> $\text{CH}_3\text{COOH} \xrightarrow{\text{SOCl}_2} \text{'A'} \xrightarrow{\text{Pd/BaSO}_4} \text{'B'} \xrightarrow{\text{Dil.NaOH}} \text{'C'}$	[3]
28.	<p>The rate constant of a reaction is <math>1.5 \times 10^7 \text{ sec}^{-1}</math> at <math>50^\circ\text{C}</math> and <math>4.5 \times 10^7 \text{ s}^{-1}</math> at <math>100^\circ\text{C}</math>. Calculate the Arrhenius parameter <math>E_a</math> and <math>A</math>.</p>	[3]

### SECTION D

**Question no. 29 and 30 are case based questions carrying 4 marks each.**

29.	<p>■ <b>Case Study Based Questions (29–30)</b></p> <p>One day Amit went to a park with his grandfather. He observed lot of plants in the park where he asked a question. "Why are plant leaves green? His grandfather said, "Plants are green due to chlorophyll a green pigment plays an important role in photosynthesis. In chlorophyll, the Mg is in co-ordination to porphyrin ring."</p> <p>Answer the following questions :</p> <p>(a) Name the metal present in chlorophyll. (b) Why the leaves and stem plants are green?</p> <p>(c) (i) What is the oxidation number of platinum in <math>[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]^{2+}</math> ion?  (ii) What is the oxidation number of Co in <math>[\text{Co}(\text{NH}_3)_6]\text{Cl}_3</math> ?</p> <p style="text-align: center;"><b>OR</b></p> <p>(i) Name the metal atom present in Vitamin B<sub>12</sub> .  (ii) Name the compound used in estimation of hardness of water.</p>	[4]
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30.	<p>In terms of equivalent conductivities Kohlrausch's law is defined as follows : The equivalent conductivity of an electrolyte at infinite dilution is the sum of the two values or depending upon the cation and the other upper anion.</p> $\Lambda_{\text{eq}}^{\alpha} = \Lambda_{\text{c}^+}^{\alpha} + \Lambda_{\text{a}^-}^{\alpha}$ <p>This law helps in determining the molar conductivity, degree of dissociation and equilibrium constant of weak electrolyte.</p> $\alpha = \frac{\Lambda_{\text{m}}^{\text{c}}}{\Lambda_{\text{m}}^{\alpha}} = \frac{\Lambda_{\text{m}}^{\text{c}}}{\nu^+ \Lambda_{+}^{\alpha} + \nu^- \Lambda_{-}^{\alpha}}$	[4]
	<p>Answer the following questions :</p> <p>(a) State Kohlrausch's law. (b) Define limiting molar conductivity. (c) Explain with graph, the variation of molar conductivity of strong electrolyte with dilution.</p> <p style="text-align: center;"><b>OR</b></p> <p>Define conductivity. How it vary with concentration ?</p>	[4]

## SECTION E

**Question no. 31 to 33 are long answer type question carrying 5 marks each.**

31.	<p>Attempt any five of the following :</p> <p>(a) How would you account for the following ? Many of the transition elements are known to form interstitial compounds.</p> <p>(b) How would you account for the following : The <math>E_{\text{M}^{2+}/\text{M}}^{\circ}</math> for copper is positive (0.34 v). Copper is the only metal in the first series of transition elements showing this behaviour.</p> <p>(c) Complete and balance the following chemical equation :</p> $\text{Fe}^{2+} + \text{MnO}_4^{\ominus} + \text{H}^+ \longrightarrow$ <p>(d) Transition metals are much harder than the alkali metals - Why ?</p> <p>(e) Which of the following cations are coloured in aqueous solution and why ? <math>\text{Sc}^{3+}</math>, <math>\text{V}^{3+}</math>, <math>\text{Ti}^{4+}</math>, <math>\text{Mn}^{2+}</math> (At. no. Sc = 21, V = 23, Ti = 22, Mn = 25)</p> <p>(f) There is a close similarity in physical and chemical properties of the 4d and 5d - series of the transition elements much more than expected on the basis of usual family relationship.</p> <p>(g) Why is europium (II) more stable than cerium (II) ?</p>	[5]
32.	<p>(a) 31.0 g of an unknown molecular material is dissolved in 500 g. of water. The resulting solution freezes at 271.14 K. Calculate the molecule mass of the material. [Given : <math>K_{\text{fH}_2\text{O}} = 1.86 \text{ K} \cdot \text{Kg} (\text{mole})^{-1}</math>, <math>T_{\text{f}}^{\circ}</math> for water = 2.73 K]</p> <p>(b) What is reverse osmosis ? Mention its use.</p> <p style="text-align: center;"><b>OR</b></p> <p>(a) 300 <math>\text{cm}^3</math> of an aqueous solution of protein contains 2.12 g of the protein, the osmotic pressure of such a solution at 310 K is found to be <math>3.89 \times 10^{-3}</math> bar. Calculate the molar mass of the protein. [<math>R = 0.823 \text{ L bar} (\text{mol})^{-1} (\text{k})^{-1}</math>]</p> <p>(b) (i) State Henry's Law. (ii) Soda water bottles are sealed under high pressure. Give reason.</p>	[5]

33.	<p>(a) How is benzoyl chloride converted into benzaldehyde? Write the equation and name the equation.</p> <p>(b) Write general equation for the formation of carboxylic acid from Grignard reagent.</p> <p>(c) Complete the reaction</p> $\begin{array}{c} \text{O} \\    \\ \text{R} - \text{C} - \text{CH}_3 \end{array} \xrightarrow{\text{NaOX}}$ <p style="text-align: center;">OR</p> <p>(a) When benzene is converted into benzaldehyde by Gattersman-Koch reaction? Write equation.</p> <p>(b) Complete &amp; name the following reaction :</p> $> \text{C} = \text{O} \xrightarrow{\text{Zn-Hg/HCl}}$ <p>(c) What is the effect of electron with drawing group on the acidity of carboxylic acid.</p>	[5]
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