TECHNO INDIA GROUP PUBLIC SCHOOL

MOCK TEST-3 (2025-2026)

CLASS-XII

Subject Code 043

Roll No. | | | | | | | |

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 π =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 standard reduction potential for Fe^{2+}/Fe and Sn^{2+}/Sn electrodes are –0.44 and –0.14V respectively. For the cell reaction, $Fe^{2+} + Sn \longrightarrow Fe + Sn^{2+}$, the standard emf is: Ⓐ +0.30 V Ⓑ –0.58 V Ⓒ +0.58 Ⓓ –0.30 V	[1]
2.	Grignard's reagent on reaction with acetone forms: Ⓐ tertiary alcohol Ⓑ secondary alcohol Ⓒ acetic acid Ⓓ aldehyde	[1]
3.	Nucleic acid are the polymer of: Ⓐ nucleotides Ⓑ nucleosides Ⓒ bass Ⓓ sugar	[1]

4. $t_{\frac{1}{2}}$ of reaction is inversely proportional to $[R_0]$, the order of reaction will be: [1]

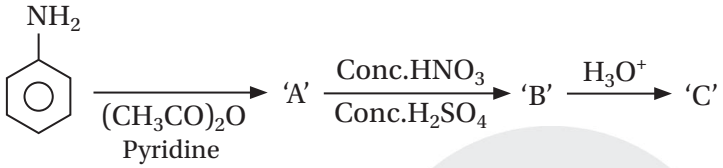
Ⓐ 0 Ⓑ 1 Ⓒ 2 Ⓓ 3

5. Match the following: [1]

Column-I		Column-II	
(p)	Ti^{4+}	(i)	green
(q)	Ti^{3+}	(ii)	colourless
(r)	V^{4+}	(iii)	purple
(s)	V^{3+}	(iv)	blue

Ⓐ p–(ii), q–(iii), r–(iv), s–(i) Ⓑ p–(i), q–(ii), r–(iii), s–(iv)

Ⓒ p–(iv), q–(iii), r–(ii), s–(i) Ⓓ p–(iii), q–(ii), r–(iv), s–(i)

6.  [1]

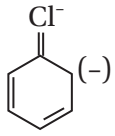
'C' is as major product is:

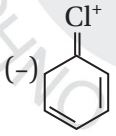
Ⓐ o–nitro aniline Ⓑ p–nitro aniline Ⓒ m–nitro aniline Ⓓ All of these

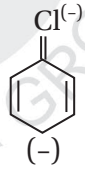
7. Which of the following is most stable complex? [1]

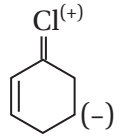
Ⓐ $[Ni(NH_3)_6]^{2+}$ Ⓑ $[Fe(CN)_6]^{3-}$ Ⓒ $[Co(CN)_3]^{+}$ Ⓓ $[Ni(H_2O)_6]^{2+}$

8. Identify the correct resonance structure of chlorobenzene. [1]

Ⓐ 

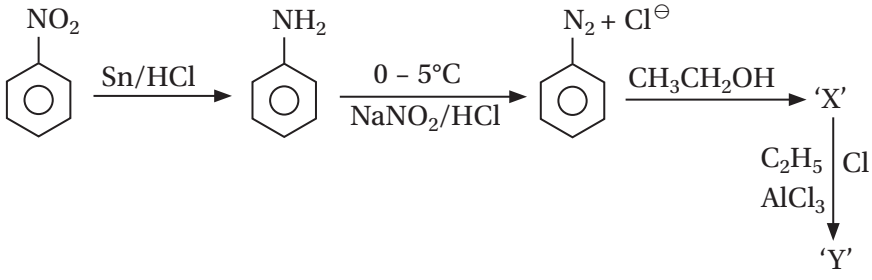
Ⓑ 

Ⓒ 

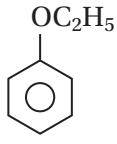
Ⓓ 

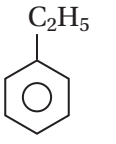
9. Which of the following is least basic in aqueous solution? [1]

Ⓐ $C_6H_5NH_2$ Ⓑ $(C_6H_5)_2NH^2$ Ⓒ $(C_6H_5)_5N$ Ⓓ $C_6H_5NHCH_3$

10.  [1]

'Y' is:

Ⓐ 

Ⓑ 

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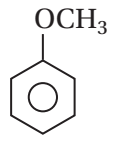
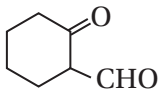
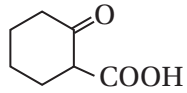
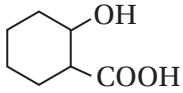
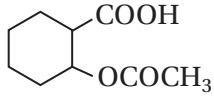
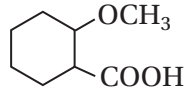
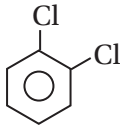
Ⓓ 

11.	 (i) $[Ag(NH_3)_2]^+$ followed by H_3O^+ (ii) $NaBH_4/H_2O$ (iii) $(CH_3CO)_2O/H_3O^+$ 'A' is: Ⓐ  Ⓑ  Ⓒ  Ⓓ 	[1]
12.	The first order reaction has $K = 4.9 \times 10^{-3}S^{-1}$. How long will it take 4 g of this reactant to reduce to 3 g? [log4 = 0.6021, log3 = 0.4771] Ⓐ 60 S Ⓑ 58.75 S Ⓒ 62 S Ⓓ 50 S	[1]
	Assertion Reason Type Question (13–16): Read the two statements carefully and select the correct option given below. **A:** Assertion and Reason both are correct and Reason is the correct explanation of Assertion **B:** Assertion and Reason both are correct and Reason is not the correct explanation of Assertion **C:** Assertion is correct but Reason is wrong **D:** Assertion is wrong but Reason is correct	
13.	**Assertion:** Molecularity is never more than three. **Reason:** Probability of multimolecular collisions is rare.	[1]
14.	**Assertion:** The magnetic moment of $(MnBr_4)^{2-}$ is 5.9 BM. **Reason:** It has five unpaired electrons.	[1]
15.	**Assertion:** Highly electropositive metals are obtained by electrolysis. **Reason:** AC current is used in electrolysis.	[1]
16.	**Assertion:** $t_{\frac{1}{2}}$ is independent of initial concentration in zero order reaction. **Reason:** $t_{\frac{1}{2}} = \frac{0.693}{K}$ for first order reaction.	[1]

SECTION B

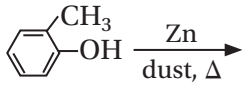
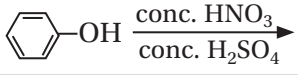
Question no. 17 to 21 are very short answer questions, carrying 2 marks each

17.	(a) $CH_3Cl + KCN \longrightarrow ?$ (b)  $\xrightarrow[AlCl_3]{CH_3Cl} ?$	[2]

18.	(i) Why do transition elements form interstitial compounds? (ii) $E^{\circ}_{Mn^{2+}/Mn}$ is negative whereas $E^{\circ}_{Cu^{2+}/Cu}$ is positive. Why?	[2]
19.	A solution having two components A and B, if vapour pressure of pure 'A' is 100 KP_a and 'B' is 50 KP_a, and the mole fraction of 'B' in liquid phase is 0.6, calculate the mole fraction of 'A' & 'B' in vapour phase.	[2]
20.	Define the following and give one example: (a) Reducing sugar (b) Globular proteins	[2]
21.	Write the products of electrolysis of aq. solution of NaCl at cathode and anode.	[2]

SECTION C

Question No. 22 to 28 are short answer questions, carrying 3 marks each

22.	E°_{Cu} for the given redox reaction is 2.71V. $Mg(s) + Cu^{2+}(0.01\ M) \longrightarrow Mg^{2+}(0.001\ M) + Cu(s)$ Calculate E_{cen} for the reaction. Write the direction of flow of current when an external opposite potential applied is (i) less than 2.71 V (ii) greater than 2.71 V	[3]
23.	Describe the cause of the following with respect to transition metals: (i) Tunsten has highest melting point in 5d series. (ii) Mn^{3+} is good oxidising agent whereas Fe^{2+} is good reducing agent. (iii) Transition metals have lower reactivity than S-block elements.	[3]
24.	(a) What is meant by activated complex? (b) 75% of reaction is completed in 30 minutes. Calculate the time taken for 90% completion of the reaction. [log 4 = 0.6021 ; log 10 = 1]	[3]
25.	Complete the following: (a) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle OH}{\overset{|}{\underset{|}{C}}}}-CH_2-CH_3 \xrightarrow[573\ K]{Cu}$ (b)  (c) 	[3]
26.	The conductivity of 0.001 M acetic acid is 4×10^{-5} S cm^{-1}. Calculate the dissociation constant of an acid, if molar conductivity at infinite dilution for acetic acid is 390 S cm^2 mol^{-1}.	[3]

27.	Convert: (**Attemtp any 3**) (a) Benzene to m–nitroaniline. (b) 4–Nitrotoluene to 2–Bromobenzoic acid. (c) Aniline to nitrobenzene (d) Aniline to toluene	[3]
28.	When benzene reacts with CH_3Cl in the presence of $AlCl_3$ to give 'A' (C_7H_8). 'A' reacts with 1 mole of Cl_2 in the presence of sunlight to form 'B' (C_7H_7Cl). 'B' on reaction with KCN forms 'C'. 'C' on hydrolysis gives 'D'. 'C' on reduction with Na and C_2H_5OH gives 'E'. Identify 'A' to 'E' and explain the reactions.	[3]

SECTION D

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

29. The table shows the values of pK_a of carboxylic acids. Study the table and answer the questions: [5]

Acid	pK_a	C_6H_5COOH	pK_a
HCOOH	3.75	C_6H_5COOH	4.20
CH_3COOH	4.76	p-nitro benzoic acid	3.44
FCH_2COOH	2.59	m-nitro benzoic acid	3.50
$ClCH_2COOH$	2.87	o-nitro benzoic acid	2.17
$BrCH_2COOH$	2.90	p-methyl benzoic acid	4.38
ICH_2COOH	3.16	m-methyl benzoic acid	4.27
		o-methyl benzoic acid	3.91
$Cl_2CHCOOH$	1.26	salicylic acid	2.98
		m-hydroxy benzoic acid	4.08
Cl_3COOH	0.63	p-hydroxy benzoic acid	4.58

I. Which of the following is strongest acid?

(i) Benzoic acid (ii) p-nitro benzoic acid

(iii) m-nitro benzoic acid (iv) o-nitro benzoic acid

OR

Which of the following acids has highest K_a based on the table?

alicylic acid, benzoic acid, p-hydroxy benzoic acid

II. Which is strongest acid among HCOOH, CH_3COOH, FCH_2COOH, $ClCH_2COOH$, CCl_3COOH?

III. Plot a graph for first four acids in increasing order of K_a. Give reason also.

30.	Primary and secondary structure of DNA The sequence of nucleotides in chain of nucleic acid is called its primary structure. The base composition in DNA varies from species to species but amount of A = T, C = G. In other words, A + G = C + T, but the ratio of AT/CG is 1.52 in man and 0.93 in E. coli. DNA can replicate. It has double helical structure. The two strands of DNA are held by hydrogen bonds. Thymine can form two H-bonds with Adenine and Cytosine and Guanine can be joined by three H-bonds. It is secondary structure of DNA. The diameter of double helix is 2 nm and the double helix repeats after interval of 3.4 nm when it completes one turn which involves 10 base pairs. DNA helices can be right handed as well as left handed. The β-conformation of DNA having right handed helices is most stable. On heating, two strands of DNA separate from each other and this process is known as melting. When these two strands are cooled they again hybridise and process is called annealing. The temperature at which the two strands completely separate is known as melting temperature (T_m) which is specific for each specific sequence. Answer the following questions: I. In E.coli DNA, the AT/GC ratio is 0.93. If number of moles of adenine in its DNA sample is 4,65,000, calculate number of moles of guanine present. II. Which bonds are stronger between A and T or between G and C and why? **OR** A DNA molecule with more number of GC pairs than AT pairs will have higher or lower melting point? III. If A + T in human being is 5,00,000, what will be amount of guanine?	[5]

SECTION E

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

31.	(a) Which type of isomerism is shown by $K[Cr(H_2O)_2(C_2O_4)_2]$? Draw structures of isomers. (b) (i) Write IUPAC name of $[Co(en)_3][Cr(C_2O_4)_2]$. (ii) Predict the shape and magnetic behaviour of: $[Cr(H_2O)_6]^{3+}$ [Atomic number of Cr = 24] (iii) How many unpaired electrons are present in 1. $[Ni(C_2O_4)_3]^{4-}$ 2. $[NiCl_4]^{2-}$ [Atomic number of Ni = 28] **OR** (a) (i) What are chelating agents? (ii) Give one use of EDTA. (b) Answer the following questions: (i) What is hybridisation in $[Fe(CO)_5]$ and shape? [At No. Fe = 26]. Write IUPAC name also. (ii) Discuss its magnetic behaviour, type of complex (inner or outer). Calculate its magnetic moment. (iii) What is hybridisation of $[Ni(H_2O)_6]^{2-}$ and discuss its magnetic behaviour? [At. No. of Ni = 28]. Write its IUPAC name also.	[5] [5]

32.	(a) Name the reagents used in the following reactions: (i) Oxidation of a primary alcohol to carboxylic acid. (ii) Oxidation of a primary alcohol to an aldehyde. (iii) Bromination of phenol to 2, 4, 6-tribromophenol. (iv) Benzyl alcohol to benzoic acid. (v) Dehydration of propan-2-ol to propene. (vi) Butan-2-one to butan-2-ol. (b) Convert Acetaldehyde to Butan-2-ol (c) Convert Benzene to Benzophenone **OR** (a) Write the equation of the reaction of hydrogen iodide with (i) 1-propoxypropane, (ii) methoxybenzene and (iii) benzyl ethyl ether. (b) Why is acetaldehyde more reactive than acetone towards HCN? (c) Write 2, 4-DNP reaction with Benzaldehyde.	[5] [5]
33.	(a) Why is vapour pressure of sea water less than river water? (b) What are ideal solutions? (c) A solution of 2.56 g of solute dissolved in 100 g of naphtalene gave a lowering in freezing point 0.68°C. Calculate the molar mass of solute. [$K_f = 6.8$ K kg mol^{-1}] (d) State one method of separation of ideal solutions. **OR** (a) What is meant by anoxia? (b) What is cause of edema? (c) Why is cucumber cut from head and rubbed with common salt? (d) Explain with the help of diagram depression in freezing point when non-volatile solute is added.	[5] [5]