



# Delhi Public School, Howrah

PERIODIC TEST - II (2024-2025)  
CLASS-XII

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

SUBJECT: CHEMISTRY (CODE-043)

TIME: 3 HOURS

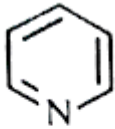
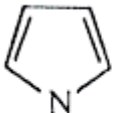
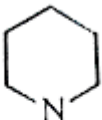
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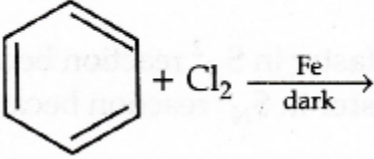
## General Instructions:

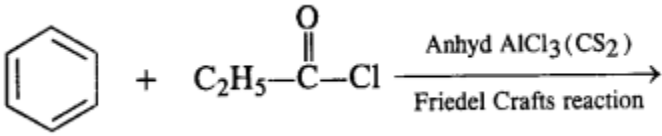
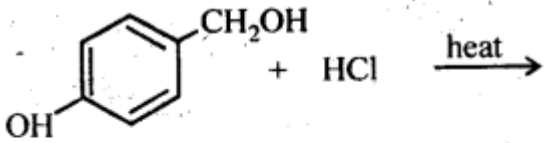
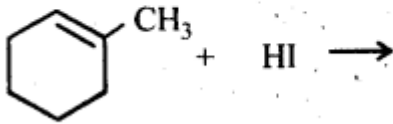
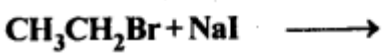
Read the following instructions carefully.

- There are 33 questions in this question paper with internal choice.
- SECTION A consists of 16 multiple choice questions carrying 1 mark each.
- SECTION B consists of 5 short answer questions carrying 2 marks each.
- SECTION C consists of 7 short answer questions carrying 3 marks each.
- SECTION D consists of 2 case - based questions carrying 4 marks each.
- SECTION E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.
- Use of log tables and calculators is not allowed.

	SECTION- A	MARKS
	<b>The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.</b>	
1.	The Rosenmund reaction can produce which of the following carbonyl compounds? (a) Methanal (b) Benzaldehyde (c) Butanone (d) Acetone	1
2.	If limiting molar conductivity of $\text{Ca}^{2+}$ and $\text{Cl}^-$ are $119.0$ and $76.3 \text{ S cm}^2 \text{ mol}^{-1}$ , then the value of limiting molar conductivity of $\text{CaCl}_2$ will be (a) $195.3 \text{ S cm}^2 \text{ mol}^{-1}$ (b) $271.6 \text{ S cm}^2 \text{ mol}^{-1}$ (c) $43.3 \text{ S cm}^2 \text{ mol}^{-1}$ (d) $314.3 \text{ S cm}^2 \text{ mol}^{-1}$ .	1
3.	Which of the following does not belong in the category of electrochemical cells? (a) Voltaic cell (b) Photovoltaic cell (c) Electrolytic cell (d) Fuel Cell	1
4.	Phenol reacts with $\text{Br}_2$ in $\text{CS}_2$ at low temperature to give (a) o-Bromophenol (b) o-and p-bromophenols (c) p-bromophenol (d) 2, 4, 6-tribromophenol	1
5.	In comparison to a $0.01 \text{ M}$ solution of glucose, the depression in freezing point of a $0.01 \text{ M}$ $\text{MgCl}_2$ solution is (a) the same (b) about twice (c) about three times	1

	(d) about six times	
6.	In the reaction of phenol with $\text{CHCl}_3$ and aqueous $\text{NaOH}$ at 343 K, the electrophile attacking the ring is: (a) $\text{CHCl}_3$ (b) $:\text{CHCl}_2$ (c) $:\text{CCl}_2$ (d) $\text{COCl}_2$	1
7.	Which of the following is the right name for the compound $\text{H}_3\text{C}-\text{CHCl}_2$ ? (a) 1,2-Dichloroethane (b) Ethylene dichloride (c) Ethylidene chloride (d) Vic-dichloride	1
8.	Which of the following substances is the least water-soluble? (a) Methanal (b) Pentanal (c) Propanone (d) Ethanal	1
9.	In chlorination of benzene, the reactive species is (a) $\text{Cl}^+$ (b) $\text{Cl}^-$ (c) $\text{Cl}_2$ (d) $\text{Cl}^{-2}$	1
10.	Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixture will show a positive deviation from Raoult's law? (a) Methanol and acetone (b) Chloroform and acetone (c) Nitric acid and water (d) Phenol and aniline	1
11.	Which of the following oxides is amphoteric in nature? (a) $\text{NiO}$ (b) $\text{ZnO}$ (c) $\text{CoO}$ (d) $\text{FeO}$	1
12.	In the following compounds:  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  (I) </div> <div style="text-align: center;">  (II) </div> <div style="text-align: center;">  (III) </div> </div> Order of acidity is (a) $\text{III} > \text{II} > \text{I}$ (b) $\text{I} > \text{II} > \text{III}$ (c) $\text{II} > \text{I} > \text{III}$ (d) $\text{III} > \text{I} > \text{II}$	1
<b>Q. no 13 to 16 are Assertion - Reasoning based questions.</b> <b>These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:</b> (a) Both A and R are true and R is the correct explanation of A.		

	(b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	
13.	<b>Assertion (A):</b> $\text{CHCl}_3$ is stored in dark bottles. <b>Reason (R):</b> $\text{CHCl}_3$ is oxidised in presence of light	1
14.	<b>Assertion (A):</b> O and p-nitrophenols can be separated by steam distillation. <b>Reason (R):</b> O-isomer is steam volatile due to chelation and p-isomer is not steam volatile due to intermolecular hydrogen bonding.	1
15.	<b>Assertion (A):</b> The resistivity for a substance is its resistance when it is one meter long and its area of cross section is one square meter. <b>Reason (R):</b> The SI units of resistivity is ohm metre .	1
16.	<b>Assertion (A):</b> On increasing dilution, the specific conductance keep on increasing. <b>Reason (R):</b> On increasing dilution, degree of ionisation of weak electrolyte increases and molality of ions also increases.	1
	<b>SECTION : B</b> <b>This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.</b>	
17.	A solution of $\text{CuSO}_4$ is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?	2
18.	Write the equations involved in the following reactions: Carbylamine reaction  OR  Diazotisation reaction.	2
19.	Although Zinc is a d block element still Zinc is not regarded as a transition element. Why?	2
20.	Actinoid contraction is greater from element to element than lanthanoid contraction. Why?	2
21.	Draw the structure of major monohalogen product in the following reaction :  	2
	<b>SECTION : C</b> <b>This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.</b>	
22.	Complete the following reaction equations : (a) $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{H}_3\text{PO}_2 + \text{H}_2\text{O} \rightarrow$ (b) $\text{C}_6\text{H}_5\text{NH}_2 + \text{Br}_2 (\text{aq}) \rightarrow$  OR  How are the following conversions carried out: (a) $\text{CH}_3\text{CH}_2\text{Cl}$ to $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ (b) Benzene to aniline	3
23.	How do you convert the following: (i) Aniline to phenol (ii) Prop-1-ene to Propan- 1-ol	3
24.	(a) Draw a plot between $\ln k$ and $1/T$ from Arrhenius equation. (b) What is the slope of the plot?	3
25.	(a) Write a short note on pseudo first order reaction in context of acidic hydrolysis of sucrose. (b) Write the unit of rate constant of pseudo first order reaction.	3
26.	Account for the following. (a) Although the amino group is o- and p- directing in aromatic electrophilic substitution	3

	<p>reactions, aniline on nitration gives a substantial amount of m-nitroaniline. (b) Aniline does not undergo Friedel-Crafts reaction.</p> <p style="text-align: center;"><b>OR</b></p> <p>Account for the following. (a) Diazonium salts of aromatic amines are more stable than those of aliphatic amines. (b) Gabriel phthalimide synthesis is preferred for synthesising primary amines</p>	
27.	<p>(a) Complete the following reaction equations:</p>  <p>(b) What is the role of the AlCl<sub>3</sub> in the above reaction?</p>	3
28.	<p>Identify the products of the reactions.</p>   	3
	<b>SECTION : D</b>	
	<p><b>The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.</b></p>	
29.	<p>Transition metals combine with oxygen at high temperature to give metallic oxides. Except Sc, all the metals upto Mn form monoxide (MO), which are ionic in nature. As oxidation number increases, covalent nature and acidic character increases. In general, the oxides in lower oxidation states of metal are basic and in their higher oxidation states, they are acidic whereas in the intermediate oxidation state, the oxides are amphoteric. These oxides and oxoanions can be coloured also. The change of colour of these compounds play an important role in chemical reactions.</p> <p>(a) Name one oxoanion of Mn which acts as a self-indicator. (b) Which oxide of Mn acts as a catalyst in the preparation of oxygen? (c) Which can be the most acidic oxide of Mn?</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) What is the lowest oxidation state shown by Mn?</p>	4
30.	<p>Kanad is investigating the melting point of different salt solutions. He makes a salt solution using 10 mL of water with a known mass of NaCl salt. He puts the salt solution into a freezer and leaves it to freeze. He takes the frozen salt solution out of the freezer and measures the temperature when the frozen salt solution melts. He repeats each experiment.</p>	4

S.No	Mass of the salt used in g	Melting point in °C	
		Readings Set 1	Reading Set 2
1	0.3	-1.9	-1.9
2	0.4	-2.5	-2.6
3	0.5	-3.0	-5.5
4	0.6	-3.8	-3.8
5	0.8	-5.1	-5.0
6	1.0	-6.4	-6.3

Assuming the melting point of pure water as 0°C, answer the following questions:

- (a) One temperature in the second set of results does not fit the pattern. Which temperature is that? Justify your answer.  
 (b) Write the law used here.  
 (c) In place of NaCl, if Kanad had used glucose, what would have been the melting point of the solution with 0.6 g glucose in it?

**OR**

- (c) In place of NaCl, if Kanad had used KCl, what would have been the melting point of the solution with 0.6 g KCl in it?

**SECTION : E**

**The following questions are long answer type and carry 5 marks each. All questions have an internal choice.**

31.	Give examples of any five of the following: (a) Etard reaction (b) Rosenmund reaction (c) Hydration of alkyne. (d) Stephen reduction (e) Clemmensen reduction (f) Wolf Kishner reduction (g) Gatterman – Koch reaction	5
32.	(a) A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is (i) doubled (ii) reduced to half? (b) The rate of the chemical reaction doubles for an increase of 10K in absolute temperature from 298K. Calculate $E_a$ .  <b>OR</b> (a) The half-life for radioactive decay of $^{14}\text{C}$ is 5730 years. An archaeological artifact containing wood had only 80% of the $^{14}\text{C}$ found in a living tree. Estimate the age of the sample. (b) Draw a diagram showing plot of potential energy vs reaction coordinate for an endothermic reaction & indicate $E_a$ .	5
33.	(a) A 1.00 molal aqueous solution of trichloroacetic acid ( $\text{CCl}_3\text{COOH}$ ) is heated to its boiling point. The solution has the boiling point of 100.18°C. Determine the van't Hoff factor for trichloroacetic acid. ( $K_b$ for water = 0.512 K kg mol $^{-1}$ ) (b) Explain why aquatic species are more comfortable in cold water rather than in warm water.  <b>OR</b> (a) 18 g of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$ (Molar mass = 180 g mol $^{-1}$ ) is dissolved in 1 kg of water in a sauce pan. At what temperature will this solution boil? ( $K_b$ for water = 0.52 K kg mol $^{-1}$ , boiling point of pure water = 373.15 K) (b) What is meant by positive deviations from Raoult's law? What is the sign of $\Delta_{\text{mix}}H$ for positive deviation?	5