श्री Venkateshwar International School

Sector-18, Dwarka, New Delhi – 110075

PRE-BOARD - 1 (2025-26)

CHEMISTRY (043)

CLASS – XII

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. This question paper contains **8 printed pages.**
2. There are 33 questions in this question paper with internal choice.
3. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
4. SECTION B consists of 5 short answer questions carrying 2 marks each.
5. SECTION C consists of 7 short answer questions carrying 3 marks each.
6. SECTION D consists of 2 case - based questions carrying 4 marks each.
7. SECTION E consists of 3 long answer questions carrying 5 marks each.
8. All questions are compulsory.

SECTION – A

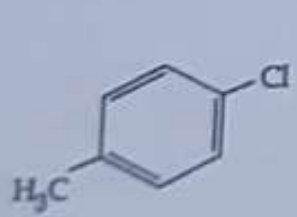
The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

Q1. The osmotic pressure of a solution can be increased by

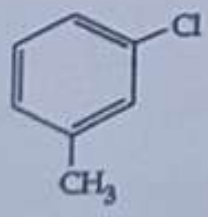
A. Increasing the volume
B. Increasing the number of solute particles
C. Decreasing the temperature
D. Removing semipermeable membrane

(1)

Q2. Which one of the following will form a yellow precipitate on reacting sequentially with (i) NaOH, (ii) dil.HNO_3 (iii) $AgNO_3$? **(1)**



A.



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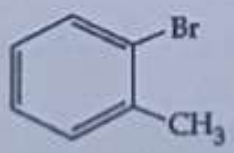
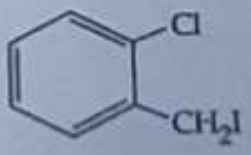


C.



D.

Q3. Which of the following is correct for spontaneity of a cell?

A. ΔG = -ve , E^0 = +ve
B. ΔG = +ve, E^0 = 0
C. ΔG = -ve , E^0 = 0
D. ΔG = +ve, E^0 = -ve

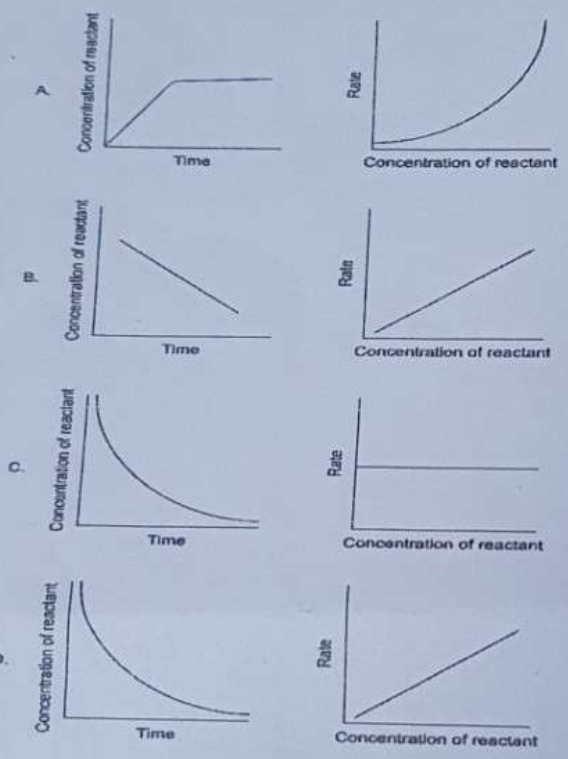
(1)

Q4. Two nucleotides are joined together by a linkage known as

A. Phosphodiester linkage
B. Glycosidic linkage
C. Disulphide linkage
D. Peptide linkage

(1)

Q5. Which of the following pairs of graphs represents the same order of reaction?



(1)

Q6. When MnO_2 is fused with KOH in air, it gives:

A. K_2MnO_4
B. $KMnO_4$
C. Mn_2O_7
D. Mn_2O_3

(1)

Q7. An organic compound A upon reacting with NH_2 gives B. On heating, B gives C. C in presence of KOH reacts with Br_2 to give $CH_3CH_2NH_2$. Identify A.

A. CH_3-CH_2-COOH
B. CH_3COOH
C. CH_3-CH_2-CH_2-COOH
D. CH_3-$CH(CH_3)$-COOH.

(1)

Q8. Which of the following statements are incorrect about Zn, Cd and Hg?

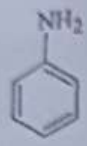
a. They exhibit high enthalpy of atomization as the d-subshell is full.
b. Zn and Cd do not show variable oxidation state while Hg shows +1and +2 oxidation state.
c. Compounds of Zn, Cd and Hg are paramagnetic in nature.
d. Zn, Cd and Hg are called soft metals.

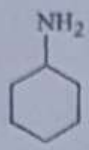
Choose the most appropriate from the options given below:

A. Only b and d
B. Only a and c
C. Only a and d
D. Only b and c

(1)

Q9. Which of the following compounds is the weakest Bronsted base? (1)

A. 

B. 

C. 

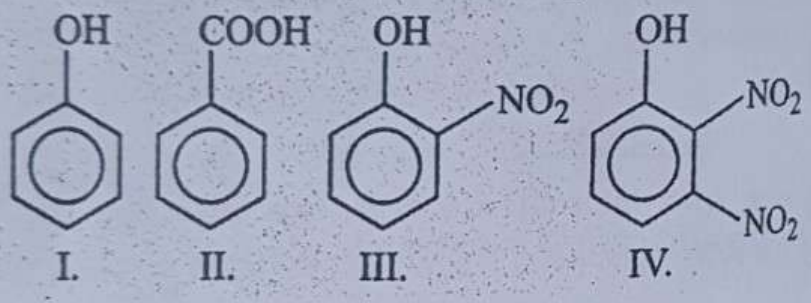
D 

Q10. Which catalyst is used in the Cannizzaro Reaction?

A. $FeCl_3$ B. $NaOH/H_2O$

C. $ZnCl_2/H^+$ D. $H_2/Pd\text{-}BaSO_4$ (1)

Q11. Arrange the following in decreasing order of pKa values:



A. IV>III>II>I B. I>III>IV>II

C. IV>III>I>II D. IV>II>III>I (1)

Q12. Which of the following complex ion is not expected to absorb visible light?

A. $[NiCN_4]^{2-}$ B. $[Fe(H_2O)_6]^{3+}$

C. $[Cr(NH_3)_6]^{3+}$ D. $[Ni(H_2O)_6]^{2+}$ (1)

For Questions 13 to 16, two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R).

Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Q13. **Assertion (A)** : When methyl alcohol is added to water, boiling point of water increases.
Reason (R) : When a volatile solute is added to a volatile solvent, elevation in boiling point is observed. **(1)**

Q14. **Assertion(A)** : SN1 reaction is basically a solvolysis reaction.
Reason (R) : Polar protic solvents help the substrate to ionize and get involved in SN1 reaction. **(1)**

Q15. **Assertion (A)** : Transition metals have low melting points.
Reason (R) : The involvement of greater number of (n-1) d and ns electrons in the interatomic metallic bonding. **(1)**

Q16. **Assertion (A)** : Deoxyribose, $C_5H_{10}O_4$ is a carbohydrate.
Reason (R) : Carbohydrates are hydrates of carbon so compounds which follow $C_x(H_2O)_y$ formula are carbohydrates. **(1)**

SECTION - 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.

Q17. What happens when
a) bromobenzene is treated with Mg in the presence of dry ether.
b) methyl chloride is treated with KCN? **(2)**

Q18. How much molar mass do you expect for NaCl using colligative properties? (Assume complete dissociation) **(2)**

Q19. a) Name the starting material used in the industrial preparation of phenol.
b) Explain why Lewis acid is not required in bromination of phenol. **(2)**

Q20. Ethanamine is treated with Hinsberg's reagent. Write the structure of its benzenesulphonamide and predict whether it will be soluble in aq. KOH or not. Explain. **(2)**

Q21. The rate constant for an isomerisation reaction, A→ B is 4.5×10^{-3} min^{-1}. If the initial concentration of A is 1M, calculate the rate of reaction after 1 hour.

OR

A radioactive decay follows first order kinetics. The initial amount of two radioactive elements X and Y is 1 g each. What will be the ratio of X and Y after two days if their half-lives are 12 hours and 16 hours respectively? **(2)**

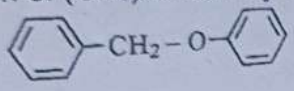
SECTION - C

This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

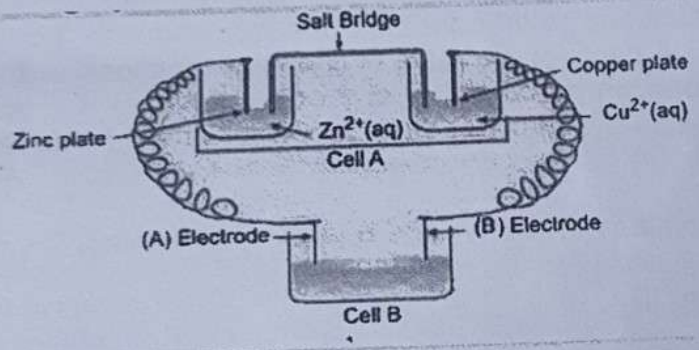
Q22. Compound 'A' with molecular formula C_4H_9Br is treated with aq. KOH solution. The rate of this reaction depends upon the concentration of the compound 'A' only. When another optically active isomer 'B' of this compound was treated with aq. KOH solution, the rate of reaction was found to be dependent on concentration of compound and KOH both.

a) Write down the structural formula of both compounds 'A' and 'B'.
b) Out of these two compounds, which one will be converted to the product with inverted configuration. (3)

Q23. 0.6 mL of acetic acid (CH_3COOH) having a density of 1.06 g mL^{-1} is dissolved in 1litreof water. The depression in freezing point observed for this strength of the acid was 0.0205°C. Calculate the Van't Hoff factor and the degree of dissociation of the acid. (3)
K_f for water = 1.86 K kg mol^{-1}.

Q24. Give the structures of final products expected from the following reactions:
a) Hydroboration of propene followed by oxidation with H_2O_2 in alkaline medium.
b) Dehydration of $(CH_3)_3C$-OH by heating with 20% H_3PO_4 at 358K.
c) Heating of  with HI. (3)

Q25. Consider the Fig. given below and answer the following questions:



a) Cell 'A' has E_{cell} = 2 V and Cell 'B' has E_{cell} = 1.1V. Which of the two cells 'A' or 'B' will act as an electrolytic cell ? Which electrode reaction will occur in this cell?
b) If cell 'A' has E_{cell} = 0.5V and cell 'B' has E_{cell} = 1.1V then what will be the reaction at anode and cathode?

OR

On passing current type 'X' through aqueous $CuSO_4$ solution, electrolysis was observed. When current type 'Y' was used, the conductivity of the solution could be measured.

a) Identify 'X' and 'Y' type of current used.
b) Write the electrolysis products of aqueous $CuSO_4$ solution on passing 'X'. (3)

Q26. a) Two amines 'A' and 'B' give carbylamine reaction. But amine 'A' gives azo dye test but amine 'B' does not. Identify amines 'A' and 'B' with suitable equation.
b) Why is CH_3NH_2 more basic than $(CH_3)_3N$ in gaseous solution? (3)

Q27. a) Write the correct formula and IUPAC name of the following coordination compound:
$CrCl_3.6H_2O$ (Violet, with 3 chloride ions/unit formula)
b) How many isomers are there for the complex $[Co(NH_3)_4Cl_2]$ Cl? (3)

Q28. $[Co(CN)_6]^{3-}$ and $[CoF_6]^{3-}$ both are octahedral complexes. Write any three differences between the two complexes. (3)

SECTION - D

The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks. Read the passage carefully and answer the questions that follow:

Q29. One reason for the importance of kinetics is that it provides evidence for the mechanisms of chemical processes. Besides being of intrinsic scientific interest, knowledge of reaction mechanisms is of practical use in deciding what is the most effective way of causing a reaction to occur. Many commercial processes can take place by alternative reaction paths, and knowledge of the mechanisms makes it possible to choose reaction conditions that favor one path over others. The vast amount of work done in chemical kinetics has led to the conclusion that some chemical reactions go in a single step; these are known as elementary reactions. Other reactions go in more than one step and are said to be stepwise, composite, or complex. Measurements of the rates of chemical reactions over a range of conditions can show whether a reaction proceeds by one or more steps. If a reaction is stepwise, kinetic measurements provide evidence for the mechanism of the individual elementary steps.
REFERENCES: Written by The Editors of Encyclopedia Britannica, Last Updated: Aug. 19, 2025 •Article History

a) Suppose the reaction between A and B was experimentally found to be of first order with respect to both A and B so the rate equation is :
Rate = $k[A][B]$

(i) Which of the following two mechanisms is consistent with this experimental finding?
Mechanism 1 : $A \rightarrow C + D$ (slow)
$B + C \rightarrow E$ (fast)
Mechanism 2 : $A + B \rightarrow C + D$ (slow)
$C \rightarrow E$ (fast)
(ii) Give reason for your answer.

b) For the reaction
$H_2 + Br_2 \rightarrow 2HBr$
Rate = $[H_2][Br_2]^{1/2}$

Predict the order for the rate of reaction and how will the rate of reaction be affected if the concentration of Br_2 is tripled?

OR

Predict the order for the rate of reaction and what change in concentration of H_2 will triple the rate of reaction?

(1+1+2)

Q30. Vitamins are organic substances present in minute amounts in natural foodstuffs. Having too little of any particular vitamin may increase the risk of developing certain health issues. A vitamin is an organic compound, which means that it contains carbon. It is also an essential nutrient that the body may need to get from food. There are currently 13 recognized vitamins. Vitamins are either soluble, or dissolvable, in fat or water. Taking some vitamins at a specific time, however, may reduce the risk of adverse effects. For example, depending on the type of vitamin, taking a supplement alongside a meal can boost how much of it the body absorbs and improve its impact on overall health.

REFERENCES: https://www.medicalnewstoday.com/reviewers

a) Except for vitamin B_{12}, all other vitamins of group B should be supplied regularly in diet. Why?

b) Fresh tomatoes are a better source of vitamin C than those which have been cut and stored for sometime. Explain.

c) Deficiency of which vitamin causes (i) Pernicious anemia (ii) convulsions?

OR

What is the chemical name of (i) Vitamin E (ii) Vitamin B_2? **(1+1+2)**

SECTION - E

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

Q31.I. a) An ore is fused with NaOH in presence of air to form yellow coloured compound A. The compound is acidified with dilute sulphuric acid to form a compound B. The compound B on relation with KCl forms an orange crystalline compound C. Name the ore and the compounds A, B and C. Give the reaction involved.

b) Write one use of compound C. **(4+1)**

OR

II. Answer the following questions with respect to the series of ions given below:

Sc^{+3}, Ti^{+4}, V^{+4}, V^{+2}, Cr^{+2}, Fe^{+3}, Ni^{+2}, Cu^{+2}, Zn^{+2}

a) Which of these ions are isoelectronic?
b) Which ion(s) from the list is/are not transition element(s) and why?
c) Cr forms two oxides in +2 and +3 oxidation states. Which of them is expected to turn red litmus blue?
d) Why is zinc soft metal?
e) Which ion can also have a +1oxidation state? **(2+1+1+1)**

Q32.I. a) Write the Nernst equation and the e.m.f of the following cell at 298 K:

$Sn_{(s)}|Sn^{2+}_{(aq)}$ (0.050 M) || H^+ (0.020 M) $|H_{2(g)}$ (1 bar) | $Pt_{(s)}$

(Given: E^0_{cell} = 0.14 V, Log1.25 = 0.0969)

b) How will the pH of aqueous solution of NaCl solution be effected when it is electrolysed?

c) Why does the conductivity of a solution decreases with dilution? **(3+1+1**

OR

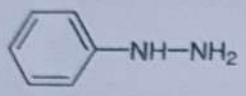
II. a) Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.

b) Three electrolytic cell A, B and C containing solutions of $ZnSO_4$, $AgNO_3$ and $CuSO_4$ respectively, are connected in series. A steady current of 1.5A was passed through them until 1.45g of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited?

(Atomic masses of Ag =108 , Cu = 63.5 g and Zn = 63.3g) **(2+3)**

Q33. I. a) Write the product formed when benzaldehyde reacts with the following reagents:

(i) CH_3CHO in the presence of dilute NaOH.

(ii) 

(iii) Conc. NaOH

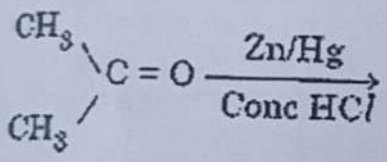
b) How will you distinguish between the following pairs of compounds:

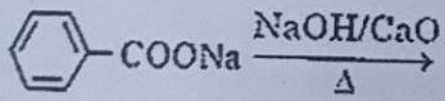
(i) CH_3-CH=CH-CO-CH_3 and CH_3-CH_2-CO-CH=CH_2

(ii) Benzaldehyde and benzoic acid. **(2+1+2)**

OR

II. a) Write the final products in the following:

(i) 

(ii) 

(iii) $CH_2 = CH - CH_2 - CN \xrightarrow[(b)\ H_3O^+]{(a)\ DIBAL\text{-}H}$

b) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:

CH_3COCH_3, HCHO, CH_3CHO, $C_6H_5COCH_3$

c) Draw the structure of 2,4-DNP derivative of acetaldehyde. **(2+2+1)**