Aakash + BYJU'S

Mock Test Paper

for

CBSE Board Exam.-2024

CHEMISTRY

INSTRUCTIONS FOR CANDIDATES

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. **Section–A** has 16 questions of 1 mark each; **Section–B** has 5 questions of 2 marks each;

   Section–C has 7 questions of 3 marks each; **Section–D** has 2 case-based questions of 4 marks each; and **Section–E** has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labelled diagrams should be drawn.

Corporate Office : Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

MM : 70

Mock Test Paper

Time : 180 min.

CBSE Board Exam.-2024
Class-XII
CHEMISTRY

Complete Syllabus of class XII

SECTION-A

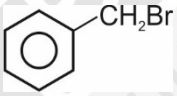
Multiple Choice Questions

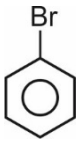
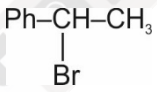
Q1. At 300 K, the highest osmotic pressure is exhibited by 0.01 M solution of **[1]**

(1) Urea (2) Glycol

(3) NaCl (4) $MgCl_2$

Q2. Which one is most reactive towards S_N1 reaction? **[1]**

(1) $Ph–CH_2–CH_2–Br$ (2) 

(3)  (4) 

Q3. Among the following lanthanoid which has the smallest size in +3 state? **[1]**

(1) Tb (2) Er

(3) Ce (4) Nd

Q4. Gabriel phthalimide synthesis is used to prepare **[1]**

(1) Aromatic primary amines (2) Aliphatic secondary amines

(3) Aliphatic tertiary amines (4) Aliphatic primary amines

Q5. Λ_m° for $CaCl_2$, HCl and $(CH_3COO)_2Ca$ are x, y and z $Scm^2\ mol^{-1}$ respectively. The Λ_m° for CH_3COOH will be **[1]**

(1) $z + y - x$ (2) $\frac{z}{2} + y - x$

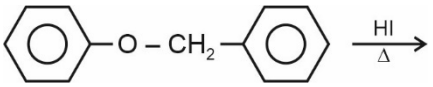
(3) $\frac{z}{2} + y - \frac{x}{2}$ (4) $z - y - \frac{x}{2}$

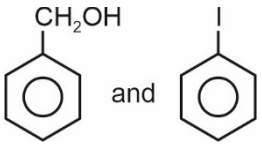
Q6. The rate constant for a zero order reaction ($A \rightarrow P$) is 6 mol $L^{-1}s^{-1}$. If the initial concentration of the reaction is 1.2×10^3 mol L^{-1}, then the time required (in sec) for the completion of the reaction would be **[1]**

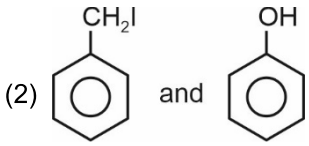
(1) 200 (2) 100

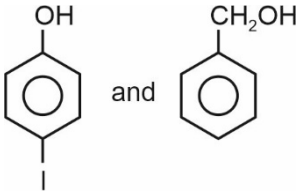
(3) 300 (4) 400

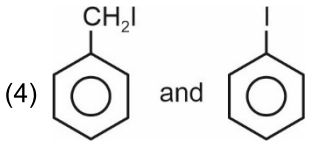
Q7. Major products of the given reaction are **[1]**



(1) 

(2) 

(3) 

(4) 

Q8. The amino acid which contains sulphur atom is **[1]**

(1) Lysine (2) Arginine

(3) Methionine (4) Tyrosine

Q9. Correct order of acidic strength of the given compounds is **[1]**

(1) $FCH_2COOH > NO_2CH_2COOH > CHCl_2COOH$

(2) $CHCl_2COOH > NO_2CH_2COOH > FCH_2COOH$

(3) $NO_2CH_2COOH > CHCl_2COOH > FCH_2COOH$

(4) $NO_2CH_2COOH > FCH_2COOH > CHCl_2COOH$

Q10. What mass of a solute (molecular weight 60) is required to dissolve in 180 g of water to reduce the vapour pressure to $8/9^{th}$ of pure water? **[1]**

(1) 66.67 g (2) 75 g

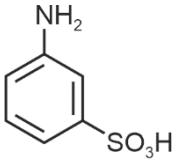
(3) 88.89 g (4) 112.5 g

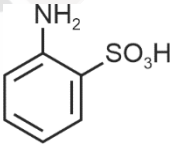
Q11. The molecularity of the given reaction is $NH_4NO_2 \rightarrow N_2 + 2H_2O$ **[1]**

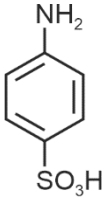
(1) 5 (2) 2

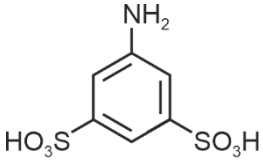
(3) 1 (4) 3

Q12. The major product formed when aniline reacts with conc. H_2SO_4 followed by heating with H_2SO_4 at 453 – 473 K is **[1]**

(1) 

(2) 

(3) 

(4) 

Q13. **Assertion (A) :** 4-Nitrobenzoic acid is a stronger acid than 4-Methoxybenzoic acid.

Reason (R) : pK_a of 4-Nitrobenzoic acid is more than 4-Methoxybenzoic acid. **[1]**

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

Q14. **Assertion (A) :** Vinyl chloride is less reactive than allyl chloride in nucleophilic substitution reaction.
Reason (R) : C–Cl bond in vinyl chloride has double bond character. **[1]**
(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Both Assertion and Reason are false statements

Q15. **Assertion (A) :** In a Daniel cell, if concentrations of Cu^{2+} and Zn^{2+} ions are doubled, the emf of the cell will be doubled.
Reason (R) : Emf of the cell is directly proportional to the concentration of ions. **[1]**
(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Both Assertion and Reason are false statements

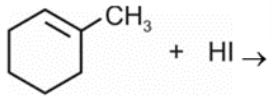
Q16. **Assertion (A) :** Order of a reaction can have fractional value.
Reason (R) : Order of a reaction is an experimentally determined quantity. **[1]**
(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Both Assertion and Reason are false statements

SECTION-B

Q17. Account for the following:
Cu^{2+} salts are coloured, while Zn^{2+} salts are white. **[2]**

Q18. Conversion of Aldehydes into Cyanohydrins is nucleophilic addition reaction. Give the reaction. **[2]**

Q19. Complete the following reaction equations: **[2]**

(i)  + HI →

(ii) $CH_3CH_2CH = CH_2 + HBr \rightarrow$

Q20. Explain the following terms giving a suitable example in each case. **[2]**
(i) Ambidentate ligand
(ii) Denticity of a ligand

Q21. Write the equation involved in Reimer-Tiemann reaction. **[2]**

OR

Write the mechanism of the following reaction **[2]**

$$CH_3CH_2OH \xrightarrow{HBr} CH_3CH_2Br + H_2O$$

SECTION-C

Q22. Rearrange the compounds of each of the following sets in order of their reactivity towards S_N2 reaction: **[3]**
(i) 2 – Bromo – 2 – methylbutane, 1 – Bromopentane, 2 – Bromopentane
(ii) 1 – Bromo – 3 – methylbutane, 2 – Bromo – 2 – methylbutane, 2 – Bromo – 3 – methylbutane
(iii) 1 – Bromobutane, 1 – Bromo – 2 –methylpropane, 2 – Bromo – 2 – methylpropane

Q23. Which of the following is more reactive towards nucleophilic addition reaction and why? **[3]**

Benzaldehyde or Propanal

OR

Aldehydes are more reactive than ketones during nucleophilic addition reaction, Give both steric and electronic reasons. **[3]**

Q24. Give reason for the following observations: **[3]**

(i) Haloarenes are less reactive than haloalkanes towards nucleophilic substitution reactions.

(ii) The treatment of alkyl chloride with aqueous KOH leads to the formation of alcohol but in the presence of alcoholic KOH, alkene is the major product.

Q25. Calculate the boiling point elevation for a solution prepared by adding 10 g of urea to 200 g of water (K_b for water = 0.52 K kg mol^{-1} molar mass of urea (NH_2CONH_2) = 60 g mol^{-1}) **[3]**

Q26. An organic compound with molecular formula $C_9H_{10}O$ forms 2, 4 – DNP derivative, reduces Tollen's reagent and undergoes cannizzaro reaction. On vigorous oxidation it gives 1, 2 – benzene dicarboxylic acid. Identify the compound. **[3]**

Q27. The rate constant for a first order reaction is 60 s^{-1}. How much time will it take to reduce the initial concentration of the reactant to its $1/10^{th}$ value? **[3]**

Q28. Explain Gabriel phthalimide synthesis. **[3]**

SECTION-D

Q29. Aniline is a resonance hybrid of five structures. $–NH_2$ group is an electro releasing group due to the presence of lone pair of electrons on Nitrogen atom. Thus $–NH_2$ group is a powerful activating group for electrophilic substitution reaction.

Due to resonance effect, the electron density redistributed and certain carbon atoms of aromatic ring have relatively high electron density. The main problem encountered during electrophilic substitution reactions of aromatic amines is that of their very high reactivity which leads to the difficulty in preparation of mono-substituted aniline derivative.

(a) On which positions at the aromatic ring, comparatively higher electron density is located? **[1]**

(b) Name the products obtained on sulphonation of Aniline. **[1]**

(c) Give the steps to prepare p-Bromoaniline. **[2]**

OR

Anline does not undergo Friedal Craft reaction. Explain. **[2]**

Q30. Colligative properties are those properties which depend on the number of solute particles irrespective of their nature relative to the total number of particles present it the solution. These properties are : (1) Relative lowering of vapour pressure of the solvent (2) Depression of freezing point of the solvent (3) Elevation of boiling point of the solvent (4) Osmotic pressure of the solution.

Raoult established that the lowering of vapour pressure depends only on the concentration of the solute particles and it is independent of their identity.

Elevation of boiling point (ΔT_b) or depression of freezing point (ΔT_f) for dilute solution is directly proportional to molality (m) of the solution whereas, the osmotic pressure (π) is proportional to the molarity of the solution at a given temperature.

(a) Find the elevation in boiling point of a solution containing 0.52 g of glucose dissolved in 80.2 g of water. (Given K_b for water = 0.52 K/m) **[2]**

(b) 30 g of urea (M = 60 g mol^{-1}) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg. **[2]**

OR

(a) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing. **[2]**

(i) 1.2% sodium chloride solution?

(ii) 0.4% sodium chloride solution?

(b) 0.1 M solution of acetic acid is 25% dissociated at 27°C. Determine its osmotic pressure in atm. **[2]**

SECTION-E

Q31. Attempt any five out of the following: **[5]**

(a) Write the IUPAC name of $K_3[CrF_6]$

(b) Name the major constituent of Bronze

(c) Calculate the half life of a first order reaction if the rate constant of reaction is $6.93 \times 10^{-2}\ s^{-1}$

(d) Name a chemical test to distinguish between Methylamine and Dimethylamine.

(e) Write down the electron configuration of Cu^+ ion.

(f) Differentiate between molecularity and order of a reaction.

(g) Zr and Hf have almost similar atomic radii. Why?

Q32. (a) Draw crystal field splitting energy diagram for octahedral complex. **[3]**

(b) Preparation of ethers by acid dehydration of secondary and tertiary alcohols is not a suitable method. Give reason. **[2]**

OR

(a) Calculate E_{cell} of the following reaction at 298 K

$$2Cr(s) + 3Fe^{2+}(0.1\,M) \longrightarrow 2Cr^{3+}(0.01\,M) + 3Fe(s)$$

Given : $E^o_{(Cr^{3+}/Cr)} = -0.74V$, $E^o_{(Fe^{2+}/Fe)} = -0.44V$ **[3]**

(b) The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y? **[2]**

Q33. (a) Complete the following equations:

(i) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \longrightarrow$ **[2]**

(ii) $5NO_2^- + 2MnO_4^- + 6H^+ \longrightarrow$

(b) Account for the following: **[3]**

(i) *d*-block elements have tendency for complex formation.

(ii) $Lu(OH)_3$ is weaker base than $Ce(OH)_3$.

(iii) Nitration of aniline gives sufficient amount of meta nitroaniline.

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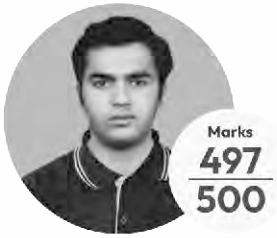

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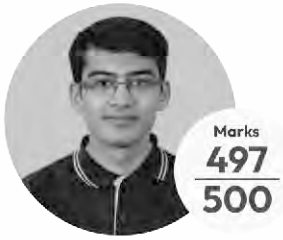

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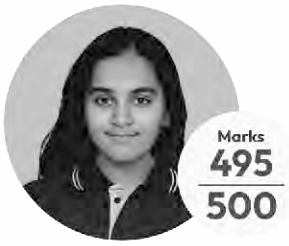

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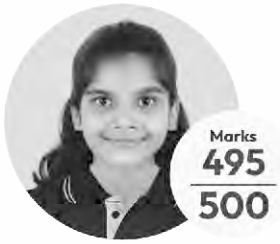

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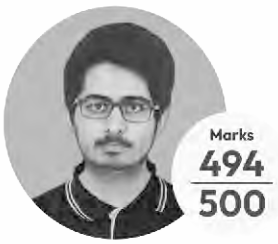

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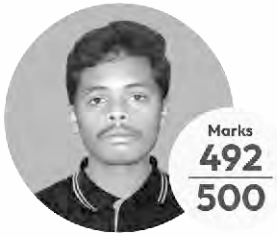

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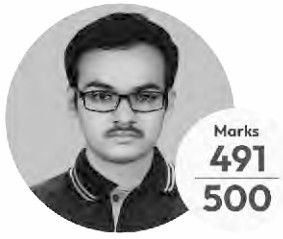

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