



CLASSROOM CONTACT PROGRAMME

(Academic Session: 2022 - 2023)

Test Pattern

Board Pattern

Practice Paper-01

PRACTICE PAPER - 01

SUBJECT: CHEMISTRY (THEORY)

Time : 3 Hrs.

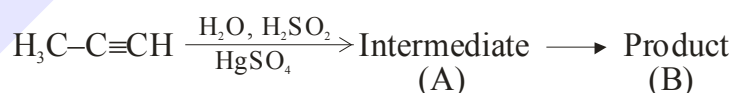
Max. Marks : 70

General Instructions :

1. This question paper contains **55** questions out of which **45** questions are to be attempted.
2. All questions carry **equal** marks.
3. The question paper consists of **three** sections – Section **A**, **B** and **C**.
4. **Section - A** contains **25** questions. Attempt any **20** questions from Q.No. **01** to **25**.
5. **Section - B** contains **24** questions. Attempt any **20** questions from Q.No. **26** to **49**.
6. **Section - C** contains **6** questions. Attempt any **5** questions from Q.No. **50** to **55**.
7. The first **20** Questions attempted in Section-**A** & Section-**B** and first 5 questions attempted in Section-**C** by a candidate will be evaluated.
8. There is only **one** correct option for every multiple choice question (MCQ). Marks will not be awarded for answering more than **one** option.
9. There is no negative marking.

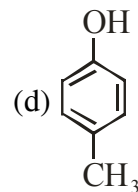
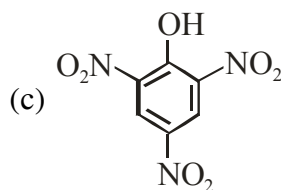
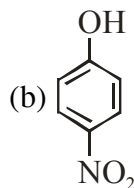
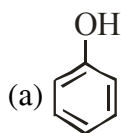
SECTION – A

1. The type of isomerism shown by the complex $[\text{CoCl}_2(\text{en})_2]$ is
 (a) Geometrical isomerism (b) Coordination isomerism
 (c) Ionization isomerism (d) Linkage isomerism
2. Name the gas that can readily decolourise acidified KMnO_4 solution :
 (a) SO_2 (b) NO_2 (c) P_2O_5 (d) CO_2
3. The heating of phenyl–methyl ethers with HI produces
 (a) iodobenzene (b) phenol (c) benzene (d) ethyl chlorides
4. Predict the correct intermediate and product in the following reaction :

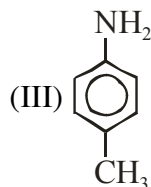
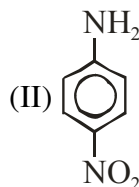
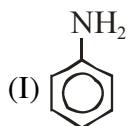


- (a) A : $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$ (b) A : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}=\text{CH}_3$ B : $\text{H}_3\text{C}-\text{C}\equiv\text{CH}$
- (c) A : $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$ (d) A : $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$

5. Which one is the most acidic compound ?



6. The correct increasing order of basic strength for the following compounds is :



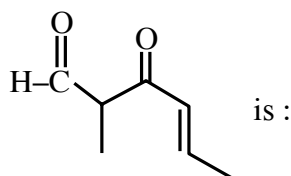
(a) III < I < II

(b) III < II < I

(c) II < I < III

(d) II < III < I

7. The IUPAC name of the compound



(a) 5-formylhex-2-en-3-one

(b) 5-methyl-4-oxohex-2-en-5-al

(c) 3-keto-2-methylhex-5-enal

(d) 3-keto-2-methylhex-4-enal

8. Which of the following is dependent on temperature?

(a) Molarity

(b) Mole fraction

(c) Weight percentage

(d) Molality

9. The correct order of the stoichiometries of AgCl formed when AgNO₃ in excess is treated with the complexes : CoCl₃.6NH₃, CoCl₃.5NH₃, CoCl₃.4NH₃ respectively is :-

(a) 3 AgCl, 1 AgCl, 2 AgCl

(b) 3 AgCl, 2 AgCl, 1 AgCl

(c) 2 AgCl, 3 AgCl, 1 AgCl

(d) 1 AgCl, 3 AgCl, 2 AgCl

10. Which of the following reactions is appropriate for converting acetamide to methanamine ?

(a) Hoffmann hypobromamide reaction

(b) Stephens reaction

(c) Gabriels phthalimide synthesis

(d) Carbylamine reaction

11. The reason for greater range of oxidation states in actinoids is attributed to :-

(a) actinoid contraction

(b) 5f, 6d and 7s levels having comparable energies

(c) 4f and 5d levels being close in energies

(d) the radioactive nature of actinoids

12. In a protein molecule various amino acids are linked together by :
- (a) α -glycosidic bond (b) β -glycosidic bond
(c) peptide bond (d) dative bond
13. α -D-Glucopyranose and β -D-Glucopyranose are
- (a) Isomers which differ in configuration at C-5
(b) Geometrical isomers
(c) Functional isomers
(d) Anomers
14. When initial concentration of a reactant is doubled in a reaction, its half-life period is not affected. The order of the reaction is :-
- (a) First (b) Second
(c) More than zero but less than first (d) Zero

(15-18) Given below are two statements labelled as Assertion (A) and Reason (R)

- (A) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is correct, but Reason (R) is wrong statement.
(D) Assertion (A) is wrong, but Reason (R) is correct statement.
15. **Assertion (A) :** Relative lowering in vapour pressure is a colligative property.
Reason (R) : Relative lowering in vapour pressure depends upon mole fraction of pure solvent.
16. **Assertion :** The rate constant of a zero order reaction has same units as the rate of reaction.
Reason : Rate constant of a zero order reaction does not depend upon the units of concentration.
17. **Assertion :** p-nitrophenol is more acidic than phenol.
Reason : Nitro group helps in the stabilisation of the phenoxide ion by dispersal of negative charge due to resonance
18. **Assertion :** The α -hydrogen atom in carbonyl compound is less acidic.
Reason : The anion, formed after the loss of α -hydrogen atom is resonance stabilised.
-

SECTION – B

19. For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.
20. (a) Write the colligative property which is used to find the molecular mass of macromolecules
- (b) In non-ideal solution, what type of deviation shows the formation of minimum boiling azeotropes ?

OR

- (a) Why are aquatic species more comfortable in cold water than in warm water ?
- (b) What happens when we place the blood cell in saline water solution (hypertonic solution)? Give reason.
21. (a) The cell in which the following reaction occurs :
$$2 \text{Fe}^{3+}(\text{aq}) + 2 \text{I}^{-}(\text{aq}) \longrightarrow 2 \text{Fe}^{2+}(\text{aq}) + \text{I}_2(\text{s})$$
 has $E^{\circ} = 0.236 \text{ V}$ at 298 K,
Calculate the standard Gibbs energy of the cell reaction. (Given : $1 \text{ F} = 96,500 \text{ C mol}^{-1}$)
- (b) How many electrons flow through a metallic wire if a current of 0.5 A is passed for 2 hours ? (Given : $1 \text{ F} = 96,500 \text{ C mol}^{-1}$)

OR

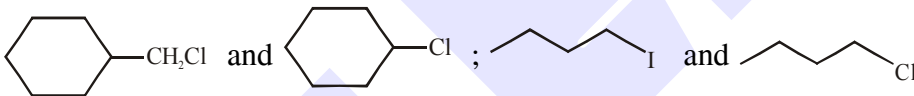
- (a) Calculate E° for the following reaction at 298 K :
$$2 \text{Cr}(\text{s}) + 3 \text{Fe}^{2+}(0.01 \text{ M}) \rightarrow 2 \text{Cr}^{3+}(0.01 \text{ M}) + 3 \text{Fe}(\text{s})$$
 (Given : $E^{\circ}_{\text{cell}} = 0.261 \text{ V}$)
- (b) Using the E° values of A and B, predict which one is better for coating the surface of iron [$E^{\circ}(\text{Fe}^{2+}/\text{Fe}) = -0.44 \text{ V}$] to prevent corrosion and why ?
(Given : $E^{\circ}(\text{A}^{2+}/\text{A}) = -2.37 \text{ V}$; $E^{\circ}(\text{B}^{2+}/\text{B}) = -0.14 \text{ V}$)
22. How will you obtain following from acetic acid ? (Give equations only)
- (a) Acetic anhydride (b) Ethyl acetate

OR

How will you obtain following compounds from benzaldehyde ? (Give equations only)

- (a) 3-phenyl prop-2-en-al (b) Benzoic acid
23. Write Friedel-Crafts alkylation and acylation reaction.
24. Write the simple and chemical name of vitamins; whose deficiency causes the following diseases :
- (a) Sterility (b) Non-clotting of blood.
- OR**
- (a) Which polysaccharide component of carbohydrates is commonly present in bread ?
- (b) Write the two types of secondary structures of proteins ?
25. Would you expect benzaldehyde to be more reactive or less reactive in nucleophilic addition reactions than propanal ? Explain your answer.

SECTION - C

26. How would you account for the following :
- (a) Of the d^4 species, Cr^{2+} is strongly reducing while manganese(III) is strongly oxidising.
 - (b) Cobalt(II) is stable in aqueous solution but in the presence of complexing reagents it is easily oxidised.
 - (c) The d^1 configuration is very unstable in ions.
27. Write the definition of the following :
- (a) mole fraction
 - (b) molality
 - (c) molarity
28. (a) **Give reasons :**
- (i) Grignard reagent should be prepared under anhydrous conditions,
 - (ii) Alkyl halides are immiscible with water although they are polar, and
- (b) In the following pairs of hydrogen compounds, which would undergo $\text{S}_{\text{N}}2$ reaction faster ?
- 
29. (a) Define standard electrode potential.
- (b) Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

OR

Write short notes on the following:

- (a) Electroplating (b) Corrosion (c) Nernst equation.

30. (a) Define 'order of a reaction'.
- (b) A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed.
- (Given : $\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 4 = 0.6021$)

OR

- (a) What is pseudo first order reaction? Inversion of cane sugar is which type of reaction. Write its chemical reaction?
- (b) Calculate the half-life of the first order reaction whose rate constant is $5 \times 10^{-14} \text{ s}^{-1}$.

SECTION – D**31. Passage :**

Amines are very reactive due to the difference in electronegativity between nitrogen and hydrogen atoms and due to the presence of unshared pair of electrons over N-atom. The number of hydrogen atoms attached to the N-atom decides the course of reactions of amine, that is why amines differ in many reactions. In aromatic amines like aniline, electron density at ortho and para-positions with respect to -NH_2 group is high. Therefore, this group is ortho or para directing and a powerful activating group.

- (a) Why amines on treatment with acids yield salt?
- (b) Arrange the following compounds in the increasing order of basic strength.
 $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$
- (c) What is the role of pyridine in the acylation reaction of amines?

OR

- (c) Primary amines (R-NH_2) have higher boiling point than tertiary amines (R_3N)

32. Passage :

The substitution reaction of alkyl halide mainly occurs by $\text{S}_{\text{N}}1$ or $\text{S}_{\text{N}}2$ mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of $\text{S}_{\text{N}}1$ reactions are governed by the stability of carbocation whereas for $\text{S}_{\text{N}}2$ reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

- (a) When anisole is treated with HI the product obtained is ?
 - (b) Name the instrument used for measuring the angle by which the plane polarised light is rotated.
 - (c) Predict the major product formed when 2-Bromopentane reacts with alcoholic KOH.
 - (d) Name the suitable alcohol and reagent, from which 2-chloro-2-methyl propane can be prepared.
-

SECTION – E

33. (a) Write the mechanism of dehydration of ethanol to form ethane.
(b) Give the name of Enzyme used to convert glucose into ethanol.
(c) Write chemical equation of phenol with chloroform and KOH.

OR

- (a) How to convert methanol into ethanol? Write chemical equations only.
(b) Write the structure formula of tertbutyl alcohol :
(c) How will you obtain p-hydroxybenzaldehyde from phenol? Give chemical equation.
34. (a) Define the following terms with a suitable example of each :
(i) Chelate complex
(ii) Ambidentate ligand
(b) Using IUPAC norms, write the formulae for the following complexes :
(i) Tetraamminediaquacobalt (III) chloride
(ii) Dibromidobis(ethane-1, 2-diamine)platinum(IV) nitrate
(c) Write the electronic configuration of d^5 on the basis of crystal field theory when $\Delta_0 > P$

OR

- (a) Although both $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]$ have sp^3 hybridisation yet $[\text{NiCl}_4]^{2-}$ is paramagnetic and $[\text{Ni}(\text{CO})_4]$ is diamagnetic. Give reason. (Atomic no. of Ni = 28)
(b) Write the electronic configuration of d^5 on the basis of crystal field theory when
(i) $\Delta_0 < P$ and
(ii) $\Delta_0 > P$
(c) Write IUPAC name of the complex $[\text{Co}(\text{en})_2(\text{NO}_2)\text{Cl}]^+$. What type of structural isomerism is shown by this complex ?
35. (a) Define electrode and electrode potential.
(b) Define specific conductance & equivalent conductance.
(c) What do you mean by Primary cell ?
(d) Write first law of Faraday's law of electrolysis.
(e) What do you understand by secondary cell ?