

General Instructions

- (i) This question paper contains 26 questions. All questions are compulsory.
- (ii) It comprises 6 single-correct multiple-choice questions.
- (iii) Attempt every question; detailed solutions are provided in the companion solutions booklet.

1. The unit of rate and rate constant is same for which order of reaction?

- (A) First
- (B) Second
- (C) Third
- (D) Zero

2. Which of the following is the mathematical form of Raoult's law?

- (A) $\frac{P^0 - P}{P^0} = \frac{n}{n + N}$
- (B) $\frac{P^0 - P}{P^0} = \frac{N}{n + N}$
- (C) $\frac{P^0 - P}{P} = \frac{n}{N + n}$
- (D) $\frac{P - P^0}{P^0} = \frac{n}{n + N}$

3. The number of unpaired electrons in Cu^{2+} is

- (A) 2
 - (B) 3
 - (C) 1
 - (D) 4
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4. Chloroform is oxidised in the presence of sunlight to form

- (A) CCl_4
 - (B) COCl_2
 - (C) CH_2Cl_2
 - (D) CHCl_3
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5. Glucose does not react with which of the following?

- (A) Bromine water
 - (B) NaHSO_3
 - (C) $\text{C}_6\text{H}_5\text{NHNH}_2$
 - (D) $(\text{CH}_3\text{CO})_2\text{O}$
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6. Formaldehyde reacts with KOH to give methanol and potassium formate. What is the name of the reaction?

- (A) Perkin reaction
 - (B) Wittig reaction
 - (C) Cannizzaro reaction
 - (D) Reimer-Tiemann reaction
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7. The rate constant for a first order reaction is 60 sec^{-1} . How much time will it take for the reactant to reduce to $1/16$ th of its initial concentration?



8. The freezing point decreases by 0.40 K , when 1.00 g non-electrolyte is dissolved in 50 g benzene. The value of K_f for benzene is $5.12 \text{ K kg mol}^{-1}$. Calculate the molar mass of the solute.



9. What is meant by the chelate effect? Give example also.



10. The resistance of a conductivity cell filled with $0.1 \text{ mol L}^{-1} \text{ KCl}$ solution is 100Ω . If the resistance of the same cell when filled with $0.02 \text{ mol L}^{-1} \text{ KCl}$ solution is 520Ω , find the conductivity and molar conductivity of the $0.02 \text{ mol L}^{-1} \text{ KCl}$ solution. The conductivity of a $0.1 \text{ mol L}^{-1} \text{ KCl}$ solution is 1.29 S/m .



11. What are the characteristics of transition metals? Why are they called transition metals?



12. Write two reactions of phenol that demonstrate its acidic nature.



13. Explain Aldol condensation with a chemical reaction.



14. What is an isotonic solution? Explain with an example.



15. Write the uses of freon. What is its impact on the environment?

16. (i) Write the electronic configuration of the following ions: (a) Cr^{3+}
(b) Cu^{2+} .
(ii) Write the formula of chromate and dichromate ions.

17. State Henry's law and its important applications.

18. (i) Explain reduction of nitriles, with chemical reaction.
(ii) Write only the chemical equation for the reaction that occurs when aniline is heated with chloroform in the presence of alcoholic KOH.

19. The rate constants of a certain reaction at 500 K and 700 K are 0.02 sec^{-1} and 0.07 sec^{-1} respectively. Calculate E_a and A . (2+2)

20. (i) What is meant by ambidentate ligand? Give examples also. (2)
(ii) Write the IUPAC names of following compounds:
a) $[\text{Co}(\text{Br})_2(\text{en})_2]^+$
b) $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$ (1+1)

21. (i) How would you obtain chlorobenzene from diazonium salt and aniline from chlorobenzene? (Write only chemical equation.) (2)

(ii) Write the increasing order of basicity of the following compounds: NH_3 , $(\text{CH}_3)_3\text{N}$, CH_3NH_2 , $(\text{CH}_3)_2\text{NH}$. (1)

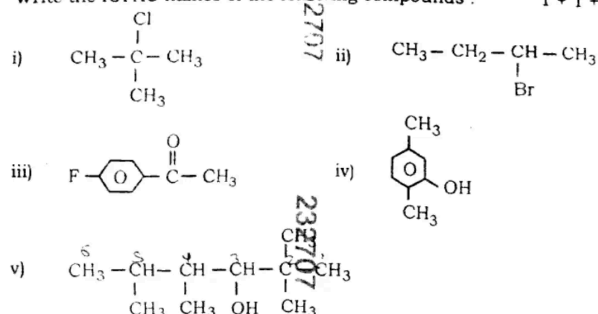
(iii) What are the main sources of protein? (1)

22. What is Kohlrausch's law? If λ_m° for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0 $\text{S cm}^2 \text{mol}^{-1}$ respectively, find the value of λ_m° for HAc. (2+2)

23.

y) Oxidation of a primary alcohol to a carboxylic acid. 2

OR
Write the IUPAC names of the following compounds : 1 + 1 + 1 + 1 + 1



(i) Explain the mechanism of the Bimolecular Nucleophilic Substitution reaction ($\text{S}_{\text{N}}2$) in a haloalkane and give the order of reactivity of the alkyl halides based on $\text{S}_{\text{N}}2$. (3)

(ii) Name the reagent used in the following reactions: (x) Oxidation of a primary alcohol to an aldehyde. (y) Oxidation of a primary alcohol to a carboxylic acid. (2)

OR

Write the IUPAC names of the following compounds (1 + 1 + 1 + 1 + 1):

(i) $(\text{CH}_3)_3\text{C}-\text{Cl}$

(ii) $\text{CH}_3-\text{CH}_2-\text{CH}(\text{Br})-\text{CH}_3$

(iii) 4-F-C₆H₄-COCH₃

(iv) a benzene ring bearing two CH₃ groups and one OH group

(v)

$\text{CH}_3-\text{CH}(\text{CH}_3)-\text{CH}(\text{CH}_3)-\text{CH}(\text{OH})-\text{C}(\text{CH}_3)_3$

24. What happens when (give only the chemical equations):

- (i) Methyl phenyl ketone is treated with iodine in the presence of NaOH?
- (ii) Ethyl bromide is heated with aqueous KOH?
- (iii) Phenol reacts with chloroform in the presence of aqueous NaOH?
- (iv) Acetaldehyde is treated with Tollen's reagent?
- (v) Benzoic acid is heated with ammonia? (1+1+1+1+1)

OR

How would you obtain (write chemical equations only):

- (i) Formic acid from formaldehyde?
 - (ii) Propane-2-ol from propene?
 - (iii) Benzene from phenol?
 - (iv) m-bromobenzoic acid from benzoic acid?
 - (v) Ethyl acetate from acetic acid? (1+1+1+1+1)
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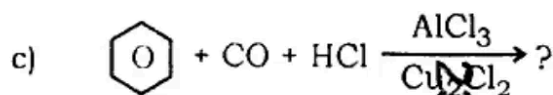
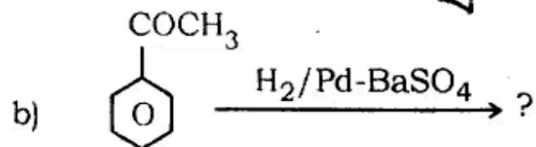
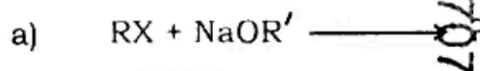
25. Discuss the structure of glucose in detail. (5)

OR

- i) What do you understand by mono, di and polysaccharides? Explain with examples. (3)
 - ii) What are peptide bonds and glycosidic bonds? (2)
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26.

निम्नलिखित अभिक्रियाओं को पूरा कीजिए :



i) Define standard electrode potential. (1)

ii) Define bidentate ligand. (1)

iii) Complete the following reactions (1+1+1):



OR

i) Explain standard hydrogen electrode potential with diagram. (1)

ii) Give an example of optical isomerism. (1)

iii) Complete the following reactions (1+1+1):

