



INDIAN SCHOOL SOHAR
SECOND TERM EXAM 2017-18
CHEMISTRY

STD: XII
Date: 19-11-2017

MARKS: 70
TIME: 3Hrs

Instructions:

1. All questions are compulsory.
2. Question nos. 1-5 are very short answer questions and carry 1 mark each.
3. Question nos. 6-10 are short answer questions and carry 2 marks each.
4. Question nos. 11-22 are short answer questions and carry 3 marks each.
5. Question no. 23 is short answer question and carry 4 marks.
6. Question nos. 24-26 are long answer questions and carry 5 marks each.
7. Write serial no. of the question before attempting it.
8. Use log tables for calculations.

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1. Give evidence that $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Cl}$ are ionization isomers.
 2. Write chemical equation for the ammonolysis of benzyl chloride followed by the reaction of the amine formed with two moles of CH_3Cl .
 3. Give the reaction for the manufacture of aspirin from phenol.
 4. What is mischmetal?
 5. Name the cell that is used in hearing aids.
 6. Write the IUPAC name for the following coordination compounds:
a) $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$ b) $[\text{Rh}(\text{PPh}_3)_3\text{Cl}]$
 7. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidizing power of F_2 and Cl_2 .
 8. How will you distinguish between the following pairs of compounds by chemical tests:
i) N-methylmethanamine and N,N-dimethylmethanamine ii) Aniline and ethanamine
OR
Write the reaction when benzene diazonium chloride reacts with the following reagents:
i) HBF_4 / Δ ii) Cu / HBr
 9. An organic compound with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzendicarboxylic acid. Identify the compound and write the Cannizzaro reaction for it.
 10. The reaction of methyl ethyl ether with HI follows S_N^2 mechanism but the reaction of methyl-tert-butyl ether with HI follows S_N^1 mechanism. Explain.
 11. a) Out of $\text{cis}-[\text{CrCl}_2(\text{ox})_2]^{3-}$ and $\text{trans}-[\text{CrCl}_2(\text{ox})_2]^{3-}$, which one is optically active and why?
b) Write the formula of Mercury(I)tetrathiocyanatocobaltate(III).
c) Predict the hybridization and geometry of $[\text{Ni}(\text{CO})_4]$ based on valence bond theory. ($Z=28$)
 12. What is meant by crystal field splitting? How does the magnitude of Δ_0 decide the actual configuration of d orbitals in a coordination entity?

13. Illustrate the following with an example:
a) Hell Volhard Zelinsky reaction b) Rosenmund reduction c) Clemmensen reduction
14. Arrange the following in the increasing order of their property mentioned:
a) F_2 , Cl_2 , Br_2 , I_2 (Bond dissociation enthalpy)
b) NH_3 , PH_3 , AsH_3 , SbH_3 , BiH_3 (Basic nature)
c) $HOCl$, $HOBr$, HOI (Acidic nature)
- OR
- a) Comment on the nature of two S-O bonds in SO_2 . Are the two S-O bonds equivalent?
b) How is the presence of SO_2 detected? Write the reaction for it.
15. How will you bring about the following conversions:
a) Aniline to nitrobenzene b) Ethanoic acid to methanamine
c) Aniline to 1,3,5 tribromobenzene
16. Give reasons:
a) pK_b of aniline is more than methylamine.
b) Although amino group is o- and p- directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline.
c) Aromatic primary amines cannot be prepared by Gabriel Phthalimide synthesis.
- 17.a) Show that for a first order reaction, half-life is independent of the initial concentration of the reactant.
b) The rate constant of a first order reaction is $60s^{-1}$. How much time will it take to reduce the initial concentration of the reactant to $1/16^{th}$ value?
18. The resistance of a conductivity cell filled with $0.1 mol L^{-1}$ KCl solution is 100Ω . If the resistance of the same cell when filled with $0.02 mol L^{-1}$ KCl solution is 520Ω . Calculate the conductivity and molar conductivity of $0.02 mol L^{-1}$ KCl solution. The conductivity of $0.1 mol L^{-1}$ KCl solution is $1.3 \times 10^{-2} \Omega^{-1} cm^{-1}$.
19. a) Why does freezing point of a solvent gets lowered on addition of a non volatile solute ?
b) Illustrate depression in freezing point with the help of a vapor pressure-temperature curve.
c) Show that the depression in freezing point is a colligative property.
- 20.a) Alcohols can act both as electrophiles and nucleophiles. Justify.
b) Write the chemical reaction for the preparation of phenol from cumene.
- 21.a) Explain why alkyl halides undergo nucleophilic substitution reactions whereas aryl halides undergo electrophilic substitution reactions.
b) p-Dichlorobenzene has higher melting point than o- and m-isomers? Why?
22. Write ionic equations for the following:
a) Aqueous solution of KI reacts with alkaline $KMnO_4$ solution.
b) Acidified $KMnO_4$ solution is added to oxalic acid solution.
c) H_2S is passed through acidified $K_2Cr_2O_7$ solution.
23. Rakesh, chemistry teacher of class XII asked Rahul to store trichloromethane in dark coloured bottle to protect it from sunlight. But Rahul did not take him seriously and stored it in a transparent glass bottle.
a) Why did Rakesh instruct Rahul to store it in dark coloured bottle?
b) What other precaution should be taken while its storage?
c) Is the act done by Rahul correct? Give reason?
d) What values Rahul lacks in?

24.a) Account for the following:

- Highest fluoride of Mn is MnF_4 while highest oxide is Mn_2O_7 .
- $\text{Cu}^{2+}(\text{aq})$ is more stable than $\text{Cu}^+(\text{aq})$.
- La^{3+} and Lu^{3+} are colorless and diamagnetic.

b) Write the equations involved in the preparation of Potassium dichromate from sodium chromate (Na_2CrO_4).

OR

a) Explain why?

- E° for $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is more positive than $\text{Fe}^{3+}/\text{Fe}^{2+}$. (Z for Mn=25, Fe=26)
- Transition metals have high enthalpy of atomization.
- Size of trivalent lanthanoid cations decreases with increase in atomic number.

b) Write the preparation of potassium permanganate from pyrolusite ore (MnO_2).

25.a) What happens when

- Acetone is heated with ethylene glycol and H_2SO_4 .
- NH_3 is treated with acetic acid and the product is heated strongly.
- Ethanoic acid is heated in the presence of P_2O_5 .

b) Write the mechanism of nucleophilic addition reactions in aldehydes and ketones.

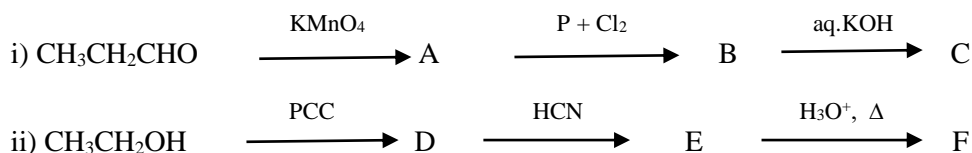
c) Explain why α - hydrogens of aldehydes and ketones are acidic in nature.

OR

a) Give reasons for the following:

- $(\text{CH}_3)_3\text{C-CHO}$ does not undergo aldol condensation.
- Benzoic acid is a stronger acid than ethanoic acid.

b) Complete the following sequence of reactions:



26.a) Give reasons:

- NO_2 is coloured while N_2O_4 is colourless.
- H_3PO_2 and H_3PO_3 acts as good reducing agents while H_3PO_4 does not.
- Hydrochloric acid is not used to acidify permanganate solution in volumetric analysis of Fe^{2+} or $\text{C}_2\text{O}_4^{2-}$.

b) Draw the structures of the following : i) H_2SO_3 ii) XeF_4

(OR)

a) Give a comparative account of the following:

- Physical state of nitrogen and phosphorous.
- Maximum covalency of oxygen and sulphur.
- Proton affinities of NH_3 and PH_3 .

b) Complete the following chemical reactions

- $\text{Fe}^{3+} + \text{SO}_2 + \text{H}_2\text{O} \rightarrow$
- $\text{XeF}_2 + \text{H}_2\text{O} \rightarrow$