



MAITRI VIDYA NIKETAN, EMSSS, RISALI, BHILAI
CLASS XII, MODEL EXAMINATION(2022-23)
CHEMISTRY(043)

Time: 3 Hours

Maximum Marks: 70

General Instructions:

1. All questions are compulsory. There are 35 questions in this question paper with internal choice.
2. This question paper has five sections. Section A, B, C, D, E
3. Section A consists of 18 MCQ, Assertion-reason questions carrying 1 mark each. ($1 \times 18 = 18$)
4. Section B consists of 7 very short answer questions carrying 2 marks each ($2 \times 7 = 14$)
5. Section C consists of 5 short answer questions carrying 3 marks each. ($3 \times 5 = 15$)
6. Section D consists of two Case based questions carrying 4 marks each ($4 \times 2 = 8$)
7. Section E consists of 3 long answer questions carrying 5 marks each ($5 \times 3 = 15$)
8. Use of log tables and calculators is not allowed.

Answer the following multiple-choice questions: (1x18=18)

- Q.1. A solution has higher osmotic pressure than its standard solution. Which of the following term will be used for this solution?
a) Isotonic b) Hypertonic c) Dilute d) Hypotonic
- Q.2. In an electrochemical process, a salt bridge is used
a) as a reducing agent. b) as an oxidizing agent
c) to complete the circuit so that current can flow. d) None of these
- Q.3. Which of the following is affected by catalyst?
a) ΔH b) ΔS c) ΔG d) E_a
- Q.4. Which of the following is a strong oxidising agent? (At.No. Mn=25, Zn=30, Cr=24, Sc=21)
a) Mn^{3+} b) Zn^{2+} c) Cr^{3+} d) Sr^{3+}
- Q.5. The oxidation number of Co in $[Co(NH_3)(NO_2)_3]$ is
a) +3 b) 0 c) -3 d) +6
- Q.6. Chlorobenzene reacts with Mg in dry ether to give a compound A, which further reacts with ethanol to give
a) phenol b) benzene c) ethylbenzene d) phenyl ether
- Q.7. Which of the following alcohols, is used as an antifreeze reagent and for making explosives?
a) Glycerol b) Glycol c) Ethanol d) Phenol
- Q.8. Which of the following reactions convert acetone into hydrocarbon having same number of carbon atoms?
a) Wolff-Kishner reaction b) Hoffmann reaction
c) Grignard reaction d) Reduction with $LiAlH_4$
- Q.9. Reaction of nitrous acid with aliphatic primary amine in cold gives
a) a diazonium salt b) an alcohol
c) a nitrite d) a dye
- Q.10. What is the chemical name of the vitamin B1
a) Riboflavin b) Thiamine c) Cyanocobalamin d) Pyridoxin
- Q.11. Oxygen cylinders of scuba divers are diluted with ----- to avoid bends.
a) Hydrogen b) Nitrogen c) Helium d) Argon
- Q.12. In a Leclanche dry cell, the cathode is
a) Zn container b) MnO_2 c) Graphite rod d) NH_4Cl
- Q.13. If the initial concentration of reactant is doubled, $t_{1/2}$ is also doubled, the order of reaction is:
a) Zero b) First c) Second d) Third
- Q.14. IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is
a) Platinum diaminechloronitrite b) Chloronitrito-N-ammineplatinum(II)
c) Diamminechloridonitrito-N-platinum(II) d) Diamminechloridonitrito-N-platinate(II)

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- a) Assertion and Reason both are correct statements and reason is correct explanation for assertion.
- b) Assertion and Reason both are correct statements but reason is not the correct explanation for assertion.
- c) Assertion is correct statement but reason is wrong statement.
- d) Assertion is wrong statement but reason is correct statement.

- Q.15. Assertion :C-X bond is a polar covalent bond .
Reason: Halogen atom is more electronegative than carbon.
- Q.16. Assertion: Alcohols are soluble in water.
Reason: Alcohols forms hydrogen bonds with water molecules.
- Q.17. Assertion: Aldehydes and ketones , both react with Tollen's reagent to form silver mirror.
Reason: Both, aldehydes and ketones contain a carbonyl group.
- Q.18. Assertion: Butan-1-ol is more soluble in water than butan-1-amine .
Reason: Alcohols are less polar than amines.

Answer the following (2x7=14)

- Q.19. Write difference between nucleoside and nucleotide.
- Q.20. Calculate the time to deposit 1.27g of copper at cathode when a current of 2A was passed through the solution of CuSO_4 (molar mass of Cu= 63.5 gmol⁻¹, $1F=96500 \text{ Cmol}^{-1}$)
- Q.21. In a first order reaction, the concentration of the reactant is reduced from 0.6 mol L⁻¹ to 0.2 mol L⁻¹ in 5 min.
Calculate the rate constant of the reaction.
- Q.22. . a) Write the structure of 4-tert.butyl-3-iodoheptane
b) Define inversion of configuration.
- Q.23.i) i) Why the boiling points of halides are higher than those of the hydrocarbons of comparable molecular mass?
ii) Define racemisation.
- Q.24.a) Define diazotisation.
b) Explain coupling reaction with the help of example.
- Q.25. How will you convert 4-nitrotoluene to 2-bromobenzoic acid?

Answer the following (3x5=15)

- Q.26. The rate of a reaction becomes four times when the temperature changes from 293K to 313K. Calculate the energy of the activation (E_a) of the reaction assuming that it does not change with temperature.
($R= 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $\log 4=0.6021$, $\log 2=0.3010$, $\log 3=0.4771$)
- Q.27.a) Why Zn ,Cd ,Hg are not regarded as transition elements?
b) What are lanthanoid contraction?
c) Name an important alloy which contains some of the lanthanoid metals.
- Q.28. Complete the reaction:
a) $\text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{KCl} \rightarrow$
b) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \rightarrow$
c) $3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow$
- Q.29. i) Write the IUPAC name of $(\text{CH}_3)_2\text{CHCOCH}(\text{CH}_3)_2$
ii) Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions:
Ethanal , propanal, propanone, butanone
iii) convert butanal to butanoic acid
- Q.30.i) Explain Stephen reaction.
ii) Convert Ethylbenzene to benzoic acid .
iii) Write distinguish test to differentiate between aniline and methanamine.

Case based question answer (4x2=8)

- Q.31. Alcohol is an organic compound in which a hydroxyl group is bonded to a saturated carbon atom. These alcohols may be classified as primary, secondary, tertiary according to which carbon of the alkyl group is bonded to the hydroxyl group.

Alcohols are prepared by hydration of alkenes, by hydroboration-oxidation, by reduction of aldehydes and ketones or reaction of Grignard reagent with aldehydes or ketones. Lucas test can be used for the distinguish between 1^o, 2^o, and 3^o alcohols.

Under normal room conditions, alcohols exist either as colourless liquids or solids. As is true for most homologous series, one finds the general trend of increasing melting point, boiling point and viscosity and decreasing vapour pressure as the number of carbon atoms in the molecule increases.

The boiling points of isomeric alcohols with the same number of carbon atoms generally decrease on going from primary to secondary to tertiary structures for the hydroxyl group and with increased branching of the hydrocarbon chain.

In the question (i-iv) a statement of assertion followed by a statement of reason is given.

Choose the correct answer out of the following choices on the basis of the above passage.

- a) Assertion and Reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and Reason both are correct statements but reason is not the correct explanation for assertion.

- c) Assertion is correct statement but reason is wrong statement.
 d) Assertion is wrong statement but reason is correct statement.
- i) Assertion: Boiling points of alcohols are lower than hydrocarbons.
 Reason: Alcohols undergo intermolecular hydrogen bonding and hence their boiling points are higher than those of the hydrocarbons.
- ii) Assertion: Boiling points of alcohols are higher than that of ethers of comparable molecular masses.
 Reason: They can form intermolecular hydrogen bonding.
- iii) Assertion: The solubility of alcohols increases with increase in branching.
 Reason: Ethanol and methanol are immiscible in water.
- iv) Assertion: tert-butyl methyl ether reacts with HBr to form tert-butyl bromide $(\text{CH}_3)_3\text{C-Br}$ and CH_3OH , methanol.
 Reason: It follows SN_1 mechanism.

Q.32. Carbohydrates are polyhydroxy aldehydes and ketones and those compounds which on hydrolysis give such compounds are also carbohydrates. The carbohydrates which are not hydrolysed are called monosaccharides. Other carbohydrates are oligosaccharides and polysaccharides.

Monosaccharides with aldehydic group are called aldose and those with free ketonic groups are called ketone. Carbohydrates are mainly synthesised by plants during photosynthesis.

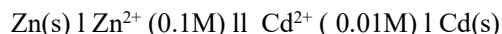
- i) Which of the following can be hydrolysed further? Glucose, Fructose, sucrose, ribose.
 ii) What do you mean by disaccharides?
 iii) Define reducing and non-reducing sugars.
 iv) What happens when glucose reacts with bromine water?

OR

What are the two constituents of starch?

Answer the following (5x3=15)

Q.33. Calculate the cell emf and $\Delta_r G^0$ for the following cell reaction at 25°C .



(Given $E^0(\text{Zn}^{2+}/\text{Zn}) = -0.763\text{ V}$, $E^0(\text{Cd}^{2+}/\text{Cd}) = -0.403\text{ V}$)

$1F = 96500\text{ Cmol}^{-1}$, $R = 8.314\text{ JK}^{-1}\text{mol}^{-1}$)

Q.34.a) Write the IUPAC names of $[\text{Co}(\text{NH}_3)_6]^{3+}$ and explain the structure on the basis of VBT. Also write the magnetic properties and type of hybridisation along with type of spin and geometry. (3)

b) Explain Linkage isomerism with the help of example. (2)

OR

i) On the basis of CFT, write electronic configuration of d^4 complex, when $\Delta_0 > P$ and $\Delta_0 < P$

ii) Why low spin tetrahedral complexes are rarely observed?

iii) Which central metal atom is present in chlorophyll?

iv) Write difference between double salt and complex salt?

Q.35.i) Define: a) Raoult's law b) Osmotic pressure

ii) Calculate the freezing point of an aqueous solution containing 10.50g of MgBr_2 in 200g of water (Given molar mass of $\text{MgBr}_2 = 184\text{ gmol}^{-1}$, K_f for water is 1.86 Kkgmol^{-1})

