

Please check that this question paper contains 33. Questions and has 7 Printed pages.

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# D.A.V. INSTITUTIONS, CHHATTISGARH

## SAMPLE QUESTION PAPER -2023-24

### CLASS –XII

### SUBJECT: CHEMISTRY

**Time Allowed: 3 Hours****Maximum Marks: 70****Instructions :**

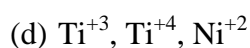
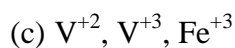
1. There are 33 Questions in this Question paper. All questions are compulsory.
2. Section A: Question no. 1 to 16 are MCQs and Assertion-Reason type questions carrying 1 mark each.
3. Section B: Question no. 17 to 21 are short answer type I questions and carry 2 marks each.
4. Section C: Question no. 22 to 28 are short answer type II questions and carry 3 marks each.
5. Section D: Question no. 29 & 30 are case based questions and carry 4 marks each
6. Section E: Question no. 31 to 33 are long answer type questions and carry 5 marks each.
7. There is no overall choice. However, an internal choice has been provided.
8. Use of calculators and log tables is not permitted.

### SECTION – A

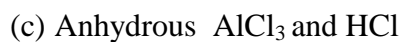
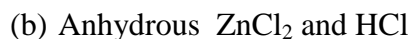
**The following questions are multiple choice questions with one correct answer. There is no internal choice in this section.**

1. Magnetic moment 2.84 B.M is given by
  - (a)  $\text{Cr}^{+2}$
  - (b)  $\text{Co}^{+2}$
  - (c)  $\text{Ni}^{+2}$
  - (d)  $\text{Ti}^{+3}$
2. Which of the following hydrocarbon is used for worldwide production of phenol?
  - (a) Iso-butylbenzene
  - (b) Iso-propylbenzene
  - (c) Iso-pentylbenzene
  - (d) None of the above
3.  $\alpha$ -D (+) glucose and  $\beta$  – D (+) glucose are :
  - (a) Enantiomers

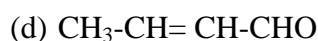
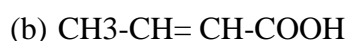
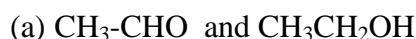
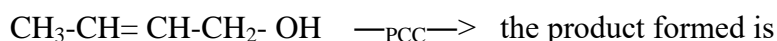
- (b) Conformers
  - (c) Epimers
  - (d) Anomers
4. The oxidation of toluene to benzaldehyde by chromyl chloride is called
- (a) Etard reaction
  - (b) Reimer –Tiemann reaction
  - (c) Stephen’s reduction
  - (d) Cannizzaro’s reaction
5. Rate constant depends upon:
- (a) temperature
  - (b) time
  - (c) concentration
  - (d) None of the above
6. Which of the following is a tertiary Amine.
- (a) 1 – Methyl cyclohexyl amine
  - (b) Triethyl amine
  - (c) Tertiary butyl amine
  - (d) N- methyl aniline
7. The compound obtained by the reaction of propene with diborane followed by hydrolysis with alkaline hydrogen peroxide is.....
- (a) Prop-2-en-1-ol
  - (b) Prop-2-en-2-ol
  - (c) Propan-1-ol
  - (d) Propan-2-ol
8. An electrochemical cell behaves like an electrolytic cell when
- (a)  $E_{\text{cell}} = E_{\text{external}}$
  - (b)  $E_{\text{cell}} = 0$
  - (c)  $E_{\text{external}} > E_{\text{cell}}$
  - (d)  $E_{\text{external}} < E_{\text{cell}}$
9. For a zero order reaction , the slope in the plot of [R] vs time is
- (a)  $-k / 2.303$
  - (b)  $-k$
  - (c)  $+k / 2.303$
  - (d)  $+k$
10. Which set of ions exhibit specific colours?
- (a)  $\text{Sc}^{+3}$  ,  $\text{Ti}^{+3}$ ,  $\text{Mn}^{+3}$
  - (b)  $\text{Sc}^{+3}$  ,  $\text{Zn}^{+2}$  ,  $\text{Ni}^{+2}$



11. Lucas reagent is :



12. In the following reaction



**In the following (Qno.12-16) a statement of assertion followed by a statement of reason is given.**

**Choose the correct answer of the following choices.**

(a) Assertion and reason both are correct but reason is correct explanation for assertion.

(b) Assertion and reason both are correct but reason is not correct explanation for assertion

(c) Assertion is correct statement but reason is wrong.

(d) Assertion is wrong statement but reason is correct statement

13. **Assertion-** D(+) Glucose is dextrorotatory in nature

**Reason -** "D" represents its dextrorotatory nature.

14. **Assertion-** Benzoic acid does not undergo Friedel- Craft's reaction

**Reason -** The carboxylic group is activating group and undergo electrophilic substitution reaction.

15. **Assertion-** Conductivity of an electrolyte increases with the decrease in concentration. .

**Reason-** Number of ions per unit volume decreases on dilution..

16. **Assertion-** Phenetole on cleavage with HI yields phenol and ethyl iodide.

**Reason- .** Phenetole is a mixed aromatic ether.

## SECTION – B

**This section contains five questions with internal choice in one question.**

17.

(a) Give one example of minimum boiling azeotrope

(b) A solute undergoes tetramerisation in solution. What will be its Van't Hoff factor.

18. For a reaction  $\text{H}_2 + \text{Cl}_2 \xrightarrow{\text{h}\nu} 2\text{HCl}$  (Rate = k)

- (a) Write the order and molecularity of the reaction.
- (b) Write the unit of k

19.

- (a) Write chemical equation for reaction of  $\alpha$  D glucose with hydroxyl amine.
- (b) Explain invert sugar.

20. Give reason

- (a) Why does p-dichlorobenzene have a higher melting point than its ortho and meta isomers.
- (b) Although chlorine is an electron withdrawing group, yet it is ortho and para directing in electrophilic aromatic substitution reaction. Why.

21. Write chemical equations in the following reactions:

- (a) Carbylamine reaction
- (b) Gabriel phthalamide synthesis

OR

Accomplish the following conversions:

- (a)  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$  to  $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{NH}_2$
- (b) Propanamide to ethanamine

### SECTION C

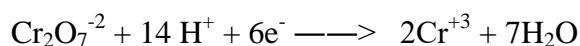
**This section contains seven questions with internal choice in one question**

22. Write the formulas of the following coordination compounds:

- (a) Iron(III)hexacyanoferrate(II)
- (b) Dichloridobis(ethane-1,2-diamine)cobalt (III)ion
- (c) Tetrachloridoplatinate(II) ion

23.

- (a) Consider the reaction:



What is the quantity of electricity in coulombs needed to reduce 1 mol of  $\text{Cr}_2\text{O}_7^{2-}$ ?

- (b) The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Explain the reactions occurring during the corrosion of iron in the atmosphere.

24. Give explanation for each of the following-

- (a) Why aliphatic amines are more basic than aromatic amines?
- (b) Why aniline does not undergo Friedal Craft's reaction.
- (c) Direct nitration of aniline is not carried out. Why ?

OR

Arrange the following:

(a) In the increasing order of their basic strength :

Aniline, p-nitroaniline and p-toluidine

(b) Decreasing order of basic strength in gas phase:

$C_2H_5NH_2$ ,  $(C_2H_5)_2NH$ ,  $(C_2H_5)_3N$  and  $NH_3$

(c) Increasing order of solubility in water

$C_6H_5NH_2$ ,  $(C_2H_5)_2NH$ ,  $C_2H_5NH_2$

25.

(a) What are reducing sugars?

(b) Explain phosphodiester linkage.

(c) Write chemical equation for reaction of  $\alpha$  D glucose with conc.  $HNO_3$ .

26.

(a) What is meant by chirality of a compound?

(b) What are racemic mixture? Give an example.

(c) What are ambident nucleophiles? Give an example.

27. The rate of reaction quadruples when the temperature changes from 293K to 313K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.

( $R=8.314JK^{-1}mol^{-1}$ ).

28.

(a) Give one chemical test to distinguish Ethanol and Phenol.

(b) Why ortho- nitrophenol is more steam than para-nitro phenol.

(c) Tertiary butyl chloride on heating with sodium methoxide gives 2-methyl-propene instead of tertiary-butylmethyl ether.

## SECTION D

**This section contains two case based questions. Each question has an internal choice.**

29. Manish set-up an experiment to find resistance of aqueous KCl solution for different concentrations at 298 K using a conductivity cell connected to a Wheatstone bridge with a.c power in the audio frequency range 550 to 5000 cycles per second. Once the resistance was calculated from null point, he also calculated the conductivity and molar conductivity and recorded his readings in tabular form.

S.No	Concentration(M)	Conductivity ( $S\ cm^{-1}$ ) $\kappa$	Molar conductivity $\Lambda_m$ ( $S\ cm^2\ mol^{-1}$ )
1.	1.00	$111.3 \times 10^{-3}$	111.3
2.	0.10	$12.9 \times 10^{-3}$	129.0
3.	0,01	$1.41 \times 10^{-3}$	141.0

Read the passage and answer the following questions

- (a) Why does conductivity decreases with dilution?
- (b) If limiting molar conductivity ( $\Lambda_m^0$ ) of KCl is  $150.0 \text{ Scm}^2\text{mol}^{-1}$ , calculate the degree of dissociation of 0.01 M KCl.
- (c) If Manish had used HCl instead of KCl then would you expect the  $\Lambda_m$  values to be more or less than those per KCl for a given concentrations. Justify

OR

Mohan, a classmate of Manish repeated the same experiment with  $\text{CH}_3\text{COOH}$  solution instead of KCl solution. Give one point that would be similar and one that would be different in his observation as compared to Manish.

30. Alfred Werner was the first chemist to study the bonding in coordination compounds. He suggested that coordination compounds possessed two type of valencies called primary and secondary valency. The metal ion tends to satisfy both type of valencies. This theory has some limitations. Valence bond theory is based on the concept of hybridisation. The metal ligand bond is obtained by donation of electron pairs by the ligands into empty hybrid orbitals and thus covalent in nature. Crystal field theory considers the bond to be ionic. It considers the effect of ligands on the relative energies of the d orbitals of the central metal atom/ion. In case of octahedral complexes, the d orbitals split into two sets  $t_{2g}$  and  $e_g$ . The difference in energy between the two sets is called crystal field stabilisation energy.

Read the passage and answer the following questions:

- (a) Out of  $[\text{CoF}_6]^{-3}$  and  $[\text{Co}(\text{en})_3]^{+3}$ , which complex is more stable,
- (b) Why are low spin tetrahedral complexes not formed?
- (c) Why is  $[\text{NiCl}_4]^{-2}$  paramagnetic but  $[\text{Ni}(\text{CO})_4]$  is diamagnetic. Explain

OR

Explain spectrochemical series. Why  $[\text{Fe}(\text{CN})_6]^{-4}$  and  $[\text{Fe}(\text{H}_2\text{O})_6]^{+2}$  are of different colours in dilute solutions.

### SECTION- E

**This section contains long answer type questions. All questions have an internal choice.**

31. Attempt any five of the following.
- (a) Why  $\text{Cu}^+$  ion is unstable in aqueous solutions.
  - (b) Actinoid contraction is greater from element to element than Lanthanoid contraction. Explain
  - (c) Why transition metals generally forms coloured compounds.
  - (d)  $\text{Ce}^{+4}$  is good oxidising agent .Why
  - (e) Out of  $\text{Cr}^{+3}$  and  $\text{Mn}^{+3}$ , which is a stronger oxidising agent and why?
  - (f) Name the element which shows only one oxidation state.
  - (g) What is Misch metal? Write its use.

32.

(a) Illustrate the following reaction –

- (i) Clemmensen's reduction.
- (ii) Cross Aldol condensation.

(b) What happens when: (only equation)

- (i) Ethanal is heated with Fehling's solution.
- (ii) Ethanoic acid is treated with  $\text{Br}_2$  in presence of small amount of red Phosphorus.
- (iii) Acetone reacts with Zn-Hg and conc. HCl.

OR

(a) Give chemical test to distinguish between- (any two)

- (i) Ethanoic acid and ethanal
- (ii)  $\text{C}_6\text{H}_5\text{COCH}_3$  and  $\text{C}_6\text{H}_5\text{COCH}_2\text{CH}_3$
- (iii)  $\text{C}_6\text{H}_5\text{COCH}_3$  and  $\text{C}_6\text{H}_5\text{COCH}_2\text{CH}_3$

(b) An organic compound with the 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-benzenedicarboxylic acid. Identify the compound. Write chemical equations for the reactions involved.

33.

(a) Define the following terms:

- (i) Antifreeze
- (ii) Mole fraction

(b) Calculate the mass of a nonvolatile solute (molecular mass -  $40\text{g mol}^{-1}$ ) that should be dissolved in 114g of octane to reduce its pressure to 80%.

OR

(a) Define the following term:

- (i) Reverse osmosis
- (ii) Molality

(b) A 5% solution (by mass) of cane sugar in water has freezing point of 271K. Calculate the freezing point of 5% solution of (by mass) of glucose in water if freezing point of pure water is 273.15 K, [Mol. Mass of cane sugar =  $342\text{g mol}^{-1}$  and glucose =  $180\text{g mol}^{-1}$ ].