PRINCE ACADEMY
OF HIGHER EDUCATION
[Co-edu. Sr. Sec. School, Affiliated to CBSE, Affiliation No. - 1730387]
Palwas Road, Near Jaipur - Bikaner Bypass Crossing, SIKAR - 332001 (Raj.) INDIA
Mob. : 9610-75-2222, 9610-76-2222
www.princeeduhub.com | E-mail : princeacademy31@gmail.com

BOARD SAMPLE PAPER- III (2025-26)

Time : 03 : 00 Hours | **CLASS :– XII-CHEMISTRY (043)** | **M.M. : 70**

Read the following instructions carefully.

(a) There are 33 questions in this question paper with internal choice.
(b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.
(c) SECTION B consists of 5 short answer questions carrying 2 marks each.
(d) SECTION C consists of 7 short answer questions carrying 3 marks each.
(e) SECTION D consists of 2 case - based questions carrying 4 marks each.
(f) SECTION E consists of 3 long answer questions carrying 5 marks each.
(g) All questions are compulsory.
(h) Use of log tables and calculators is not allowed.

SECTION - A

The following are multiple choice questions. Each question carry 1 mark.

1. The standard electrode potential for Ni^{2+}/Ni couple is - 0.25 V and for Ag^{+}/Ag couple is 0.80 V. These two couples are connected to make an electrochemical cell. The redox reaction is spontaneous. The cell potential will be :

   (a) + 1.05 V (b) - 1.05 V (c) + 0.55 V (d) -0.55 V

2. Out of Fe^{2+}, Co^{2+}, Cr^{3+}, Ni^{2+}, the one which shows lowest magnetic moment is:

   (a) Fe^{2+} (b) Co^{2+} (c) Cr^{3+} (d) Ni^{2+}

   [Atomic number: Fe = 26, Co=27, Ni=28, Cr = 24]

3. The geometry of paramagnetic nickel complex $[NiCl_4]^{2-}$ is:

   (a) tetrahedral (b) octahedral (c) square planar (d) distorted octahedral

4. Which of the following does not undergo Aldol condensation ?

   (a) HCHO (b) CH_3CH_2CHO (c) CH_3COCH_3 (d) CH_3CHO

5. The IUPAC name of the complex $[Co(NH_3)_5(ONO)]Cl_2$ is:

   (a) Pentaamminenitrito-O-cobalt (III) chloride (b) Pentaamminenitrito-N-cobalt(III) chloride
   (c) Pentaamminenitro-cobalt(III) chloride (d) Pentaamminenitrito-cobalt(II) chloride

6. The most stable complex among the following is:

   (a) $[Pt(NH_3)_2Cl_2]$ (b) $[Ag(NH_3)_2]Cl$ (c) $[Pt(en)_2Cl_2]^{2+}$ (d) K_4 $[Fe(CN)_6]$

7. If amines are arranged in increasing order of their basic strength in aqueous phase, then the correct order will be:

(a) $NH_3<CH_3NH_2<(CH_3)_3N<(CH_3)_2NH$ (b) $NH_3<(CH_3)_2NH<(CH_3)_3N<CH_3NH_2$

(c) $NH_3<(CH_3)_3N<CH_3NH_2<(CH_3)_2NH$ (d) $NH_3<CH_3NH_2<(CH_3)_2NH<(CH_3)_3N$

8. The chemical test which can be used to distinguish between ethanamine and aniline is:

(a) Haloform test (b) Isocyanide test (c) Azo dye test (d) Hinsberg test

9. The correct IUPAC name of $(CH_3)_3$ C-CH_2Br is:

(a) 2,2-Dimethyl-2-bromopropane (b) 1-Bromo-2,2,2-trimethylethane

(c) 2-Bromo-1,1,1-trimethylethane (d) 1-Bromo-2,2-dimethylpropane

10. Considering the strength of the ligand, the highest excitation energy will be observed in:

(a) $[Co(H_2O)_6]^{3+}$ (b) $[Co(NH_3)_6]^{3+}$ (c) $[Co(CN)_6]^{3-}$ (d) $[CoCl_6]^{3-}$

11. For a chemical reaction, $A \rightarrow B$, it was observed that the rate of reaction doubles when the concentration of A is increased four times. The order of the reaction is:

(a) 2 (b) 1 (c) 1/2 (d) Zero

12. Williamson's synthesis of preparing dimethyl ether is a/an:

(a) Electrophilic substitution (b) SN_1 reaction

(c) Electrophilic addition (d) SN_2 reaction

In the following questions (Q. no.13 to 16) 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 correct explanation for assertion.

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

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

13. Assertion (A): Rate constant increases with increase in temperature.

Reason (R): Increasing the temperature of the substance increases the fraction of molecules, which collide with energies greater than activation energy.

14. Assertion (A): Reaction of diborane $(BH_3)_2$ with propene in presence of H_2O_2 / OH^- give propan-1-ol

Reason (R): Addition of both diborane and H_2O take place according to markovnikov rule.

15. Assertion (A): Glycogen is also known as animal starch.

Reason (R): Structure of glycogen is similar to amylocpectin starch and is rather more highly branched.

16. Assertion (A): E^o value for Mn^{+3} / Mn^{+2} couple is much more postivie than that for Cr^{+3} / Cr^{+2}.

Reason (R): Stability of Mn^{+2} is higher than Mn^{+3} but Cr^{+3} is less stable than Cr^{+2}.

SECTION - B

This section contains five questions with internal choice in two questions. The following questions are very short answer type and carry two marks each –

17. (a) Account for the following: l + l = 2

(i) CH_3CHO is more reactive than CH_3COCH_3 towards reaction with HCN.

(ii) Carboxylic acids has higher boiling point than aldehydes and ketones.

OR

(b) Give chemical tests to distinguish between the following pair of compounds: l + 1 = 2

(i) Propanal and Propanone (ii) Benzaldehyde and Benzoic acid

18. Write the reaction involved in the following: l + 1 = 2

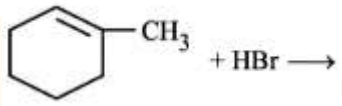
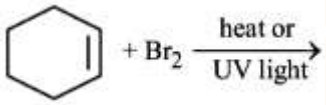
(a) Reimer-Tiemann reaction (b) Kolbe's reaction

19. Write the reaction of glucose with: l + 1 = 2

(a) HI (b) Br_2 water

20. The thermal decomposition of an acid is a first order reaction with a rate constant of $2.3 \times 10^{-3} s^{-1}$ at a certain temperature. Calculate how long it will take for three-fourths of the initial quantity of acid to decompose. ($\log_4$ = 0.6021, log(4) = 0.301) 2

21. Draw the structures of major monohalo products in each of the following reactions: 2

(a)  (b) 

SECTION - C

This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each –

22. Give possible explanation for the following: l + l + l = 3

(a) Diazonium salts of aromatic amines are stable.

(b) Aniline does not undergo Friedel-Crafts reaction.

(c) Aniline on nitration gives a substantial amount of meta product.

23. Account for the following: (Any three) l + l + l = 3

(a) The dipole moment of chlorobenzene is lower than that of cyclohexylchloride.

(b) Alkyl halides are immiscible in water.

(c) t-butyl bromide has lower boiling point than n-butyl bromide.

(d) Chloroform is stored in dark coloured bottles.

24. (a) Draw the geometrical isomers of the complex [Pt $(NH_3)_2Cl_2$].

(b) Give the electronic configuration of d^4 ion when $\Delta_o > P$.

(c) Solution of $[Ni(H_2O)_6]^{2+}$ is green in colour whereas $[Ni(CN)_4]^{2-}$; colourless. Give reason.

[Atomic number: Ni = 28] l + l + l = 3

25. The electrical resistance of a column of 0.05 M NaOH solution of cell constant 50 c m^{-1} is 4.5×10^3 *ohm* . Calculate its resistivity, conductivity and molar conductivity.

26. Calculate elevation of the boiling point of the solution when 4 g of $MgSO_4$ (molar mass = 120g/mol) was dissolved in 100 g of water, assuming $MgSO_4$ undergoes complete ionisation. (K_b for water = 0.52 K kg mol^{-1})

27. Hydrolysis of ethyl ethanoate takes place by the chemical reaction:

$$CH_3COOC_2H_5 + H_2O\ (excess) \xrightarrow{H^+} CH_3COOH + C_2H_5OH$$

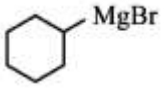
Based on the above reaction, write:

(a) What do you call such reactions?

(b) Rate law equation

(c) Molecularity and order of reaction

28. What happens when: (any three) 3x1 = 3

(a)  is treated with CH_3CHO followed by hydrolysis.

(b) Phenol is treated with conc. (HNO_3+H_2SO_4)

(c) Anisole is treated with CH_3COCl in the presence of anhydrous $AlCl_3$.

(d) Propan-2-ol is heated with Cu at 573 K.

SECTION - D

The following questions are case-based questions. Read the case carefully and answer the questions that follow.

29. The particles in the nucleus of the cell, responsible for heredity, are called chromosomes which are made up of proteins and another type of biomolecules called nucleic acids. These are mainly of two types, DNA and RNA. Nucleic acids on hydrolysis yield a pentose sugar, phosphoric acid and nitrogen containing heterocyclic compound. Nucleic acids have a very diverse set of functions, such as cell creation, the storage and processing of genetic information, protein synthesis and the generation of energy cells. Although their functions may differ, the structure of DNA and RNA are very similar, with only a few fundamental differences in their molecular make-up.

Based on the above passage, answer the following questions:

(a) Write three types of RNA molecules.

(b) What products will be formed when a nucleotide from DNA containing thymine is hydrolysed?

(c) Give two differences between DNA and RNA.

OR

(c) (I) Why are the two strands of DNA complementary?

(II) What type of linkage joins two nucleotides?

30. The cause for deviation from Raoult's law in the colligative properties of non-ideal solutions lie in the nature of interactions at the molecular level. These properties show deviations from Raoult's law due to difference in interactions between solute solvent, solute solute and solvent solvent. Some liquids on mixing, form azeotropes which are binary mixtures having the same composition in liquid and vapour phase and boil at a constant temperature. In such cases, it is not possible to separate the components by fractional distillation. There are two types of azeotropes called minimum boiling azeotrope and maximum boiling azeotrope.

Based on the above passage, answer the following questions.

(a) Pure ethanol cannot be prepared by fractional distillation of ethanol - water mixture. Comment. 1

(b) Why does a mixture of chloroform and acetone show negative deviation from ideal behaviour ? 1

(c) At 300 K, 36 g glucose present per litre in its solution has osmotic pressure of 4·98 bar. If the osmotic pressure of the solution is 1·52 bar at the same temperature, what would be its concentration? 2

OR

19.5g of CH_2FCOOH is dissolved in 500g of water. The depression in the freezing point of water observed is 1.0°C. Calculate degree of dissociation fluoroacetic acid.

(K_f = 1.86 K kg mol^{-1}) 2

SECTION - E

The following questions are long answer type and carry 5 marks each, with internal choice -

31. (a) What type of battery is the dry cell ? Write the anode and the cathode reactions and the overall reaction occurring in a dry cell when current is drawn from it. 3

(ii) Calculate the time to deposit 1.5 g of silver at cathode when a current of 1.5 A was passed through the solution of $AgNO_3$. [Molar mass of Ag = 108 g mol^{-1} F = 96500 C mol^{-1}] 2

OR

(b) (i) State Kohlrausch's law of independent migration of ions. Molar conductivity at infinite dilution for NH_4Cl, NaOH and NaCl solution at 298 K are 110, 100 and 105 S cm^2 mol^{-1} respectively. Calculate the molar conductivity of NH_4OH solution.

(ii) Calculate ΔG^o of the following cell at 25^oC: 2

Zn (s) $|Zn^{2+}$ (aq)$||Cu^{2+}$ (aq)| Cu(s)

Given: $E^o_{Zn^{2+}/Zn} = -0.76V$

$E^o_{Cu^{2+}/Cu} = +0.34V$

$1F = 96500\,C\,mol^{-1}$

32. (a) (i) Explain with the help of chemical reaction when :

(I) Acetone is treated with semicarbazide.

(II) Two molecules of benzaldehyde are treated with conc. NaOH.

(III) Butan-2-one is treated with Zn/Hg and conc. HCl.

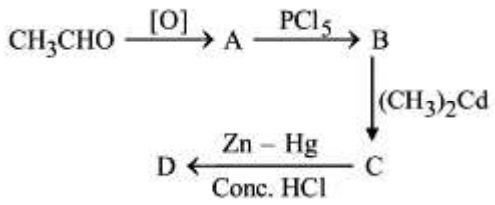
(ii) Arrange the following in the increasing order of their acidic strength:

(I) $CH_3CH_2CH_2COOH$, $BrCH_2CH_2CH_2COOH$, $CH_3CHBrCH_2COOH$, $CH_3CH_2CHBrCOOH$

(II) Benzoic acid, 4-Methoxybenzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid

OR

(b) (i) Identify the products A, B, C and D in the following sequence of reactions:



(ii) How will you bring about the following conversions ? 3×1=3

(I) Propanone to Propene

(II) Benzoic acid to Benzaldehyde

(III) Ethanal to But-2-enal

33. Attempt any five of the following: 5×1=5

(a) Cu^+ is not stable in aqueous solution. Comment.

(b) Out of Cr^{2+} and Fe^{2+}, which one is a stronger reducing agent and why?

(c) Actinoid contraction is greater from element to element than lanthanoid contraction. Why?

(d) $KMnO_4$ acts as an oxidising agent in acidic medium. Write the ionic equation to support this.

(e) Name the metal in the first transition series which exhibits +1 oxidation state most frequently.

(f) Transition metals and their compounds are good catalysts. Justify.

(g) Scandium forms no coloured ions, yet it is regarded as a transition element. Why?

*****

ROUGH WORK

ROUGH WORK