

KVS(DR)/2025/VI

KENDRIYA VIDYALAYA SANGATHAN, DELHI REGION
PRE BOARD-I EXAMINATION -2025-26
Class: XII; Subject: Chemistry (043)

Max. Marks: 70

Time: 3 Hours

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** very 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

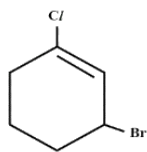
The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. Rate law for the reaction $A + 2B \rightarrow C$ is found to be ,Rate = $k[A][B]^2$
Concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value of rate constant will be.....
(a) the same (b) doubled (c) quadrupled (d) halved
2. Which of the following compounds will react with sodium hydroxide solution in water?
(a) C_6H_5OH (b) $C_6H_5CH_2OH$ (c) $(CH_3)_3C-OH$ (d) CH_3CH_2OH
3. The unit of rate constant and rate of reaction are identical for a:
(a) zero order reaction (b) first order reaction
(c) second order reaction (d) third order reaction
4. The Gabriel phthalimide synthesis is used for the preparation of:
(a) primary aromatic amines (b) primary aliphatic amines
(c) secondary amines (d) tertiary amines
5. Deficiency of which of the following vitamins causes Pernicious anaemia?
(a) Vitamin B_1 (b) Vitamin B_2
(c) Vitamin B_6 (d) Vitamin B_{12}
6. In the two tetrahedral structures of dichromate ion
(a) 4 Cr – O bonds are equivalent in length.
(b) 6 Cr – O bonds are equivalent in length.
(c) All Cr – O bonds are equivalent in length.
(d) All Cr – O bonds are non-equivalent.
7. When a co-ordination compound $CoCl_3.4NH_3$ is mixed with $AgNO_3$ 1 mole of $AgCl$ is precipitated per mole of the compound. The structure of the compound is:

- (a) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3] \cdot \text{NH}_3$
 (c) $[\text{Co}(\text{NH}_3)\text{Cl}_3] \cdot 2\text{NH}_3$

- (b) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$
 (d) $[\text{Co}(\text{NH}_3)_4\text{Cl}]\text{Cl}_2$

8. The IUPAC name of the compound shown below is



- a) 2-Bromo-6-chlorocyclohexene
 b) 6-Bromo-2-chlorocyclohexene
 c) 3-Bromo-1-chlorocyclohexene
 d) 1-Bromo-3-chlorocyclohexene

9. Which of the following has magnetic moment value of 5.9?

- (a) Fe^{2+} (b) Fe^{3+} (c) Ni^{2+} (d) Cu^{2+}

10. As a result of Wolff-Kishner reduction, the following conversions can be made:

- a) Benzaldehyde into Benzyl alcohol
 b) Cyclohexanol into Cyclohexane
 c) Cyclohexanone into Cyclohexanol
 d) Benzophenone into Diphenylmethane

11. Which among the following is not a polysaccharide?

- (a) Lactose (b) Glycogen
 (c) Starch (d) Dextrin

12. What is IUPAC name of the ketone A, which undergoes iodoform reaction to give $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)\text{COONa}$ and yellow precipitate of CHI_3 ?

- (a) 3-Methylpent-3-en-2-one (b) 3-Methylbut-2-en- one
 (c) 2, 3-Dimethylethanone (d) 3-Methylpent-4-one

Instructions (for the questions 13-16):

(A) If both assertion and reason are correct statements and reason is correct explanation of assertion.

(B) If both assertion and reason are correct statements and reason is not correct explanation of assertion.

(C) If assertion is correct statements and reason is incorrect.

(D) If assertion is incorrect statements and reason is correct.

13. **Assertion** : With reference to the Arrhenius equation $k = A \cdot e^{(-E_a/RT)}$, the value of k can be higher than A.

Reason : The number of effective collisions cannot be higher than the total number of collisions.

14. **Assertion** : $[\text{Co}(\text{en})_3]^{3+}$ is more stable than $[\text{Co}(\text{NH}_3)_6]^{3+}$.

Reason : Due to chelate effect in $[\text{Co}(\text{NH}_3)_6]^{3+}$

15. **Assertion**: Products of electrolysis of aqueous NaCl are H_2 and Cl_2 .

Reason: Due to overpotential of H_2O , oxidation of chloride ions are preferred.

16. **Assertion** : Sucrose is called an invert sugar.

Reason : On hydrolysis, sucrose bring the change in the sign of rotation from dextro (+) to laevo(–).

SECTION B

This section contains 5 questions with internal choice in one question only. The following questions are very short answer type and carry 2 marks each.

17. Which of the following solutions has higher freezing point?

0.05M Al_2SO_4 , 0.1M $\text{K}_3[\text{Fe}(\text{CN})_6]$. Justify your answer.

18. (a) Why are low spin tetrahedral complexes not formed?

(b) Name a co-ordination compound of platinum which is used to inhibit growth of tumours.

19. Define the followings term (any two):

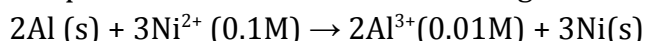
- a) Peptide linkage
- b) Glycosidic linkage
- c) Denaturation

20. Why is boiling point of o-dichlorobenzene higher than p-dichlorobenzene but melting point of para isomer is higher than ortho isomer ?

OR

Why haloarenes are less reactive towards nucleophilic substitution reaction. Give any two reason.

21. Represent the cell in which following reaction takes place:



Calculate emf of cell if $E^0_{\text{cell}} = 1.41 \text{ V}$

SECTION C

This section contains 7 questions with internal choices. The following questions are short answer type and carry 3 marks each.

22. a) The Complex $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is a coloured compound. Justify.

b) Explain: $[\text{Co}(\text{NH}_3)_6]^{3+}$ is an inner orbital complex whereas $[\text{CoF}_6]^{3-}$ is an outer orbital complex.

c) Write the coordination number and oxidation number for Fe in the coordination entity $[\text{Fe}(\text{CN})_6]^{4-}$

OR

a) Explain on the basis of valence bond theory that $[\text{Ni}(\text{CN})_4]^{2-}$ ion with square planar structure is diamagnetic and $[\text{NiCl}_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.

b) FeSO_4 solution mixed with $(\text{NH}_4)_2\text{SO}_4$ solution in 1: 1 molar ratio gives the test of Fe^{2+} ion but CuSO_4 solution mixed with aqueous ammonia in 1:4 molar ratio does not give the test of Cu^{2+} ion. Explain why?

23. What happen when?

(i) Chlorobenzene is treated with $\text{Cl}_2/\text{FeCl}_3$?

(ii) Ethyl chloride is treated with AgNO_2 ?

(iii) 2- bromopentane is treated with alcoholic KOH?

Or

a) Name the poisonous compound obtained when chloroform is exposed to air, in presence of sunlight.

b) Haloalkanes react with aq. KOH to form alcohols but react with alc. KOH to form alkenes. Why?

24. What happens when

- i) Propanone is treated with methyl magnesium bromide and the product is hydrolysed.
- ii) Two moles of Benzaldehyde are heated with concentrated NaOH.
- iii) Tert-butyl alcohol is heated with copper at 573K.

25. The cell in which the following reaction occurs: $2\text{Fe}^{3+}(\text{aq}) + 2\text{I}^{-}(\text{aq}) \longrightarrow 2\text{Fe}^{2+}(\text{aq}) + \text{I}_2(\text{s})$ has $E^{\circ}_{\text{cell}} = 0.236 \text{ V}$ at 298 K. Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.

Or

What is Kohlrausch's law of independent migration of ions. Λ° for NaCl, HCl and NaAc are 126.4, 425.9 and $91.0 \text{ S cm}^2\text{mol}^{-1}$ respectively. Calculate Λ° for HAc.

26. a) Explain the following giving one example for each:

- i) Reimer-Tiemann reaction ii) Kolbe's reaction

b) Write the products obtained when benzyl phenyl ether is heated with HI.

OR

a) Give chemical test to distinguish between:

- i. Isopropyl alcohol and n-Propyl alcohol
- ii. Phenol and Ethanol

b) Name the reagent which is used to convert Butan-2-one to butan-2-ol

27. (a) Write difference between a nucleoside and a nucleotide.

(b) What are the monosaccharides produced by hydrolysis of lactose.

(c) Name the two hormones that regulates the glucose level in blood.

28. (a) Explain how conductivity and molar Conductivity changes with dilution giving reasons.

(b) A solution of CuSO_4 is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode? ($1F = 96500 \text{ Cmol}^{-1}$)

SECTION D

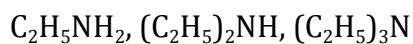
Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow

29. Read the passage given below and answer the questions that follow :

Amines are usually formed from nitro compounds, halides, amides, imides, etc. They exhibit hydrogen bonding which influences their physical properties. In alkyl amines a combination of electron releasing, steric and hydrogen bonding factors influence the stability of the substituted ammonium cations in protic polar solvents and thus affect the basic nature of amines. In aromatic amines, electron releasing and withdrawing groups, respectively increase and decrease their basic character. Influence of the number of hydrogen atoms at nitrogen atom on the type of reactions and nature of products is responsible for identification and distinction between primary, secondary and tertiary amines. Presence of amino group in aromatic ring enhances reactivity of the aromatic amines. Aryl diazonium salts provide advantageous methods for producing aryl halides, cyanides, phenols and arenes by reductive removal of the diazo group.

Answer the following questions:

(a) Arrange the following in the increasing order of their pK_b values in aqueous solution:

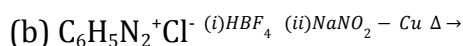
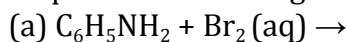


(b) Aniline on nitration gives a substantial amount of m-nitroaniline, though amino group is o/p directing. why?

(c) An aromatic compound 'A' of molecular formula $\text{C}_7\text{H}_6\text{O}_2$ on treatment with aqueous ammonia and heating forms compound 'B'. Compound 'B' on heating with Br_2 and aqueous KOH gives a compound 'C' of molecular formula $\text{C}_6\text{H}_7\text{N}$. Write the structures of A, B and C.

OR

Complete the following reactions giving main products:



30. Read the passage given below and answer the following questions:

In first- order reaction in which the rate- limiting step is the protonation of the reactant, the sorption of the reactant dominates the rates. Identical intrinsic rates of reactions were observed for the cracking of alkanes over zeolites of different structure types and after post-synthesis treatments. Compensation relations were observed, which shows that the differences in kinetic parameters are caused by the sorption characteristics of the reactants. A better fit between reactant and pore wall increases the heat of absorption, and decreases the apparent reaction barrier. Reactions that depend on the stability of the adsorbed reactive intermediates will have a different dependence on zeolite structure and Si/Al ratio, which is shown by the kinetic parameters of the dehydrogenation of alkanes. There is no simple dependence of zeolitic acid strength and the rate of reaction in either of these types of reactions.

Answers the following questions given below

- I. Plot the graph between $\log [\text{R}_0]/[\text{R}]$ vs time(t) for a first order reaction and write its slope.
- II. Give the mathematical expression for the half-life of a first order reaction and also give the unit of rate constant.
- III. Time required to decompose SO_2Cl_2 to half of its initial amount is 60 min. If the decomposition is a first order reaction, calculate the rate constant of the reaction.

OR

- III. A first order reaction takes 40 min for 30% decomposition calculate the rate constant.

SECTION E

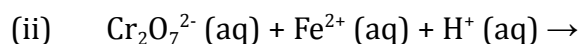
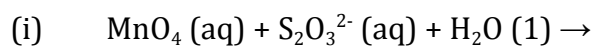
The following questions are long answer type and carry 5 marks each. All questions have an internal choice.

31. (a) Why do transition elements show variable oxidation states?

(b) Generally there is an increase in density of elements from titanium ($Z = 22$) to copper ($Z = 29$) in the first series of transition elements. Why?

(c) Transition elements and their compounds are generally found to be good catalysts in chemical reactions. Explain.

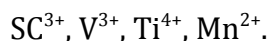
(d) Complete the following chemical equations :



OR

a) Which metal in the first transition series (3d series) exhibits +1 oxidation state most frequency and why?

b) Which of the following cations are coloured in aqueous solutions and why?



(At. nos. Sc = 21, V = 23, Ti = 22, Mn = 25)

c) The transition metals (with the exception of Zn, Cd and Hg) are hard and have high melting and boiling points. Why?

d) State reasons for the following :

(i) $\text{Cu} (\text{I})$ ion is not stable in an aqueous solution.

(ii) Chromate and dichromate ions are inter-convertible depending upon the pH of the solution. Write the reaction involved.

32. (a) What is the effect of temperature on the solubility of glucose in water?

(b) Ibrahim collected a 10mL each of fresh water and ocean water. He observed that one sample labeled "P" froze at 0°C while the other "Q" at -1.3°C . Ibrahim forgot which of the two, "P" or "Q" was ocean water. Help him identify which container contains ocean water, giving rationalization for your answer.

(c) Calculate Van't Hoff factor for an aqueous solution of $\text{K}_3[\text{Fe}(\text{CN})_6]$ if the degree of dissociation (α) is 0.852. What will be boiling point of this solution if its concentration is 1 molal? ($K_b = 0.52 \text{ K kg/mol}$)

OR

(a) What type of deviation from Raoult's Law is expected when phenol and aniline are mixed with each other? What change in the net volume of the mixture is expected? Graphically represent the deviation.

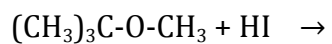
(b) The vapour pressure of pure water at a certain temperature is 23.80 mm Hg. If 1 mole of a non-volatile non-electrolytic solute is dissolved in 100g water, Calculate the resultant vapour pressure of the solution.

33. (a) Give names of the reagents to bring about the following transformations:

(i) Ethanoic acid to ethanol

(ii) Propan-1-ol to propanal

(b) Complete the following reactions:



(c) Write the mechanism of acidic hydration of alkene to form alcohols.

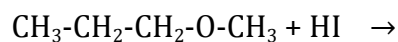
OR

(a) How will you distinguish between the following pairs of compounds?

(i) Pentan-2-ol and pentan-3-ol

(ii) Formic acid and Ethanoic Acid

(b) Complete the following reactions:



(c) Write the mechanism of acidic dehydration of alcohols to form alkenes.