BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

II PRE- BOARD EXAMINATION 2024-25

CHEMISTRY (043)

Class : XII
Date :16/12/24
Admission No:

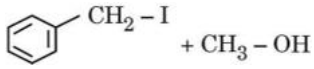
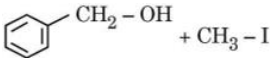
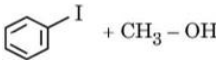
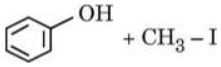
Duration : **3 Hrs**
Max. Marks : **70**
Roll No.

General Instructions:

Read the following instructions carefully.

1. There are**33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple - choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case - based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

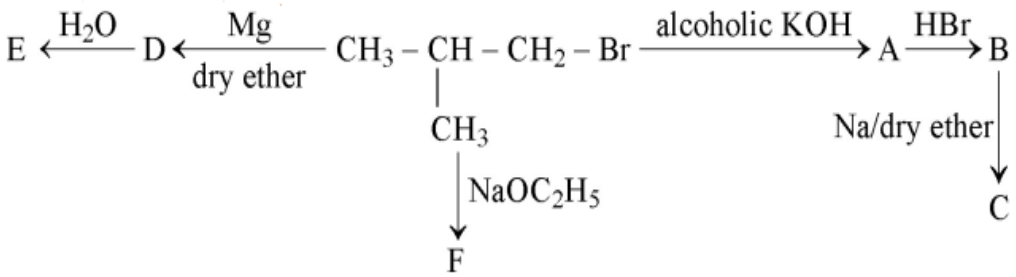
	Section A	
1	The IUPAC name of $CH_3 - \overset{O}{\overset{\|\|}{C}} - CH_2 - \overset{O}{\overset{\|\|}{C}} - H$ is: a) 1 - oxobutanal b) 3 - oxobutanal c) 1 - oxobutanal - 3 - one d) 3 - oxobutanone	**[1]**
2	Proteins are found to have two different types of secondary structures namelyα - helix and β - pleated sheet structure, α - helix structure of protein is stabilized by a) peptide bonds b) van der Waals forces c) dipole - dipole interactions d) hydrogen bonds	**[1]**

3	Anisole reacts with HI to give: a)  b)  c)  d) 	**[1]**
4	Benzaldehyde and acetone can be best distinguished by using: a) Hydrazine b) Tollen's reagent c) 2, 4 – DNP reagent d) Sodium hydroxide solution	**[1]**
5	A first order reaction takes 30 minutes for 50% completion. The value of rate constant k would be: a) 2.31×10^{-3} min^{-1} b) 1.25×10^{-3} min^{-1} c) 2.75×10^{-4} min^{-1} d) 2.5×10^{-3} min^{-1}	**[1]**
6	Match the items given in column I with that in column II. Column I: (a) Molarity; (b) Molality; (c) Normality; (d) ppm Column II: (i) $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 10^6$; (ii) Number of gram moles of a solute per litre of solution; (iii) Number of gram moles of a solute per kg of solvent; (iv) Number of gram equivalent of a solute per litre of solution a) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i) b) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i) c) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv) d) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)	**[1]**

7	A dibromo derivative of an alkane reacts with sodium metal to form an alicyclic hydrocarbon. The derivative is a) 1, 1 – dibromopropane b) 2, 2 – dibromobutane c) 1, 2 – dibromoethane d) 1, 4 – dibromobutane	**[1]**
8	Which property of transition metals enables them to behave as catalysts? a) Alloy formation b) High melting point c) Variable oxidation states d) High ionisation enthalpy	**[1]**
9	Consider the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ The equality relation between $\frac{d[NH_3]}{dt}$ and $\frac{-d[H_2]}{dt}$ is: a) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$ b) $\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$ c) $\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$	**[1]**
10	Aldol condensation will not take place in: a) CH_3 CHO b) CH_3 $COCH_3$ c) HCHO d) CH_2 CH_2 CHO	**[1]**
11	IUPAC name of m - cresol is _____. a) 3 - chlorophenol b) benzene - 1, 3 - diol c) 3 - methoxyphenol	**[1]**

	d) 3 - methylphenol	
12	Which of the following reacts with $NaNO_2$ + HCI to give alcohol? a) $C_6 H_5 CH_2 NHCH_3$ b) $CH_3 NH_2$ c) $C_6 H_5 NH_2$ d) $(CH_3)_3 N$	**[1]**
13	**Assertion (A):** Maltose is a reducing sugar that gives two moles of D - glucose on hydrolysis. **Reason (R):** Maltose has a 1, 4 - β - glycosidic linkage. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
14	**Assertion (A):** Formaldehyde cannot be prepared by Rosenmund's reduction. **Reason (R):** Acid chlorides can be reduced into aldehydes with hydrogen in boiling xylene usingpalladium or platinum as a catalyst supported on barium sulphate. This is known as Rosenmund's reduction. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
15	**Assertion (A):** Benzyl bromide when kept in acetone - water, it produces benzyl alcohol. **Reason (R):** The reaction follows $S_N 2$ mechanism. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
16	**Assertion (A):** Phenol is more reactive than benzene towards electrophilic substitution reaction. **Reason (R):** In the case of phenol, the intermediate carbocation is more resonance stabilized.	**[1]**

	a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	
	Section B	
17	Explain the following:[$Fe(CN)_6$] $^{4-}$ and [$Fe(H_2O)$] $^{2+}$ are of different colours in dilute solutions.	**[2]**
18	What is the effect of increasing pH on $K_2 Cr_2 O_7$ solution?	**[2]**
19	**Answer the following:** 1. If half life period of a first order reaction is X and $\frac{3}{4}th$ life period of the same reaction is Y, how are x and y related each other? 2. The rate constant for the first order decomposition of $N_2 O_5$ is given by the following equation: $\log k = 23.6 - \frac{2\times10^4\ K}{T}$ Calculate E_a for this reaction. [R = 8.314 J K^{-1} mol^{-1}]	**[2]**
20	A 0.2% aqueous solution of a non - volatile solute exerts vapour pressure of 1.004 bar at100^0 C. What is the molar mass of the solute? **OR** What do you mean by azeotropic mixture?	**[2]**
21	Write the reaction involved in the following: 1. Wolff - Kishner reduction 2. Decarboxylation reaction 3. Cannizzaro reaction	**[2]**
	Section C	
22	What is understood by a normal hydrogen electrode? Give its significance?	**[3]**
23	The decomposition ofNH_3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4}\ mol^{-1}\ L\ s^{-1}$?	**[3]**

24	An organic compound ' A ' having molecular formula C_3H_6 on treatment with aq. H_2SO_4 give 'B' which on treatment with Lucas reagent gives 'C'. The compound 'C' on treatment with ethanolic KOH gives back 'A' .Identify A, B, C . **OR** Identify A, B, C, D, E and F in the following: 	**[3]**
25	1. Oxidation of propanal is easier than propanone. Why? 2. How can you distinguish between Acetophenone and Benzophenone? 3. Draw the structure of the following derivative: 2,4 - Dinitrophenylhydrazone of Propanone.	**[3]**
26	Write the Nernst equation and calculate emf of the following cell at 298 K: Cr | Cr^{3+} (0·1 M) || Fe^{2+} (0·01 M) | Fe Given : $E^{\ominus}_{Cr^{3+}/Cr}$ = - 0·75 V $E^{\ominus}_{Fe^{2+}/Fe}$ = - 0·45 V (log 10 = 1)	**[3]**
27	Elimination reactions (especially β - elimination) are as common as the nucleophilic substitution reaction in case of alkyl halides. Specify the reagents used in both cases.	**[3]**
28	Calculate the emf of the following cell at 25°C. Ag (s)| Ag^+ (10^{-3} M) || Cu^{2+} (10^{-1} M) |Cu (s) [Given, E^o_{cell} = +0.46 V and log 10^n = n]	**[3]**
	Section D	
29	**Read the following text carefully and answer the questions that follow:** Transition metals have incomplete d - subshell either in neutral atom or in their ions. The presence of partly filled d - orbitals in their atoms makes transition elements different from that of the non - transition elements. With partly filled d - orbitals, these elements exhibit certain characteristic properties such as display of a variety of oxidation states, formation of coloured ions and entering into complex formation with a variety of ligands. The transition metals and their compounds also exhibit catalytic properties and paramagnetic behaviour.	**[4]**

	The transition metals are very hard and have low volatility. An examination of the $E^{O}_{\frac{M^{2+}}{M}}$ values shows the varying trends: Answer the following questions: 1. On what basis can we say that Cu is a transition element but Zn is not? (Atomic number: Cu = 29, Zn = 30) **(1)** 2. Why do transition elements show variety of oxidation states? **(1)** 3. a. How would you account for the irregular trend of ionization enthalpy from Vanadium to Zinc? b. How is the variability in oxidation states of transition metals different from that of the non - transition elements? **(2× 1 = 2)** **OR** a. Of the d^4 species, Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidizing. Why? (Atomic number: Cr = 24, Mn = 25) b. Complete the following ionic equation: **(2× 1 = 2)** $2MnO_4^- + H_2O + I^- \rightarrow$	
30	**Read the following text carefully and answer the questions that follow:** Many chemical and biological processes depend on osmosis, the selective passage of solvent molecules through the porous membrane from a dilute solution to a more concentrated one. The osmotic pressure π depends on molar concentration of the solution (π = CRT). If two solutions are of equal solute concentration and, hence, have the same osmotic pressure, they are said to be isotonic. If two solutions are of unequal osmotic pressures, the more concentrated solution is said to be hypertonic and the more diluted solution is described as hypotonic. Osmosis is the major mechanism, for transporting water upward in the plants. Transpiration isthe leaves supports the transport mechanism of water. The osmotic pressure of seawater is about 30 atm;this is the pressure that must be applied to the seawater (separated from pure water using a semi - permeable membrane) to get drinking water. 1. What will happen if a plant cell kept in a hypertonic solution? (1) 2. Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cellsin a solution containing in 1.2% sodium chloride solution? (1) 3. What happens when the external pressure applied becomes more than the osmotic pressure of solution? (2) **OR** Which mechanisms helps in the transportation of water in a plant? (2)	**[4]**

	Section E	
31	**Attempt any five of the following:** 1. What happens when D- glucose is treated with the following reagents? (i) HI (ii) Bromine Water (iii) HNO_3 2. Write two differences between DNA and RNA. 3. What type of linkage is present in polysaccharides? 4. a. Name any two bases which are common to both DNA and RNA. b. Which vitamin deficiency causes: i. Bone deformities in children? ii. Pernicious anaemia? 5. Which of the two components of starch is water soluble? 6. The two strands in DNA are not identical but are complementary. Explain. 7. a. Why do amino acids show amphoteric behaviour? b. What happens when D - Glucose is treated with hydroxylamine?	**[5]**
32	$[Fe(H_2 O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3+}$ is weakly paramagnetic. Explain. **OR** Explain with two examples each of the following: Coordination entity, ligand coordination number, coordination polyhedron, homoleptic and heteroleptic.	**[5]**
33	How will you convert: 1. Ethanoic acid into methanamine 2. Hexanenitrile into 1 - aminopentane 3. Methanol to ethanoic acid 4. Ethanamine into methanamine 5. Ethanoic acid into propanoic acid **OR** Complete the following chemical reactions: 1. $\mathbf{C_6H_5\overset{+}{N}_2\,\bar{Cl} + C_6H_5NH_2 \xrightarrow{H^+}}$	**[5]**

	2. $C_6H_5\overset{+}{N}_2\overset{-}{Cl} + CH_3CH_2OH \rightarrow$ 3. $\mathbf{RNH_2 + CHCl_3 + KOH \rightarrow}$	