



COMMON PRE-BOARD EXAMINATION 2022-23



Subject: CHEMISTRY (043)

Class: XII

Time: 3 Hours

Date:

Max. Marks: 70

General Instructions:

Read the following instructions carefully.

- There are 35 questions in this question paper with internal choice.
- SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
- SECTION B consists of 7 very short answer questions carrying 2 marks each.
- SECTION C consists of 5 short answer questions carrying 3 marks each.
- SECTION D consists of 2 case-based questions carrying 4 marks each.
- SECTION E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.
- Use of log tables and calculators is not allowed.

SECTION A		
<i>The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.</i>		
1.	The correct IUPAC name of $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_3 \\ \\ \text{OH} \end{array}$ <ol style="list-style-type: none">2-methylbutan-2-ol3-methylbutan-3-olTert-butyl alcohol2, 2-dimethylpropanol	1
2.	Complete the following analogy: $\text{S}_{\text{N}}2$: inversion of configuration : $\text{S}_{\text{N}}1$: <ol style="list-style-type: none">RacemisationOptical rotationRetentionChiral	1
3.	The incorrect statement about interstitial compounds is: <ol style="list-style-type: none">They have a high melting pointThey are chemically reactiveThey are very hardThey retain metallic conductivity	1
4.	For the reaction, $\text{H}_2(\text{g}) + \text{Br}_2(\text{g}) \rightarrow 2\text{HBr}(\text{g})$ The experimental data suggests, $\text{Rate} = k[\text{H}_2][\text{Br}_2]^{1/2}$ The molecularity and order for the reaction is <ol style="list-style-type: none">2 and 22 and $1\frac{1}{2}$$1\frac{1}{2}$ and 2$1\frac{1}{2}$ and $1\frac{1}{2}$	1

5.	<p>The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is</p> <p>a) 6F b) 3F c) 2F d) 1F</p>	1
6.	<p>Consider a first order of gas phase decomposition reaction given below:</p> $\text{A(g)} \rightarrow \text{B(g)} + \text{C(g)}$ <p>The initial pressure of the system before the decomposition of A was P_i. After a lapse of time t, the total pressure of the system increased by x units and became P_t. The rate constant k for the reaction is given by</p> <p>a) $k = \frac{2.303}{t} \log \frac{P_i}{P_i - x}$ b) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i - P_t}$ c) $k = \frac{2.303}{t} \log \frac{P_i}{P_i + P_t}$ d) $k = \frac{2.303}{t} \log \frac{P_i}{P_i + x}$</p>	1
7.	<p>Out of the following, the strongest base in aqueous solution is</p> <p>a) trimethylamine b) methylamine c) aniline d) dimethylamine</p>	1
8.	<p>EDTA is a</p> <p>a) ambidentate ligand b) monodentate ligand c) bidentate ligand d) hexadentate ligand</p>	1
9.	<p>Phenol is less acidic than</p> <p>a) <i>o</i>-nitrophenol b) <i>o</i>-methylphenol c) <i>o</i>-methoxyphenol d) ethanol</p>	1
10.	<p>$\text{C}_6\text{H}_5 - \text{CH}_2 - \text{NH}_2$ on heating with CHCl_3 and alcoholic KOH give foul smell of</p> <p>a) $\text{C}_6\text{H}_5 - \text{CH}_2\text{OH}$ b) $\text{C}_6\text{H}_5 - \text{CH}_2\text{NC}$ c) $\text{C}_6\text{H}_5 - \text{CH}_2\text{CN}$ d) $\text{C}_6\text{H}_5 - \text{CH}_2\text{Cl}$</p>	1
11.	<p>Which of the following reactions will not result in the formation of carbon-carbon bond?</p> <p>a) Friedel-Crafts acylation b) Wurtz reaction c) Cannizzaro reaction d) Reimer-Tiemann reaction</p>	1

12.	Match the following	1										
	<table><tr><th>Column I</th><th>Column II</th></tr><tr><td>(i) Half life of the 1st order reaction</td><td>A. Order = 1</td></tr><tr><td>(ii) $k \cdot [A]^{1/2} [B]^{1/2}$</td><td>B. molecularity = 1</td></tr><tr><td>(iii) Zero-order reaction</td><td>C. $\frac{0.693}{k}$</td></tr><tr><td>(iv) $\text{NH}_2\text{NO}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$</td><td>D. $k = \frac{[R]_0 - [R]}{t}$</td></tr></table> <p>a) (i) – A, (ii) – D, (iii) – C, (iv) – B. b) (i) – B, (ii) – A, (iii) – C, (iv) – D. c) (i) – A, (ii) – C, (iii) – D, (iv) – B. d) (i) – C, (ii) – A, (iii) – D, (iv) – B.</p>	Column I	Column II	(i) Half life of the 1 st order reaction	A. Order = 1	(ii) $k \cdot [A]^{1/2} [B]^{1/2}$	B. molecularity = 1	(iii) Zero-order reaction	C. $\frac{0.693}{k}$	(iv) $\text{NH}_2\text{NO}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$	D. $k = \frac{[R]_0 - [R]}{t}$	
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13.	Which of the following analogy is correct a) $\text{K}_4[\text{Fe}(\text{CN})_6]$: anionic complex :: $\text{Na}[\text{Ag}(\text{CN})_2]$: cationic complex b) $[\text{Pt}(\text{NH}_3)_6]^{4+}$: octahedral :: $[\text{Zn}(\text{NH}_3)_4]^{2+}$: tetrahedral c) $[\text{NiCl}_4]^{2-}$: diamagnetic :: $[\text{Ni}(\text{CN})_4]^{2-}$: paramagnetic d) $\text{K}_3[\text{CoF}_6]$: low spin complex :: $[\text{Ni}(\text{CN})_4]^{2-}$: high speed spin	1										
14.	Ethyl alcohol on oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ gives a) Acetic acid b) Acetaldehyde c) Formaldehyde d) Formic acid	1										
15.	Assertion: Methoxy ethane reacts with HI to give ethanol and iodomethane. Reason: Reaction of ether with HI follows $\text{S}_{\text{N}}2$ 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: Proteins are made up of α -amino acids. Reason: During denaturation, secondary and tertiary structures of proteins are destroyed. 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										
17.	Assertion: Transition metals have high melting points. Reason: Transition metals have completely filled d-orbitals. 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										
18.	Assertion: Aromatic primary amines cannot be prepared by Gabriel-phthalimide synthesis. Reason: Aryl halides do not undergo nucleophilic substitution with anion formed by phthalimide. 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										

	SECTION - B												
	<i>This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.</i>												
19.	The following data are obtained for the reaction: $\text{N}_2\text{O}_5(\text{g}) \rightarrow 2\text{NO}_2 + \frac{1}{2} \text{O}_2$ <table><tr><th>t/s</th><th>0</th><th>300</th><th>600</th></tr><tr><td>$\text{N}_2\text{O}_5 \text{ mol L}^{-1}$</td><td>$1.6 \times 10^{-2}$</td><td>$0.8 \times 10^{-2}$</td><td>$0.4 \times 10^{-2}$</td></tr></table> Show that it follows first-order reaction (given $\log 2 = 0.3010$, $\log 4 = 0.6021$)				t/s	0	300	600	$\text{N}_2\text{O}_5 \text{ mol L}^{-1}$	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}	2
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20.	a) Draw the pyranose structure of glucose. b) Give one example each for water-soluble vitamins and fat-soluble vitamins. OR a) Amino acids show amphoteric behavior. Why? b) Why cannot vitamin C be stored in our body?				2								
21.	Give reason for the following (i) Chloroethane is insoluble in water. (ii) Thionyl chloride method is preferred for preparing alkyl chlorides from alcohols. OR Illustrate the following reactions giving a suitable example for each. (i) Wurtz-fittig reaction. (ii) Finkelstein reaction.				2								
22.	For the complex $[\text{Fe}(\text{CO})_5]$, write the hybridization, magnetic character and spin of the complex. (At. Number : Fe = 26)				2								
23.	When a current of 0.75A is passed through a CuSO_4 solution for 25 min, 0.369g of copper is deposited at the cathode. Calculate the atomic mass of copper.				2								
24.	Define the following terms a) Pseudo first order reaction. b) Half life period of reaction ($t_{1/2}$).				2								
25.	Write the equation involved in the following reactions. a. Rosenmund reduction. b. Hell-Volhard Zelinsky reaction.				2								
	SECTION C												
	<i>This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.</i>												
26.	What happens when (a) $(\text{CH}_3)_3\text{C} - \text{OH}$ is treated with Cu at 573 K, (b) Anisole is treated with $\text{CH}_3\text{Cl}/\text{anhydrous AlCl}_3$, (c) Phenol is treated with Zn dust? Write the chemical equations in support of your answer.				3								
27.	(a) Differentiate between weak field and strong field coordination entity. (b) Using IUPAC norms write the formulae for the following: tris(ethane-1,2-diamine)chromium (III) chloride. (c) Write the IUPAC name of the following $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$				3								
28.	Calculate the freezing point of a solution containing 60g of glucose (Molar mass = 180 g mol^{-1}) in 250g of water. (K_f of water = $1.86 \text{ K kg mol}^{-1}$)				3								
29.	Write the structures of main products when aniline reacts with the following reagents: (a) Br_2 water (b) HCl (c) Benzene diazonium chloride				3								

30.	<p>(a) How do you convert the following</p> <p>(i) Prop-1-ene to 1-Fluoropropane</p> <p>(ii) Chlorobenzene to 2-chlorotoluene</p> <p>(iii) Ethanol to propanenitrile</p> <p style="text-align: center;">OR</p> <p>(a) Write the equation for the preparation of 1-iodobutane from 1-chlorobutane.</p> <p>(b) Out of 2-bromopentane, 2-bromo-2-methylbutane and 1-bromopentane, which compound is the most reactive towards elimination reaction and why?</p> <p>(c) Give IUPAC name of</p> $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{CH} = \text{CH} - \text{C} - \text{CH}_3 \\ \\ \text{Br} \end{array} $	3
SECTION D		
<i>The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.</i>		
31.	<p>Carbohydrates, proteins, nucleic acids, etc. form the basis of life and are responsible for the growth and maintenance of living systems. Therefore, they are referred to as biomolecules. Carbohydrates are widely distributed in nature. Carbohydrates are optically active polyhydroxy aldehydes or ketones or the compounds which produce such units on hydrolysis. Glucose, fructose, sucrose, starch, cellulose, etc. are some naturally occurring carbohydrates. They act as the major source of energy for animals and human beings. Monosaccharides are simple carbohydrates that cannot be broken further into smaller units on hydrolysis, e.g., glucose and fructose, ribose, etc. Oligosaccharides are carbohydrates that on hydrolysis give two to ten units of monosaccharides, e.g., sucrose, maltose, raffinose, stachyose, etc. Polysaccharides are carbohydrates that produce a large number of monosaccharide units on hydrolysis, e.g., starch, cellulose, etc.</p> <p>i. Which carbohydrate provides instant energy to the body?</p> <p>ii. Which disaccharide is found only in animals and not in plants?</p> <p>iii. (a) Which carbohydrate is the main constituent of the plant cell wall? (b) Which type of linkage is present in starch?</p> <p style="text-align: center;">OR</p> <p>iii. (a) Write the name of two monosaccharides obtained on hydrolysis of lactose sugar. (b) Which one of the following is a polysaccharide? Starch, Maltose, Fructose, Glucose</p>	4
32.	<p>A solution that obeys Raoult's law strictly is called an ideal solution, while a solution that shows deviations from Raoult's law is called a non-ideal solution or real solution. Suppose the molecules of the solvent and solute are represented by A and B respectively and let γ_{AB}, γ_{AA} and γ_{BB} are the attractive forces between A-B, A-A, and B-B respectively. An ideal solution of the components A and B is defined as a solution in which the intermolecular interactions between the components A-B are of the same magnitude as the intermolecular interactions found in the pure components A-A and B-B. Similarly, a non-ideal solution of the components A and B is defined as the solution in which the intermolecular interaction between the components A-B is of a different magnitude as the intermolecular interactions are found in the pure components A-A and B-B.</p> <p>i. What type of liquids form the ideal solution?</p> <p>ii. Give one example of an ideal solution.</p> <p>iii. Write two characteristics of a non-ideal solution.</p>	4

	<p style="text-align: center;">OR</p> <p>iii. (a) On mixing liquid A and liquid B, the volume of the resulting solution decreases, what type of deviation from Raoult's law is shown? (b) Which type of deviation will be shown by the solution, if $\gamma_{AB} < \gamma_{AA}$.</p>	
	SECTION E	
	<i>The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.</i>	
33.	<p>(a) Calculate the e.m.f. and ΔG for the following cell at 298 K: $\text{Mg (s)} + \text{Mg}^{2+} (0.01\text{M}) \text{Ag}^+ (0.0001\text{M}) + \text{Ag (s)}$ Given $E^\circ_{\text{Mg}^{2+}/\text{Mg}} = -2.37 \text{ V}$, $E^\circ_{\text{Ag}^+/\text{Ag}} = +0.80 \text{ V}$.</p> <p style="text-align: center;">OR</p> <p>(a) State two advantages of $\text{H}_2 - \text{O}_2$ fuel cell over ordinary cell. (b) What type of battery is a lead storage battery? Write the anode and cathode reactions and overall cell reaction occurring in the operation of a lead storage battery. (c) Calculate Λ°_m for acetic acid. Given that $\Lambda^\circ_m (\text{HCl}) = 426 \text{ S cm}^2 \text{ mol}^{-1}$, $\Lambda^\circ_m (\text{NaCl}) = 126 \text{ S cm}^2 \text{ mol}^{-1}$ and $\Lambda^\circ_m (\text{CH}_3\text{COONa}) = 91 \text{ S cm}^2 \text{ mol}^{-1}$</p>	5
34.	<p>(a) An alkene 'A' (Mol. formula C_5H_{10}) on ozonolysis gives a mixture of two compounds 'B' and 'C'. Compound 'B' gives positive Fehling's test and also forms iodoform on treatment with I_2 and NaOH. Compound 'C' does not give Fehling's test but forms iodoform. Identify the compounds A, B and C. Write the reaction for ozonolysis and formation of iodoform from either B and C. (b) Give simple chemical tests to distinguish between the following pairs of compounds: (i) Butanal and Butan-2-one (ii) Benzoic acid and phenol</p> <p style="text-align: center;">OR</p> <p>(a) Write the reactions involved in the following: (i) Etard reaction (ii) Stephen reduction (b) How will you convert the following (i) Benzoic acid to benzaldehyde (ii) Acetophenone to benzoic acid (iii) Ethanoic acid to 2-hydroxyethanoic acid</p>	5
35.	<p>(a) The elements of 3d transition series are given as: Sc Ti V Cr Mn Fe Co Ni Cu Zn (i) Which element has the highest m.p. and why? (ii) Which element is a strong oxidizing agent in +3 oxidation state and why? (iii) Which element is soft and why? (b) Write the equation involved in the preparation of potassium dichromate from sodium chromate (Na_2CrO_4)</p>	5
