

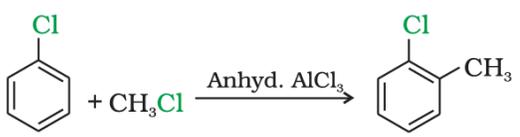
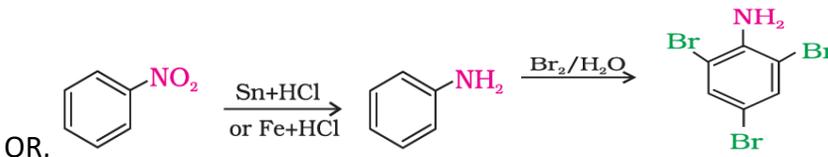
SECOND YEAR HIGHER SECONDARY EXAMINATION MARCH 2026 – ANSWER KEY

(UNOFFICIAL)

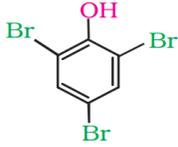
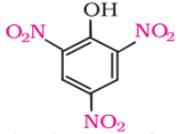
SUBJECT: CHEMISTRY

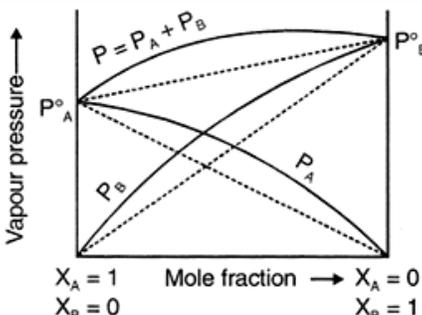
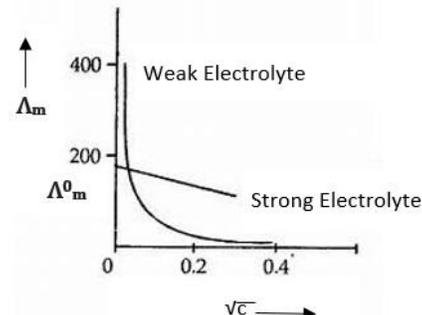
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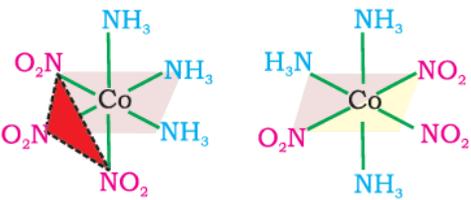
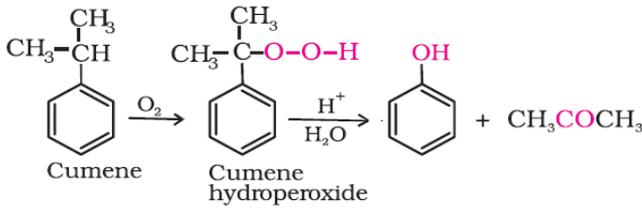
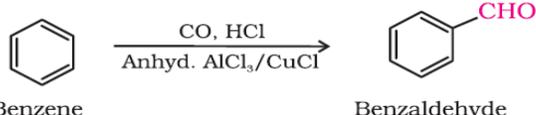
Qn. No.	Sub Qns	Answer Key/Value Points	Score	Total												
Answer any 4 questions from 1 to 5. Each carry 1 score																
1.		(b) Na	1	1												
2.		(c) Rate constant	1	1												
3.		(d) C ₂ O ₄ ²⁻	1	1												
4.		(c) Chlorobenzene	1	1												
5.		(d) Cellulose	1	1												
Answer any 8 questions from 6 to 15. Each carry 2 scores																
6.		This is because the fluid inside our blood cell is isotonic with saline solution [0.9% mass/volume]. So, osmosis does not occur. OR, saline water [0.9% mass/volume] and fluid inside our blood cell have the same osmotic pressure. So blood cells do not shrink or swell.	2	2												
7.		$\Delta_r G^0 = -nFE_{\text{cell}}^0$ Here n = 2, F = 96500 C and E _{cell} ⁰ = 1.1 V So, $\Delta_r G^0 = -2 \times 96500 \text{ C} \times 1.1 \text{ V} = -212300 \text{ J mol}^{-1}$	1 1	2												
8.	(i)	Activation energy is the minimum amount of kinetic energy required for effective collision during a reaction. OR, It is the minimum amount of kinetic energy required by the reactant molecules to initiate a chemical reaction or to form activated complex.	1	2												
	(ii)	A catalyst increases the rate of a chemical reaction by providing a new path with low activation energy. OR, the graphical representation.	1													
9.		For a first order reaction, $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ Here [R] ₀ = 1.24 x 10 ⁻² mol/L, [R] = 0.2 x 10 ⁻² mol/L, t = 60 min. $k = \frac{2.303}{60 \text{ min.}} \log \frac{1.24 \times 10^{-2} \text{ mol/L}}{0.2 \times 10^{-2} \text{ mol/L}} = \underline{\underline{0.0304 \text{ min}^{-1}}}$	1 1	2												
10.	(i)	X is CH ₃ -CH ₂ -Cl OR, Chloroethane OR, Ethyl chloride	1	2												
	(ii)	Y is CH ₃ -F OR, Fluoromethane OR, Methyl fluoride	1													
11.		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">S_N1 Reaction</th> <th style="width: 50%; text-align: center;">S_N2 Reaction</th> </tr> </thead> <tbody> <tr> <td>Occurs in two steps.</td> <td>Occurs in one step.</td> </tr> <tr> <td>Order and molecularity = 1.</td> <td>Order and molecularity = 2.</td> </tr> <tr> <td>Intermediate carbocation is formed.</td> <td>No intermediate is formed.</td> </tr> <tr> <td>For optically active compounds, the reaction proceeds through racemization.</td> <td>For optically active compounds, the reaction proceeds through inversion of configuration.</td> </tr> <tr> <td>The order of reactivity of alkyl halide is 3^o > 2^o > 1^o.</td> <td>The order of reactivity of alkyl halide is 1^o > 2^o > 3^o.</td> </tr> </tbody> </table> <p style="text-align: center; color: red; margin-top: 5px;"><i>[Any 2 differences are required]</i></p>	S _N 1 Reaction	S _N 2 Reaction	Occurs in two steps.	Occurs in one step.	Order and molecularity = 1.	Order and molecularity = 2.	Intermediate carbocation is formed.	No intermediate is formed.	For optically active compounds, the reaction proceeds through racemization.	For optically active compounds, the reaction proceeds through inversion of configuration.	The order of reactivity of alkyl halide is 3 ^o > 2 ^o > 1 ^o .	The order of reactivity of alkyl halide is 1 ^o > 2 ^o > 3 ^o .	2 x 1	2
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12.	(i)	Phosgene OR, Carbonyl chloride OR, COCl ₂	1	2												
	(ii)	By treating chlorobenzene with CH ₃ Cl in presence of anhydrous AlCl ₃ OR, By Friedel-Crafts Alkylation reaction.	1													

	<p>OR,</p>  <p style="text-align: center;">1-Chloro-2-methylbenzene</p>		
13.	<p>Industrially methanol is prepared by the catalytic hydrogenation of carbon monoxide at about 573-673 K temperature and 200-300 atm pressure and in the presence of ZnO – Cr₂O₃ catalyst.</p> $\text{CO} + 2\text{H}_2 \xrightarrow[573-673 \text{ K}]{\text{ZnO-Cr}_2\text{O}_3, 200-300 \text{ atm}} \text{CH}_3\text{OH}$	1 1	2
14.	<p>By Iodoform test. Acetaldehyde gives a yellow ppt when treated with iodine and NaOH or with sodium hypoiodite (NaOI). Formaldehyde does not give this test. OR, By Aldol condensation reaction; Acetaldehyde gives this reaction. OR, By Cannizzaro reaction; Formaldehyde gives this reaction. OR, Reaction with Grignard reagent.</p>	2	2
15.	<p>Nitrobenzene is first converted to aniline by reduction with iron and HCl or tin and HCl or by catalytic hydrogenation. This on treating with bromine water we get 2,4,6-tribromoaniline.</p>  <p>OR,</p>	1 + 1	2
Answer any 8 questions from 16 to 26. Each carries 3 scores			
16.	<p>Given $w_2 = 1.26 \text{ g}$, $R = 0.083 \text{ L bar K}^{-1} \text{ mol}^{-1}$, $\pi = 2.57 \times 10^{-3} \text{ bar}$, $T = 300 \text{ K}$ and $V = 200 \text{ cm}^3 = 0.2 \text{ L}$</p> <p>Molar mass of solute, $M_2 = \frac{w_2 RT}{\pi V}$</p> $= \frac{1.26 \text{ g} \times 0.083 \text{ L bar/K/mol} \times 300 \text{ K}}{2.57 \times 10^{-3} \text{ bar} \times 0.2 \text{ L}}$ $= \underline{\underline{61038.9 \text{ g mol}^{-1}}}$ <p style="text-align: center;">OR, $6.1 \times 10^4 \text{ g mol}^{-1}$</p>	1 1 1	3
17.	<p>Rusting of Iron is a redox reaction. At a particular spot of the metal, oxidation takes place and that spot behaves as anode. Here Fe is oxidized to Fe²⁺.</p> $2 \text{Fe}_{(s)} \longrightarrow 2 \text{Fe}^{2+}_{(aq)} + 4 \text{e}^-$ <p>Electrons released at anodic spot move through the metal and go to another spot on the metal and reduce oxygen in presence of H⁺. This spot behaves as cathode. The reaction taking place at this spot is:</p> $\text{O}_{2(g)} + 4 \text{H}^+_{(aq)} + 4 \text{e}^- \longrightarrow 2 \text{H}_2\text{O}_{(l)}$ <p>The overall reaction is:</p> $2\text{Fe}_{(s)} + \text{O}_{2(g)} + 4\text{H}^+_{(aq)} \longrightarrow 2\text{Fe}^{2+}_{(aq)} + 2 \text{H}_2\text{O}_{(l)}$ <p>The ferrous ions (Fe²⁺) are further oxidised to ferric ions (Fe³⁺) and finally to hydrated ferric oxide (Fe₂O₃ · x H₂O), which is called rust.</p> <p style="text-align: right;"><i>[Only Explanation or Equations required]</i></p>	1 1 1	3

18.	(i)		Order	Molecularity	2 x 1	3	
		1	It is the sum of the powers of the concentration terms in the rate law expression.	It is the total number of reactant species collide simultaneously in a chemical reaction.			
		2	It is an experimental quantity	It is a theoretical quantity			
		3	It can be zero or fractional	It cannot be zero or fractional			
	4	It is applicable to both elementary and complex reactions.	It is applicable only to elementary reactions.				
<i>[Any 2 differences required]</i>							
	(ii)	Pseudo order reaction is a reaction which appears to follow higher order but actually follows first order kinetics.			1		
19.	(i)	Due to the absence of partially filled d orbitals in the ground state or in any of the common oxidation states of Zn, Cd and Hg.			1	3	
	(ii)	This is due to comparatively smaller size, high ionic charge, presence of partially filled d orbitals and ability to show variable oxidation state.			1		
	(iii)	Due to the absence of partially filled d orbitals in Sc^{3+} . OR, Due to the presence of partially filled d-orbitals in Ti^{3+} .			1		
20.	Potassium dichromate is generally prepared from chromite ore ($FeCr_2O_4$) by the following three steps.				3 x 1	3	
	1. Conversion of chromite ore to sodium chromate by fusing with sodium carbonate in presence of air. $4 FeCr_2O_4 + 8 Na_2CO_3 + 7 O_2 \rightarrow 8 Na_2CrO_4 + 2 Fe_2O_3 + 8 CO_2$ 2. Sodium chromate is acidified with sulphuric acid to form sodium dichromate. $2Na_2CrO_4 + 2 H^+ \rightarrow Na_2Cr_2O_7 + 2 Na^+ + H_2O$ 3. Conversion of sodium dichromate to potassium dichromate by treating with potassium chloride. $Na_2Cr_2O_7 + 2 KCl \rightarrow K_2Cr_2O_7 + 2 NaCl$ <i>[Either equation or explanation required]</i>						
21.	(i)	In $[Ni(CN)_4]^{2-}$, the central ion Ni^{2+} is dsp^2 hybridized and so it has square planar geometry . But in $[Ni(CO)_4]$, the central atom Ni is sp^3 hybridized and so it has tetrahedral shape . Due to the absence of unpaired electrons, both are diamagnetic.			2	3	
	(ii)	$[Co(NH_3)_4(H_2O)Cl]Cl_2$			1		
22.	(i)	<p style="text-align: center;">Tetrahedral splitting</p>				2	3
	(ii)	Limitations of VB theory are: (i) It involves a large number of assumptions. (ii) It does not give quantitative interpretation of magnetic data of complexes. (iii) It does not explain the colour exhibited by co-ordination compounds.			1		

		(iv) It does not give a quantitative interpretation of the thermodynamic or kinetic stabilities of co-ordination compounds. (v) It does not make exact predictions regarding the tetrahedral and square planar structures of 4-co-ordinated complexes. (vi) It does not distinguish between weak and strong ligands. [Any one required]																						
23.	(i)	2,4,6-Tribromophenol OR, 	1	3																				
	(ii)	Benzene (C ₆ H ₆) OR, 	1																					
	(iii)	2,4,6-Trinitrophenol OR, Picric acid OR, 	1																					
24.		<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Reactant</th> <th>Reagent</th> <th>Major Product</th> <th>Name of reaction</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>RCOCl</td> <td>H₂, Pd/BaSO₄</td> <td>R-CHO</td> <td>Rosenmund reduction</td> </tr> <tr> <td>2.</td> <td>CH₃COOH</td> <td>Cl₂/Red P</td> <td>CH₂Cl-COOH</td> <td>HVZ Reaction</td> </tr> <tr> <td>3.</td> <td>CH₃CHO</td> <td>Zn-Hg/Conc. HCl</td> <td>CH₃-CH₃</td> <td>Clemmensen reduction</td> </tr> </tbody> </table>	Sl. No.	Reactant	Reagent	Major Product	Name of reaction	1.	RCOCl	H ₂ , Pd/BaSO ₄	R-CHO	Rosenmund reduction	2.	CH ₃ COOH	Cl ₂ /Red P	CH ₂ Cl-COOH	HVZ Reaction	3.	CH ₃ CHO	Zn-Hg/Conc. HCl	CH ₃ -CH ₃	Clemmensen reduction	6 x ½	3
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25.	(i)	Hoffmann Bromamide Degradation Reaction.	1	3																				
	(ii)	Primary amine reacts with Hinsberg reagent to form a precipitate (of N-alkylbenzenesulphonamide), which is soluble in alkali. While secondary amine reacts with Hinsberg reagent to give a precipitate (of N,N-dialkylbenzenesulphonamide), which is insoluble in alkali.	1																					
			1																					
26.	(i)	<table border="1"> <thead> <tr> <th>Fibrous protein</th> <th>Globular protein</th> </tr> </thead> <tbody> <tr> <td>It has fibre-like shape</td> <td>It has spherical shape</td> </tr> <tr> <td>It is water insoluble</td> <td>It is water soluble</td> </tr> <tr> <td>Here the polypeptide chains run parallel and are held together by hydrogen bond and disulphide bond.</td> <td>Here the chains of polypeptides coil around to give a spherical shape.</td> </tr> <tr> <td>E.g.: Keratin and myosin</td> <td>E.g. Insulin and albumins.</td> </tr> </tbody> </table> <p style="text-align: center;"><i>[Any 2 differences required]</i></p>	Fibrous protein	Globular protein	It has fibre-like shape	It has spherical shape	It is water insoluble	It is water soluble	Here the polypeptide chains run parallel and are held together by hydrogen bond and disulphide bond.	Here the chains of polypeptides coil around to give a spherical shape.	E.g.: Keratin and myosin	E.g. Insulin and albumins.	2 x 1	3										
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E.g.: Keratin and myosin	E.g. Insulin and albumins.																							
	(ii)	When a protein is subjected to physical change (like change in temperature) or chemical change (like change in pH), it loses the biological activities. This process is called denaturation of protein.	1																					
Answer any 4 questions from 27 to 31. Each carry 4 scores																								
27.	(i)	Henry's law states that at constant temperature, the solubility of a gas in a liquid is directly proportional to the pressure of the gas. Or, The partial pressure of the gas (p) in vapour phase is proportional to the mole fraction of the gas (x) in the solution. OR, the mathematical expression, $p = K_H \cdot x$ (where p is the partial pressure of the gas, x is the mole fraction of the gas in the solution and K _H is the Henry's law constant).	1																					

	<p>Applications: (i) In the preparation of soda water and soft drinks. (ii) A medical condition known as Bends in Scuba divers. (iii) A medical condition known as Anoxia in people living at high altitudes or climbers.</p> <p style="text-align: right;"><i>[Any two applications required]</i></p>	½+½	4
	<p>(ii) </p>	2	
28.	<p>(i) For Daniel cell, the cell reaction is: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ The Nernst equation is: $E_{\text{cell}} = E_{\text{cell}}^0 - \frac{0.0591}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$ OR, $E_{\text{cell}} = E_{\text{cell}}^0 + \frac{0.0591}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Zn}^{2+}]}$</p> <p>(ii) For both strong and weak electrolytes, conductivity always decreases with dilution. This is because as dilution increases, the number of ions per unit volume decreases and hence the conductivity decreases. The molar conductivity increase with dilution for both strong and weak electrolytes. This is due to the increase in ionic mobility for strong electrolytes and increase in degree of dissociation for weak electrolytes.</p> <p>OR,</p> 	1 1	
		1 1	4
29.	<p>(i) The important postulates of Werner's Coordination theory are:</p> <ol style="list-style-type: none"> 1. Every metal has two types of valencies – primary (1^0) valency and secondary (2^0) valency. Primary valency is ionisable, while secondary valency is non-ionisable. 2. Primary valency is denoted by dotted lines, while secondary valency is denoted by thick lines. 3. Primary valency gives the oxidation state of the metal, while secondary valency gives the co-ordination number of the metal. 4. Primary valency is always satisfied by –ve ions, while secondary valency may be satisfied by –ve ions or neutral molecules. 5. Every metal has a fixed number of secondary valencies. In order to satisfy this requirement, some –ve ions may act as both primary and secondary valencies simultaneously. 	2	4

	<p>6. The primary valencies are non-directional, while the secondary valencies are directional. i.e. they are directed to some fixed positions in space.</p> <p>7. Since secondary valencies are directional, co-ordination compounds have a definite geometry and they show isomerism. <i>[Any 2 postulates required]</i></p>		
	<p>(ii)</p>  <p>Fac-isomer Mer-isomer</p>	2	
30.	<p>(i) A is $(\text{CH}_3\text{-CH}_2\text{-CH}_2)_3\text{B}$ OR, Tri(n-propyl) borane B is $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ OR, Propan-1-ol OR, 1-Propanol</p>	1 1	
	<p>(ii) Cumene is oxidised in presence of air to form cumene hydroperoxide which on acidification or hydrolysis to form phenol. OR,</p>  <p>Cumene Cumene hydroperoxide Phenol + CH_3COCH_3</p>	2	4
31.	<p>(i) Aldol condensation reaction: Aldehyde or ketone having at least one α-hydrogen atom when treated with dilute alkali, β-hydroxy aldehyde (aldol) or β-hydroxy ketone (ketol) is formed. This on heating undergoes dehydration to give α,β-unsaturated aldehyde or ketone. This reaction is called Aldol condensation reaction. OR, Aldehydes or ketones having at least one α-hydrogen atom when heated with dilute alkali, we get α,β-unsaturated aldehydes or ketones. OR, $2\text{CH}_3\text{-CHO} \xrightarrow{\text{dil. NaOH}} \text{CH}_3\text{-CH(OH)-CH}_2\text{-CHO} \xrightarrow{\Delta} \text{CH}_3\text{-CH=CH-CHO}$ Ethanal 3-Hydroxybutanal (aldol) But-2-enal OR, Any other example.</p>	2	
	<p>(ii) (a) By treating benzaldehyde with CO and HCl in presence of anhydrous AlCl_3 or CuCl. [Gattermann – Koch reaction] OR,</p>  <p>Benzene Benzaldehyde</p> <p>(b) By reduction using LiAlH_4 Or Diborane (B_2H_6) OR, $\text{CH}_3\text{-COOH} \xrightarrow{\text{LiAlH}_4 \text{ OR, } \text{B}_2\text{H}_6} \text{CH}_3\text{-CH}_2\text{OH}$ OR, By converting acetic acid to an ester followed by catalytic hydrogenation. OR, $\text{CH}_3\text{-COOH} + \text{CH}_3\text{-CH}_2\text{OH} \xrightarrow{\text{H}^+} \text{CH}_3\text{-COOCH}_2\text{-CH}_3 \xrightarrow{\text{H}_2/\text{Pd}} 2 \text{CH}_3\text{-CH}_2\text{OH}$</p>	1 1	4

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