HIGHER SECONDARY SECOND YEAR EXAMINATION, MARCH 2025

Part III

CHEMISTRY

Answer Key (Unofficial)

Solutions Prepared by:

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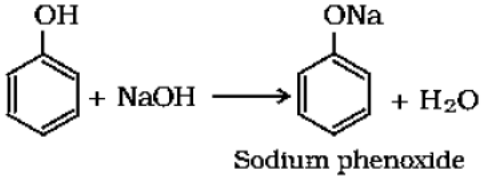
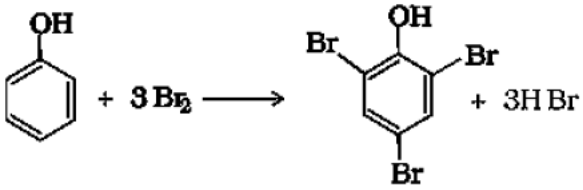
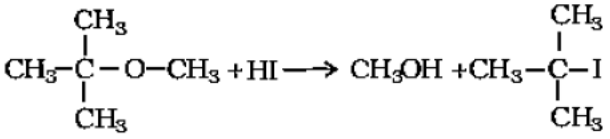
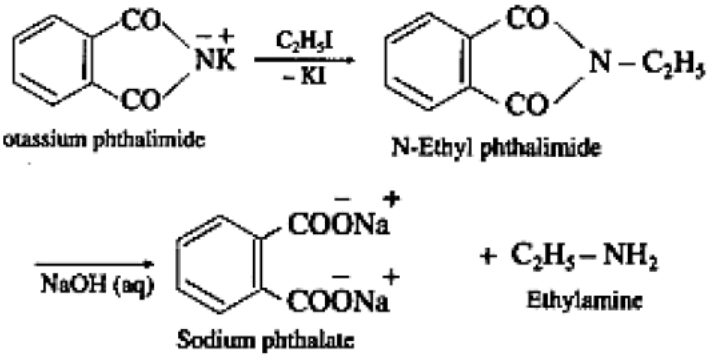
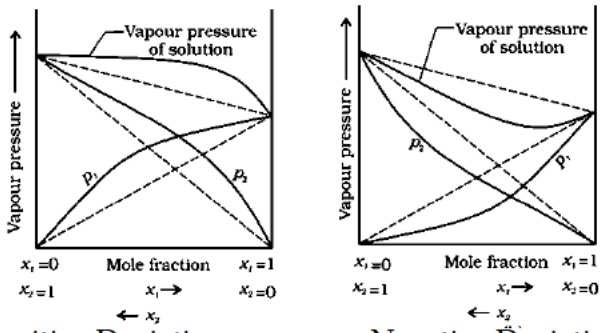
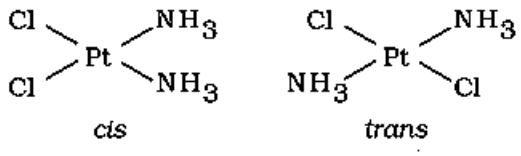
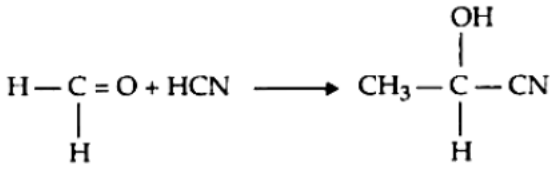
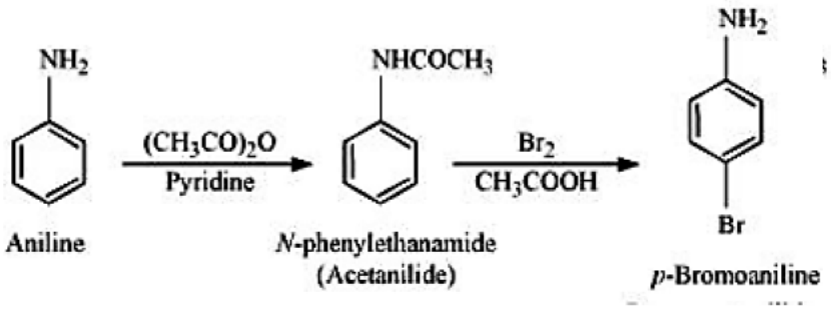
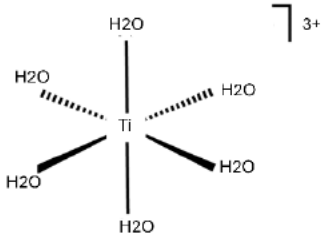
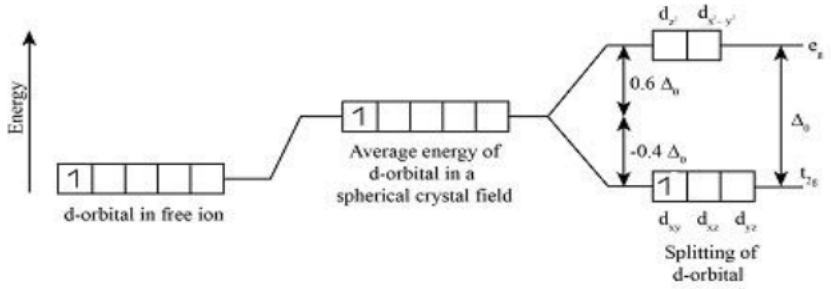
Question Paper Code: SY425

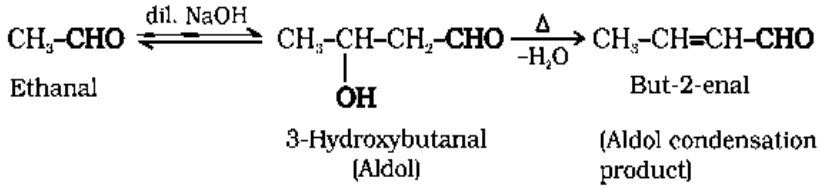
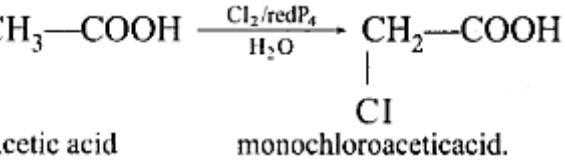
Qn. No	Sub Qn.	Value Points	Split Score	Total Score
		SECTION- I Answer any 4 questions from 1 – 5 Each Carries 1 Score.		
1		(c) or Decrease in enthalpy. **(Note:** Dissolution of a gas in a liquid is an exothermic process, that is it releases heat and decrease enthalpy of the system.)		1
2		Zero		1
3		Copper / Cu		1
4		Propanol		1
5		$NH_3^+ - CH_2 - COO^-$		1
		SECTION II Answer any 8 questions from 6 – 15. Each Carries 2 Scores.		
6		Formula $\frac{\Delta P}{P_0} = \frac{n_{solute}}{n_{solute} + n_{solvent}}$ (1 score) Substituting; $\frac{\Delta P}{P_0} = \frac{0.5}{0.5 + 55.5} = \frac{0.5}{56.0} = 0.0089$ **(1 Score)**		2
7		Pt(s) | H_2 (g, 1 bar) | H+ (aq, 1 M) || Cu^{2+} (aq, 1 M) | Cu		2
8		For the first order reaction, $k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$ at $t_{1/2}$ $[R] = \frac{[R]_0}{2}$ So, the above equation becomes $k = \frac{2.303}{t_{1/2}}\log\frac{[R]_0}{[R]/2}$ or $t_{1/2} = \frac{2.303}{k}\log 2$ $t_{1/2} = \frac{2.303}{k} \times 0.301$ $t_{1/2} = \frac{0.693}{k}$		2
9		The number of collisions per second per unit volume of the reaction mixture is known as collision frequency (1 score) The collisions in which molecules collide with sufficient kinetic energy (called threshold energy) and proper orientation, are called as effective collisions (1 score)		2
10		Allylic – (B) Benzylic – (A) Vinylic – (D) Aryl halides – (C) (½ × 4 = 2)		2

11	(a)	propan-2-ol	1	2
	(b)	Ethanol	1	
12	(a)	 Sodium phenoxide	1	2
	(b)	Phenols, on losing a proton forms phenoxide ion, which is more stabilized through resonance / hydroxyl group is attached to an sp2 hybridised carbon, which is an electron withdrawing group / Relevant answer.	1	
13	(a)	 2,4,6-Tribromophenol	1	2
	(b)		1	
14		Treating a nitrile with Grignard reagent followed by hydrolysis yields a ketone / Example / reaction		2
15				2
Answer any 8 questions from 16 – 26. Each Carries 3 Scores				
16	(i)	strength of hydrogen bonding between ethanol and water is less compared to that of ethanol-ethanol or water-water / A – B interaction is weaker than A_A and B_B interaction	1	3
	(ii)	 positive Deviation Negative Deviation	2	

17		$E = E^\circ - \frac{0.0591}{n}\log[H^+]$ $E = 0 - \frac{0.0591}{2}\log(0.01)$ $E = 0 - \frac{0.0591}{2} \times (-2)$ $E = 0 + (0.0591 \times 1)$ $E = 0.0591\ \text{V}$		3
18	(i)	$r = k[NO]^2[O_2]$	1	3
	(ii)	Order – 3 and Molecularity – 3	1	
	(iii)	$r' = k(3[NO])^2[O_2]$ $r' = k \cdot 9[NO]^2[O_2]$ $r' = 9r$ Rate becomes 9 times	1	
19	(i)	zinc atom has completely filled d orbitals ($3d^{10}$) in its ground state as well as in its oxidised state, hence it is not regarded as a transition element.	1	3
	(ii)	Due to presence of large number of unpaired electrons in their atoms they have stronger interatomic interation and hence stronger bonding between atoms resulting in higher enthalpies of atomisation.	1	
	(iii)	it readily gains an electron to achieve a more stable half-filled d^5 electronic configuration when it is reduced to Mn^{2+}	1	
20		Lanthanide contraction is the gradual decrease in the size of lanthanide atoms and ions as atomic number increases. **Cause :- poor** shielding of 4f electrons by other 4f electrons in the same subshell. **Consequences:- Any conseeunce / Zr – Hf etc.**	1 1 1	3
21	(i)	$[Pt(NH_3)_2Cl_2]$ primary valency of Pt is +2 and the secondary valency is 4	1	3
	(ii)	diamminedichloridoplatinum(II)	1	
	(iii)		1	
22		1. It involves a number of assumptions. 2. It does not give quantitative interpretation of magnetic data. 3. It does not explain the colour exhibited by coordination compounds. 4. It does not give a quantitative interpretation of the thermodynamic or kinetic stabilities of coordination compounds.		

		5. It does not make exact predictions regarding the tetrahedral and square planar structures of 4-coordinate complexes. 6. It does not distinguish between weak and strong ligands. (Any THREE points)		3
23	(i)	A – CH_3CH_2OH B- NaI C- C_2H_4 or $CH_2=CH_2$	1	3
	(ii)	Finkelstein reaction	1	
	(iii)	C_2H_5OH or CH_3CH_2OH	1	
24	(i)	Due to steric and electronic reasons Sterically, the presence of two relatively large substituents in ketones hinders the approach of nucleophile to carbonyl carbon than in aldehydes. Electronically, aldehydes are more reactive than ketones because two alkyl groups reduce the electrophilicity of the carbonyl carbon more effectively than in former	2	3
	(ii)		1	
25	(i)	Due to resonance in aniline, lone pair of electrons gets delocalised over benzene ring and, thus is less available for protonation.	1	3
	(ii)		2	
26		Monosaccharides: A carbohydrate that cannot be hydrolysed further to give simpler unit. Eg Glucose / Fructose / Ribose Oligosaccharides: Carbohydrates that yield two to ten monosaccharide units, on hydrolysis. Eg. Sucrose / Maltose	1 1	3

		Polysaccharides: Carbohydrates which yield a large number of monosaccharide units on hydrolysis. Eg. Starch, Cellulose, Glycogen, gums etc.	1	
SECTION IV. Answer Any 4 questions from 27 – 31. Each Carries 4 Scores				
27	(i)	$i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$ $= \frac{\text{Observed colligative property}}{\text{Calculated colligative property}}$ $i = \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Number of moles of particles before association/dissociation}}$	1	4
	(ii)	K_2SO_4 dissociates completely as follows: $K_2SO_4 \longrightarrow 2K^+ + SO_4^{2-}$ $i = \frac{3}{1} = 3$ $\pi = iCRT = i\frac{W}{MV}RT$ $= 3 \times \frac{0.025}{174 \times 2} \times 0.0821 \times 298$ $= \mathbf{0.00527\ atm}$	3	
28	(i)	Because the number of ions per unit volume that carry the current in a solution decreases on dilution	1	4
	(ii)	For strong electrolytes, Λm increases with dilution because ion-ion interactions decrease, leading to more free-moving ions. For weak electrolytes, for weak electrolytes, the molar conductivity (Λm) significantly increases with dilution because the degree of ionization increases on dilution. / Graph	2	
	(iii)	limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte.	1	
29	(i)	Octahedrel	½	4
	(ii)	Correct structural formula / 	½	
	(iii)		2	

	(iv)	If light corresponding to the energy of blue-green region is absorbed by the complex, it would excite the electron from t2g level to the eg level (t2g1 eg0 to t2g0 eg1). / d- d transition of electrons (Note : the complex not appear blue green. It absorbs blue green to appear violet. See Table 5.3 and related explanation at NCERT)	2	
30	(i)	Reaction of propene with HBr forms 2 – Bromopropane (B) [Markovnikov's addition] To convert propene to 1-bromopropane, react it with hydrogen bromide (HBr) in the presence of a peroxide, (Anti-markovnikov's addition) / Reaction / Any other relavent method	2	4
	(ii)	2-bromopropane (B) will follow the SN1 mechanism faster because it forms a more stable secondary carbocation compared to the primary carbocation formed by 1-bromopropane	2	
31	(i)	Aldehydes and ketones having at least one a-hydrogen undergo a reaction in the presence of dilute alkali as catalyst to form b-hydroxy aldehydes (aldol) or b-hydroxy ketones (ketol) /Reaction  / Suitable example	2	4
	(ii)	HVZ Reaction Carboxylic acids having an a-hydrogen are halogenated at the a-position on treatment with chlorine or bromine in the presence of small amount of red phosphorus to give a-halocarboxylic acids  / Any suitable example.	2	

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