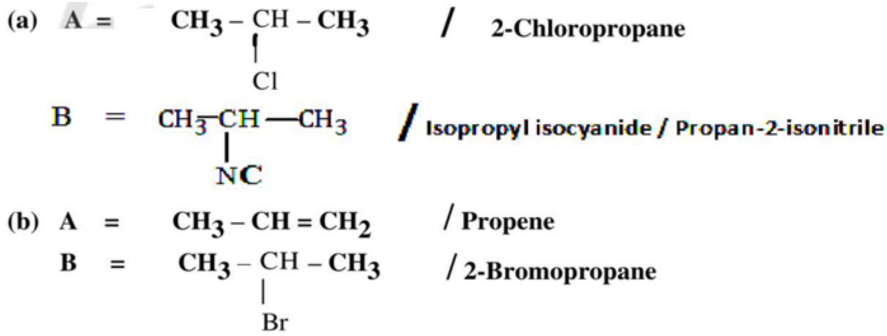
NAVODAYA VIDYALAYA SAMITI
PRE BOARD EXAMINATION – I (2023 -24) SET - I
CLASS- XII CHEMISTRY THEORY (043)
Maximum Marks : 70 Time: 3 Hours

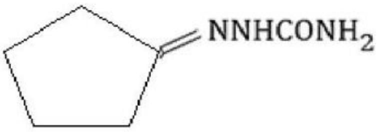
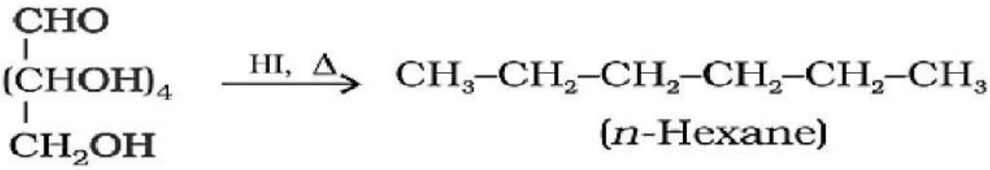
MARKING SCHEME

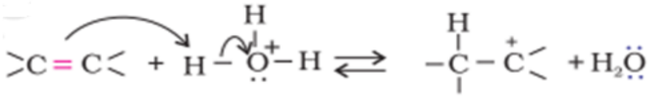
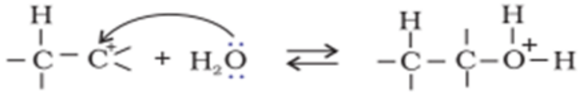
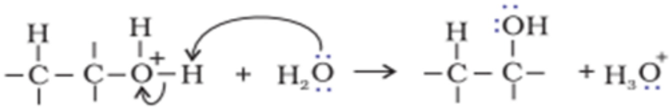
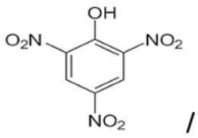
SECTION A

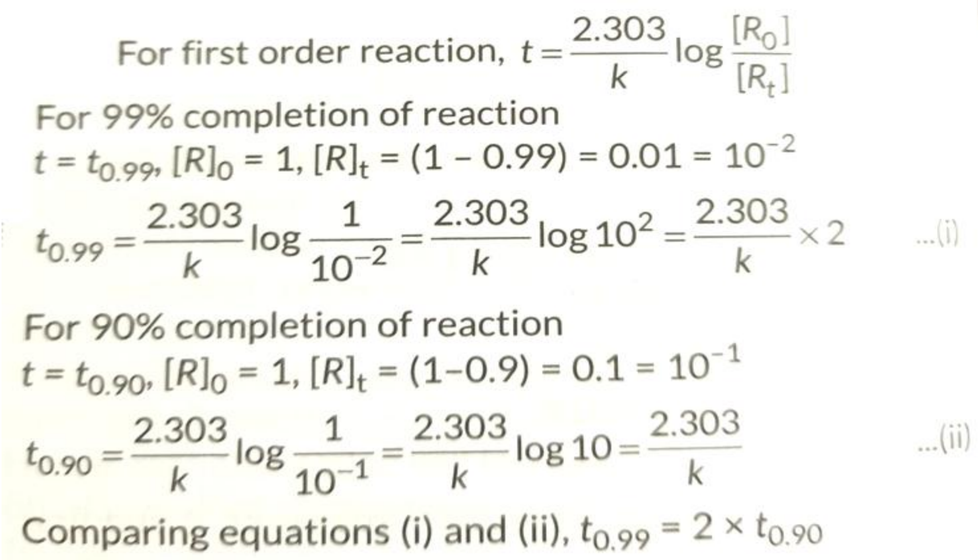
Q NO.	ANS	Q. NO	ANS	Q NO	ANS
1	**D**	7	**C**	13	**C**
2	**C**	8	**B**	14	**A**
3	**B**	9	**D**	15	**D**
4	**D**	10	**C**	16	**B**
5	**A**	11	**C**		
6	**C**	12	**B**		

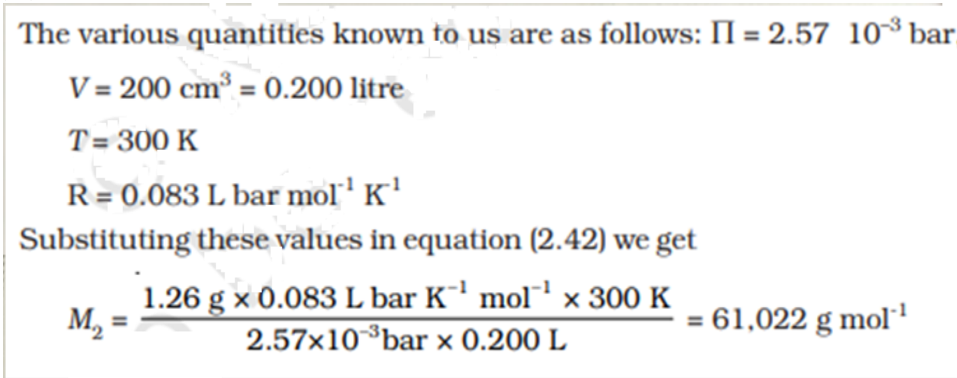
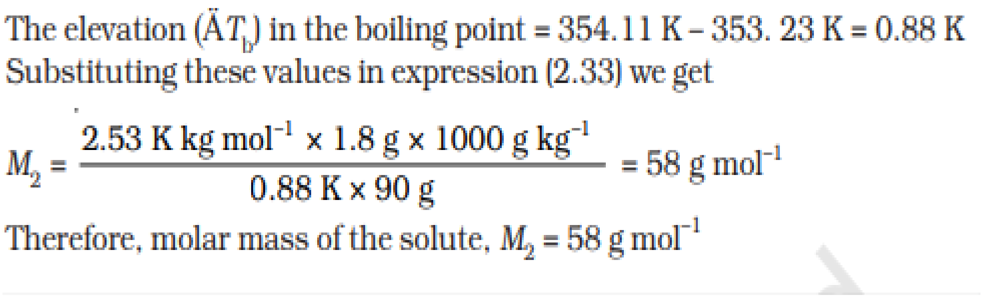
SECTION B

17	(a)properties depend on the number of solute particles irrespective of their are called colligative properties (b)Two solutions having same osmotic pressure at a given temperature are called isotonic solutions	1 1
18	(a)1st order (b)No ,it will take infinite time for the reaction tongo to completion	1 1
19	 **(a) A =** $CH_3-CH(Cl)-CH_3$ / **2-Chloropropane** **B =** $CH_3-CH(NC)-CH_3$ / **Isopropyl isocyanide / Propan-2-isonitrile** **(b) A =** $CH_3-CH=CH_2$ / **Propene** **B =** $CH_3-CH(Br)-CH_3$ / **2-Bromopropane**	½ ½ ½ ½

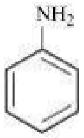
20	(i)  (ii)  Or (i) Fehling’s/tollen’s test/schiff’s test/iodoform test/reaction with Na metal (with explanation) (ii) Fehling’s/tollen’s test/schiff’s test/iodoform test (with explanation)	1+1 1+1
21	(a)  $CHO-(CHOH)_4-CH_2OH \xrightarrow{HI,\ \Delta} CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$ (n-Hexane) (b) Peptide linkage	1 1
	SECTION C	
22	(a)Potassium tetrachloridopalladate(II) (b)Coordination isomerism (c) Complexes in which a metal is bond to only **one kind of ligand** are called homoleptic complex, Any one suitable example	1 1 ½ ½
23	(i)A is strong electrolyte and B is weak electrolyte (ii)For electrolyte A,on extrapolated to zero concentration to get molar conductance at infinite dilution. For weak electrolyte B, Λ_m increases steeplyon dilution and extrapolation to zero conc is not possible.Hence Λ_α cannot be determined.	1 1 1

24.	*Mechanism* The mechanism of the reaction involves the following three steps: Step 1: Protonation of alkene to form carbocation by electrophilic attack of H_3O^+. $H_2O + H^+ \rightarrow H_3O^+$  Step 2: Nucleophilic attack of water on carbocation.  Step 3: Deprotonation to form an alcohol. 	1 1 1 1 1 1
25.	A is $CH_3CH{=}C(CH_3)_2$ B is CH_3CHO C IS CH_3COCH_3	1 1 1
26	i. (i)Vitamin C is soluble in water and regularly excreted in urine and hence cannot be stored in body. ii. (ii)Nucleoside= base + sugar Nucleotide – base + sugar +phosphate iii. Glycosidic linkage **OR** Phospho diester linkage	1 ½ ½ 1
27	(a) **CH_3I / Iodomethane / Methyl iodide** (b)  **/ Picric acid / 2,4,6-Trinitrophenol / 2,4,6-Trinitrobenzenol** (c) **$CH_3CH_2CH{=}CH_2$ / But-1-ene**	1 1 1

28		 For first order reaction, $t = \frac{2.303}{k} \log \frac{[R_0]}{[R_t]}$ For 99% completion of reaction $t = t_{0.99}, [R]_0 = 1, [R]_t = (1 - 0.99) = 0.01 = 10^{-2}$ $t_{0.99} = \frac{2.303}{k} \log \frac{1}{10^{-2}} = \frac{2.303}{k} \log 10^2 = \frac{2.303}{k} \times 2$ ...(i) For 90% completion of reaction $t = t_{0.90}, [R]_0 = 1, [R]_t = (1-0.9) = 0.1 = 10^{-1}$ $t_{0.90} = \frac{2.303}{k} \log \frac{1}{10^{-1}} = \frac{2.303}{k} \log 10 = \frac{2.303}{k}$ ...(ii) Comparing equations (i) and (ii), $t_{0.99} = 2 \times t_{0.90}$	1 1 1
		SECTION D	
29		(a)any two from C0,CN^-,en,NH_3,EDTA (b) $t_{2g}^3 e_g^2$ © SP^3 , diamagnetic Or $t_{2g}^4 e_g^2$ paramagnetic	1 1 2 2
30		(a)cathode (b) to maintain electrical neutrality or to prevent voltage drop. (c)any two differences OR The device which converts the chemical energy liberated during the chemical reaction to electrical energy is called electrochemical cell. if external potential applied becomes greater than E^0_{cell} of electrochemical cell then it behaves as an electrolytic cell	1 1 2 1 1
		SECTION E	
31	a	Sc^{+3} is colourless due to absence of d-d transitions and Ti^{+3} is coloured due to d-d transitions/unpaired d electrons/partially filled d-orbitals	1
	b	Due to less energy difference between 5f and 6d electrons	1
	c	Cr^{2+} changes from d^4 to stable half-filled t_{2g}^3 configuration while Mn^{3+} changes to stable half-filled d^5 configuration.	1
	d	Due to similar size	
	e	+6 and +6	
	f	Due to variable oxidation state/due to the ability to adopt multiple oxidation states/due to the large surface area/due to complex formation	1 1
	g	Cu^+ ion (aq.) undergoes disproportionation to Cu^{2+} (aq.) and Cu / $2\,Cu^+ (aq.) \longrightarrow Cu^{2+} (aq.) + Cu (s)$	1 1

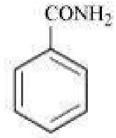
32	(i)pressure that just stops the flow of solvent is called osmotic pressure of the solution. (ii) pressure measurement is around the room temperature and the molarity of the solution is used instead of molality. The technique of osmotic pressure for determination of molar mass of solutes is particularly useful for biomolecules as they are generally not stable at higher temperatures and polymers have poor solubility. (iii).  The various quantities known to us are as follows: $\Pi = 2.57\ \ 10^{-3}$ bar, $V = 200\ cm^3 = 0.200$ litre $T = 300$ K $R = 0.083\ L\ bar\ mol^{-1}\ K^{-1}$ Substituting these values in equation (2.42) we get $M_2 = \frac{1.26\ g \times 0.083\ L\ bar\ K^{-1}\ mol^{-1} \times 300\ K}{2.57 \times 10^{-3} bar \times 0.200\ L} = 61{,}022\ g\ mol^{-1}$	1 1 3
	OR (a) for a solution of volatile liquids, the partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in solution. (b) If we compare the equations for Raoult's law and Henry's law, it can be seen that the partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution (c)  The elevation (ÄT_b) in the boiling point = 354.11 K – 353. 23 K = 0.88 K Substituting these values in expression (2.33) we get $M_2 = \frac{2.53\ K\ kg\ mol^{-1} \times 1.8\ g \times 1000\ g\ kg^{-1}}{0.88\ K \times 90\ g} = 58\ g\ mol^{-1}$ Therefore, molar mass of the solute, $M_2 = 58\ g\ mol^{-1}$	1 1 3
33.	(a) Aniline does not undergo Friedel-Crafts reaction (alkylation and acetylation) due to salt formation with aluminium chloride, the Lewis acid, which is used as a catalyst (b)due to resonance (c)	1 1 1

It is given that compound 'C' having the molecular formula, C_6H_7N is formed by heating compound 'B' with Br_2 and KOH. This is a Hoffmann bromamide degradation reaction. Therefore, compound 'B' is an amide and compound 'C' is an amine. The only amine having the molecular formula, C_6H_7N is aniline, ($C_6H_5NH_2$). 1



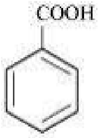
Aniline 1

Therefore, compound 'B' (from which 'C' is formed) must be benzamide, ($C_6H_5CONH_2$).



Benzamide

Further, benzamide is formed by heating compound 'A' with aqueous ammonia. Therefore, compound 'A' must be benzoic acid.



1

1

Benzoic acid

OR

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(i) a) $(C_2H_5)_2NH < (C_2H_5)_3N < C_2H_5NH_2$

b) in the strongly acidic medium, aniline is protonated to form the anilinium ion which is meta directing

c)

Due to the +I effect of - CH_3 group, methylamine is more basic than water. Therefore, in water, methylamine produces OH^- ions by accepting H^+ ions from water.

$$CH_3-NH_2+H-OH \longrightarrow CH_3-\overset{+}{N}H_3+OH^-$$

Ferric chloride ($FeCl_3$) dissociates in water to form Fe^{3+} and Cl^- ions.

$$FeCl_3 \longrightarrow Fe^{3+} + 3Cl^-$$

Then, OH^- ion reacts with Fe^{3+} ion to form a precipitate of hydrated ferric oxide.

2

(ii)

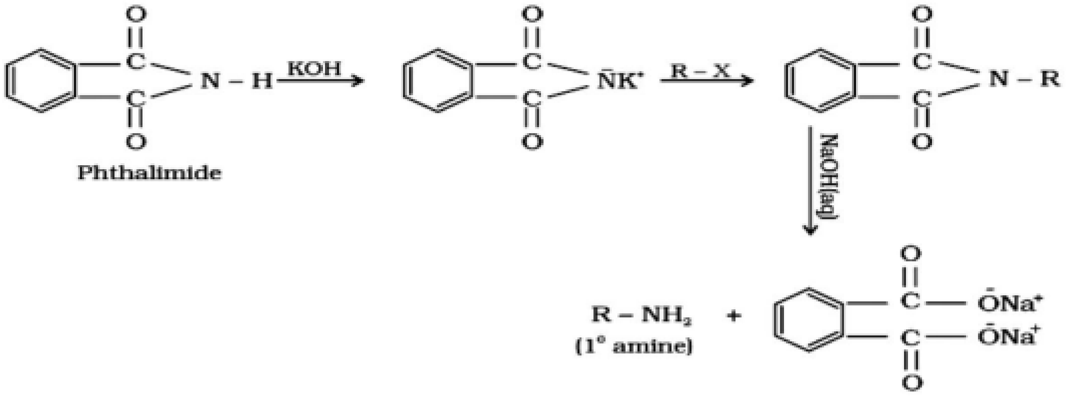
(a) Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines which are foul-smelling substances. /

$$R{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R{-}NC + 3KCl + 3H_2O$$

Isocyanide with an offensive smell is formed.

(Explanation or reaction)

(b) Phthalimide on treatment with ethanolic potassium hydroxide forms potassium salt of phthalimide which on heating with alkyl halide followed by alkaline hydrolysis produces the corresponding primary amine /



(Explanation or reaction)

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