21.02.2024

MODEL EXAM

+2 CHEMISTRY

ANSWER KEY

SCIENCENTRE CENTRE FOR CAREER EXCELLENCE TOUCH THE INVISIBLE SKY

RAYS THE SKY IS THE LIMIT

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Answer any 4 questions From 1 to 5. Each Carries 1 score.

1] 3

2] Dry cell or Mercury Cell

3] Linkage Isomerism

4] $SoCl_2$

5] Vitamin C

Answer any 8 questions from 6 to 15. Each carries 2 scores.

6](i) i = Total no: of moles of particles after association / Dissociation

No: of moles of particles before association / Dissociation

(ii) $i = 2$

7] (i). Galvanic Cell is a electrochemical cell that Converts chemical energy to Electrical Energy

(ii). $Zn / Zn^{2+} // Cu^{2+} / Cu$

8] Reaction which appear to be higher Order but actually follow lower order kinetics is called Pseudo Order reaction

Eg :- $C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

$r = k[C_{12}H_{22}O_{11}]$

$= 1$

9] (i) • Temperature
• Concentration
• Nature of Reactant

(ii) $2NH_{3(g)} \xrightarrow{Au/Pt} N_{2(g)} + 3H_{2(g)}$

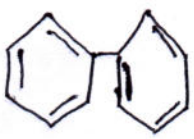
$r = k[NH_3]^0$ or $r = k$.

10] (i) Finkelstein Reaction

$RX + NaI \xrightarrow{Dry\ Acetone} RI + NaX$

(ii) Fittig Reaction

$+ 2Na \xrightarrow{Dry\ Ether}$



$+ 2NaX$

Diphenyl

11]

S_N1 Reaction	S_N2 Reaction
* Proceeding 2 steps	* Proceeding Single Step
* Order is equal to one	* Order is equal to two
* Carbocation is the intermediate	* No Intermediate
* Order of Reactivity $3^0 > 2^0 > 1^0$	* Order of Reactivity $1^0 > 2^0 > 3^0$

12] Chloroform is slowly oxydised by air in presence of light to form a poisonous gas [$COCl_2$] is phosgene

$$2\,CHCl_3 + O_2 \xrightarrow{\text{Light}} 2\,COCl_2 + HCl$$

13] $$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Invertase}} C_6H_{12}O_6 + C_6H_{12}O_6$$

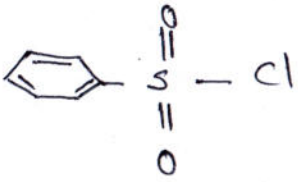
$$C_6H_{12}O_6 \xrightarrow{\text{Zymase}} 2\,C_2H_5OH + 2\,CO_2$$

Ethanol

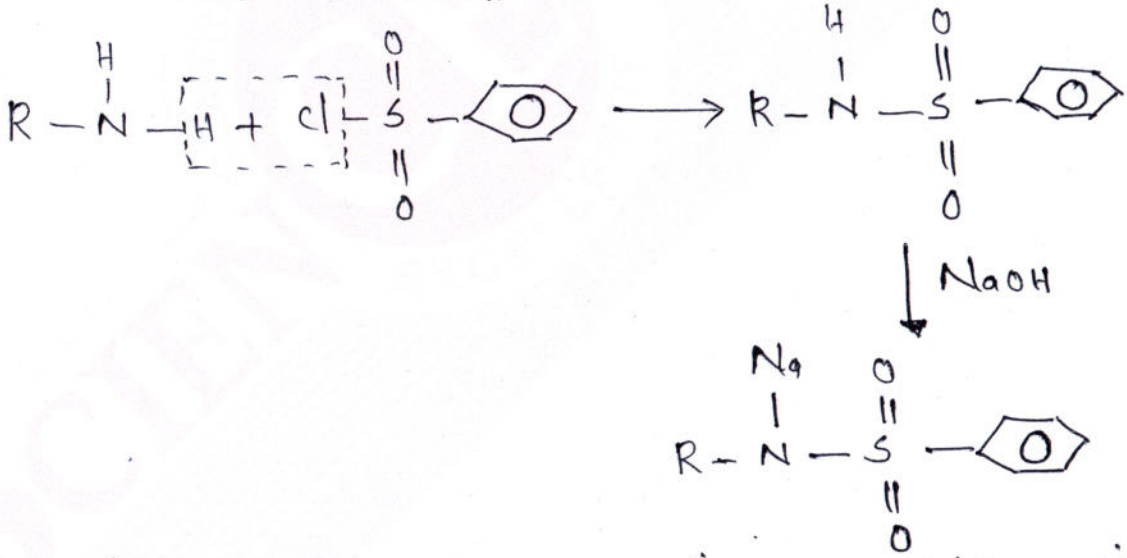
14] A = $HCOONa$

B = CH_3OH

15] (i). Benzene Sulphonyl chloride



(ii). Primary Amines react with benzene sulphonyl chloride to form N-alkyl benzene sulphonamide, which is Soluble in alkali.



16] (i) When an excess pressure applied on a solution side to prevent osmosis, It is known as osmotic pressure for dilute solution.

(ii) When a pressure higher than osmotic pressure is applied on a solution side, the solvent molecules move from solution to solvent. This process is called reverse osmosis.

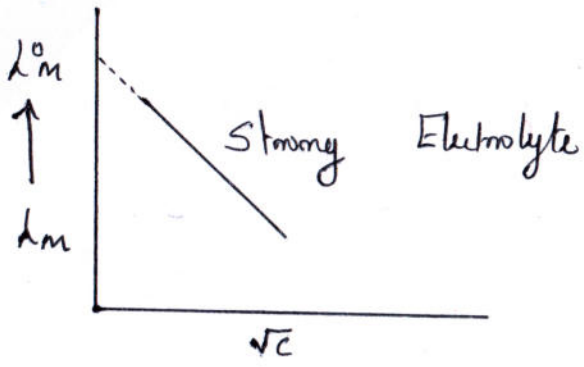
Eg :- Pure water is obtained from sea-water by reverse osmosis

17] (i) Molar Conductivity (Λ_m)

It is a conductivity of 1 mol. of an electrolytic solution kept between two electrodes with sufficient area of cross section and at a distance of unit length

$$\Lambda_m = \frac{K \times 1000}{\text{Molarity}}$$

(ii)



(iii) $\Lambda_m = \Lambda^\circ_m - A\sqrt{c}$

18] (i) $t_{1/2} = \frac{0.693}{k}$

$= \frac{0.693}{5.5 \times 10^{-14}} = 1.26 \times 10^{13}\ s$

(ii) $mol^{-1}\ L\ s^{-1}$

19] (i). Due to the presence of vacant d orbital from d-d transition of electron which cause colour.

(ii). $Mn = [Ar]\ 3d^5 4s^2$

$Mn^{2+} \longrightarrow 3d^5$

$\mu_m = \sqrt{n(n+2)}$

$= \sqrt{5(5+2)}$

$= \sqrt{35}$

$= 5.9\ BM$

20] Preparation of potassium dichromate from chromite

Potassium dichromite is prepared from chromite ($FeCr_2O_4$)

It involves 3 steps

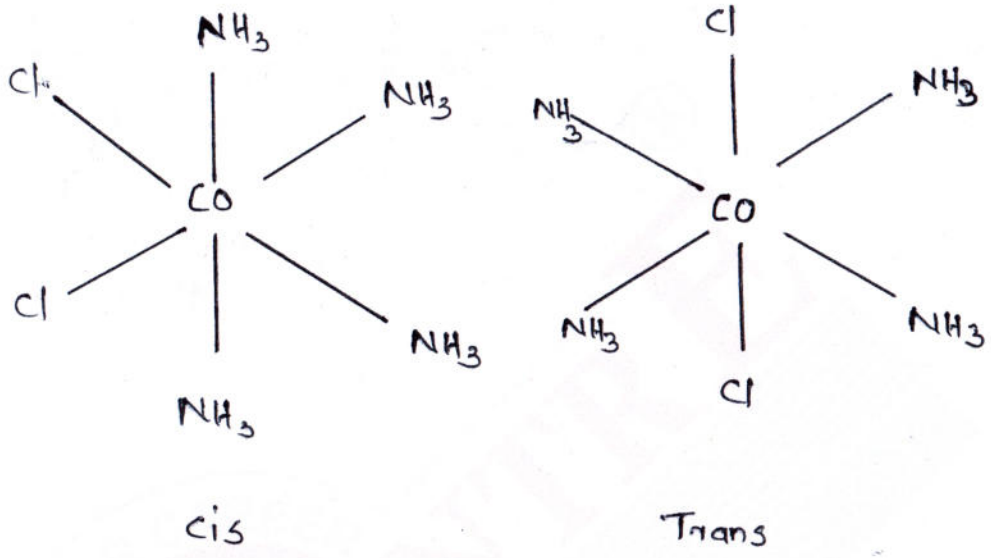
$$4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7O_2 \longrightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 \downarrow + 8\ CO_2$$

$$2\ Na_2CrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na + H_2O$$

$$Na_2Cr_2O_7 + 2KCl \longrightarrow K_2Cr_2O_7 + 2NaCl$$

21] (i) Tetra ammine dichloride Cobalt (III) chloride

(ii)



(iii) Cis isomer show optical activity

22] (i) Double salt dissociated in to their constituent ion in aqueous solution, Cordination compounds does not dissociated in to ions

(ii) Di- or polydentate ligands can bind to the central atom through two or more donor atoms and form ring complexes. Such complexes are called chelates and such types of ligands are said to be chelating ligands.

(iii) $C_2O_4^{2-}$

$NH_2 - CH_2 - CH_2 - NH_2$

(Ethane 1,2 diamene)

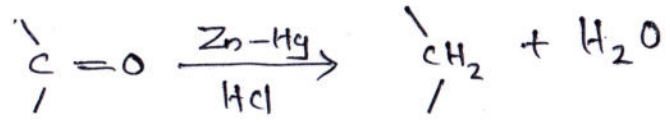
23] (i). In alcohol Intermolecular hydrogen bonding is present.

(ii) phenol ionise in acqous solution to give phenoxide ion. both phenol and phenoxide ion are resonance stabilized but phenoxide ion is more stabilized then phenol.

(iii). Alkoxy group in ether increases electron density at ortho and para position of benzene ring due +R effect.

24. (i). It is due electronic and steric factor which is favourable for aldehyde. So aldehyde is more reactive than ketone (In aldehyde there is +I effect of one alkyl group only)

(ii) Clemmensen Reduction



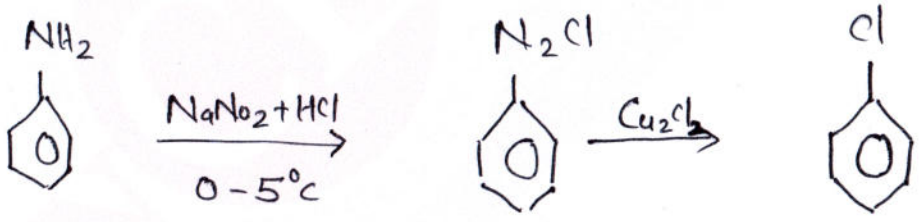
$$CH_3-CHO + [H] \xrightarrow{Zn/Hg} CH_3-CH_3$$

(iii) Esterification

$$RCOOH + R'OH \underset{}{\overset{H^+}{\rightleftharpoons}} RCOOR' + H_2O$$

eg:- $CH_3COOH + CH_3OH \overset{H^+}{\rightleftharpoons} CH_3-COO-CH_3 + H_2O$

25] (i)



(ii) $R-\overset{O}{\overset{\|}{C}}-NH_2 + Br_2 + 4\,NaOH \longrightarrow$

$$R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

26] (i). Essential Amino acid :- Certain amenoacids required for proper growth and health in human beings but human body cunable to synthesize this must be supplied through food. are called essential amino acids
eg :- Valine, Leucine

(ii) Globular protein ⟶ eg:- egg albumin, haemoglobin

Fibrous protein ⟶ eg:- keratin, Myosin

27] (i) Non ideal Solution

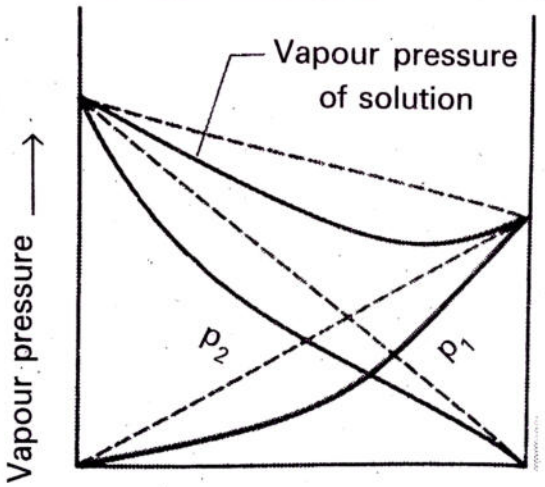
The Solution which does not obey Raoult's law.

$$P_A \neq P^\circ_A \times A$$

$$\Delta V_{mix} \neq 0$$

$$\Delta H_{mix} \neq 0$$

(ii) -Ve deviation



i) A-B Interaction is Stronger than A-A and B-B interaction

ii) $P_A < P^\circ_A x_A$

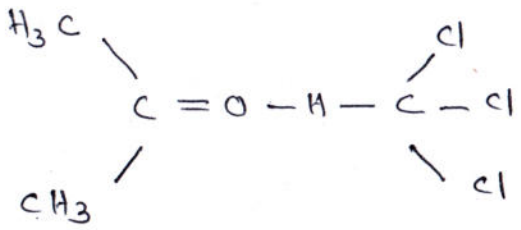
$P_B < P^\circ_B x_B$

iii) $\Delta_{mix} V$ = -Ve

iv) $\Delta_{mix} H$ = -Ve

Examples :-

a) Solution of acetone and chloroform.



Due to formation of H-bond - attractive force increases and solution showing -ve deviation

b) H_2O and HNO_3

c) Acetone and Aniline

(iii) Minimum boiling azeotropes

They are azeotropes whose boiling point is less than that of pure components. They are formed by non-ideal solution showing +ve deviation

95.5 % Alcohol

4.5 % Water

28] (i) Kohlrausch's Law

The law states that limiting molar Conductivity of an electrolyte can be represented as the sum of individual Contribution of the anion and cation of the electrolyte

Application :-

1] Determination of λ°_m of weak electrolyte

2] Determination of degree of dissociation of weak electrolyte

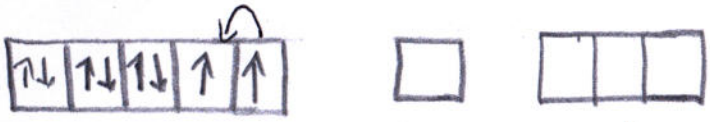
(ii) $\lambda_m = \frac{k \times 1000}{\text{Molarity}}$

$= \frac{0.0148 \times 1000}{0.05}$

$= 229.6 \text{ S cm}^2 \text{ mol}^{-1}$

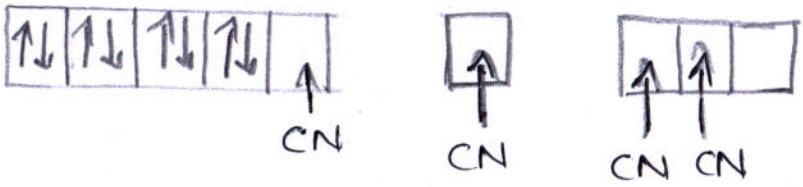
29] (i) In the case of $[Ni(CN)_4]^{2-}$

$Ni^{2+} = 3d^8$



3d 4S 4P

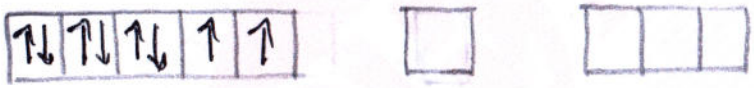
CN^- is strong ligand therefore pairing takes place



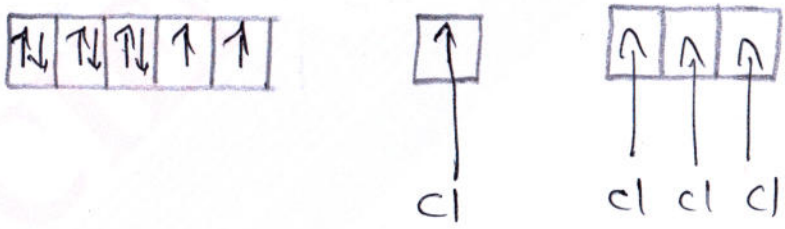
dsp^2 hybridisation, there is no unpaired electron so diamagnetic.

$[NiCl_4]^{2-}$

$Ni^{2+} = 3d^8$

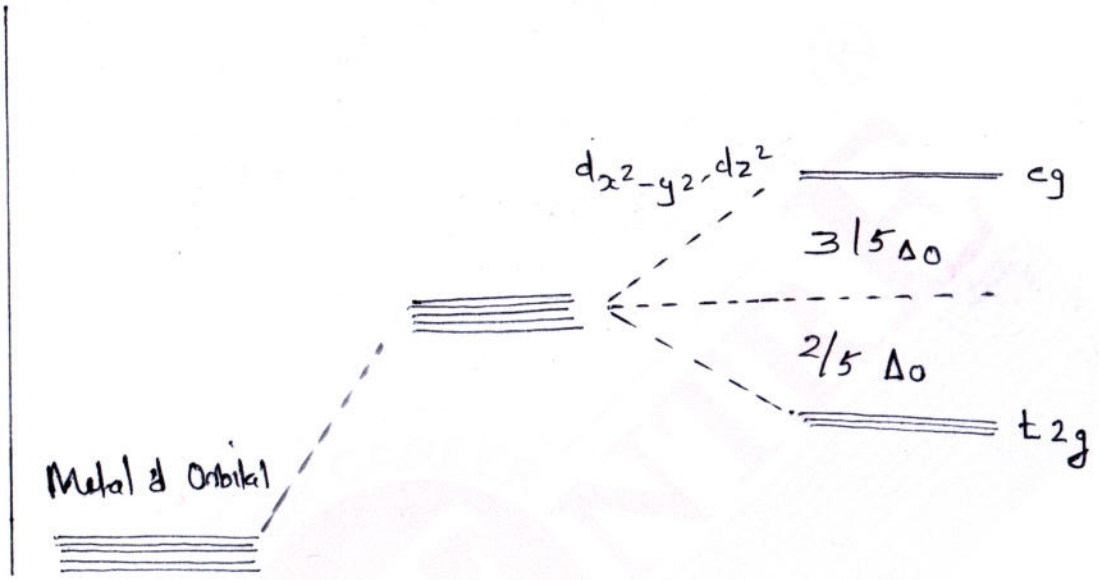


Cl^- weak ligand there fore no pairing take place



Sp^3 hybridisation — Due to the presence of unpaired electrons the compound is paramagnet

29] (ii) Crystal field Splitting of the octahedral Complexes



30] (ii) Lucas Test

An equimolar mixture of anhydrous $ZnCl_2$ + Conc. HCl is called Lucas reagent

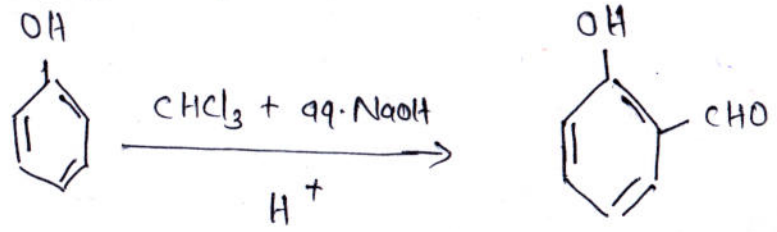
Tertiary Alcohol react with Lucas reagent to give immediate turbidity

$$R_3C-OH \xrightarrow[\text{anhydrous ZnCl}]{HCl} R_3C-Cl$$

Secondary alcohol react with Lucas reagent to give 5-10 minutes turbidity

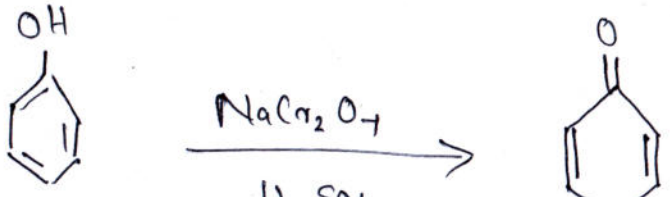
primary alcohol react with lucas reagent no turbidity

(ii) Reimmer Tiemann reaction



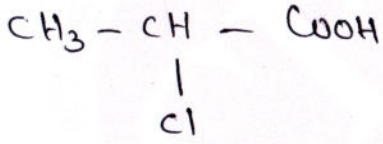
Salicylaldehyde

(iii)



benzoquinone

31| (i)



(ii) In 2-chloropropanoic acid chlorine is electron withdrawing group (ewg). So acidity is high

(iii)