CENTRAL KERALA SAHODAYA

MODEL EXAMINATION 2023-2024

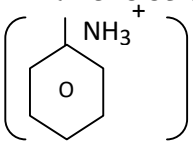
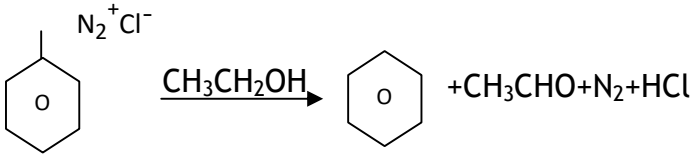
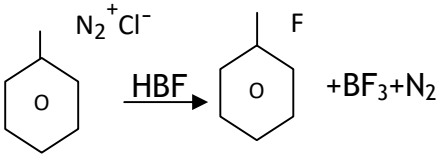
CLASS XII

CHEMISTRY [043]

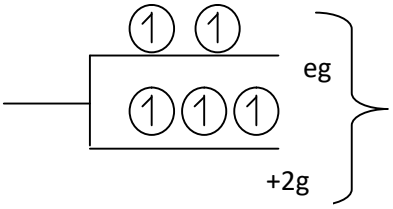
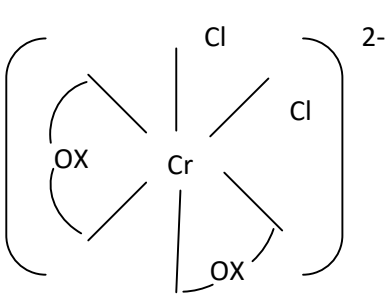
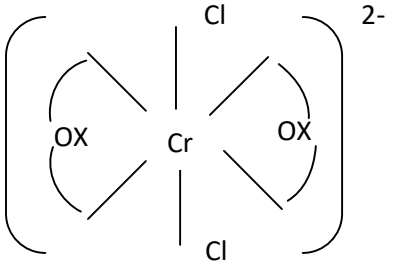
ANSWER KEY

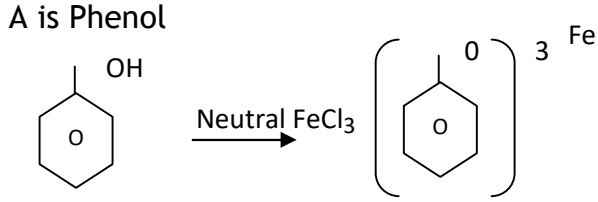
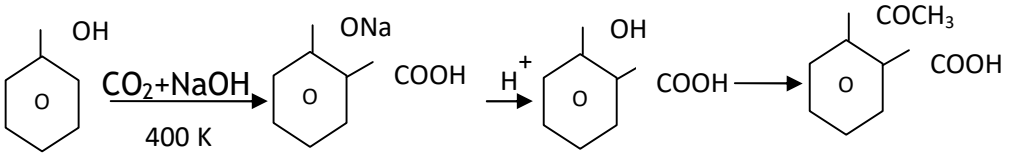
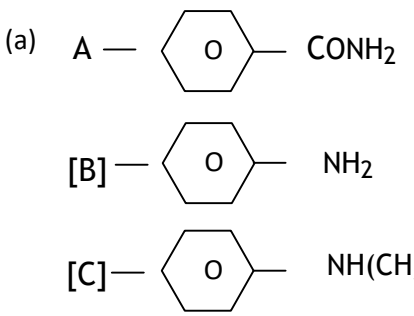
SECTION A

1	(b)1-methyl cyclohexene	1
2	(a) $[Fe(C_2O_4)_3]^{3-}$	1
3	(c) Mostly amino acids have D-Configuration	1
4	(c) 6F	1
5	(b) phenol	1
6	(d) $t = \frac{4.606}{K}$	1
7	(c) $CoCl_3.6NH_3$	1
8	(d) $CH_3CH_2NH_2$	1
9	(a) P - (II) Q – (III) R – (IV) S – (I)	1
10	(b)IV > III > I > II	1
11	(d) 5.92 BM	1
12	(b) Etard reaction	1
13	A)	1

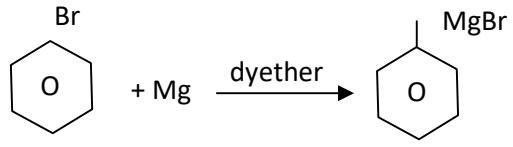
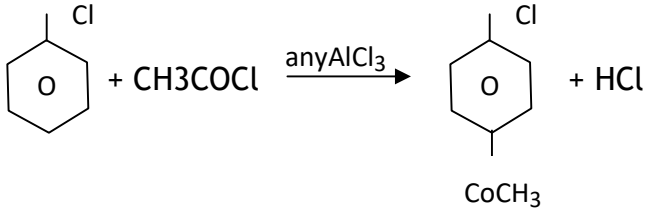
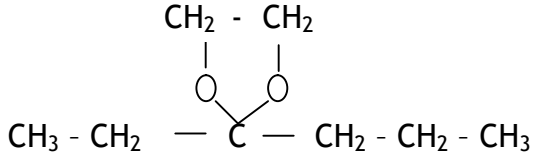
14	A)	1
15	D)	1
16	B)	1
17	(i) $(Ti^{4+})^{p}$ because of the losing 4 electron there is no unpaired electrons $[3d^{\circ}4S^{\circ}]$ (ii) Cu^{+} gets oxidized to Cu^{2+} which is more stable due to higher ΔH enthalpy hydration.	1+1
18	(a) $[Fe(CN)_6]^{4-}$ does not have unpaired electrons whereas $[Fe(H_2O)_6]^{2+}$ are of has unpaired electrons and absorb light from visible region and radiates complementary colour. (b) $K_2[Ni(CN)_4]$	1+1
19	Give reason (a) Aniline is strong acidic medium changes in to anilium ion  Which is metadirecting ammonium salt. (b) Ammonolysis has the disadvantage of yielding a mixture of primary, secondary and tertiary amines and a quaternary OR (a)  $+CH_3CHO+N_2+HCl$ (b)  $+BF_3+N_2$	1+1

20	K = 60/S $K = \frac{2.303}{t} \log \frac{[Ro]}{[R]}$ $60 = \frac{2.303}{t} \log \frac{Ro}{Ro/16}$ $60 = \frac{2.303}{t} \log 16$ $t = \frac{2.303}{60} X\ 1.2042$ $= 0.046$ sec	2
21	(a) n-Butane < methoxymethane < propanal < Acetone < 1-propanol (b) propanone < Acetone < propanal < Acetaldehyde	2
22	(a) A+2B → pdt $\frac{-d[A]}{dt} = \frac{-1}{2} d \frac{[B]}{dt}$ (b) Concentration of B three times rate = $K[A][B]^2$ rate = $K[A][3B]^2$ rate = 9 times (c) Both A and B doubled rate = $K[2A][2B]^2$ = 8 times	1+1+1
23	$\Delta Tb = iKb \frac{w_2 \times 1000}{M_2 \times w_i}$ $\Delta Tb = Tb - T^\circ b$ $Mg\ SO_4 \longrightarrow Mg^{2+} + SO_4^{2-}$ l = 2 (kb = 0.52 kkg/mol) $w_2 = 4g$ $w_1 = 100g$ $M_2 = 24+2x35.5$ = 24+71 = 95g/mol $\Delta Tb = \frac{2x0.52x4x1000}{95x100}$	3

	$= \frac{4160}{9500}$ = 0.437K $\Delta Tb = Tb - T^{\circ}b$ 0.437k = Tb-373.15 Tb = 373.15+0.437=373.587k	
24	(a) Ionization Isomerism i) $[Co(NH_3)_5Co_3]u$ pentaamminecarbanato cobalt-III chloride ii) $[Co(NH_3)_5Cl]Co_3$ pentaammine chlorido cobalt-III carbonate (b) Double salt. No: of ions = 5 $FeSO_4(NH_4)_2SO_46H_2O \rightarrow Fe^{2+}+SO_4^{2-}+2NH_4^{+}+SO_4^{2-}+6H_2O$ OR (a) d^5 configuration  $\Delta_0 < p$ E-C$\rightarrow +2g^3eg^2$ (b) $Fe(CN)_6^{3-}$ because Fe is in +3 oxidation state. Higher the oxidation state more will be the stability (c)   Cis Trans	2+1

25	A $\xrightarrow{\text{aq } feCl_3}$ Characteristic violet colour A $\xrightarrow[400\ K]{CO_2+NaOH}$ B $\xrightarrow{\text{acidification}}$ C $\xrightarrow[\text{Chloride}]{\text{acetyl}}$ D A is Phenol  	3
26	i) a) It is due to smaller size, higher charge and availability of d-orbitals of suitable energy b) Chromium consist of 6 unpaired electrons, more interatomic metallic bonding. While Hg only paired electrons ii) $2MnO_4^- + 16H^+ + 10I^- \longrightarrow 2Mn^{2+} + 8H_2O + 5I_2$	1+1+1
27	(a) A – strong electrolyte B – Weak electrolyte (b) A on extrapolations gives limitimg molar conductivity ($\Lambda^\circ m$) Whereas extrapolation of B is not possible due to step curve. (Refer text) (c) Anode $\rightarrow O_2$ gas Cathode $\rightarrow H_2$ gas (Refer text)	1+1+1
28	(a) 	1.5+1.5

	(b) [A] CH_3CH_2CN [B] $CH_3\text{-}CH_2\ NH_2$ [C] $CH_3\text{-}CH_2CH_2OH$	
29	(a) Exothermic because force of attraction between gas and solvent increases on dissolution (b) k_H value increases with increase in temperature. Helium is least soluble because its k_H is highest (c) $p = k_H X_{N2}$ $X_{N2} = \frac{p_{N2}}{k_H} = \frac{0.987\ bar}{7.6480x\ \ ^4bar}$ $= 1.29 \times 10^{-5}$ $X_{N2} = \frac{n_{N2}}{n_{N2}+nH_2O}$ $X_{N2} = \frac{n_{N2}}{n_{N2}+ 55.5}$ $X_{N2} = \frac{n_{N2}}{nH_2O}$ $X_{N2} = X_{N2} \times NH_2O = 1.29 \times 10^{-5} \times 55.5$ $= 7.16x10^{-4}$moles = 0.716 millimole OR 0.195mmeans 0.195 moles of H_2S is dissolved in 1kg of H_2O. $X_{H2}S = \frac{nH_2S}{nH_2S+nH_2O}$ $= \frac{0.195}{0.195+55.55} = 0.0035$ $P_{H2}S$ at STP = 0.987bar $P_{H2}S = K_H \times YH_2S$ $K_H = \frac{PH_2S}{xH_2S} = \frac{0.987}{0.0035} = 282$bar	1+1+2

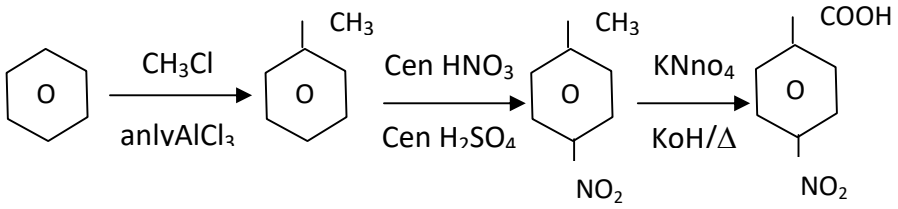
30	(a)  (b) i) $CH_2 = CH - CH_2 Cl$ (Allyl carbocation is stabilized by resonance) ii) $(CH_3)_3 C - Cl$ (3° carbocation is more stable) (c) i) $CH_3 CH_2 - CH_2 - CH_2 Cl + NaI \xrightarrow{\text{Acetone}}$ ii) $CH_3 - CH_2 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} CH_3 CH_2 - CH_2 - CH_2Br$ $CH_3 - CH_2 - CH_2 - CH_2Br + NaI \xrightarrow{\text{Acetone}} CH_3 - CH_2 - CH_2I$ OR i) $CH3 - CH - CH3 + KOH \xrightarrow[\triangle]{\text{Ethanol}} CH_3 - CH = CH_2 + KBr + H_2O$ Propene ii) 	1+1+2
31	(a) $CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_2 - CH_3 + 2CH_3CH_2OH$  (b) Compound A is $CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_3$ (PENTAN -3-ONE) clemmensen reduction $CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_3 \xrightarrow[HCl]{zn-Hg}$ $CH_3 - CH_2 - CH_2 - CH_2 - CH_3 + H_2O$	1+2+2

$CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_3 + NaOI \rightarrow$ No reaction

$CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_3 + [Ag(NH_3)_2]^+ \rightarrow$ No reaction

(c) Convert the following

i) Benzene to p-nitrobenzoic acid



ii) Propanoic acid to acetic acid

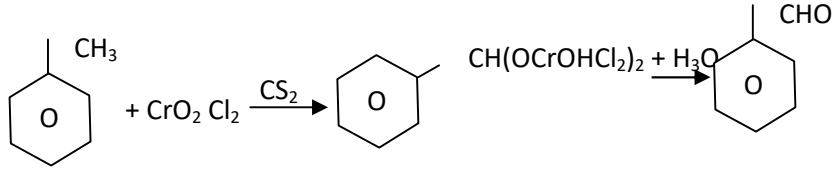
$CH_3 - CH_2 - CO_2OH \xrightarrow[\Delta]{NH_3} CH_3\text{-}CH_2\text{-}CONH_2 \xrightarrow{KOH\ \ Br_2}$

$CH3 - COOH \xleftarrow{[O]}{KMng} CH_3 - CH_2OH \xleftarrow[0°C]{NaNO_2/HCl} H3\text{-}CH_2\ NH_2$

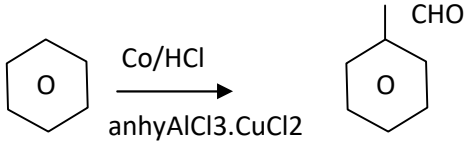
OR

d) Illustrate the following

i)



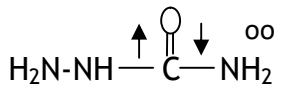
ii)



iii) $HCHO + Con\ NaOH \xrightarrow{\Delta} HCOONa + CH_3OH$

e) Assign the reason for the following

i) The lone pair of electrons on NH2 attached to carbonyl gip is involved in resonance and hence not available

	for the reaction  ii) Benzoic acid do not undergo friedel crafts reaction because the carboxyl group is deactivating and the catalyst aluminium chloride [Lewis acid] gets bonded to the carboxyl group	
32	(a) $E_{cell} = E^{\circ}_{cell} - \frac{0.059}{n} \log$ $E_{cell} = 2 - \frac{0.059}{6} \log \frac{[Al^{3+}]}{[Cu^{2+}]^3}$ $E_{cell} = 2 - \frac{0.059}{6} \log \frac{[0.01]^2}{[0.01]^3}$ $= 2 - \frac{0.059}{6} \log \frac{1x10^{-2}}{1x10^{-6}}$ $2 - \frac{0.059}{6} \log 10^{+4}$ $2 - \frac{0.059}{6} 4 \log 10$ $= 2 - \frac{0.059}{6} x 4$ $\frac{12 - 0.059}{6} x 4$ $\frac{11.941}{6\ 3} x \cancel{4}2 =$ <u>7.96V</u> (b) Mercury will always potential remains constant because the overall reaction does not involve any ion in solution whose concentration can change during its life time. (c) 38% solution of sulphuric acid is used as electrolyte OR	3+1+1

	(d) When direct current is passed, it changes the composition of the solution . (e) Amount of nickel deposited W = ZIt $Ni(NO3)_2 \rightarrow Ni^{2+} + 2NO_3^-$ $W = \frac{58.7}{2x9}$ x 5x20x60 $= \frac{352200}{193000} = \underline{1.82g}$ (f) Reactivity decreases as electrode potential increase Decreasing order of reactivity -1.66V > -0.14V > + 0.34V > + 0.80V	
33	(a) Saccharic acid (b) Sugar, base and phosphate (c) Guanine and cytosine (d) Hydrogen bond, disulphide linkages Van der Waals and electrostatic forces of attraction (e) RNA helps in protein synthesis (f) It indicate the absence of free CHO group (g) During denaturation secondary and tertiary structures are destroyed	5x1=5