

केंद्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
सांख्यिक स्कूल सर्टिफिकेट परीक्षा (कक्षा बारहवीं)
परीक्षाधी प्रश्न पत्र के अनुसार धरे



बोर्ड (दिल्ली)
केंद्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
EXAMINATION (CLASS XII) - CENTRAL BOARD OF SECONDARY EDUCATION, DELHI

Subject: CHEMISTRY

Day & Date of the Examination: Monday, 11-03-2013

Medium of answering the paper: English

Write Code No. as written on the top of the Question paper. 56/3

No. of supplementary answer books used: Zero

Physically Challenged Candidates Only

B D H S C

For Disabled Candidates (Physically Handicapped, Non-spastic & Non-stroke)

Whether water provided: Yes / No No

*एक बॉक्स में एक अक्षर लिखें तथा प्रत्येक अक्षर के बीच एक खाली बॉक्स दें, यदि परीक्षाधी का नाम 24 अक्षरों से अधिक है तो केवल नाम के प्रथम 24 अक्षर ही लिखें।
Each letter be written in one box and one box be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

Space for office use

श्रीमानि यशस्वी स्कूल 'सर्टिफिकेट' परीक्षा (कक्षा -दशम) के
SENIOR SCHOOL CERTIFICATE EXAMINATION (CLASS X) (CENTRAL BOARD OF SECONDARY EDUCATION, DELHI)



प्रमाणित किया जाता है कि मैंने इस उत्तर-पुस्तिका का मूल्यांकन प्रश्नपत्र के संशुद्धित प्रश्नों के अनुसार और पूर्ण रूप से मूल्यांकन शब्दों के अनुसार किया है।

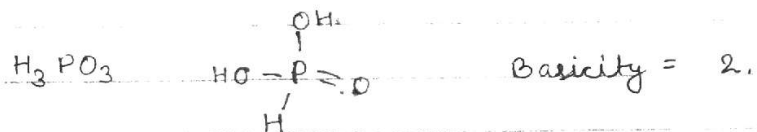
Certified that I/we have evaluated this answer book according to the correct set of question paper and strictly as per the marking scheme.

2

Ans. (1) -

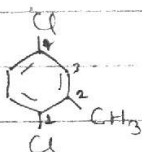
Tyndall effect, i.e. path of light is observed due to scattering of light when seen perpendicularly from the direction of light. Colloidal particles shine as bright stars upon black background.

Ans. (2) -



Only two hydrogen those attached to oxygen are ionisable to give H^+ ions.

Ans. (3) -



IUPAC name: 1,4-dichloro-2-methylbenzene.


Ans. (4) -

Electrolytic refining, in which impure copper act as an anode and pure as cathode.

Ans. (5)-

β -D-galactose and β -D-glucose are hydrolysis product of lactose.

Ans. (6)-

$(\text{CH}_2 - \text{CH})_n$ is a homopolymer of styrene \Rightarrow $\text{CH}_2 = \text{CH}$ 

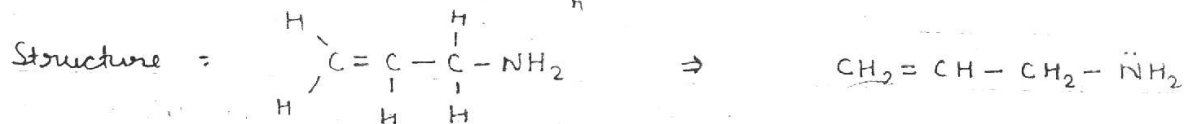
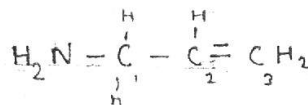
Ans. (7)-

$\text{CH}_3 - \text{CH}_2 - \text{CH}_3 < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH}$

Boiling Point increases \rightarrow

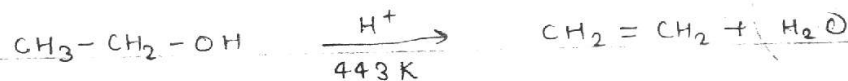
Ans. (8)

Prop-2-en-1-amine



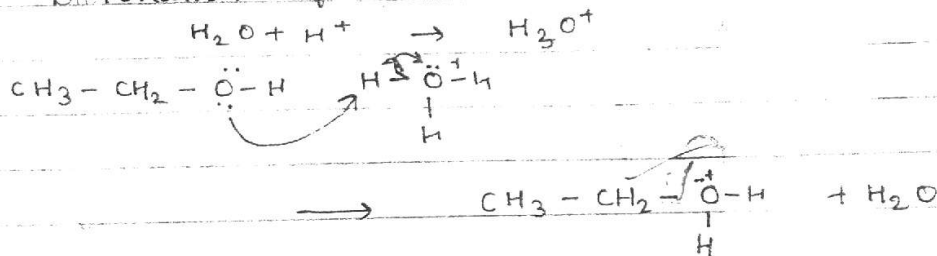
P. T. O.

Ans. (9)-

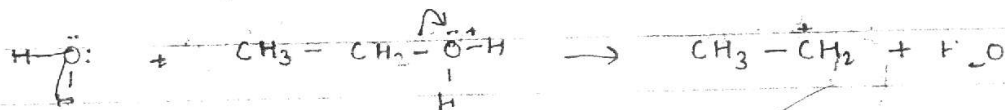


Mechanism

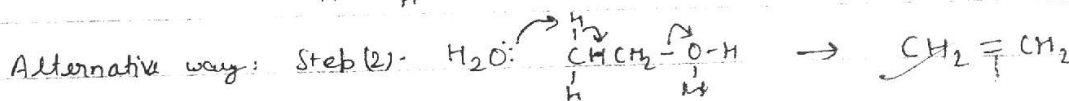
Step (1) Protonation of Alcohol



Step (2) loss of H₂O molecule to form carbocation



Step (3) deprotonation of carbocation to yield ethene.



Ans. (10)

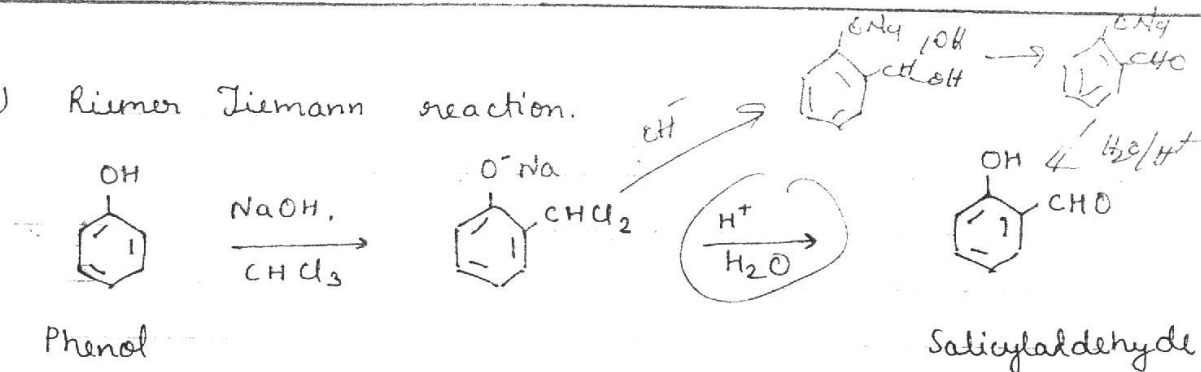
Interhalogen Compounds are formed by direct combination of halogen (different) molecules at suitable physical condition. e.g.



General composition is assigned as XX' or XX'_3 , XX'_5 , XX'_7 where X is larger halogen molecule than X' .

Ans. (11)

(i) Reimer Tiemann reaction.



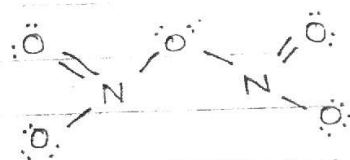
P.T.O.

6

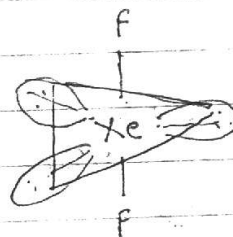
(ii) Williamson's ether synthesis: (Unsymmetrical ether)



Alkoxide ion attack on haloalkane to yield ether

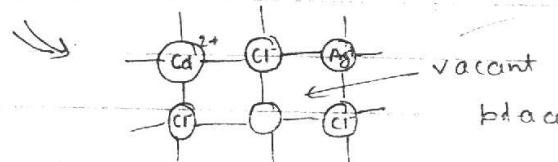
Ans. (12)- (i) N_2O_5 (ii) XeF_2

linear

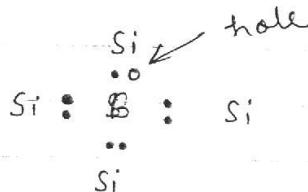


Ans. (3) (a) When AgCl doped with CdCl_2 , some of the Ag^+ ions are displaced by Cd^{2+} . To maintain electrical neutrality of the compound 2 Ag^+ ions displaced for one Cd^{2+} . This create a type of vacancy defect known as impurity defect in the compound imparts colour to the compound.

(b)



(b) p-type semiconductor because Boron only have 3 valence electron. 4th e^- of Silicon can't bond, and hole is create that is responsible for conduction.



Ans. (14)

For FCC structure.

$$R = \frac{a}{2\sqrt{2}}$$

$$a = 2\sqrt{2} R$$

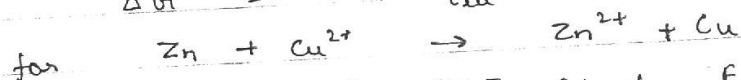
where R = Radius, a = edge length.

$$\begin{aligned} a &= 2 \times 1.414 \times 125 \text{ pm} \\ &= 250 \times 1.414 \text{ pm} \\ &= 353.500 \text{ pm} \end{aligned}$$

$$\begin{aligned} \text{length of side} &= 353.50 \text{ pm} \\ &= 3.53 \text{ \AA} \end{aligned}$$

Ans. (15)

$$\Delta G^\circ = -nFE^\circ_{\text{cell}}$$



$$n = 2, \quad F = 96500 \text{ C/mol}, \quad E^\circ_{\text{cell}} = 1.1 \text{ V}$$

$$\begin{aligned} \Delta G^\circ &= -2 \times 96500 \times 1.1 \text{ J} \\ &= -2 \times 106150 \end{aligned}$$

$$\Delta G^\circ = -212300 \text{ J} = -212.3 \text{ kJ}$$

$$\text{Thus } \Delta G^\circ = -212.30 \text{ KJ}$$

Ans. (16) (a) $r = k [A]^{1/2} [B]^2$

$$\text{Order} = 2 + \frac{1}{2} = \frac{5}{2} = 2.5$$

(b) $T_{1/2} = \frac{0.693}{k}$

$$= \frac{0.693}{5.5 \times 10^{-14}} = \frac{0.693}{5.5} \times 10^{14} = \frac{6.93}{5.5} \times 10^{13}$$

$$T_{1/2} = 1.26 \times 10^{13} \text{ Second.}$$

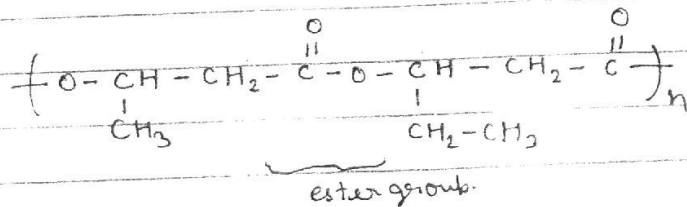
$$\begin{array}{r} 1.26 \\ 550 \overline{) 693} \\ \underline{550} \\ 1430 \\ \underline{1100} \\ 3300 \\ \underline{3300} \\ 0 \end{array}$$

Ans. (17) Biodegradable Polymer: Polymers that can be degraded in environment by bacteria, fungus are other microorganisms during reasonably short time are called biodegradable polymer. These don't pollute environment like non-biodegradable polymer like polyethylene.

P. T. O.

Biodegradable aliphatic polyester -

PHBV - { β -polyhydroxybutyrate-co- β -polyhydroxyvalerate) -

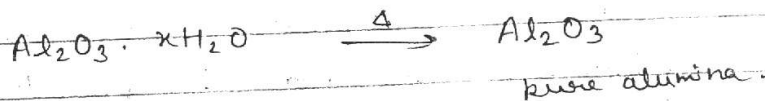
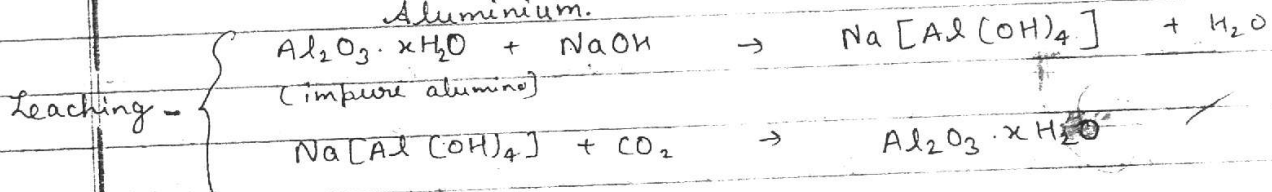


Ans: (18)

Principal ore of Aluminium Bauxite $\text{Al}_2\text{O}_3 \cdot (\text{OH})_{1-x}$

Leaching is significant because it concentrates the ore and remove impurities to get pure alumina. Then alumina reduced to get pure

Aluminium.



Ans. (19)

(i) Macromolecular Sol: These are colloidal sol in which dispersed phase have Macromolecules of colloidal range like proteins, gums, albumin. These are especially stable and can be prepared easily by dissolving and shaking.

eg. Protein.

(ii) Peptization: It is method of preparing generally lyophobic sol. Adding an electrolyte in a freshly prepared precipitate, break the particles in colloidal range.

eg. Peptization of Gold to form sol.

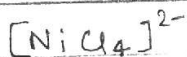
(iii) Emulsion: Emulsions are colloids in which both dispersed phase and dispersion medium are of colloidal range liquid.

These are 2 types (i) O/W type

(ii) W/O type

eg. Milk is an emulsion of fat as dispersed phase in water.

Ans. (20) =

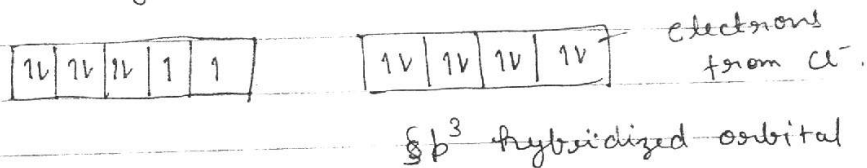


(i) IUPAC name : ~~Tetrachloridonickel(II) ion.~~
Tetrachloridonickelate(II) ion

(ii) Ni^{2+} orbital

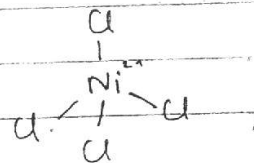


Cl^- is weak field ligand and doesn't cause pairing of electrons.

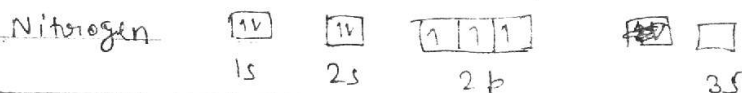


So hybridization = sp^3 .

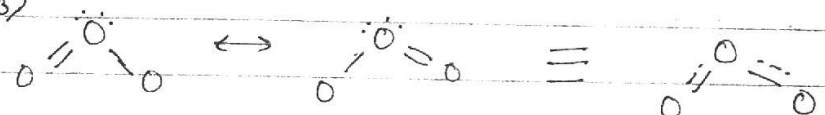
(iii) thus shape : Tetrahedral



- Ans. (2) (i) Though nitrogen exhibits +5 oxidation state. But it can't form pentahalides because it does not have vacant d-orbital to share e^- with halogens. So its covalency is limited to 4 due to 1s and 3p orbitals



- (ii) Fluorine has anomalous behaviour due to very small size. Thus when it accepts electron to form F^- , due to small size, repulsion of electron happens. Due to this energy released is less than that of chlorine which is large, i.e. electron gain enthalpy is less negative for fluorine.

- (iii) Ozone is the hybrid of its 2 canonical resonance structures (O_3)
- 

Thus two bonds in actual structure hybrid structure of ozone are equivalent and have same bond length.

Ans. (22) -
$$\log \left(\frac{k_2}{k_1} \right) = \frac{E_a}{2.303 R} \left(\frac{T_2 - T_1}{T_1 T_2} \right)$$

If rate of reaction becomes four times then $\frac{k_2}{k_1} = 4$

$T_1 = 293 \text{ K}$ $T_2 = 313 \text{ K}$ $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$
 $E_a = ?$

$$\begin{aligned} \log 4 &= \frac{E_a}{2.303 \times 8.314} \times \left(\frac{20}{293 \times 313} \right) \\ &= \frac{0.6021 \times 2.303 \times 8.314 \times 293 \times 313}{20} \text{ J} = E_a \\ &= \frac{11.454 \times 91709}{20} \\ &= 52503.4 \text{ J} = 52503.4 \text{ J} \\ &= 52.5 \text{ KJ} = 52.50 \text{ KJ} \end{aligned}$$

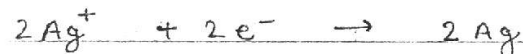
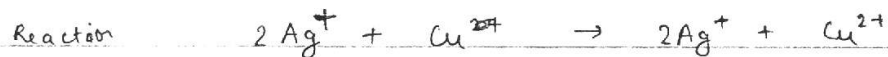
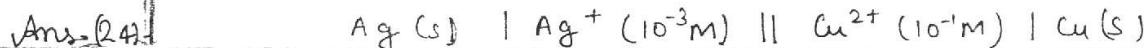
$$\begin{array}{r} 1.38 \\ \times 8.3 \\ \hline 414 \\ 1104 \\ \hline 11.454 \end{array} \quad \begin{array}{r} 293 \\ \times 313 \\ \hline 879 \\ 293 \\ \hline 91709 \end{array}$$

$E_a = 5.25 \text{ KJ}$ $E_a = 52.50 \text{ KJ}$

Ans. (23) (i) Values shown by Mrs. Anuradha are very positive and valuable. She is helpful, kind, caring, loving and curious. She even cares for her servant's health. She is not miser. She also helps her economically that cures her servant in a month.

(ii) Vitamin B-12.

(iii) Vitamin C.



According to Nernst eqn.

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2} \quad \text{at } 25^{\circ}\text{C}$$

$$\begin{aligned}
 E_{\text{cell}} &= 0.46 - \frac{0.059}{2} \log \frac{10^{-1}}{(10^{-3})^2} \\
 &= 0.46 - \frac{0.059 \times 5}{2} \\
 &= 0.46 - \frac{0.295}{2} = 0.46 - 0.1475 \\
 E_{\text{cell}} &= 0.3125 \text{ V.}
 \end{aligned}$$

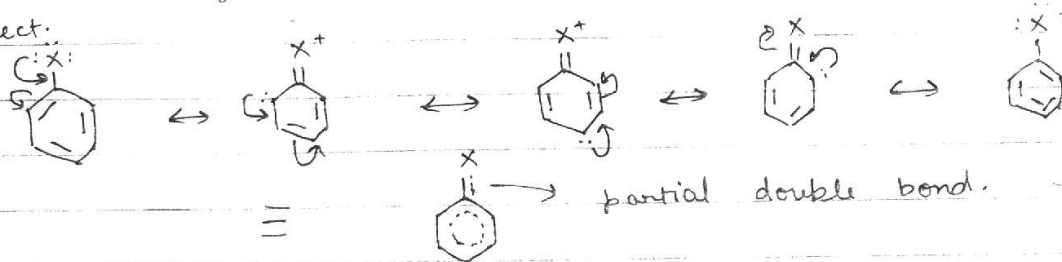
Ans. (25)- (i) $\text{C}_2\text{H}_5\text{-I}$ undergoes $\text{S}_{\text{N}}2$ reaction faster than $\text{C}_2\text{H}_5\text{-Br}$ because I^- is good leaving group than Br^- .

Thus better the leaving group, faster is the $\text{S}_{\text{N}}2$ reaction.

(ii) (\pm) 2-Butanol is optically inactive. Because it is a racemic mixture which contain + (dextrorotatory) and - levorotatory enantiomers in equal amounts. Thus total rotation of plane polarised light is zero. So (\pm) -2-Butanol is optically inactive.

- (iii) C-X bond length in halobenzene is shorter than C-X bond in $\text{CH}_3\text{-X}$ because in halobenzene, resonance imparts partial double bond character to C-X bond and X attached to carbon is halobenzene is sp^2 hybridised carbon.

+R effect:



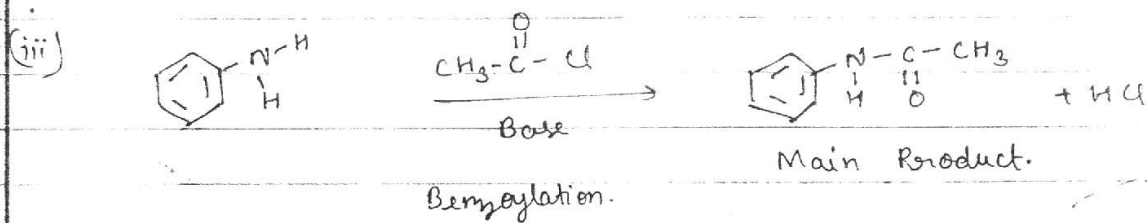
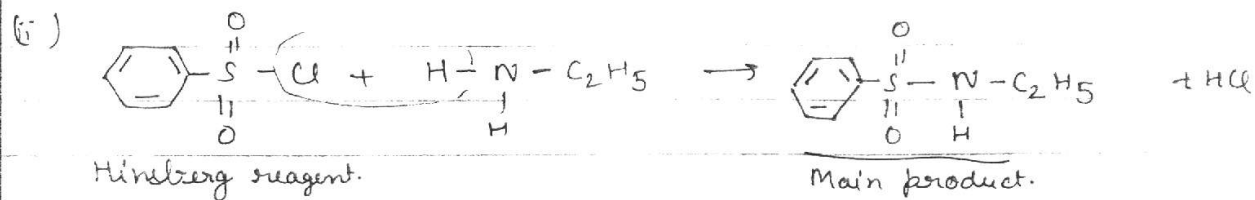
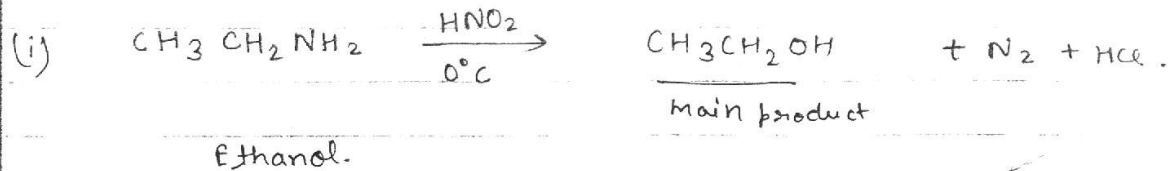
Ans. (26)

(i) Antacid. (Ranitidine)

(ii) Synthetic detergent because it does not react to Ca^{2+} ions to form scum.

(iii) 0.2% phenol is an antiseptic but 1% phenol is disinfectant.

Ans. (27)-



Ans. (28)

(a) Transition metal have vacant d-orbitals and generally unpaired electrons. These electrons have almost nearly same energy which can promote to show variable oxidation state.

(b) (i) Manganese (Mn) show oxidation states +2 to +7 because of maximum no. of unpaired electron.

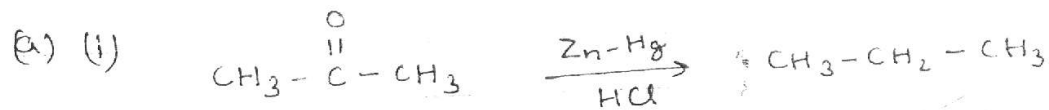
(ii) Scandium (Sc) only shows +3 oxidation state Sc^{+3} . Because it (Sc^{III}) has noble gas configuration and stable.

(b) Lanthanoid Contraction: Filling of 4f orbitals before 5d orbitals shorten the radius of Lanthanoids and 3rd series transition element. 4f orbitals have even low shielding effect than 5d, so effective nuclear charge increases that results in small radii.

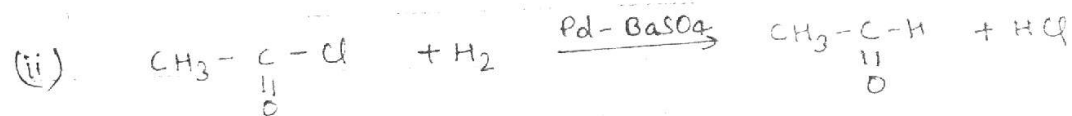
'Mischmetall' has 95% component as lanthanoid, 5% d-block elements and traces of P, C, Al.

20

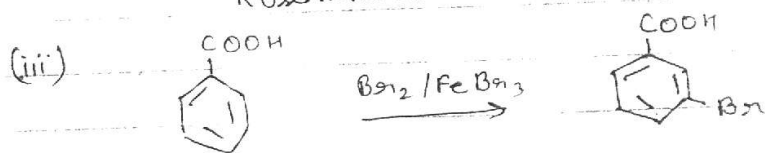
Ans. (29)-



Clemmensen Reduction




Rosenmund Reaction.



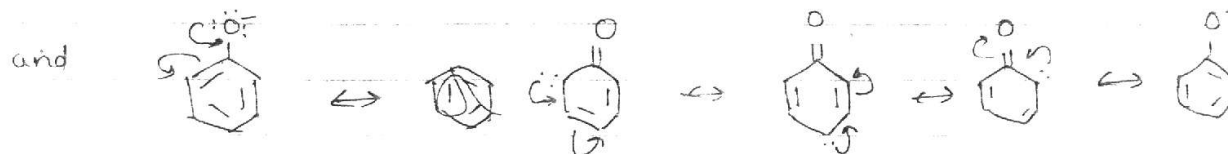
-COOH is strong deactivating and meta directing group.

(b) (i) $\text{F-CH}_2\text{-COOH}$ is stronger acid than $\text{Cl-CH}_2\text{COOH}$ (-I effect)

because F is more electronegative and withdraw electrons (-I effect) that makes $\text{F-CH}_2\text{-COOH}$ more acidic.

(ii) CH_3COOH is more acidic than  $\text{pK}_a = 4.38$ $\text{pK}_a = 10.76$

due to more stable carboxylate ion (CH_3COO^-) than Phenoxide ion Ph-O^- according to resonance.



Although phenoxide ion have more resonance structure, it is less stable because negative charge resides on less electronegative atom Carbon.

While in carboxylate ion, negative charge is only on more electronegative oxygen.

Ans. (30)-

(a) Raoult's Law: According to this law, vapour pressure exerted by a volatile component in solution is directly proportional to its mole fraction in solution. i.e.

$$p = p^{\circ} x$$

p° = vapour pressure when pure volatile component.

x = mol fraction.

According to Henry law partial pressure of gas in vapour state is directly proportional to the mole fraction of gas in solution.

i.e.

$$p = K_H x$$

When volatile component in solution is a gas then p° is equal to K_H (Henry law const.).

Thus Raoult's law becomes a special case of Henry Law.

$$\text{Total vapour pressure} \Rightarrow p_T = p_1 + p_2 + \dots = p_1^{\circ} x_1 + p_2^{\circ} x_2 + \dots$$

(b) Depression in freezing point :

$$\Delta T_f = K_f \cdot m$$

$$K_f = 5.12 \text{ K kg/mol}$$

$$m = \frac{w_1 \times 1000}{M \times w_2}$$

$$\text{where } w_1 = 1 \text{ g}, w_2 = 50 \text{ g}$$

$$\Delta T_f = 0.40 \text{ K}$$

Putting in eqn (1)

$$0.40 \text{ K} = 5.12 \times \frac{1 \times 1000}{M \times 50}$$

$$M = \frac{5.12 \times 20}{0.40} = \frac{5.12 \times 20}{0.40} = 256.0 \text{ g/mol}$$

Molar mass of solute = 256 g/mol

24

