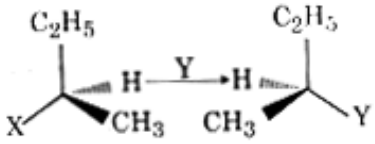
COURSE NAME: 12TH **DATE: 20 FEB 2019**

1. $2\,Pb(NO_3)_2\,(s) \longrightarrow 2\,Pbo\,(s) + 4\,No_2\,(g) + O_2\,(g)$

NO_2 gas dimeriz on cooling

$2\,No_2 \longrightarrow N_2O_4$

2. (i)



Reaction (i) is SN^2 Reaction

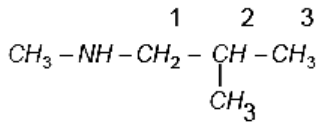
Because is this Reaction Inversion of configuration occur.

3. Colloidal solution are stable due to random motion (Brownian motion) of Colloidal particles.

4. $ZnO \xrightarrow{\text{heating}} Zn^{+2} + \frac{1}{2}\,O_2 + 2e^-$

Zinc oxide is white in colour at room temp. On heating it loses oxygen and turn yellow.

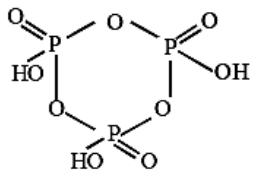
5.



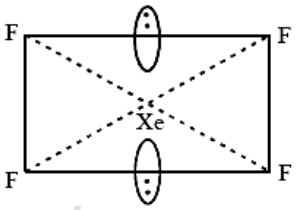
N-methyl-2-methyl Propanamine

6.

(i) $(H\,PO_3)$



(ii) XeF_4

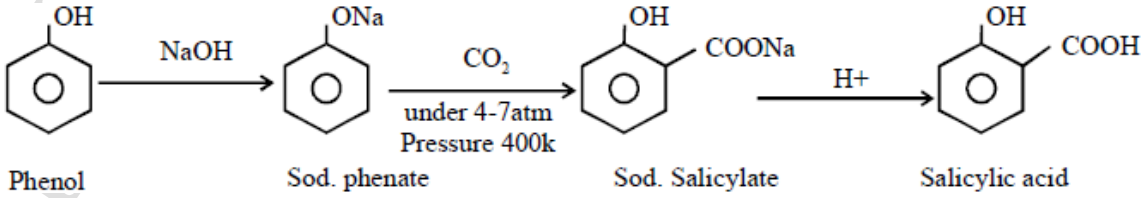


7. (i) osmotic pressure

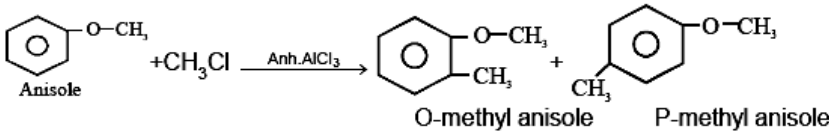
(ii) Minimum boiling azeotropes are show positive deviation from Raoult Law.

Examples ⇒ mixture of water + ethanol

8. (i) Kolbe Reaction: On Reacting sodium salt of phenol with carbon dioxide gas, salicylic acid (2-hydroxy benzoic acid) is formed.



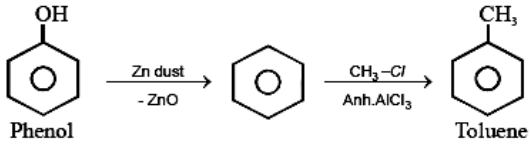
(ii) Friedal – Carft acetylation of anisole on Reacting alky halide [Ex. CH_3 Cl] in presence of Anhydrous AlCl3 with anisole, ortho-Methyl anisole and para methyl anisole is formed as product.



Anisole O-methyl anisole P-methyl anisole

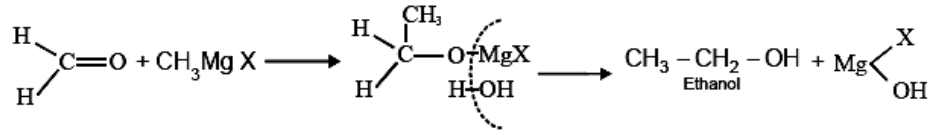
OR

(i) Phenol to toluene:



Phenol Toluene

(ii) Forma Idehyde to Ethanol



Formaldehyde Methyl megnesium halide

9. (i) When 2 chlorine atoms are removed from coordination sphere, 2 moles of AgCl precipitated out. So, the formula of complex will be: $[Ni(H_2O)_6]Cl$

(ii) Hexaamine nickel (II) Chloride

10. $2\,NH_3(g) \xrightarrow{Pt} N_2(g) + 3\,H_2(g)$

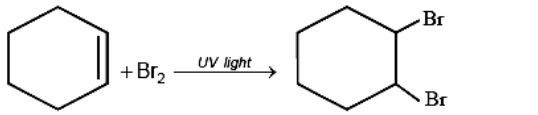
(i) Order of Reaction = Zero order

Molecularity = 2

(ii) Unit of k = mol l^{-} sec^{-}

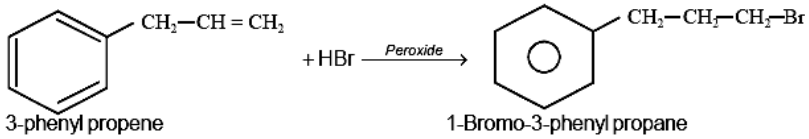
11.

(i)



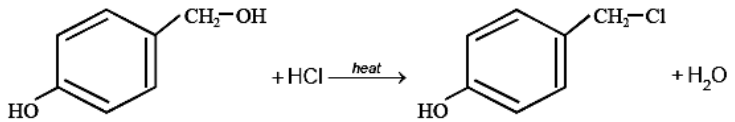
Cyclo hexene 1,2-di bromo Cyclohexane

(ii)



3-phenyl propene 1-Bromo-3-phenyl propane

(iii)



2-Chloromethyl Phenol

12. Volume of unit cell = a^3 [a = edge length)

= (400 Pm)

= $(400 \times 10^{-12}\ m)^3$

= $(400 \times 10^{-10}\ cm)^3$

= $64 \times 10^{-24}\ cm^3$

Volume of 208 g of the Element $= \frac{\text{mass}}{\text{density}} = \frac{208\,g}{7\,g\,cm^{-3}} = 29.71\,cm^3$

Number of unit cells in this volume = $\frac{\text{vol of given amount}}{\text{vol of one unit cell}} = \frac{29.71}{64\times10^{-24}} = 0.46\times10^{24}$

Since each f.c.c. unit cell contain 4 atoms therefore, total number of atoms in 208 g

$= 4 \times 0.46 \times 10^{24}$

$= 1.84 \times 10^{24}$ atoms.

13. (a) In phenol the lone pair of e^- on oxygen involves in delocalization not available freely for the protonation, where as in ethanol the e^- lone pairs on oxygen atom are not delocalized, so they available for protonation.

(b) Due to presence of H–bond in ethanol, intermolecular force of attractions are more in ethanol rather than alcohol.

(c) Because in case of anisole, methyl phyenyl oxinium ion $C_6H_5-\overset{\oplus}{\underset{|}{O}}\underset{H}{}-CH_3$ is formed by protonation of ether. The bond between $O–CH_3$ is weaker than the bond between $O–C_6H_5$ because the carbon of phenyl group is Sp^2 hybridised and there is partial double bond character. Therefore the attack by I^- ion breaks $O–CH_3$ bond to form $CH_3–I$.

14. (i) The open chain structure fails to explain the following reation's

(a) Despite having aldehyde (–CHO), glucose does not react with sodium bisulphate ($NaHSO_3$).

(b) Glucase does not give 2, 4–DNP Test and Schiff test.

(c) The pentaacetate of glucose does not react with hydroxylamine. This indicates the absence of free–CHO group.

(ii) Phosphodiaester linkage present in Nucleic acids.

(iii) Example of fat soluble vitamin $\Rightarrow$ Vitamin A, D, E, K.

Examples of water soluble vitamin $\Rightarrow$ Vitamin B and C.

15. weight of solute (w) = 2g

molar mass (M_w) = 142 g/mol

weight of solvent (w) = 50 g

K_b = 0.52 K kg mol

For Complete Ionization

i = n

$Na_2SO_4 \Rightarrow$ i = 3.

So Elevation in Boiling point $\Delta T_b = i\times\frac{w\times K_b}{M_w\times W}\times1000$

$$\Delta T_b = 3\times\frac{2}{142\times50}\times1000\times0.52$$

So boiling of solution = Boiling point of solvent + Elevation in B.P.

= 100° C + 0.43 $\Rightarrow$ 100.43°C

16. (i) Chromatography

(ii) Some time, it is possible to separate two sulphide ores by adjusting proportion of oil to water or by using depressants.

(iii) $CaCO_3 \longrightarrow CaO + CO_2$

$$\underset{\text{flux}}{CaO} + \underset{\text{Impurity}}{SiO_2} \longrightarrow \underset{\text{Slag}}{CaSiO_3}$$

Lime stone provide CaO on decomposition, CaO which work as flux to Remove Impurity of silica as slag ($CaSiO_3$).

17. (i) o/w Emulsions: In this system water acts as dispession medium and oil act as disphersed phase. For e.g. – milk and vanishing cream.

In milk, liquid fat is dispired in water.

(ii) Zeta potential: Separation of charge is a set of potential, the charges of opposite signs on the fixed and diffused parts of double results in a difference in potential between these layers. This potential difference between the fixed layer and the diffused layer of opposite charges is called the zeta potential.

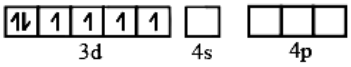
(iii) Multimolecular colloids: A large number of atoms or smaller molecules of a substance aggregate together to form species having size in the colloidal range. The species thus formed are called multimolecular colloids.

18. (a)

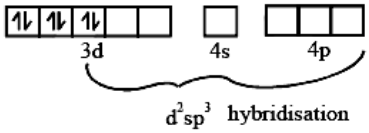
$[Fe(CN)_6]^{4-}$ O.N. of Fe = x + 6 (–1) = – 4

x = + 2

$Fe^{+2} = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^6, 4s^\circ$



in the presence of CN –

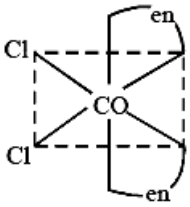


– Hybridisation – $d^2 sp^3$

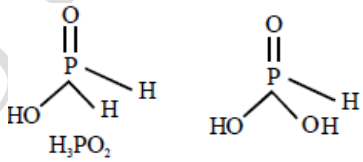
– magnetic character – all the electrons are paired because CN^- is a low spin ligand as a result it is diamagnetic is Nature

– low spin complex

(b)

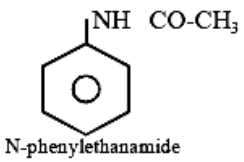


19. (a) In H_3PO_2, there are 2 P–H bonds whereas in H_3PO_3 there is only 1 P–H bond.

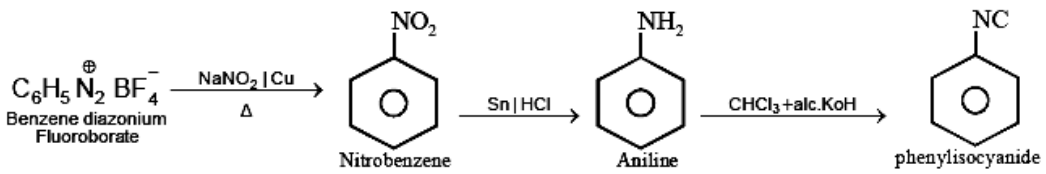


(b) This is because S–S bond is stronger than O–O bond.

(c) due decrease in bond dissociation Enthalpy from HF to HI.

20. (i) $C_6H_5-COO-\overset{\oplus}{N}H_4 \xrightarrow{\Delta} C_6H_5CONH_2 \longrightarrow C_6H_5-NH_2 \xrightarrow[(Acetylation)]{(H_3COCl)\ Pyridine}$ 

Benzanaide Aniline N-phenylethanamide

(ii) 

21. $2H_2O_2 + \xrightarrow{\Delta} 2H_2O + O_2$

$$\log_{10} k = \log_{10} A - \frac{E_a}{2.303RT}$$

Given

$$\log_{10} k = 14.2 - \frac{1.0\times10^4}{T} k$$

$$\therefore \quad \frac{E_a}{2.303R} = 1.0\times10^4$$

(Activation Energy) $E_a = 1.0 \times 10^4 \times 2.303 \times 8.314$

$= 19.14 \times 10^4$ J mol^{-}

Half life ($t_{50\%}$) = 200 minutes

$$k = \frac{0.693}{t\,50\%} = \frac{0.693}{200\times60}$$

$k = 5.78\times10^{-5}\ \text{sec}^{-}$ (Rate constant)

22. (i) Benzoyl peroxide is free radical generater. In the presence of benzoyl peroxide phenyl free radical formed which is responsible of chain initiating step.

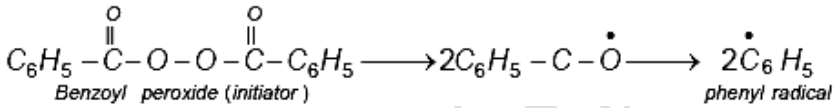
(ii) (a) $H_2N - (CH_2)_6 - NH_2 \rightarrow$ (Hexamethydiamine) and adipic acid COOH – $(CH_2)_4$ – COOH

(iii) Polythene < Buna–S < Nylon 6, 6

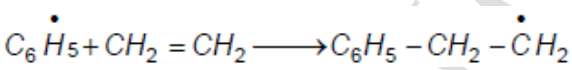
OR

Free radical mechanism:

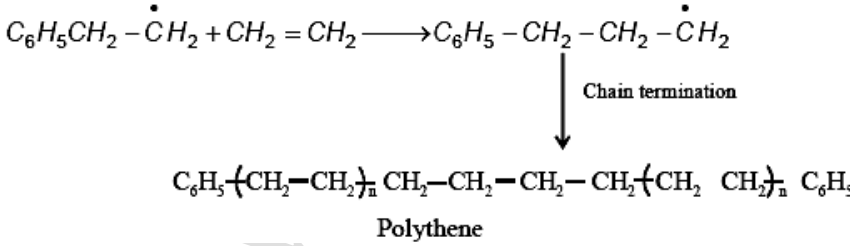
(i) Chain initiation steps –



(ii) Chain propagating step –



(iii) Chain terminating step –



23. (i) (a) Mr. Roy is a good friend of Mr. Awasthi, and he is a responsible person.

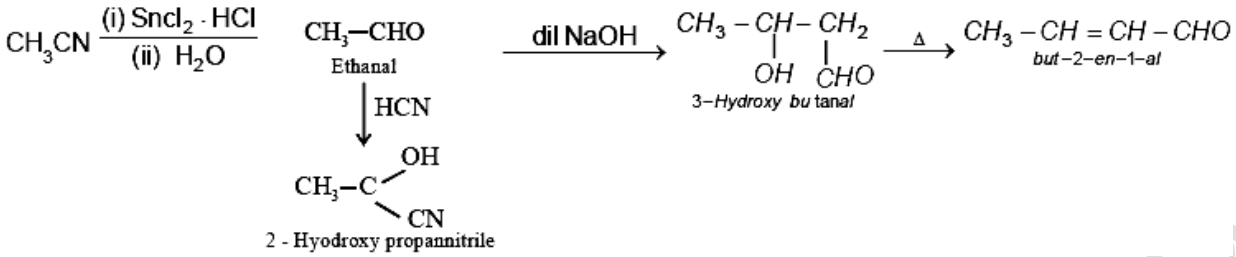
(b) Mr. Roy is concern about the health of his friend.

(ii) It is not advisable to take sleeping pills without consulting doctor because the main ingredient of most of the sleeping pills is barbiturates. These chemicals make you to breathe slowly and less deeply.

(iii) Tranquilizers are drugs which are used for treatment of stress, fatigue, mild and severe mental diseases.

e.g. Chlordiazerpoxide and meprobamate.

24. (a)



(A) → CH_3CHO

(B) → $CH_3\text{-}\underset{\underset{OH}{|}}{CH}\text{-}CH_2\text{-}CHO$

(C) → $CH_3\text{-}CH=CH\text{-}CHO$

(D) → $CH_3-\underset{\underset{CN}{\diagdown}}{\overset{\overset{OH}{\diagup}}{C}}$

(b) (i) homologous members of same series.

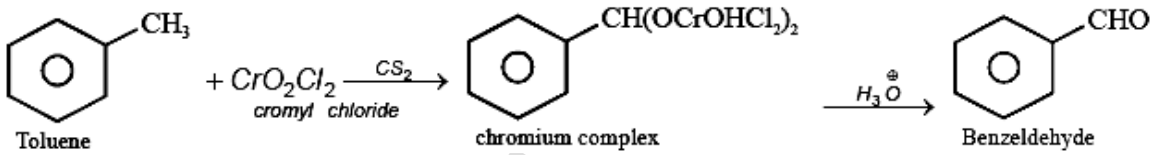
(ii) homologous members of same series.

(c) $CH_3COOH > CH_3CH_2OH > CH_3COCH_3$

Carboxylic acids are having high boiling point due to hydrogen bonding.

OR

(a) Etard Reaction



(b) HCHO > CH_3CHO > $C_6H_5COCH_3$

(c) Because in C*l* – CH_2 – COOH, – I effective group is present which decreases the electron density of C. that's why C*l* –CH_2–COOH is more acidic than CH_3COOH.

(d) $CH_3CH_2CH=CH-CH_2-CN \xrightarrow[(ii)\ H_2O]{(i)\ (i..Bu)_2\ AIH} CH_3-CH-CH=CH_2-CH_2-CHO$

Hex – 3– en – 1 – nitrile Hex – 3–en–1–al

(e) two isomers are $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$ and CH_3-CH_2-CHO

(A) ⇒ $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$ ⇒ Ketone

(B) ⇒ CH_3-CH_2-CHO ⇒ aldehyde

$\underset{(A)}{CH_3COCH_3} \xrightarrow{NaOH+I_2} CH_3-COONa + \underset{\text{Yellow ppt}}{CHI_3}$

$\underset{(B)}{CH_3CH_2CHO} \xrightarrow{NaOH+I_2}$ No reaction

25. (a) $E_{cell} = E^\circ_{cell} - \frac{0.0591}{n}\log_{10}\frac{[Product]}{[Reactant]}$

$E^\circ_{cell} = E_{cell} + \frac{0.0591}{6}\log_{10}\frac{[0.01]^2}{[0.01]^3}$

$$= 0.261 + 0.009 \log_{10} \frac{10^{-4}}{10^{-6}}$$

$$= 0.261 + 0.0098 \log_{10} 10^2 [\log_{10} 10 = 1]$$

$$= 0.261 + 0.0098 \times 2$$

$$= 0.261 + 0.0196$$

$$= 0.2806 \text{ V}$$

(b) Given

[$E°$ (Fe^{+2} / Fe) = – 0.44 V]

$E°$ (A^{+2} / A) = – 2.37 V

$E°$ (B^{+2} / B) = – 0.14 V

'A' will prevent iron from corrosion, so we can coat the iron metal by element A because it is having more negative value of reduction potential then iron.

OR

(a) Given

Molarity (M) = 0.001 mol / L

Conductivity = 3.905×10^{-5} 5 cm^{-1}

$\lambda°$ (H^+) = 349.6 5 cm^2 mol^{-1}

$\lambda°$ (CH_3COO^-) = 40.9 5 cm^2 mol

Molar Conductivity (λ_m) = $\text{Conductivity} \times \frac{1000}{M}$

$$= 3.905 \times 10^{-5} \times \frac{1000}{0.001}$$

= 39.05 cm^2 mol^{-1}

$$\alpha = \frac{\text{Molar conductance at specific concntration}}{\text{Molar conductance at infinite ditation}}$$

$$= \frac{39.05}{390.5} \qquad \left[\begin{array}{l} \lambda^{\infty}_{CH_3COOH} = \lambda^{\infty}_{H^+} + \lambda^{\infty}_{CH_3OO^-} \\ = 349.6 + 40.9 \\ = 390.5 \end{array}\right]$$

= 0.1

= 10%.

(b) Electro chemical cell:

Cell which convert chemical Energy into Electrical Energy

If E°_{cell} [External] > E°_{cell}

(i) Electron flow from

Cathode to anode and current flow from anode to cathode.

26. (a) (i) The ability of oxygen to stabilize the high oxidation state exceeds that of fluorine.

(ii) Due to lanthanoid contraction Zr and Hf show similar properties.

(iii) Due to variable oxidation state, transition metals act as good catalyst.

(b) (i) $2MnO_2 + 4KOH + O_2 \xrightarrow{\text{Fuse}} 2K_2MnO_4 + 2H_2O$

(ii) $Cr_2O_7^{-2} + 14H^+ + 6I^- \longrightarrow 2Cr^{+3} + 7H_2O + 3I_2$

OR

(i) Zn $\rightarrow$ because Zn does not show variable oxidation State.

(ii) Cr $\rightarrow$ chromium is having highest melting point due to high enthalpy of atomization.

(ii) Copper (Cu).

(iv) Mn $\rightarrow$ (Ar) $4s^2\ 3d^5$

$\downarrow$

$Mn^{+3} \rightarrow$ (Ar) $4s^\circ\ 3d^4$

Mn^{+3} having 4 electrons in 3d subshell, it required one electron to half filled configuration in 3d subshell it act as strong oxidizing agent.