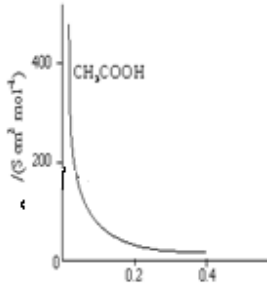
VIKAAS PU COLLEGE MANGALORE,

II PU CHEMISTRY ANSWER KEY

1. Shrinks.
2. Remains same
3. 

4. Zero
5. Chemisorption.
6. It selectively prevents ZnS from coming to the froth but allowesPbS to come with the froth
7. Neon
8. $R\ X + 2\,Na + X\ \ R \xrightarrow{dry\ ether} \underset{Alkane}{R - R} + 2Na\ X$
9. $LiAlH_4$
10. B_{12}

PART –B

11. $d = \frac{ZM}{N_0 a^3}$

$d = \frac{2 \times 7}{(6.022 \times 10^{23})(352 \times 10^{-10})^3}$

$= 0.53 g/ml$

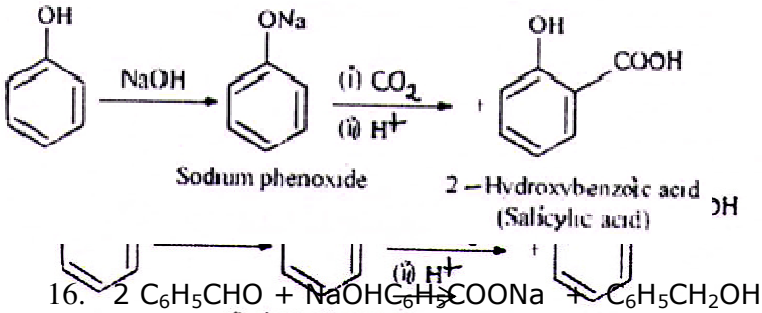
12. When **same quantity of electricity passes** through solutions of **different electrolytes**, the **amounts of substances** liberated at the electrodes are **directly proportional to their chemical equivalent masses**.
13. A reaction which appears to be of higher order but made to follow first order kinetics by taking the other reactants except one in large excess.

    Eg: Acid hydrolysis of ethyl acetate: $CH_3COOC_2H_5 + H_2O \rightarrow CH_3COOH + C_2H_5OH$

    $r \propto [CH_3COOC_2H_5]\,[H_2O]^0$; order = 1

14. i) As in actinoids the outer electrons are less firmly held, they are easily available for bonding.
    ii) Due to Lanthanoid contraction

15.



16. 2 C_6H_5CHO + NaOH C_6H_5COONa + $C_6H_5CH_2OH$
"Cannizzaro reaction" Sodium phenoxide 2 – Hydroxybenzoic acid (Salicylic acid)

17. i)In anionic detergents large part of the molecules is anion and it is the anionic part of the molecule which is involved in their cleansing action.
ii) Artificial sweetener.

18. i)Norethindrone orethynylestradiolor novestrol
ii)Morphine or heroin or codeine

PART –C

19. a) i)$2Al_2O_3 + 3C \longrightarrow 4Al + 3CO_2$
ii) The molten cryolite decreases the melting point and also increases the electrical conductivity.
b) Nickel

20. Flow chart

$$N_{2(g)} + 3H_{2(g)} \rightleftarrows 2NH_{3(g)} \Delta H = -46.1\ kJmol^{-1}$$

The optimum condition of a pressure of 200 bar and 750 K are used along with the catalyst such a finely divided iron with small amount of molybdenum, or potassium oxide or aluminium oxide as promoter

21. i) In H_2O electronegative element like oxygen is present that involves I hydrogen bonding.
ii) Conc. H_2SO_4 has high affinity for water.

22. i) $NH_3 + 3Cl_2 \longrightarrow NCl_3 + 3HCl$

ii) $Na_2SO_3 + 2HCl \longrightarrow 2NaCl + H_2O + SO_2$

ii) $Br_2 + 3F_2 \longrightarrow 2BrF_3$

23.

$4FeCr_2O_4 + 16NaOH + 7O_2 \rightarrow 8NaCrO_4 + 2Fe_2O_3 + 8H_2O$

$2Na_2CrO_4 + conc.H_2SO_4 \rightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$

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

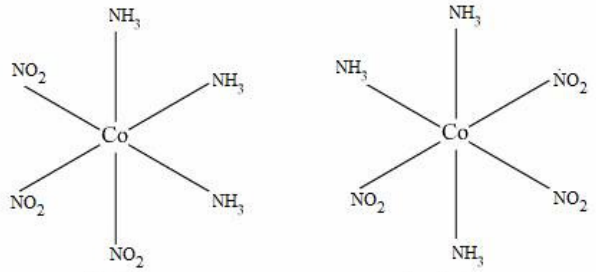
24.i)These are the compounds formed when the smaller atoms of H, C, N and B occupy the interstitial places in the metallic crystals of d-block.

ii) a. Transition metals exhibit variable oxidation states due to the presence of unpaired d-electrons.

b. Finely powdered transition metals provide a large surface area.

25. a) potassium trioxalatochromate(III)

b)



(fac) isomer (mer) isomer

26.The electronic configuration of nickel (Z = 28) in the ground state is [Ar] 3d84s2. In the +2 oxidation state, the configuration of nickel is [Ar] 3d84s0.

When cyanide ligands approach the Ni2+ ion the unpaired 3d electrons get paired up against Hund's rule leaving one of the d orbitals vacant.

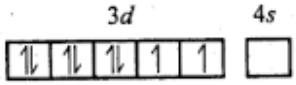
$[Ni(CN)_4]^{2-}$: Ni(28) : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^8$

or, last shell EC is

$3d^8\ 4s^2$

in $[Ni(CN)_4]^{2-}$, Ni is in +2 state

$\therefore$ $Ni^{2+} : 3d^8\ 4s^0$



CN^- being a strong field ligand pairs up the e^{-1}s, thus

$[Ni(CN)_4]^{2-}$:

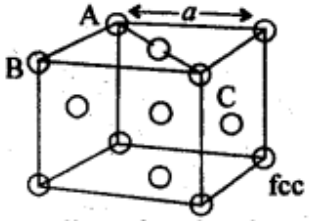
Now dsp2 hybridisation takes place giving four vacant hybrid orbitals directed to the four corners of a square. The electron pairs donated by cyanide ligands occupy the dsp2 hybrid orbitals of Ni2+ ion

Due to the absence of unpaired electrons, the inner orbital complex will be diamagnetic. The complex has a square planar shape.

PART –D

27)a)

(*iii*) In *fcc*: Let the edge length of unit cell = a

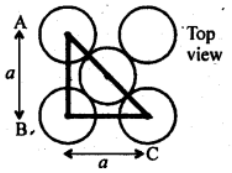


Let the radius of each sphere = r

$\therefore$ **AC** $= 4r$

From right angled triangle ABC,

$$AC = \sqrt{AB^2 + BC^2} = \sqrt{a^2 + a^2} = \sqrt{2a^2} = \sqrt{2}a$$



$\therefore$ $\sqrt{2}a = 4r$

$\therefore$ $a = \frac{4r}{\sqrt{2}}$

$\therefore$ **Volume of the unit cell**

$$= a^3 = \left(\frac{4}{\sqrt{2}}r\right)^3 = \frac{64r^3}{2\sqrt{2}} = \frac{32r^3}{\sqrt{2}}$$

No. of unit cell in *fcc* = 4

$\therefore$ **Volume of four spheres** $= 4 \times \frac{4}{3}\pi r^3 = \frac{16}{3}\pi r^3$

$\therefore$ **Packing efficiency**

$$= \frac{16\pi r^3/3}{64r^3/3\sqrt{3}} = 0.74, \textit{ i.e.}, 74\%$$

b) **Frenkel defect is the displacement of few smaller ions (generally cation is smaller than anions) from their normal position to the interstitial sites.**

Density remains same.

28)a) $M_2 = \dfrac{K_f \times w_2 \times 1000}{\Delta T_f \times w_1}$

$= \dfrac{1.86 \times 31 \times 1000}{1.86 \times 500}$

$= 62 g/m$

b) The process of reversing the direction of osmosis by applying the pressure higher than the osmotic pressure to the solution of higher concentration is called **reverse osmosis.**

29)A) Anode reaction: $Pb + SO_4^{2-} \rightleftharpoons PbSO_4 + 2e^-$

Cathode reaction: $PbO_2 + 4H^+ + SO_4^{2-} + 2e^- \rightleftharpoons PbSO_4 + 2H_2O$

b) $\Delta G^0 = -nfE^0 Cell$

$= -6 \times 96487 \times 0.7$

$= -405245.4 J$

$= -405.2 kJ$

30)A) Consider R · P

Integrating on both the side,

i.e., $\ln [R] = -kt + C$ …….(1)

C · constant of integration

To find the value of C

When $t = 0$, $[R] = [R]0$

Substituting in (1)

ln [R]0 = - k(0) + C

C = ln [R]0

Substituting in equation 1

ln [R]= -kt + ln [R]0 …..(2)

kt = ln [R]0 - ln [R]

b)

$$\log\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left[\frac{T_2}{T_1} - \frac{T_1}{T_2}\right]$$

log4= $\frac{E_a \times (323 - 303)}{2.303 \times 8.314 \times 323 \times 303}$

E_a= 56.2KJ/mol

31)A) Zeolites are microporousaluminosilicates with three dimensional network of silicates in which some silicon atoms are replaced by aluminium atoms giving Al-O-Si framework. ZSM -5

B) The process of conversion of freshly prepared precipitate into a colloidal solution by adding an electrolyte containing the common ion is calledpeptisation. Example: Ferric hydroxide sol

c) $\frac{x}{m} = kp^{1/n}$, where x is the mass of the gas adsorbed on mass m of the adsorbent at pressure P, k and n are constants which depend on the nature of the adsorbent and the gas at a particular temperature.

V.

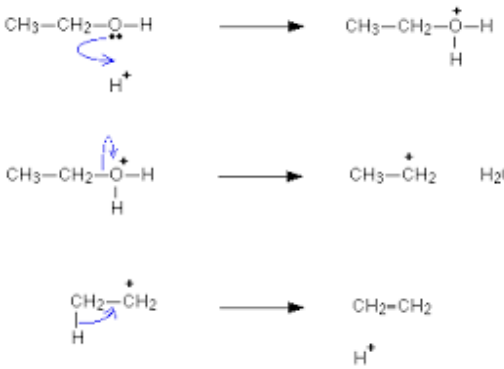
32. a)

b) i) Propene

ii) The chairal molecule should contain asymmetric carbon atom.

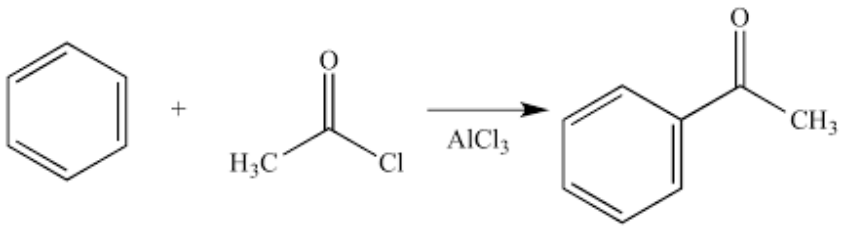
c)Equimolar mixture of dextrotatory and leavorotatory isomers is called racemic mixture.

33.a)

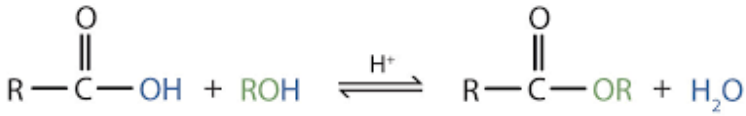


b)$CH_3\ CH_2ONa + CH_3Br \longrightarrow CH_3CH_2OCH_3 + NaBr$

34.a)



b)i)



ii) benzamide

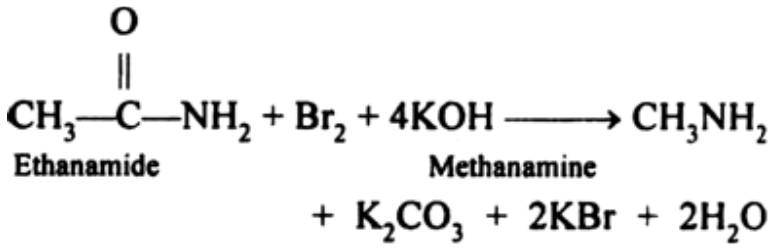
C) Zn/Hg and conc. HCl

35) a) Methylamine is more basic because of electron releasing nature of methyl group

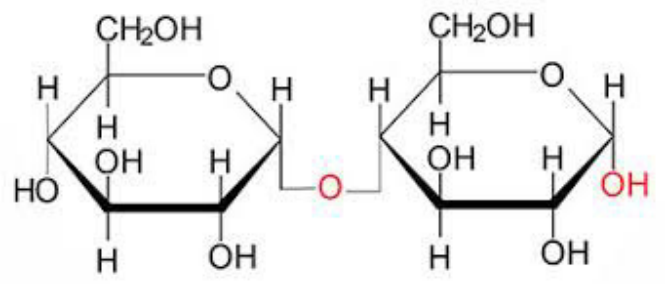
b)i) Phenyl isocyanide

ii) N,N-dimethyl ethanamine

c)



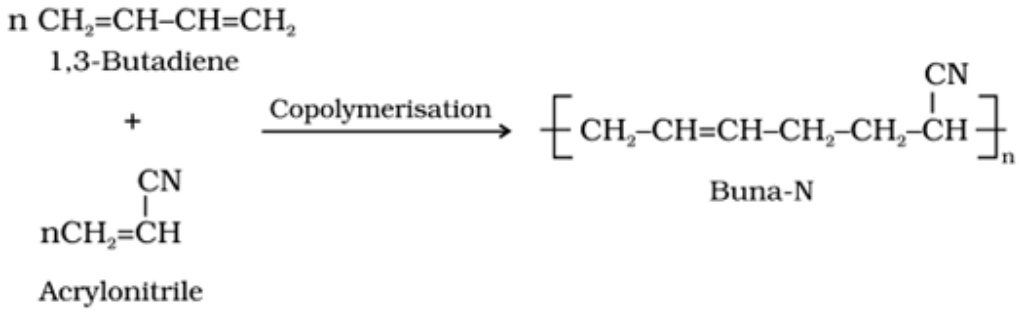
36) a)



b) A peptide bond is bond is formed by the reaction between amino group of one amino acid molecule with carboxyl group of another amino acid molecule with the elimination of water. There are four peptide bonds in tetrapeptide .

c) Insulin

37) a)



b) adipic acid and hexamethylenediamine

c) These are cross-linked or heavily branched polymers which got hardened during moulding process. These can't be softened again on heating.