ANSWER KEY

Test # 02 **Test Pattern : BOARD**

Class-XII

Chemistry

1. b
2. a
3. a
4. d
5. c
6. b
7. a
8. d
9. b
10. c
11. d
12. b
13. a
14. d
15. d
16. b

17. In TiO_2 there is no electron in 3d orbital therefore it can not show d-d transition while in $TiCl_3$ there is one electron in 3d-orbital that can show d-d transition to give violet colour.

18. Two applications of electrolysis -

1. Metals are purified and refined by electrolysis.
2. Low cost metals are coated by layer of noble metals like gold through electrolysis for prevention from corrosion.

OR

Formula, Cell constant = conductivity × Resistance

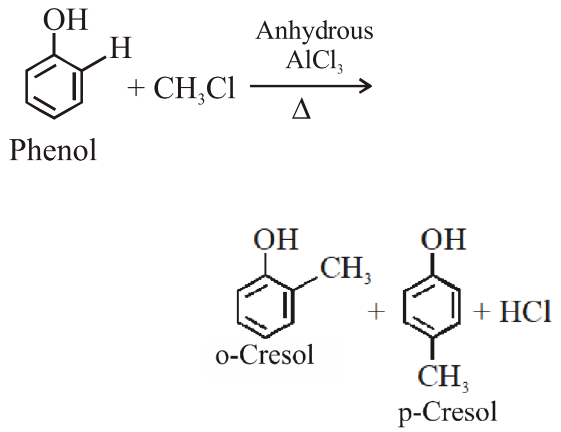
= 0.013 × 300 = 3.9 cm^{-1}

19. **Chelate effect :** When a bi-dentate ligand or polydentate ligand forms coordinate bonds with central metal atom or central metal atomic ion in such a way that it forms a ring like strucutre that provides stability to cooridnation complex this effect is known as Chelate effect.

20. It is because the C-I bond becomes less stable than C–Cl bond. When CHI_3 is heated wtih $AgNO_3$ then AgI is formed while there is no cleavage of C–Cl bond when $CHCl_3$ is heated with $AgNO_3$ so it does not give any precipitate.

21. (i) $\underset{\text{diethyl ether}}{C_2H_5-O-C_2H_5} \xrightarrow[\Delta]{Al_2O_3} \underset{\text{Ethene}}{2C_2H_4} + \underset{\text{Water}}{H_2O}$

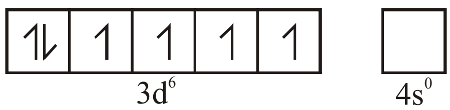
(ii)



22. (i) Tetraammineplatinum (II) tetrachloroplatinate (II)

(ii) $Na_3[CoCl_6]$ compound contains four unpaired electrons.

Co^{3+} =



Therefore its magnetic momentum will be

$\mu = \sqrt{n(n+2)}$ B.M.

$\mu = \sqrt{4(4+2)}$

$\mu = \sqrt{4(6)}$;

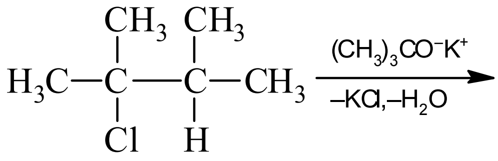
$\mu = 2\sqrt{2} \times \sqrt{3}$

$\mu = 2 \times 1.414 \times 1.732$

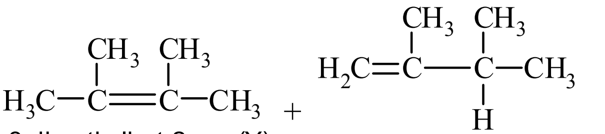
μ = 4.8989 B.M.

(iii) Structure of compound $[Ni(dmg)_2]$ is square planar.

23.



2-Chloro-2, 3-dimethylbutane (X)



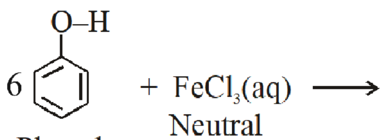
2,3-dimethylbut-2-ene(Y) + 2,3-dimethylbut-1-ene(Z)

Compound Y + $H_2 \xrightarrow[\Delta]{Pt} CH_3-\overset{CH_3}{\overset{|}{C}H}-\overset{CH_3}{\overset{|}{C}H}-CH_3$

Compound Z + $H_2 \xrightarrow[\Delta]{Pt} CH_3-\overset{CH_3}{\overset{|}{C}H}-\overset{CH_3}{\overset{|}{C}H}-CH_3$

2,3-dimethylbutane

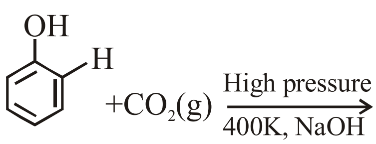
24.



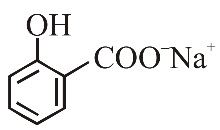
Phenol (A) Neutral ferric chloride

$[(C_6H_5-O^-)_6Fe]^{3-} + 3H^+ + 3HCl$

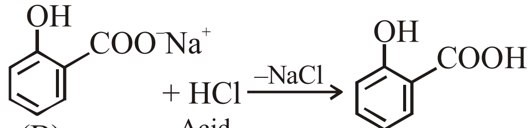
Violet colour complex



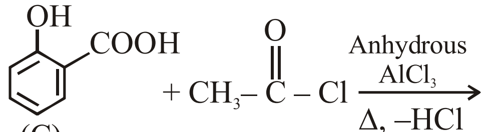
Phenol (A)



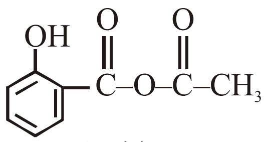
Sodium salicylate (B)



(B) Acid Salicylic acid



(C)



Aspirin or 2-acetoxybenzoicacid (D) (Medicine)

25. (i) Methylamine is a primary amine and dimethyl amine is a secondary amine so we can distinguish them by carbyl amine test.

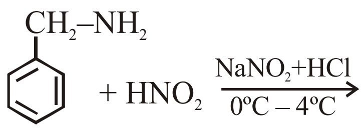
$$\underset{1^\circ \text{ amine}}{CH_3-NH_2} + CHCl_3 + 3KOH \xrightarrow{\Delta}$$

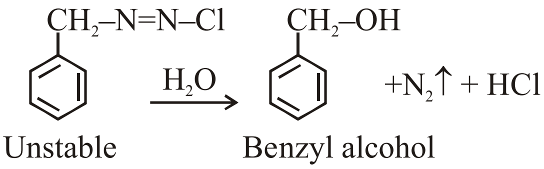
$$\underset{\substack{\text{Methyl isocyanide}\\ \text{(Foul smell)}}}{CH_3NC} + 3KCl + 3H_2O$$

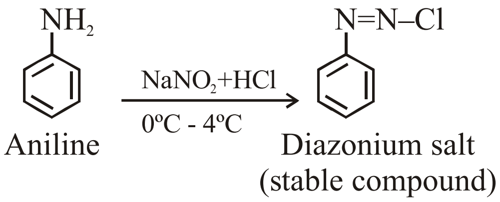
We get a foul smell compound with 1° amine

$\underset{2^\circ\text{amine}}{(CH_3)_2NH} + CHCl_3 + 3KOH \xrightarrow{\Delta}$ No reaction, no foul smell.

(ii) We can distinguish both of them by reaction with freshy prepared nitrous acid at low temperature. The benzylamine forms unstable diazonium salt that gives N_2 gas and benzyl alcohol will form, while in case of aniline no N_2 gas is produced as aniline forms more stable compound when reacted with nitrous acid at low temperature.







OR

(i) In amines there is comparitively weaker intermolecular hydrogen bonding due to comparitively less electronegativeity of nitrogen atom while in alcohol the intermolecular hydrogen bonding is stronger due to more electronegativity of oxygen atom. So alcohol has higher b.p. than amines.

(ii) Ethylamine can form intermolecular hydrogen bond with water molecules while due to large hydrophobic group ($-C_6H_5$) aniline can not form intermolecular hydrogen bond with water molecules so aniline is not soluble in water.

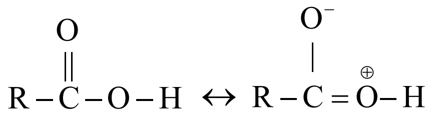
26. Compound 'A' is propionic acid which is when reacted with ammonia gives propanamide which is compound 'B', when propanamide is reacted with bromine and alcoholic sodium hydroxide gives Ethanamine 'C', when 'C' is reacted with chloroform and NaOH gives ethyl isocyanide which is compound 'D' in Reactions.

$$\underset{(A)}{CH_3CH_2COOH} \xrightarrow{NH_3} CH_3CH_2COONH_4$$

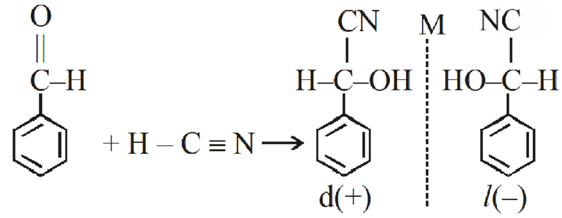
$$\xrightarrow[-H_2O]{\Delta} \underset{(B)}{CH_3CH_2CONH_2} \xrightarrow[NaOH,Br_2]{\Delta}$$

$$\underset{(C)}{CH_3CH_2NH_2} \xrightarrow[NaOH]{CHCl_3} \underset{(D)}{CH_3CH_2NC}$$

27. (i) Because of resonance, the psoition of carbonyl group is changing

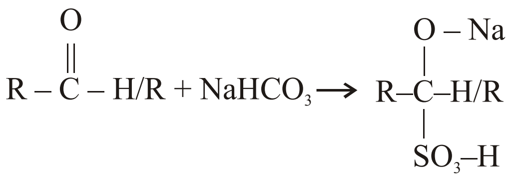


(ii)



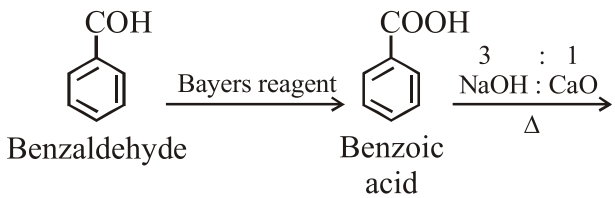
Due to two optical isomers they can not be separated even by fractional distillation.

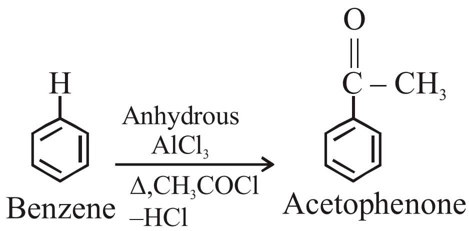
(iii) Because aldehyde and ketone can form an additional compound wtih $NaHSO_3$ while impurity can not.



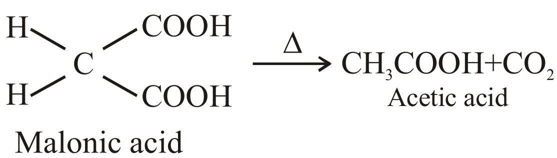
OR

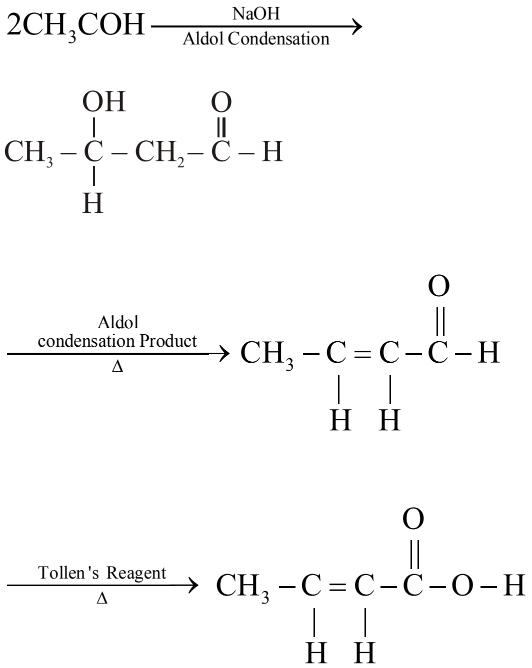
(i)





(ii)



(iii) 

But – 2 – enoic acid

28. A = $C_6H_5COCH_3$

B= $C_6H_5CH_2CH_3$

C = C_6H_5COOH

D = C_6H_5COONa

E = CHI_3

[Note- D and E may be interchanged]

29. (i) Rickets disease

(ii) Marasmus, Kwashiorkor etc.

(iii) Cellulose

(iv) Maltase is an enzyme that converts maltose sugar into glucose.

30. (i) (c) Gd

(ii) (d) Pan

(iii) (d)

(iv) [Xe], $4f^9$, $6s^2$

31. $E^0_{Cell} = E^0_{cathode} - E^0_{anode}$

$E^0_{Cell} = -0.45 - (-2.37) = 1.92V$

$$E_{cell} = E^0_{cell} - \frac{0.059}{n}\left[\log\frac{[oxi.]}{[red.]}\right]$$

$$1.92 = 1.92 = \frac{0.059}{2}\left[\log\frac{x}{0.01}\right]$$

$$0 = \frac{-0.059}{2}\log\frac{x}{0.01}$$

Now, if we put x = 0.01 then we get log 1 which value became zero. Therefore whole RHS term will became zero.

So, x = 0.01 mole/L.

(ii) $\Lambda_m = \frac{k \times 1000}{M} = \frac{8 \times 10^{-5} \times 1000}{2 \times 10^{-3}}$

= 40 Scm^2/mole

Now, degree of dissociation $(\alpha) = \frac{\Lambda_m}{\Lambda^0_m} = \frac{40}{404} = 0.099$

OR

(i) $\rho = \frac{R.A.}{\ell} = \frac{5 \times 10^3 \times 0.625}{50} = 62.5$ Ohm cm

Conductivity $(k) = \frac{1}{\rho} = \frac{1}{62.5}$

= 0.016 $ohm^{-1}cm^{-1}$

Molar conductivity $\Lambda_m = \frac{k \times 1000}{M}$

$= \frac{0.016 \times 1000}{0.05} = 320\ ohm^{-1}cm^2mol^{-1}$

(ii) $E^0_{Cell} = E^0_{cathode} - E^0_{anode}$

= 0.80 – (–0.76) = 1.56 V

$$E_{cell} = E^0_{cell} - \frac{0.059}{n}\log\frac{[Zn^{++}]}{[Ag^+]^2}$$

$$= 1.56 - \frac{0.059}{2}\log\frac{0.1}{0.01 \times 0.01}$$

= 1.56 – 0.0295 $\log 10^3$

= 1.56 – 0.0295 × 3 log 10

$\because \log 10 = 1$

$\therefore E_{cell} = 1.56 - 0.0885 = 1.471$ V

32. (i) 1. Zero order reaction

2. Slope = –k [Rate constant]

3. mole/L /second

(ii) $k = \frac{2.303}{t}\log\frac{[A_0]}{[A]}$

Let inital concentration of reactant is 100 mole/L then final concentration of reactant after time t = 25 minute will be 75 mole/L

$$K = \frac{2.303}{25}\log\frac{100}{75}$$

$$K = \frac{2.303}{25}\log\frac{4}{3}$$

$$K = \frac{2.303}{25}[\log 4 - \log 3]$$

K = 0.09212 [0.6020 – 0.477]

K = 0.09212 × 0.1249

K = 0.01150 minute^{-1}

Half life time period $t_{1/2} = \frac{0.693}{k}$

$$= \frac{0.693}{0.0115} = 60.26 \text{ minute}$$

OR

(i) $t = \frac{2.303}{k}\log\frac{[A_0]}{[A]}$

$$t = \frac{2.303}{k}\log\left[\frac{1}{\frac{1}{16}}\right]$$

t = 0.03838 log 16

t = 0.03838 log 2^4

t = 0.03838 × 4 log 2

t = 0.03838 × 4 × 0.3010

t = 0.046 second

(ii) Factors affecting rate of reaction are :

Temperature, concentration of reactant, pressure etc.

(iii) The energy of colliding particles should be equals to or greater than threshold energy.

33. (i) We know that the elevation in boiling piont for the solution that contains non-volatile impurity became directly proprotional to the mole farction of non-volatile solute.

So, $\Delta T_b \propto X_b$

$\Delta T_b = k.X_b$

where k = proportionality constant

$$\because X_b = \frac{nb}{na + nb}$$

na = no. of moles of solvent

nb = no. of moles of solute

$$\therefore \Delta T_b = k.\frac{n_b}{n_a + n_b}$$

$$\Delta T_b = \frac{k.\frac{W_b}{M_b}}{\frac{W_a}{M_a} + \frac{W_b}{M_b}}$$

W_b = Given mass of solute

M_b = Molar mass of solute

W_a = Given mass of solvent

M_a = Molar mass of solvent

Let $\frac{W_b}{M_b} << 1$ then $\Delta T_b = k.\frac{W_b / M_b}{W_a / M_a}$

$$\Delta T_b = k.\frac{W_b}{M_b} \times \frac{M_a}{W_a}$$

$\because$ Molality (m) $= \frac{W_b}{M_b} \times \frac{1}{W_a}$

$\therefore \Delta T_b = k.m.M_a$

$\because$ M_a and k both are constant

$\therefore T_b \propto$ molality of solution

(ii) Let total mass of glucose solution is 100 g

Then mass of glucose = 10g

mass of water = 90 g

Let total mass of sucrose solution is 100 g

Then, mass of sucorse = 10 g

Mass of water = 90 g

$M_{glucose} = 180$ g/mole

$M_{Sucrose} = 342$ g/mole

For sucrose solution:-

$\Delta T_f = K_f.m$

$\Delta T_f = T_f^0 - T_f$

$\Delta T_f = 273.15 - 269.15$

$\Delta T_f = 4k$

$$\Delta T_f = K_f.\frac{W_b}{M_b}.\frac{1000}{W_a(ing)}$$

$$4 = K_f.\frac{10}{342}.\frac{1000}{90}$$

$K_f = 12.3$ K kg/mole

Now, ΔT_f for glucose solution will be

$$\Delta T_f = k_f.\frac{W_b}{M_b}.\frac{1000}{W_a(ing)}$$

$$\Delta T_f = 12.3\times\frac{10}{180}\times\frac{1000}{90}$$

$\Delta T_f = 7.6$ Kelvin

$\Delta T_f = T_f^0 - T_f$

$7.6 = 273.15 - T_f$

$T_f = 265.55$ K