SUBJECTIVE MOCK TEST | CHEMISTRY | SOLUTION

CLASS – XII | SET - 1

1.(C)
2.(A)
3.(C)
4.(D)
5.(C)
6.(B)
7.(B)
8.(B)
9.(D)
10.(A)
11.(A)
12.(A)
13.(A)
14.(D)
15.(B)
16.(D)

17.(a) The solubility of nitrogen will decrease at a temperature above 293 K, as the value of Henry's constant K_H increases with temperature. Solubility is inversely proportional to K_H.

(b) The boiling point of the azeotrope formed will be 54°C (iii). This is because the boiling point of an azeotropic mixture is lower than that of its individual components due to positive deviation from Raoult's Law.

Or

(a) Yes, the statement is correct.

In Srinagar, the atmospheric pressure is lower due to its higher altitude compared to Delhi. Lower pressure reduces the solubility of carbon dioxide in the soda, causing it to escape more quickly, making the soda go flat faster.

(b) Sugar helps increase shelf life by reducing the water activity in the product. It binds with water molecules, making them unavailable for microbial growth. This inhibits spoilage and extends the shelf life.

18.(a) The IUPAC name of $\left[K_2Cr(H_2O)(C_2O_4)_2\right]$: Potassium diaquadioxalotochromate(III).

(b) Metal present in:

(i) **Haemoglobin:** Iron (Fe)

(ii) **Vitamin B-12:** Cobalt (Co).

19.(a) **Cathode:** Ag (silver electrode, reduction occurs).

Anode: Mg (magnesium electrode, oxidation occurs).

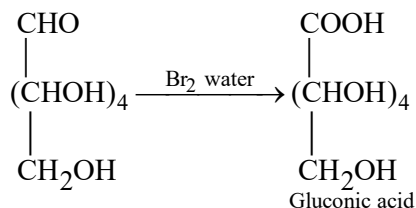**(b)** Overall reaction: $Mg(s) + 2Ag^+(aq) \rightarrow Mg^{2+}(aq) + 2Ag(s)$

20.(a) **Reaction:** $CH_3CH_2Br + KCN \rightarrow CH_3CH_2CN + KBr$

Minor product: None, as this reaction gives only one product.

(b) **Reaction:** $(CH_3)_3CCH_2Cl + alc. KOH \rightarrow (CH_3)_3CCH_2CH = CH_2 + HCl$

Minor product: 3-Methyl-1-butene (if rearrangement occurs).

21. The carbonyl group is present in glucose aldehyde at the C_1 atom. Glucose on oxidation with a mild oxidising agent like Br_2 water gives gluconic acid containing the same number of C atoms (six) as are present in glucose.

$$\begin{array}{c} CHO \\ | \\ (CHOH)_4 \\ | \\ CH_2OH \end{array} \xrightarrow{Br_2 \ water} \begin{array}{c} COOH \\ | \\ (CHOH)_4 \\ | \\ CH_2OH \\ \text{Gluconic acid} \end{array}$$

This indicates that the carbonyl group is present in an aldehydic (–CHO) group.

22.(a) Kohlrausch's Law and Decrease in Conductivty

Kohlrausch's Law states that the molar conductivity of an electrolyte at infinite dilution is the sum of contributions of its individual ions.

With dilution, the number of ions per unit volume decreases, reducing the ionic interaction. This leads to a decrease in conductivity.

(b) **Molar Conductivity of Aluminium Sulphate:** For $Al_2(SO_4)_3$, the expression for molar conductivity (Λ_m) at infinite dilution:

$$\Lambda_m = 2\lambda°(Al^{3+}) + 3\lambda°(SO_4^{2-})$$

23.(a) **Lowest and highest oxides of Transition Metals**

- Lowest oxides are basic (e.g., MnO, FeO) because the metal oxidation state is low, making the metal ion electron-rich and capable of donating electrons (basic).

- Highest oxides (e.g., CrO_3, Mn_2O_7) are acidic as the high oxidation state causes electron deficiency, making them electron acceptors (acidic).

(b) Chromium as Hard Metal and Mercury as Liquid

Chromium has strong metallic bonds due to extensive delocalization of electrons in its 3d and 4s orbitals, making it hard.

Mercury has weak metallic bonding as its outermost electrons are less available for bonding due to relativistic effects, making it liquid at room temperature.

(c) **Ionisation Energy Variation in 3d Series**

In the 3d series, ionization energy doesn't vary significantly with increasing atomic number because the increase in nuclear charge is balanced by the shielding effect of 3d electrons.

24.(a) **Reaction of p-Nitrotoluene with Etard Reagent**

When p-nitrotoluene reacts with Etard reagent $(CrO_2Cl_2$ in $CS_2)$, it undergoes oxidation to form p-nitrobenzaldehyde.

$$C_7H_7NO_2 + CrO_2Cl_2 \rightarrow C_7H_5NO_3 + HCl$$
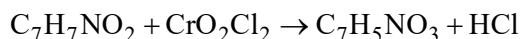
(b) **Benzoic Acid as a dimer in Organic Solvent**

Benzoic acid exists as a dimer in organic solvents due to hydrogen bonding between carboxyl groups (–COOH) of two molecules.

(c) **Reaction of Benzene with Methyl Chloride**

- Benzene reacts with methyl chloride (CH_3Cl) in the presence of anhydrous $AlCl_3$ (Friedel-Crafts alkylation) to form toluene.

$$C_6H_6 + CH_3Cl \xrightarrow{AlCl_3} C_6H_5CH_3$$

- If benzene is replaced by benzoic acid, the carboxylic group deactivates the aromatic ring, preventing the reaction.
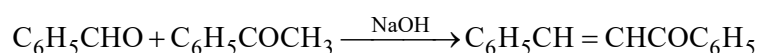
Or

Compound 'X' does not undergo aldol condensation but reacts with compound 'Y' in the presence of a strong base to give 1,3-diphenylprop-2-en-1-one.

(a) **Identify 'X' and 'Y':**

- 'X': Benzaldehyde (C_6H_5CHO)

- 'Y': Acetophenone (C_6H_5COCH)

(b) **Chemical Reaction:** This reaction is the Claisen-Schmidt condensation:

$$C_6H_5CHO + C_6H_5COCH_3 \xrightarrow{NaOH} C_6H_5CH = CHCOC_6H_5$$

(c) **Test to Distinguish 'X' and 'Y':**

(i) Tollen's Test:

- Benzaldehyde ('X') gives a positive Tollen's test (silver mirror) due to the presence of an aldehyde group.

- Acetophenone ('Y') does not give Tollen's test as it is a ketone.

25.(a) Peptides from Glycine and Alanine

The possible peptides are:

(i) Gly-Ala   (ii) Ala Gly

(b) **Keratin and Insulin as Proteins**

Keratin is a fibrous protein, providing structure strength (e.g., in hair, nails).

Insulin is a globular protein, functioning as a hormone for glucose metabolism.

26. Unknown alcohol with Lucas Reagent

    (a)   **Primary, Secondary, or Tertiary Alcohol Determination:**

        Lucas Test Reaction: Alcohol reacts with Lucas reagent $(HCl + ZnCl_2)$ to form alkyl

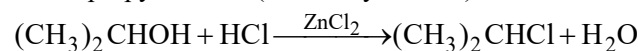   chloride. The speed of turbidity formation indicates the type of alcohol:

        (i)   **Tertiary alcohol: Immediate turbidity.**

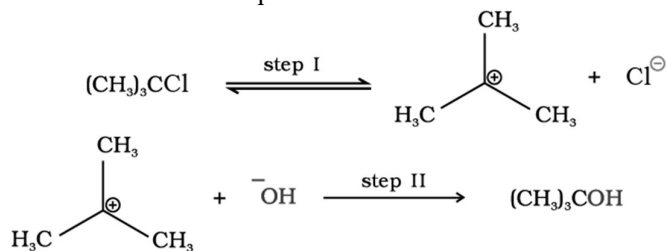   **(ii)**   **Secondary alcohol:** Turbidity within 5-10 minutes.

        (iii)   **Primary alcohol:** No turbidity at room temperature.

    (b)   **Reactions Equation:**

        For isopropyl alcohol (secondary alcohol):

$$(CH_3)_2 CHOH + HCl \xrightarrow{\;ZnCl_2\;} (CH_3)_2 CHCl + H_2O$$

27. "A" is $(CH_3)_3 CCl,$ the carbocation intermediate obtained in tertiary alkyl halide is most stable, making A most reactive of all possible isomers.

28.(a) $E_{cell} = E_{cell}^{\circ} - \dfrac{2.303RT}{nF} \log Kc$

At 298 K

$E_{cell} = E_{cell}^{\circ} - \dfrac{0.0591}{n} \log Kc$

At equilibrium $E_{cell} = 0, n = 6$

$E_{cell}^{\circ} = \dfrac{0.0591}{n} \log Kc$

At equilibrium $E_{cell} = 0, \ n = 6$

$E_{cell}^{\circ} = \dfrac{0.0591}{n} \log Kc$

$= 0.059 / 6 \log 4.617 \times 10^{184}$

$= 0.00983 \times 184.6644 = 1.8152$

  (b) $E_{cell}^{\circ} = E_{Sn^{4+}/Sn^{2+}}^{\circ} - E_{Al^{3+}/Al}^{\circ}$

$1.81 = -0.15 - E_{Al^{3+}/Al}^{\circ}$

$E_{Al^{3+}/Al}^{\circ} = -1.66 \, V$

29.(a) $Rate = k[H_2][Br_2]^{1/2}$

$Order = \dfrac{3}{2}$

$Unit \ of \ k = \dfrac{mol \, L^{-1} s^{-1}}{mol^{3/2} L^{-3/2}} = mol^{-1/2} L^{1/2} s^{-1}$

(b) Rate $= k[H_2][Br_2]^{1/2}$ if conc of Br_2 is tripled.

Rate' $= k[H_2][3Br_2]^{1/2}$

Rate' $= \sqrt{3}k[H_2][Br_2]^{1/2}$

Rate' $= \sqrt{3}$ Rate

<div align="center">**Or**</div>

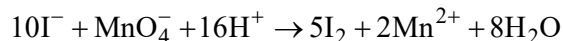Rate $= k[H_2][Br_2]^{1/2}$ if conc of Br_2 is tripled.

Rate' $= 3$ Rate $= k[XH_2][Br_2]^{1/2}$
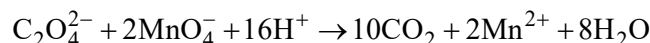
3 Rate $= k[XH_2][Br_2]^{1/2}$

$X = 3$, the concentration of H_2 is tripled.

(c) The slowest step is the one that determines the rate. From mechanisms 2, Rate k[A][B] while from mechanisms 1, Rate = k[A]. Therefore, mechanisms 2 is consistent with the experimental finding.

30. **(i)(B)**   **(ii)(B)**   **(iii)(A)**   **(iv)(D)**
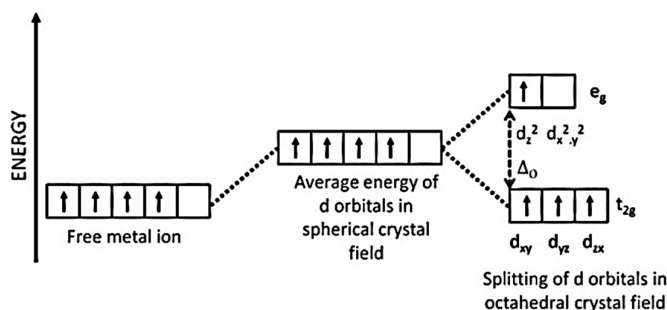
31.(a) (i)   Test tube C

$$10I^- + MnO_4^- + 16H^+ \rightarrow 5I_2 + 2Mn^{2+} + 8H_2O$$

(ii)   Test tube A

$$C_2O_4^{2-} + 2MnO_4^- + 16H^+ \rightarrow 10CO_2 + 2Mn^{2+} + 8H_2O$$

(b) (i)

(ii) Sp^3d^2, Since $\Delta_0 > P$ it will form an outer orbital complex as the electrons in the 3d orbital will not pair up.

(iii)   Optical isomerism.

<div align="center">**Or**</div>

(a) $A = Co^{2+}$

$B = 3$

$C = d^2sp^3$

$D = $ Paramagnetic

$E = sp^3$

$F = $ tetrahedral

(b) (i) $Cr_2O_7^{2-} + 8H^+ + 3H_2S \rightarrow 2Cr^{3+} + 3S + 7H_2O$

(ii) $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$

32.(a) **(i)** The reaction of ethanol with acetyl chloride is carried out in the presence of pyridine. Pyridine is a strong organic base. The function of pyridine is to remove HCl formed in the reaction.

(ii) The electron releasing groups, such as alkyl groups in general, do not favour the formation of phenoxide ion resulting in decrease in acid strength. Cresols, for example, are less acidic than phenol.
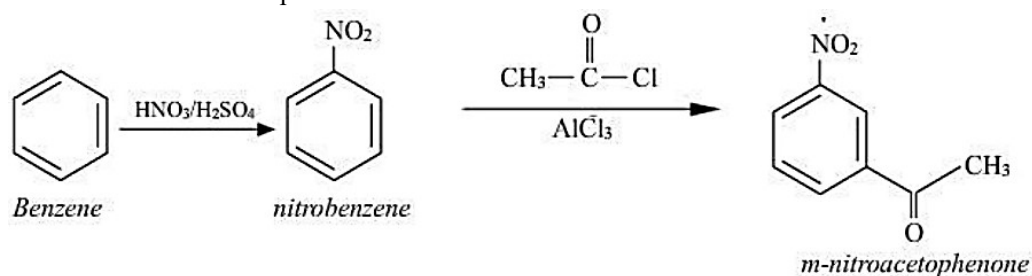
(b) C_2H_5Br and $CH_3CH_2CH(CH_3)CH_2CH_2ONa$

yields 2-ethoxy-3-methylpentane
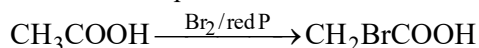
(c) (i) Toluene to 3-nitrobenzoic acid.
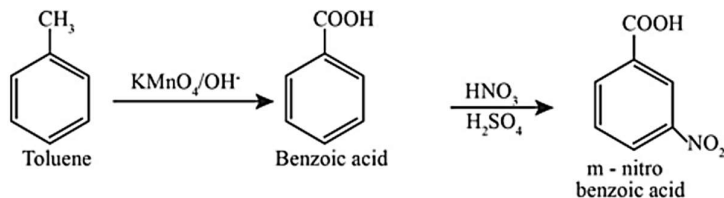
(ii) Benzene to m-nitroacetophenone.

Or

(a) Acetic acid will give HVZ reaction.

Carboxylic acids having an α-hydrogen are halogenated at the α-position on treatment with chlorine or bromine in the presence of a small amount of red phosphorus to give a-halo carboxylic acids.

$$CH_3COOH \xrightarrow{Br_2/redP} CH_2BrCOOH$$

(b) Isomers of butanol are Butan-1-ol, butan-2-l, 2-methylpropanol and 2-methylpropan-2-ol.

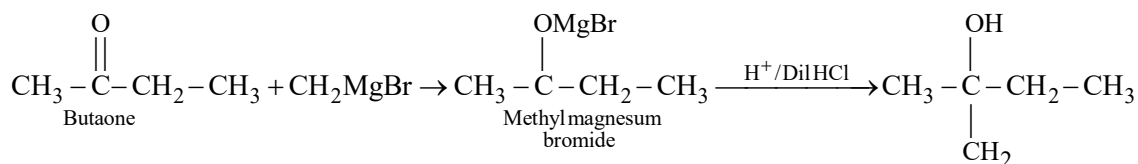Acidic strength in isomeric alcohols varies as follows:

The acidic character of alcohols is due to the polar nature of the O-H bond. An electron-releasing group $(CH_3, -C_2H_5)$ increases electron density on oxygen, tending to decrease the polarity of the O-H bond.

2-methylpropan-2-ol < 2-methylpropanol < butan-2-ol < Butan-1-ol

(c) An organic compound A is a Grignard reagent: RMgX B is a ketone RCOR'

(2-methylbutan-2-ol)
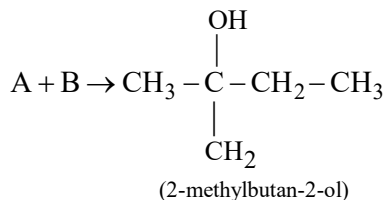
Ketones leads to the formation of te3rtiary alcohol, so the compound B is a ketone B-Butan-2-one and A' is CH_3MgBr

$$CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - CH_3 + CH_2MgBr \rightarrow CH_3 - \overset{\overset{OMgBr}{|}}{C} - CH_2 - CH_3 \xrightarrow{H^+/Dil\,HCl} CH_3 - \overset{\overset{OH}{|}}{\underset{\underset{CH_2}{|}}{C}} - CH_2 - CH_3$$

Butaone   Methyl magnesum bromide

33.(a) Depression the freezing point is a colligative property. In dilute solutions the depression of freezing point (ΔTf) is directly proportional to the molal concentration of the solute n a solution. From the graph it is interpreted that Solution 2 shows more depression in freezing point 1 M $Al(NO)_3$ has higher i value $(i = 3)$ than 1 M glucose $(i = 1)$

1 M $Al(NO)_3$ will have higher depression, hence solution 2 is $Al(NO)_3$ solution and solution 1 is glucose solution.

(b) $\pi = (n_2 / V)RT$

Given $\pi = 2.64\,atm$

Let $V_1 = V$

$V_2 = 5V$ (On dilution by 5 times)

$$\frac{\pi^1}{\pi^2} = \frac{(n/V_1)}{(n/V_2)}$$

$$\frac{2.64}{\pi^2} = \frac{(n/V)}{(n/5V)}$$

$$\pi^2 = 0.528\,atm$$

Osmotic pressure is directly proportional to temperature.

The osmotic pressure of can sugar can be decreased by decreasing the temperature.

Or

(a) While giving intravenous injection to the patients, utmost care of concentration o the solution is to be taken. The solution must have same concentration as that of blood cells. If the solution becomes more concentrated than the concentration of the blood it will lead to the shrinking of blood cells and fluid will start flowing out because of endosmosis.

If concentration is less concentrated than the concentration of the blood it will lead to swelling of blood cells will take place. Both situations are life-threatening.

(b) $2C_6H_5OH \rightarrow (C_6H_5OH)_2$
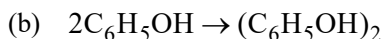
Initial concentration	C	O
Final concentration	$C(1-\alpha)$	$\dfrac{C\alpha}{n}$

Where α is degree of association. Experimentally, phenol is 73% associated.

Hence $\alpha = 0.73$

Relation between i (vant hoff factor) and α is given as: $\alpha = \dfrac{1-i}{1-n}$, where n for phenol $= \dfrac{1}{2}$ as phenol

acts as dimmer, association is taking place

Substituting the values:

$$0.73 = \dfrac{1-i}{0.5}$$

$$i = i - (0.73 \times 0.5)$$

$$i = 1 - 0.365 = 0.635$$

Depression in freezing point can be calculated as:

$$K_f = 5.12 \, K \, Kg \,/\, mol,$$

$$W_b = 2 \times 10^{-2} \, Kg = 20 \, g,$$

$$W_a = 1 \, kg = 1000$$

$$M_b = 1 \, kg = 1000$$

$$M_b = 94$$

$$\Delta T_f = \dfrac{k_f \times i \times W_b}{M_b} = \dfrac{5.12 \times 0.635 \times 20}{94} = \dfrac{65.024}{94} = 0.691 \, K$$

MOCK CHEMISTRY | SUBJECTIVE TEST

CLASS – XII | SET - 2 | SOLUTIONS

1. (B)	6. (A)	11. (A)
2. (C)	7. (B)	12. (B)
3. (D)	8. (C)	13. (C)
4. (A)	9. (A)	14.(B)
5. (B)	10. (A)	15. (B)
		16. (D)

17. (i) Given:

Half-life of X = 12 h

Half-life of Y = 16 h

Time = 2 days = 48 h

For first order reaction,

Half-life of X after 2 days $= \dfrac{48}{12} = 4$

Amount of X left after 4 half lives $= \dfrac{1}{16}$ of initial value half-life of Y after 2 days

$= \dfrac{48}{16} = 3.$

Amount of Y left after 3 half lives $= \dfrac{1}{8}$ of initial value.

Ratio of X : Y = 1 : 2

(ii) For the reaction, $P + Q \longrightarrow R$

$\text{Rate} = k[P]^{1/2}[Q]^{0} = k[P]^{1/2}$

General formula for determination of unit is

$mol^{1-n}L^{n-1}s^{-1}.$

So, for $\dfrac{1}{2}$ order reaction, unit is $mol^{1/2}L^{-1/2}s^{-1}.$

18. $\pi_1 = \pi_2$

$iC_1RT = C_2RT$

$\dfrac{3 \times 5}{322} = \dfrac{2}{M}$

$M = \dfrac{2 \times 322}{3 \times 5}$

$M = 42.9g$

19. **(a).** m-dichlorobenezne < o-dichlorobenzene < p-dichlorebenzene

Symmetrical structure and close packing in para isomer ortho has a stronger dipole interaction as compared to meta

(b). the halogen atom because of its -I effect has some tendency to withdraw electrons from the benzene ring. As a result, the ring gets somewhat deactivated as compared to benzene and hence the electrophilic substitution reactions in haloarenes occur slowly and require more drastic conditions as compared to those in benzene.

20. **(a).** p-nitrobenzaldehyde is more reactive towards the nucleophilic addition reaction than p-tolualdehyde as Nitro group is electron withdrawing in nature. Presence of nitro group decrease electrons density, hence facilitates the attack of nucleophile. Presence of $-CH_3$ leads to +l effect as CH_3 is electron releasing group.

(b).

OR

(a).

(b).
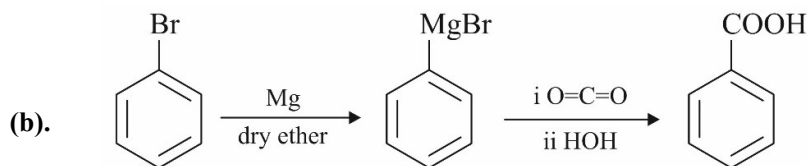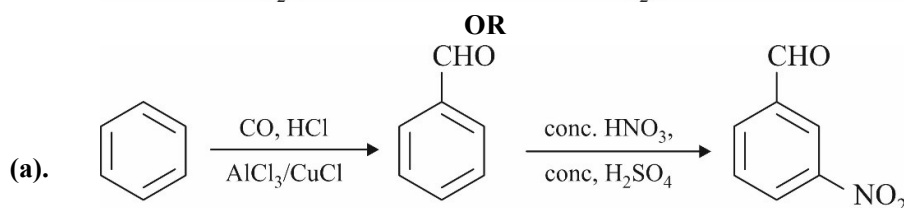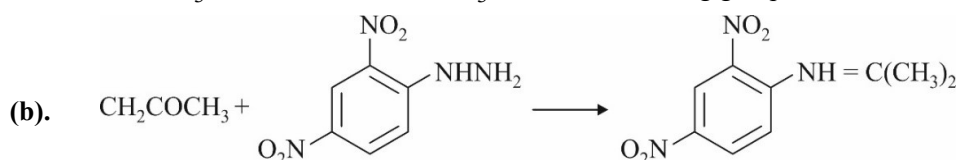
21. **(a).** **Replication**

A sequence of bases on DNA is unique for a person and is the genetic material transferred to the individual from the parent which helps in the determination of paternity.

(b). During denaturation secondary and tertiary structures are destroyed but the primary structure remains intact.

22. **(a).** $[Cr(en)_2(OH)_2]Cl$ or $[Cr(H_2NCH_2CH_2NH_2)_2(OH)_2]Cl$

(b). No, ionization isomers are possible by exchange of ligand with counter ion only and not by exchange of central metal ion.

(c). The central atom is electron pair acceptor so it is a Lewis acid.

23. **(a).** Yes, if the concentration of $ZnSO_4$ in the two half cell is different, the electrode potential will be different making the cell possible.

(b). $\Lambda_m^0(MgCl_2) = \lambda_m^0(Mg^{2+}) + 2\lambda_m^0(Cl^-)$

$258.6 = 106 + 2\lambda_m^0(Cl^-)$

$\lambda_m^0(Cl^-) = 76.3 \, Scm^2 mol^{-1}$

(c). cell constant $G* = k \times R$

$k = G*/R = 0.146/1000 = 1.46 \times 10^{-4} \, Scm^{-1}$

24. **(a).** Reimer Tiemann,

OH

CHO
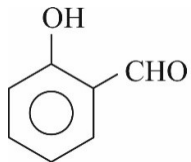
2-Hydroxybenzaldehyde

(b). Williamson synthesis, $CH_3CH_2CH(CH_3)CH(CH_3)OC_2H_5$

2-Ethoxy-2-methylpentane

25. A, B and C contain carbonyl group as they give positive 2, 4 DNP test

A and B are aldehydes as aldehydes reduce Tollen's reagent

C is a ketone, as it contains carbonyl group but does not give positive Tollen's test

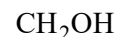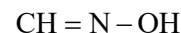C is a methyl ketone as it gives positive iodoform test

D is a carboxylic acid

Since the number of carbons in the compounds A, B, C and D is three or two B is CH_3CHO

as this is only aldehyde which gives a positive iodoform test

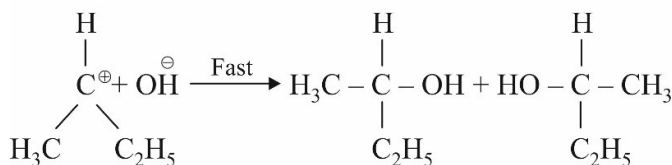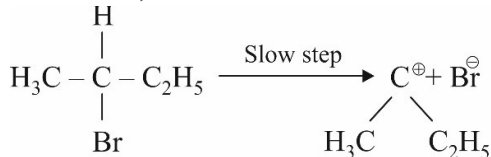The remaining compounds A, C and D have three carbons

A is CH_3CH_2CHO, C is CH_3COCH_3 and D is CH_3CH_2COOH

26. **(a).** The reactant Sucrose is dextrorotatory. On hydrolysis it give glucose dextrorotatory and fructose which is leavororatory. The specific rotation of fructose is higher than glucose. Sucrose is dextrorotatory but after hydrolysis gives dextrorotatory glucose and leavorotatory fructose. Since the laevorotation of fructose (–92°4) is more than dextrorotation of glucose (+ 52.5°), the mixture is laevorotatory.

(b). Invert sugar, the hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (–) and the product is named as invert sugar.

(c). Glucose

$CH = N - OH$

$|$

$(CHOH)_4$

$|$

CH_2OH

27. $C_2H_5 - CH - CH_3$

$|$

Br

Mechanism;

H

$|$

$H_3C - C - C_2H_5 \xrightarrow{\text{Slow step}} C^{\oplus} + \overset{\ominus}{Br}$

$|$

$Br \qquad\qquad\quad H_3C \quad C_2H_5$

H $\qquad\qquad$ H $\qquad\quad$ H

$|$ $\qquad\qquad\quad$ $|$ $\qquad\quad$ $|$

$C^{\oplus} + \overset{\ominus}{OH} \xrightarrow{\text{Fast}} H_3C - C - OH + HO - C - CH_3$

$H_3C \quad C_2H_5 \qquad\qquad C_2H_5 \qquad\quad C_2H_5$

28.
$$\log\left(\frac{k_1}{k_1}\right) = \frac{Ea}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$$

$$\frac{\log 0.20}{0.05} = \frac{Ea}{2.303R}\left[\frac{1}{200} - \frac{1}{500}\right]$$

$$\log 10 = \frac{Ea}{19.15}\left(\frac{300}{200 \times 600}\right)$$

$$Ea = \frac{19.15 \times 200 \times 500}{300}$$

$$Ea = 6383 \, J/mol$$

29.   **(a)**   D energy is directly proportional to the wave number. Maximum energy of light is required for an electron to jump from t_{2g} to eg in case of $[CrD_6]^{3-}$.

<div align="center">**OR**</div>

A, the splitting caused in least in this case as the energy required for electron to jump from t_{2g} to eg., is minimum.

(b) $[C_rB_6]^{3+}$, wavelength of light absorbed is $\frac{1}{17830} = 560\,nm$ for the complex while

$\frac{1}{13640} = 733$ nm for $[CrA_6]^{3-}$ complex.

(c)   **(i)** $[CrCl_6]^{3-}$, Hexachloridochloramte (III) ion

(ii) $[Cr(NH_3)_6]^{3+}$, Hexaamminechromium (III) ion

$A = Cl^{-1}, B = H_2O, C = N$

30.   **(a)**   2 mol e" (or 2F) have been transferred from anode to cathode to consume 2 mol of H_2SO_4 therefore, one mole H_2SO_4 requires one faraday of electricity or 96500 coulombs.

(b) $w_{max} = -nFE° = -2 \times 96500 \times 2.0 = 386000\,J$ of work can be extracted using lead storage cell when the cell is in use.

(c)   Yes, Hydrogen is a fuel that on combustion gives water as a byproduct. There are no carbon emissions and no pollutions caused. However, at present the means to obtain hydrogen are electrolysis of water which use electricity obtained from fossil fuels and increases carbon emissions. Inspite of the problems faced today in the extraction of hydrogen, we cannot disagree on the fact that hydrogen is a clean source of energy. Further research can help in finding solutions and green wavs solutions and green ways like using solar energy for extraction of hydrogen.

<div align="center">**Or**</div>

(i).   Lead batteries are currently the most important and widely used batteries. These are rechargeable. The problem is waste management which needs research and awareness. Currently, these are being thrown into landfills and there is no safe method of disposal or recycling. Research into safer methods of disposal will reduce the pollution and health hazards caused to a great extent.

(ii). A fuel cell is a clean source of energy. Hydrogen undergoes combustion to produce water. The need of the hour is green fuel and hydrogen is a clean fuel. The current problem is obtaining hydrogen. Research that goes into this area will help solve the problem of pollution and will be a sustainable solution.

31. **(a)** Both Ti^{3+} and Cu^{2+} have 1 unpaired electron, so the magnetic moment for both will be 1.73 BM

(b) Zn, it has a more negative electrode potential so will corrode itself in place of iron.

(c) Mn' has $3d^5 4s'$ configuration and configuration of Cr. is $3d^5$, therefore, ionisation enthalpy of Mn^+ is lower than Cr^+.

(d) Sc and Zn both form colourless compound and are diamagnetic.

(e) The decrease in the atomic and ionic radii with increase in atomic number of actinoids due to poor shielding effect of 5f electron.

(f) In both chromate and dichromate ion the oxidation state of Cr is +6

(g) $10 I^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5I_2$

32. **(a)** Addition of glucose to water is an endothermic reaction. According to Le Chatelier's principle, on increase in temperature, solubility will increase.

(b) Q is ocean water, due to the presence of salts it freezes at lower temperature (depression in freezing point)

(c) $K_3[Fe(CN)e]$ gives 4 ions in aqueous solution

$$i = 1 + (n-1)\alpha$$

$$i = 1 + (4-1) \times 0.0.852$$

$$i = 3.556$$

$$\Delta Tb = iKb\ m = 3.556 \times 0.52 \times 1 = 1.85 = 101.85°C$$

Or

(a) Negative Deviation is expected when phenol and aniline are mixed with each other. The net volume of the mixture will decrease, $\Delta V < 0$ due to stronger intermolecular interactions.
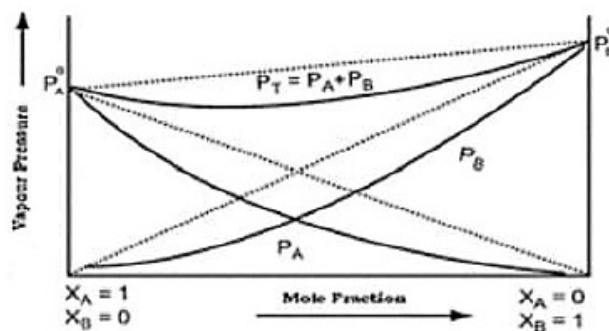
p, x Diagram for solutions showing Negative deviation from Raoult's Law.

(b)   Relative lowering of vapour pressure $= (P° - P) / P° = X^2$

$$x_2 = n_2 / n_1$$

$$n_2 = 0.1$$

$$n_1 = 100 / 18$$

$$x_2 = 0.1 / 5.55 + 0.1 = 0.1 / 5.65 = 0.018$$

$P° = 23.8$ mm Hg

Relative lowering of vapour pressure $= (23.80 - P) / 23.80 = 0.018$

$23.80 - P = 0.428$

$P = 23.80 - 0.428 = 23.37$ mm Hg

33.(a) Compound "A" is p-methylnitrobenzene
Compound 'B" is p- methylbenzenamine
Compound C is p-methylbenzenediazoiumchloride
Compound D - Toluene
Compound E - Benzaldehyde
The chemical reactions involved are
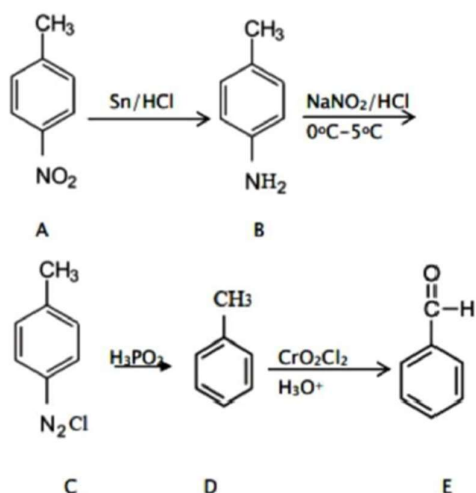
Or

(i)   The hydrogen attached to N-Ethylbenzene sulphonamide is acidic in nature. This is due to the presence of strong electron withdrawing sulphonyl group. Hence, it is soluble in alkali.

(ii)   Reduction with iron scrap and hydrochloric acid is preferred because $FeCl_2$ formed gets hydrolysed to release hydrochloric acid during the reaction. Thus, only a small amount of hydrochloric acid is required to initiate the reaction.

(b) **(i)** $C_6H_5NH_2 > C_6H_5NHCH_3 > NH_3 > C_6H_5CH_2NH_2 > CH_3NH_2$

      (ii) $C_2H_5Cl < C_2H_5 NH_2 < C_2H_5OH$

      (iii) $CH_3COOH > C_2H_5OH > CH_3NH_2 > CH_3OCH_3$