ISC Solved Paper 2018
Chemistry
Class-XII

(Maximum Marks : 80)

(Time allowed : Three hours)

*Candidates are allowed an additional **15 minutes** for **only** reading the paper.*
*They must **NOT** start writing during this time.*

All questions are compulsory
Question 1 is of 20 marks having four sub parts, all of which are compulsory. Question numbers 2 to 8 carry 2 marks each, with any two questions having internal choice.
Question numbers 9 to 15 carry 3 marks each, with any two questions having an internal choice.
Question numbers 16 to 18 carry 5 marks each, with an internal choice.
All working, including rough work, should be done on the same sheet as, and adjacent to the rest of the answer.
The intended marks for questions or parts of questions are given in brackets [].
Balanced equations must be given wherever possible and diagrams where they are helpful.
When solving numerical problems, all essential working must be shown.
In working out problems, use the following data:.
Gas constant R = 1.987 cal deg^{-1} mol^{-1} = 8.314 JK^{1} mol^{-1} = 0.0821 dm^3 atm. 11 atm = / dm^3 atm = 101.3 J.
1 Faraday = 96500 coulombs. Avogadro's number = 6.023×10^{23}

---

1. (a) Fill in the blanks by choosing the appropriate word/words from those given in the brackets: [4 × 1]

(square pyramidal, electrical, 74, 26, sp^3d^2, sp^3d, chemical, 68, 32, tetrahedral, yellow, white, iodoform, Lucas)

(i) A Galvanic cell converts ____ energy into ___ energy.

*__(ii)__ The percentage of unoccupied spaces in bcc and fcc arrangements are ____ and ___,__ respectively.

(iii) Propan-2-ol on reaction with iodine and sodium hydroxide gives ____ precipitate and the reaction is called ____test.

*__(iv)__ The geometry of $XeOF_4$ molecule is_____ and the hybridisation of xenon atom in the molecule is _____ .

(b) Complete the following statements by selecting the correct alternative from the choices given : [4 × 1]

(i) During the course of an S_N1 reaction, the intermediate species formed is :

(1) a carbocation
(2) a free radical
(3) a carbanion
(4) an intermediate complex

*__(ii) Purification of aluminium by electrolytic refining is called :__

(1) Serpeck's process
(2) Hoope's process
(3) Hall's process
(4) Baeyer's process

(iii) An aqueous solution of urea freezes at –0.186°C, K_f for water = 1.86 K kg mol^{-1}, K_b for water = 0.512 K kg mol^{-1}. The boiling point of urea solution will be :

(1) 373.065 K
(2) 373.186 K
(3) 373.512 K
(4) 373.0512 K

(iv) In the dehydration of alcohols to alkenes by heating with concentrated sulphuric acid, the initiation step is :

(1) formation of carbocation
(2) formation of an ester
(3) protonation of alcohol molecule
(4) elimination of water

(c) Match the following : [4 × 1]

(i)	Rate constant	**(a)**	Dialysis
(ii)	Biodegradable polymer	**(b)**	Glycine
(iii)	Zwitter ion	**(c)**	Arrhenius equation
(iv)	Purification of colloids	**(d)**	PHBV

***Out of Syllabus**

(d) Answer the following questions : [4 × 2]

(i) (1) Why does the density of transition elements increase from Titanium to Copper ?
(at, no. Ti = 22, Cu = 29)

(2) Why is zinc not regarded as a transition element ?
(at, no. Zn = 30)

(ii) Identify the compounds A, B, C and D.

$$CH_3CN \xrightarrow{H_2O/H^+} A \xrightarrow{NH_3} B \xrightarrow{heat} C \xrightarrow{Br_2/KOH} D$$

(iii) Calculate the osmotic pressure of a solution prepared by dissolving 0.025g of K_2SO_4 in 2.0 litres of water at 25°C assuming that K_2SO_4 is completely dissociated, (mol, wt. of K_2SO_4 = 174 g mol^{-1})

(iv) What type of isomerism is shown by the following coordination compounds :
$[Pt\ Cl_2\ (NH_3)_4]\ Br_2$ and $[Pt\ Br_2(NH_3)_4]Cl_2$.
Write their 1UPAC names.

Ans. (a) (i) chemical to electrical.

(iii) yellow and Iodoform..

(b) (i) (1) a carbocation.

(iii) (4) 373.0512 K

(iv) (1) Formation of carbocation.

(c) (i) Rate constant → Arrhenius equation.

(ii) Biodegradable polymer → PHBV.

(iii) Zwitter ion → Glycine.

(iv) Purification of colloids → Dialysis.

(d) (i) (1) In transition elements the electrons are being added to the inner shells (*d* or *f* sub-shells) where they are very effective at screening the outer electrons from the nuclear charge. This trend in density can be explained by the small and irregular decrease in metallic radii coupled with the relative increase in atomic mass.

(2) Zinc is not a transition metal because its stable ion Zn^{2+} has completely filled *d*-orbitals. Transition metals are compounds that form at least one stable ion with incomplete *d*-structure. The electronic configuration of Zn and Zn^{2+} is [Ar] $3d^{10}\ 4s^2$ and [Ar] $3d^{10}$, respectively.

(ii) $CH_3CN \xrightarrow{H_2O/H+} \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{NH_3}$

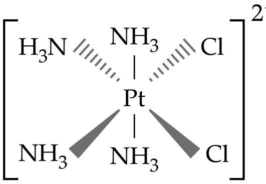
$\underset{\text{Ethanamide}}{CH_3CONH_2} \xrightarrow{\Delta} \underset{\text{Methyl isocyanate}}{CH_3N{=}C{=}O} \xrightarrow{Br_2/KOH} \underset{\text{Methyl amine}}{CH_3NH_2}$

(iii) Osmotic pressure can be calculated as $\pi = \dfrac{mRT}{(MV)}$, where m is the mass of the compound, R is the Gas constant, T is the temperature, and V is the volume. m = 0.025 gm, R = 8.31 J K^{-1} mol^{-1}, T = 25° C or 298 K, M = 174 gm mol^{-1}, and V = 2 L or 2000 × 10^{-6} m^3.

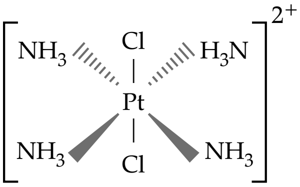
$$\pi = \frac{0.025 \times 8.31 \times 298}{174 \times 0.002}$$

Thus, π = 177.9 N m^{-2}, or π = 1779 dyne cm^{-2}, or π = 1779 Pa.

(iv) They will exhibit geometric isomerism (cis- and trans-).
The IUPAC names of $[PtCl_2(NH_3)_4]$ Br_2 and $[PtBr_2(NH_3)_4]$ Cl_2 are Tetraamminedichloroplatinum (IV)bromide and Tetraamminedibromoplatinum (IV) chloride, respectively.
$[PtCl_2(NH_3)_4]Cl$ shows geometrical isomerism :

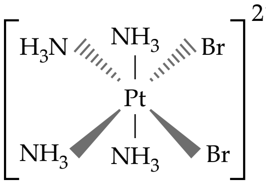


Cis

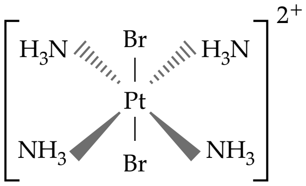


Trans

$[PtBr_2(NH_3)_4]Br$ shows geometrical isomerism :



Cis



Trans

2.(a) (i) Write the rate law expression for the reaction A + B + C → D + E , if the order of reaction is first, second and zero with respect to A, B and C, respectively.

(ii) How many times the rate of reaction will increase if the concentration of A, B and C are doubled in the equation given in (i) above? [2]

OR

(b) The rate of reaction becomes four times when the temperature changes from 293 K to 313 K. Calculate the energy of activation (E_a) of the reaction assuming that it does not change with temperature. (R = 8.314 K^{-1} mol^{-1}). [2]

*Out of Syllabus

Ans. (a) (i) $\frac{dx}{dt} = k[A]^1[B]^2[C]^0$

(ii) When the concentration doubles the reaction rate will increase by a factor of 8 as the order of the reaction is 3.

(b) Given $\frac{k_2}{k_1} = 4, T_2 = 313\text{ K}, T_1 = 293\text{ K}$, we have

$$\log\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left(\frac{T_2 - T_1}{T_2T_1}\right),$$

$$\text{or } \log 4 = \frac{E_a}{2.303 \times \frac{8.314\text{ J}}{\text{mol/K}}} \times \frac{313\text{K} - 293\text{K}}{313\text{K} \times 293\text{K}}, \text{ or}$$

Activation energy $E_a = 52.86\ \frac{k\text{ J}}{\text{mol}}$

***3. (a) How do antiseptics differ from disinfectants?**

(b) State the role of the following chemicals in the food industry :

(i) Sodium benzoate

(ii) Aspartame **[2]**

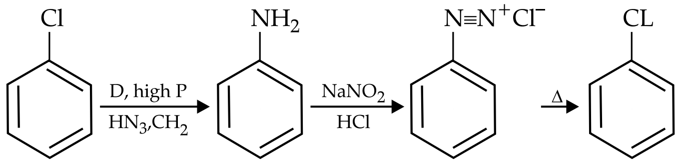
Ans. (a) Antiseptics are applied to the living skin or tissue to prevent infection whereas disinfectants are applied to surfaces, equipments or other non-living things. They kill microorganisms such as bacteria, viruses, and fungi using chemicals called biocides.

(b) (i) Sodium benzoate is the sodium salt of benzoic acid. It is used as a preservative in the food industry and can be found in acidic foods such as salad dressings, carbonated drinks (as carbonic acid), sauces and juices (citric acid), and pickles (acetic acid).

(ii) Aspartame is used as an intense sweetener in the food industry. It is approximately 200 times sweeter than sugar and is used in soft drinks, low calorie sugar free foods.

4. An aromatic organic compound [A] on heating with NH_3 and Cu_2O at high pressure gives [B|. The compound [B] on treatment with ice cold solution of $NaNO_2$ and HCl gives [C], which on heating with Cu/HCI gives compound [A] again. Identify the compounds [A], [BJ and [C]. Write the name of the reaction for the conversion of (B] to [C]. **[2]**

Ans. $A \xrightarrow[NH_3, Cu_2O]{\Delta, \text{High P}} B \xrightarrow[HCl]{NaNO_2} C \xrightarrow[Cu/HCl]{\Delta} A$



Benzylchloride Benzylamine Benzene diazonium Chloride Benzylchloride

***5. Write the names of the monomers for each of the following polymers:**

(a) Bakelite

(b) Nylon – 2 – nylon – 6 **[2]**

6. Name the purine bases and pyrimidine bases present in RNA and DNA.

Ans. RNA : Purine base–Adenine and Guanine, Pyrimidine base–Uracil, Cytosine.

DNA : Purine base–Adenine and Guanine, Pyrimidine base–Thymine and Cytosine.

7. (a) How will you obtain the following? (Give balanced equation.)

(i) Picric acid from phenol.

(ii) Ethyl chloride from diethyl ether. **[2]**

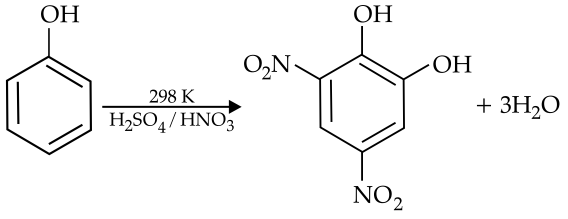
OR

(b) How will you obtain the following? (Give balanced equation.)

(i) Anisole from phenol

(ii) Ethyl acetate from ethanol **[2]**

Ans. (a) (i) Picric acid from phenol



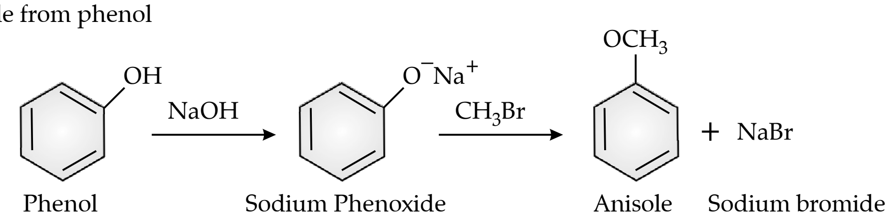
Phenol 2, 4, 6 - trinitrophenol (Picric acid) water

(ii) $CH_3CH_2OCH_2CH_3 + PCl_5 \xrightarrow{\Delta} 2\,CH_3CH_2Cl + POCl_3$

Diethyl ether Ethyl chloride

***Out of Syllabus**

(b) (i) Anisole from phenol



(ii) Ethylacetate from ethanol

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3COOH} \longrightarrow \underset{\text{Ethylaetate}}{CH_3COOC_2H_5} + \underset{\text{Water}}{H_2O}$$

8. 40% of a first order reaction is completed in 50 minutes. How much time will it take for the completion of 80% of this reaction? [2]

Ans. 40% of first order reaction is completed in 50 min.

$$k = \left(\frac{2.303}{t}\right)\log\frac{a}{(a-x)}, \text{ when}$$

$x = 0.4a$, and $t = 50$ min, $k = \left(\frac{2.303}{50}\right)\log\frac{1}{0.6}$,

$k = 0.010218 \text{ min}^{-1}$.

$$t = \left(\frac{2.303}{0.010218}\right)\log\left(\frac{a}{a-0.8a}\right)$$

$t = 157.5$ min

9. (a) The freezing point of a solution containing 5.85g of NaCl in 100g of water is – 3.348°C. Calculate van't Hoff factor '*i*' for this solution. What will be the experimental molecular weight of NaCl?

(K_f for water = 1.86 K kg mol^{-1}, at wt. Na = 23, Cl = 35.5)

OR

(b) An aqueous solution containing 12.48 g of barium chloride ($BaCl_2$) in 1000g of water, boils at 100.0832°C. Calculate the degree of dissociation of barium chloride, (K_b for water = 0.52 K kg mol^{-1}, at. wt. Ba = 137, Cl = 35.5)

Ans. (a) Freezing point of water −3.348ºC when solute is added. Freezing point of water under normal conditions is 0°C. Change in the freezing point $\Delta T_f = 0-(-3.348)$°C, or $\Delta T_f = 3.348$°C, or $\Delta T_f = 3.348$ K. The van't Hoff factor i is calculated as $i = \frac{\Delta T_f}{(K_f m)}$, where $K_f = 1.86$ K kg mol^{-1}, molality

m is calculated as m =mass of solute/(Molecular weight of solute × mass of solvent). Mass of solute= 5.85 g, Molecular weight of NaCl is 58.5 g mol^{-1} i.e., (23 + 35.5) g mol-1, and mass of solvent is 100 g or 0.1 kg. Thus, $m = \frac{5.85}{(58.5\times 0.1)}$,

or $m = 1$ mol kg^{-1}. Using the above values, van'*t* Hoff factor $i = 1.8$.

(b) Change in the boiling point $\Delta T_b = 100.0832 - 100$ºC, or $\Delta T_b = 0.0832$°C, or $\Delta T_b = 0.0832$ K. The van't Hoff factor i is calculated as $i = \frac{\Delta T_b}{(K_b m)}$, where $K_b = 0.52$ K kg mol^{-1}, molality

m is calculated as m =Mass of solute/(Molecular weight of solute × mass of solvent). Mass of solute= 12.48 g, Molecular weight of $BaCl_2$ is 208 g mol^{-1} i.e., (137 + 2×35.5) g mol^{-1}, and mass of solvent is 1000 g or 1 kg. Thus, m = 12.48/(208 × 1). Using the above values, van't Hoff factor $i = 2.67$.

The degree of dissociation α is related to the van't Hoff factor i, as $i = 1 + \alpha\,(n-1)$, or $\alpha = \frac{(i-1)}{(n-1)}$ where n is the number of ions, and n = 3, as there are 3 ions in $BaCl_2$. Using the above values, degree of dissociation $\alpha = \frac{(2.67-1)}{(3-1)}$, or $\alpha = 0.835$.

***10. Examine the defective crystal given below and answer the question that follows :**

A^+	B^-	A^+	B^-	A^+
B^-		B^-	A^+	B^-
A^+	B^-	A^+		A^+
B^-	A^+	B^-	A^+	B^-

State if the above defect is stoichiometric or non-stoichiometric. How does this defect affect the density of the crystal? Also, write the term for this type of defect.

***11. Give reason for each of the following : [3]**

(a) For ferric hydroxide sol the coagulating power of phosphate ion is more than chloride ion

(b) Medicines are more effective in their colloidal form.

(c) Gelatin is added to ice creams.

12. (a) For the complex-ion $[Fe(CN)_6]^{3-}$, state : [3]

(i) the type of hybridisation.

(ii) the magnetic behaviour.

(iii) the oxidation number of the central metal atom.

***Out of Syllabus**

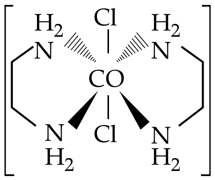
(b) Write the IUPAC name of $[Co(en)_2Cl_2]^+$ ion and draw the structures of its geometrical burners.

Ans. (a) (i) The hybridisation of $[Fe(CN_6)]^{3-}$ is d^2sp^3 because of strong field ligand, CN_.

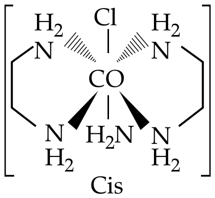
(ii) The magnetic behaviour is paramagnetic with an octahedral geometry and one electron.

(iii) The oxidation number of the central metal atom Fe= +3.

(b) Cis and Trans isomers of Dichlorobis ethylenediamine cobalt (III) chloride.



Trans



Cis

The IUPAC name of $[Co(en)_2Cl_2]^+$ ion is Dichlorobis (ethylenediamine) Cobalt (III) Chloride.

13. (a) Explain why :

(i) Mn^{2+} is more stable than Fe^{2+} towards oxidation to +3 state.
(At. no. of Mn-25, Fe-26)

(ii) Transition elements usually form coloured ions.

(iii) Zr and Hf exhibit similar properties.
(At. no. of Zr = 40, Hf=72)

OR

(b) Complete and balance-the following chemical equations :

(i) $KMnO_4 + KI + H_2SO_4 \rightarrow$ ______ + ______ + ______ + ______

(ii) $K_2Cr_2O_7 + H_2SO_4 + H_2S \rightarrow$ ______ + ______ + ______ + ______

(iii) $KMnO_4 + H_2SO_4 + FeSO_4 \rightarrow$ ______ + ______ + ______ + ______

Ans. (a) (i) The electronic configuration of Mn^{2+} and Fe^{2+} are $[Ar]^{18}3d^5$ and $[Ar]^{18}3d^6$, respectively. Mn^{2+} has a stable state $3\underline{d}^5$ configuration and is thus resistant towards oxidation to Mn^{3+}. On the other hand, Fe^{2+} has a $3\underline{d}^6$ configuration and by losing one electron, it can change to a more stable $3\underline{d}^5$ configuration. Therefore, Fe^{2+} is easily oxidised to Fe^{3+} oxidation state.

(ii) Transition metals have partially filled *d*-orbitals. When they start bonding with other ligands, the *d*-orbitals split and become non-degenerate which means they have different energy levels.

The electrons are able to absorb certain wavelengths of electromagnetic radiation to get to higher energy level orbitals and during the downward transition emit light which gives them a coloured appearance.

(iii) Zr and Hf exhibit similar properties due to lanthanide contraction. Electrons present in the *f*-subshell are not too effective in shielding, due to which the size gets constricted with atomic number and so the size of Zr and Hf have nearly the same size and properties.

(b) (i) $2\,KMnO_4 + 10\,KI + 8\,H_2SO_4 \longrightarrow 5\,I_2 + 2\,MnSO_4 + 6\,K_2SO_4 + 8\,H_2O$

(ii) $K_2Cr_2O_7 + 4\,H_2SO_4 + 3\,H_2S \longrightarrow K_2SO_4 + Cr_2(SO_4)_3 + 3\,S + 7\,H_2O$

(iii) $2\,KMnO_4 + 8\,H_2SO_4 + 10\,FeSO_4 \longrightarrow 5\,Fe_2(SO_4)_3 + 2\,MnSO_4 + K_2SO_4 + 8\,H_2O$

14. (a) Arrange the following in the increasing order of their basic strength :
$C_2H_5NH_2$, $C_6H_5NH_2$, $(C_2H_5)_2NH$

(b) Give a balanced chemical equation to convert methyl cyanide to ethyl alcohol,

(c) What happens when benzene diazonium chloride reacts with phenol in weak alkaline medium?
(Give balanced equation)

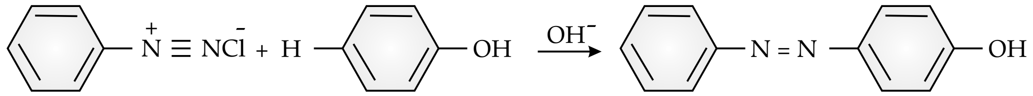
Ans. (a) $C_6H_5NH_2 < C_2H_5NH_2 < (C_2H_5)_2NH$

$C_6H_5NH_2$ will be least basic because of the de-localisation of the lone pair of electron present on the N-atom over the benzene ring due to the −R effect of the C_6H_5 group. On the other hand, the alkyl group C_2H_5 will tend to increase the electron density on the N-atom making it more easily available for the donation to a proton.

(b) Methylcyanide to Ethylalcohol

$$\underset{\text{methylcyanide}}{CH_3CN} + 2H_2O \xrightarrow[-NH_4Cl]{H^+/HCl} \underset{\text{acetic acid}}{CH_3COOH} \xrightarrow{4[H]} \underset{\text{ethylalcohol}}{CH_3CH_2OH}$$

(c) Benzene diazonium chloride reacts with phenol in weak alkaline medium.



Benzenediazonium Chloride　　Phenol　　Parahydroxyazobenzone + H_2O + Cl– Water　Chloride ion

***15. Name the sulphide ore of Copper. Describe how pure copper is extracted from this ore. [3]**

16. (a) (i) Calculate the emf and ΔG° for the cell reaction at 25°C :

Zn(s) $\left|Zn^{2+}_{(aq)}\right|\left|Cd^{2+}_{(aq)}\right|$ **$Cd_{(s)}$**

(0.1M) (0.01M)

Given $E^\circ_{Zn^{2+}/Zn} = -0.763$ and $E^\circ_{Cd^{2+}/Cd} = -0.403V$

(ii) Define the following terms :

(1) Equivalent conductivity

(2) Corrosion of metals

OR

(b) (i) The specific conductivity of a solution containing 5g of anhydrous $BaCl_2$ (mol. wt. = 208) in 1000 cm^3 of a solution is found to be 0.0058 ohm^{-1} cm^{-1}. Calculate the molar and equivalent conductivity of the solution.

(ii) What is an electrochemical series? How is it useful in predicting whether a metal can liberate hydrogen from acid or not?

Ans. (a) (i) $E^\circ_{cell} = E^{o\ Right}_{cathode} - E^{o\ Left}_{anode}$

$E^\circ_{cell} = -0.403 - (-0.763)$ V, or $E^\circ_{cell} = 0.36$ V.

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

$\Delta G^\circ = -(2\ mol)(96485\ C\ mol^{-1})(0.36\ J\ C^{-1})$

$\Delta G^\circ = -69.469$ kJ

(ii) (1) Equivalent conductivity is defined as conducting power of all the ions produced by dissolving 1 g equivalent of an electrolyte in solution. Equivalent conductivity $\Lambda_e = 1000$ k/c, where k is the specific conductivity and c is the concentration in molarity.

(2) Corrosion of metals is the deterioration of a metal as a result of chemical reactions between the metal and the surrounding environment which converts a refined metal to a more chemically stable form such as oxide, hydroxide, or sulphide.

(b) (i) Molar conductivity $\Lambda_m = \frac{k}{c}$, where k is the specific conductivity and c is the concentration in molarity. $k = 0.0058\ ohm^{-1}\ cm^{-1}$. Mass of $BaCl_2$ m_a = 5g, volume of solvent V = 1 L, molecular weight of $BaCl_2$ M = 208 g mol^{-1}. Thus, $c = \frac{\left(\frac{m_a}{M}\right)}{V}$, and hence, $\Lambda_m = \frac{0.0058}{0.024}$, or Λ_m = 24.167 $ohm^{-1}\ m^{-1}\ M^{-1}$.

Equivalent conductivity $\Lambda_e = 1000\Lambda_m$, hence $\Lambda_e = 24.167 \times 10^3\ ohm^{-1}\ m^{-1}\ M^{-1}$

(ii) Electrochemical series is a series of chemical elements in order of their standard electrode potential. Hydrogen electrode is considered as having zero electrode potential. Electro-positive elements are the ones having greater tendency than Hydrogen to lose electrons to their solution. Thus they lie above Hydrogen in the series. Those that gain electrons from their solutions are electro-negative elements lie below Hydrogen in the series. Thus electro-positive elements tend to replace Hydrogen from acids.

***17. (a) (i) Explain why :**

(1) Nitrogen does not form pentahalides.

(2) Helium is used for filling weather balloons.

(3) ICl is more reactive than I_2.

(ii) Draw the structures of the following :

(1) $HClO_4$

(2) H_3PO_3

OR

***(b) (i) Explain why :**

(1) Mercury loses its meniscus in contact with ozone.

(2) Halogens are coloured and the colour deepens on moving down in the group from fluorine to iodine.

(3) Hydride of sulphur is a gas while hydride of oxygen is a liquid.

(ii) Complete and balance the following reactions:

(1) $NaCl + MnO_2 + H_2SO_4 \rightarrow$ ______ + ______ + ______ + ______

(2) $KMnO_4 + SO_2 + H_2O \rightarrow$ ______ + ______ + ______

18. (a) (i) Give balanced equations for the following reactions :

(1) Benzaldehyde reacts with hydrazine.

(2) Acetic acid reacts with phosphorous pentachloride.

(3) Acetone reacts with sodium bisulphite.

(ii) Give one chemical test each to distinguish between the following pairs of compounds :

(1) Ethanol and acetic acid

(2) Acetaldehyde and benzaldehyde

OR

(b) (i) Write chemical equations to illustrate the following name reactions :

(1) Clemmensen's reduction

(2) Rosenmund's reduction

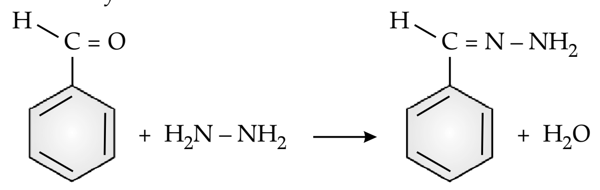
(3) HVZ reaction

(ii) Explain why :

(1) Acetaldehyde undergoes aldol condensation, but formaldehyde does not.

(2) Acetic acid is a weaker acid as compared to formic acid.

Ans. (a) (i) (1) Benzaldehyde with hydrazine



Benzaldehyde hydrazine Water

(2) $PCl_5 + CH_3COOH \longrightarrow CH_3COCl + HCl + POCl_3$

Phosphorus Pentachloride, acetic acid, acetyl chloride, Phosphorus oxychloride

(3) $CH_3COCH_3 + NaHSO_3 \longrightarrow C_3H_7NaO_4S$

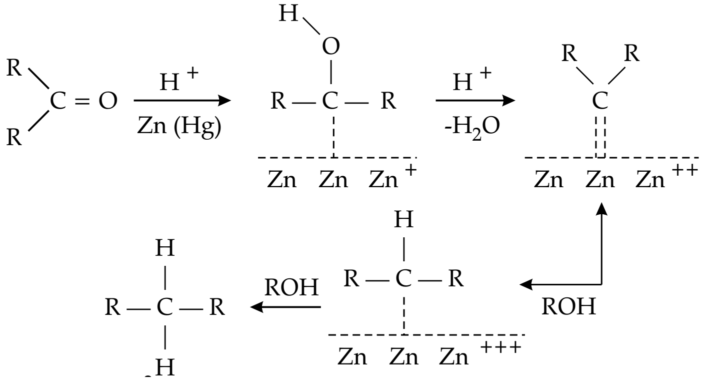
Acetone, Sodium Bisulphate, Sodium 3-hydroxy Propane-1-sulphonate

(ii) (1) **Litmus test :** Ethanol does not show any change, while with acetic acid, blue Litmus turns to red.

(2) Acetaldehyde gives Iodoform test with I_2 and alkalis, while benzaldehyde does not.

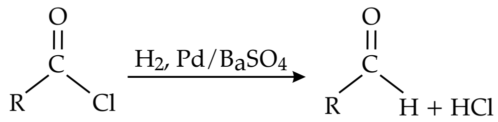
(b) (i) (1) Clemmensen's Reduction :

Reduction of ketones to alkanes using zinc amalgam and HCl.



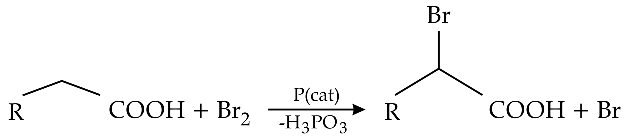
(2) Rosenmund's reduction :

The catalytic hydrogenation of acid chlorides to form aldehydes.



(3) Hell – Volhard – Zelinsky Reaction :

Carboxylic acid on reacting with bromine and catalytic amount of phosphorus leads to α-bromination of carboxylic acid.



(ii) (1) Acetaldehyde (CH_3CHO) undergoes aldol condensation due to the presence of α-hydrogen attached to the α-carbon but formaldehyde (HCHO) has no α-carbon attached to the functional group hence no α-hydrogen is available for the reaction to occur.

(2) In Acetic acid, CH_3 is an electron donating group, thus it increases

***Out of Syllabus**

electron density towards O—H bond making it difficult to remove the H^+ to a base. Formic acid (HCOOH), has no electron donating group, thus O-H bond is more polarised and can easily donate H^+ ion making it more acidic.