

SENIOR SECONDARY EXAMINATION, 2017 CHEMISTRY

Time allowed : 3¼ hours

Maximum Marks : 56

General Instructions :

- (i) Candidate must write first his/her Roll No. on the question paper compulsorily.
- (ii) All questions are compulsory.
- (iii) Write the answer to each question in the given answer-book only.
- (iv) For questions having more than one part, the answers to those parts are to be written together in continuity
- (v) If there is any error / difference / contradiction in Hindi & English versions of the question paper, the question of Hindi version should be treated valid.
- (vi)

Q. Nos.	Marks per question
1-13	1
14-24	2
25-27	3
28-30	4
- (vii) There are internal choices in Q. Nos. 21 and 27 to 30.
- (viii) Use of calculator is not allowed in the examination.

SECTION - A

Q 1. Write the value of axial distances and axial angles of triclinic crystal.

Ans 1. Triclinic $a \neq b \neq c$, $\alpha \neq \beta \neq \gamma$

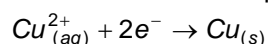
Q 2. Write the definition of Kohlrausch law of independent migration of ions.

Ans 2. The conductivity of anion in a compound is independent of its constituent ion in infinite dilution.

$$\lambda^\circ_{NaCl} = \lambda^\circ_{Na^+} + \lambda^\circ_{Cl^-}$$

Q 3. Give half cell equation of daniell cell takes place at cathode.

Ans 3. At cathode reduction takes place



Q 4. Write the unit of velocity constant for second order reaction.

Ans 4. $L \cdot mol^{-1} s^{-1}$

Q 5. For reaction $2N_2O_5 \rightarrow 2N_2O_4 + O_2$ the Half life time is 6.93 sec, determine the rate constant.

Ans 5. $2N_2O_5 \longrightarrow 2N_2O_4 + O_2$
 Half life time is 6.93 sec.

Rate constant at $\frac{t_1}{2}$

$$\frac{t_1}{2} = \frac{0.693}{K}$$

$$\Rightarrow 6.93 = \frac{0.693}{K}$$

$$K = \frac{0.693}{6.93}$$

$$K = 0.1 \text{ sec}^{-1}$$

Q 6. Transition element form inertial compound. Give one reason.

Ans 6. (1) Transition metals are large in size and contain lots of interstitial sites.
 (2) Transition element can trap atoms of other elements (that have small size), such as H, C, N, in the interstitial sites of their crystal lattice. The resulting compounds are called interstitial compounds.

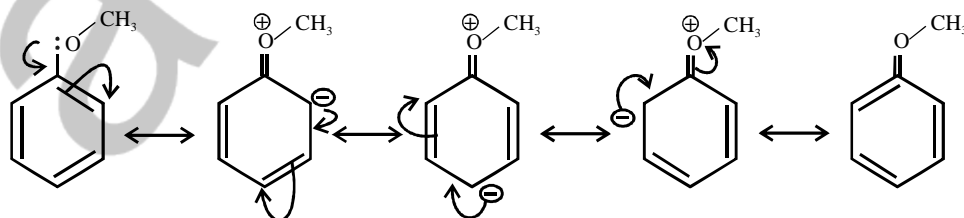
Q 7. Write the formula of each alkyl alcohol and benzyl alcohol.

Ans 7. $C_6H_5CH_2OH$ – Benzyl alcohol

$C_nH_{2n+2}O$ or $C_nH_{2n+1}CH_2OH$ –alkyl alcohol

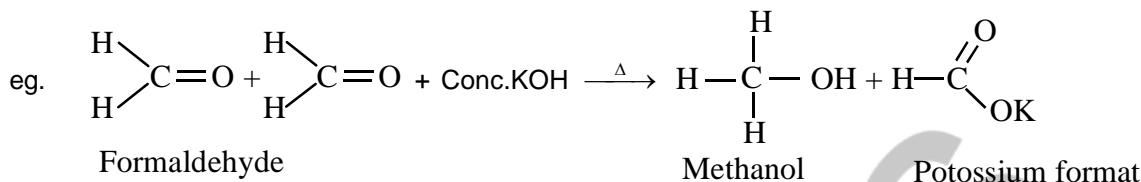
Q 8. Give resonating structures of anisole.

Ans 8. Resonating structure of anisole.



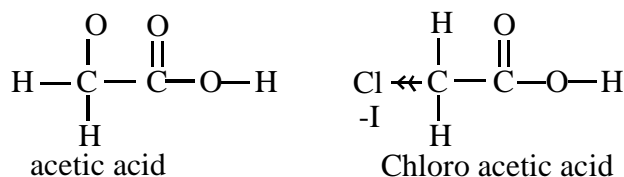
Q 9. Write chemical equation of Cannizzaro reaction.

Ans 9. **Cannizzaro reaction** : Aldehydes which do not have an α -hydrogen atom, undergoes self reduction and oxidation reaction on heating with concentrated alkali.



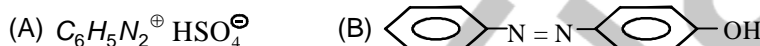
Q 10. Chloro acetic acid is stronger acid than acetic acid. Give one reason.

Ans 10.



Cl has (-) I effect (i.e. inductive effect) so it withdraws electron density from carbon atom which increases the acidic strength.

Q 11. Write the name of following compounds:-



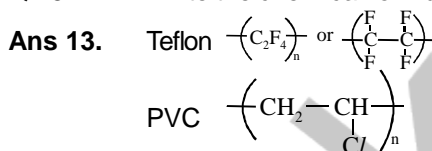
Ans 11. (A) Benzene diazonium hydrogen sulphate
 (B) p - Hydroxyazobenzene

Q 12. Identify the type of following drugs and write its types.

(A) Valium (B) Cimetidine

Ans 12. (A) **Valium** → Tranquilizers
 (B) **Cimetidine** → Antacid

Q 13. Write the chemical formula of teflon and P.V.C.



SECTION -B

Q 14. (A) Give any one difference between anisotropy and isotropy nature of solid.
 (B) Electric conductivities of solid (X) is $10^4 - 10^7 \text{ ohm}^{-1} \text{ m}^{-1}$ and solid (Y) is $10^{-20} - 10^{-10} \text{ ohm}^{-1} \text{ m}^{-1}$. Identify solid (X) and solid (Y) and write their name.

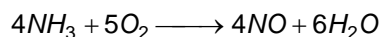
Ans 14.

Anisotropic	Isotropic
(a) When the properties of material vary with different crystallographic orientations, the material is said to be anisotropic	When the properties of a material are the same in all directions the material is said to be isotropic
(b) The solids with conductivities ranging between 10^4 to $10^7 \text{ ohm}^{-1} \text{ m}^{-1}$ are called conductors. So solid X is a conductor	
The solid with very low conductivities ranging between 10^{-20} to $10^{-10} \text{ ohm}^{-1} \text{ m}^{-1}$ are insulators so solid y is a insulator	

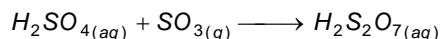
Q 15. Write only chemical equations for following reactions.

- (A) When Ammonia react with atmospheric oxygen in the presence of catalyst.
 (B) When sulphuric acid react with sulphur trioxide.

Ans 15. (A) When Ammonia react with atmospheric oxygen in the presence of catalyst.



- (B) When sulphuric acid react with sulphur trioxide.



Q 16. (A) Write only the types of hybridisation of central atom present in XeF_2 and XeF_4 .
 (B) Explain the reason of different length of equatorial and axial bond in the structure of PCl_5 .

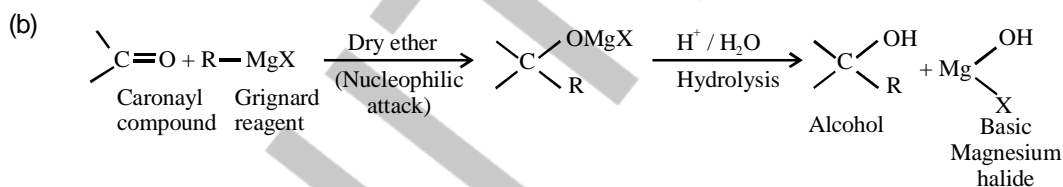
Ans 16. (A) $\text{XeF}_2 \Rightarrow \text{Sp}^3\text{d}$
 $\text{XeF}_4 \Rightarrow \text{Sp}^3\text{d}^2$

- (B) The structure of PCl_5 is trigonal bipyramidal in which three Chlorine atoms are at the corners of triangle and two chlorine atoms are at the axial. The length of axial bond is greater than of equatorial bond to minimize the Bond pair-bond pair repulsion b/w axial and equatorial bonds.

Q 17. (A) Explain denaturation of alcohol.

- (B) Give chemical equation to obtain primary alcohol from grignard reagent.

Ans 17. (a) To supply cheaper alcohol to industries and to refrain people from drinking alcohol, it is denatured (rendered unfit for drinking) by addition of poisonous substance like methyl alcohol, acetone or pyridine and some coloring matter such as copper sulphate or some dye to color it. Such sample of alcohol is called methylated spirit or denatured alcohol.



\Rightarrow When formaldehyde is used in above reaction, primary alcohols are formed

Q 18. (A) Give two examples of Bio degradable polymers.
 (B) Give the name of both monomers used in formation of terylene.

Ans 18. Examples of biodegradable polymer are :-

- (a) (i) Poly β -hydroxybutyrate - co - β -hydroxy valrate (PHBV)
 (ii) Polyhydroxy butyrate (PHB)
 (iii) Nylon 2 – nylon 6.
 (b) Monomers of Terylene are
 (i) Ethylene Glycol
 (ii) Terephthalic acid

Q 19. (A) Write any two differences between soap and detergent.

- (B) In which work saccharine is used.

Ans 19. (A) Difference between soap and detergent.

Soap

- (1) Soaps are the sodium salts of long chain carboxylic acids.
 (2) The ionic group in soaps is $-\text{COO}^- \text{Na}^+$

Detergent

- (1) Detergents are sodium salts of long chain benzene sulphonc acids.
 (2) The ionic group in soaps is $\text{SO}_3^- \text{Na}^+$ or $\text{SO}_4^- \text{Na}^+$

- (B) Saccharine is used as :-
 Saccharine (O-Sulphobenzimide)



It is the most popular artificial sweetener, it is 550 times as sweet as cane sugar, It is used to sweeten products such as drinks, candies, medicines and tooth paste.

- Q 20.** (A) Write the name of two metals which used in maximum composition in mischmetal.
 (B) Calculate the value of magnetic moment of V^{2+} .

- Ans 20.** (a) Cerium + lanthanum
 (b) $n = 3$ for V^{2+}

$$\begin{aligned} \text{So Magnetic moment.} &= \sqrt{n(n+2)} \Rightarrow \sqrt{3(3+2)} \\ &\Rightarrow \sqrt{15} \\ &\Rightarrow 3.8 \text{ BM} \end{aligned}$$

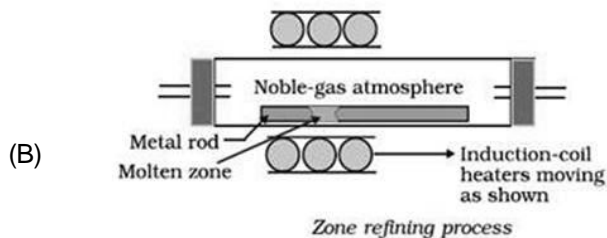
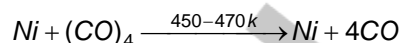
- Q 21.** (A) Give both chemical equations of 'Mond process' used in nickel refining.
 (B) Draw a neat and labelled diagram of zone refining process.

OR

- (A) Give both chemical equations of leaching of silver in silver metallurgy by using sodium cyanide.
 (B) Draw a neat and labelled diagram of electrolytic cell for the extraction of aluminum.

- Ans 21.** (A) $Ni + 4CO \xrightarrow{330-350k} Ni(CO)_4$

The carbonyl is subjected to higher temperature so that it decomposed to give pure metal



OR

- (A)
$$\underset{\text{impure}}{Ag} + 2NaCN \longrightarrow Na [Ag(CN)_2]_{(aq)}$$

$$Na [Ag(CN)_2] + Zn \longrightarrow \underset{\text{pure}}{Ag_{(s)}} + Na_2 [Zn(CN)_4]$$

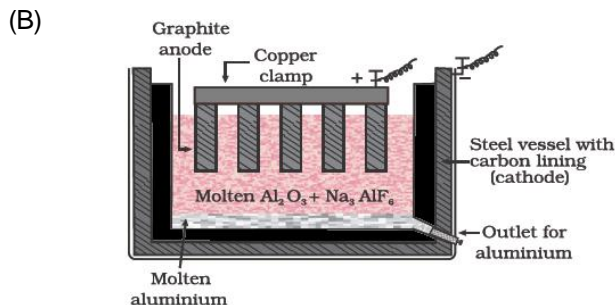


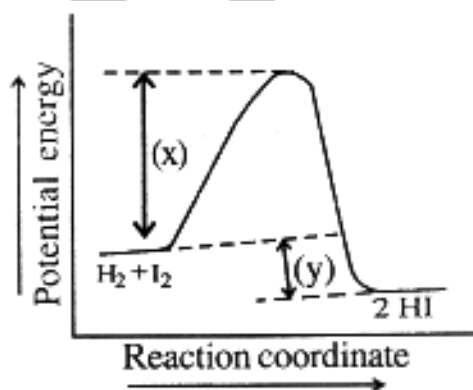
Fig.: Electrolytic cell for the extraction of aluminium

- Q 22.** (A) Write the name of metal used in sacrificial electrode for the prevention of corrosion of iron metal how its prevent the corrosion:
 (B) If λ_m° for NaCl, HCl and CH_3COOH are 110, 100 and $390 \text{ S cm}^2 \text{ mole}^{-1}$ respectively. Determine the value of λ_m° for CH_3COONa .

Ans 22. Name of metal = Zinc

- (A) when a zinc electrode is placed close to iron, zinc oxidised to Zn^{2+} and the electron is transferred to Fe which becomes negatively charge. Thus the oxidation of Fe is prevented. This is done by sacrificing Zn (from Zn to Zn^{2+})
 (B)
$$\begin{aligned} \lambda_m^\circ (\text{CH}_3\text{CO}_2\text{Na}) &= \lambda_m^\circ (\text{CH}_3\text{CO}_2^-) + \lambda_m^\circ \text{Na}^+ \\ &= \lambda_m^\circ (\text{CH}_3\text{CO}_2^-) + \lambda_m^\circ \text{H}^+ - \lambda_m^\circ \text{H}^+ - \lambda_m^\circ \text{Cl}^- + \lambda_m^\circ \text{Na}^+ + \lambda_m^\circ \text{Cl}^- \\ &= \lambda_m^\circ \text{CH}_3\text{COOH} - \lambda_m^\circ \text{HCl} + \lambda_m^\circ \text{NaCl} \\ &= 390 - 100 + 110 \\ &= 400 \end{aligned}$$

Q 23.



- (A) Write suitable name of (x) and (y) denoted in above graph.
 (B) Give definition of only (A) denoted in graph.

Ans 23.

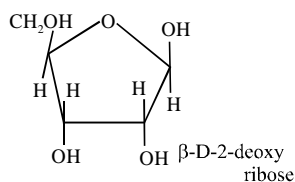
- (A) $x \rightarrow$ Activation energy
 $y \rightarrow$ Change in enthalpy of reactant and product
 (B) Activation energy – The minimum amount of energy which the reactant species must possess to undergoes a specified reaction.

- Q 24.** (A) Write the name of diseases due to deficiency of vitamins 'A' and vitamins 'B'
 (B) On the basis of 'Sugar' differentiate D.N.A. and R.N.A.

- Ans 24.** (A) Disease caused due to deficiency of vitamin A are
 (i) Nyctalopia (night blindness)
 (ii) Xerophthalmia
 (iii) Keratomalacia (Ulceration of the cornea)
 → Disease Caused due to deficiency of Vitamin B
 (i) Beriberi
 (ii) Wernicke's encephalopath (Impaired sensory perception)
 (iii) irregular heart beat
 (B)

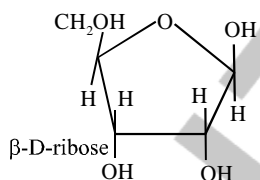
DNA

DNA stands for Deoxyribonucleic acid. the Sugar portion of DNA is β -D-2-deoxyribose



RNA

RNA stands for Ribonucleic acid. the sugar portion of RNA is β -D-ribose



SECTION-C

- Q 25.** (A) Due to low concentration of oxygen in blood, climber become weak and unable to think clear-
 (i) Write specific name of above condition.
 (ii) Explain the reason of such condition.
 (B) 30 gm of ethanoic acid present in 100gm of water, determine molality of ethanoic acid in water.

- Ans 25.** (A) Due to low concentration of oxygen in blood, climber become weak and unable to think clear.
 (i) The above condition is called "Anoxia".
 (ii) At high altitudes the partial pressure of oxygen is less than that at the ground level. This leads to low concentration. of oxygen in the blood and tissues of people living at high altitudes or climbers.

(B) mass of ethanoic acid = 30 g
 mass of water = 100 g
 molecular mass of ethanoic acid = CH_3COOH
 = 60 g
 moles of ethanoic acid = $\frac{30}{60} = \frac{1}{2} \text{ mole}$
 Molality of ethanoic acid = $\frac{\text{moles of ethanoic acid}}{\text{mass of water}}$

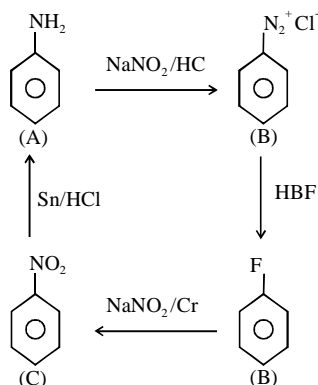
$$= \frac{\frac{1}{2}}{100 \times 10^{-3} \text{ kg}} = \frac{1}{2} \frac{\text{mole}}{\text{kg}}$$

$$= 5 \text{ m}$$

molality of ethanoic acid is 5 m or 5 molal.

- Q 26.** Compound [A] is an aromatic amine which react with $\text{NaNO}_2 + \text{HCl}$ at 273 – 278 K and form-compound [B]. Compound [B] react with HBF_4 and the obtained product on further heating, in the presence of NaNO_2 and Cu form compound [C]. Compound [C] reduced in the prescnece of Sn + HCl to re formed compound [A]. Write general name of 'A', 'B' and 'C' and write equation of all reaction involved.

Ans 26.



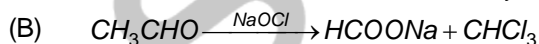
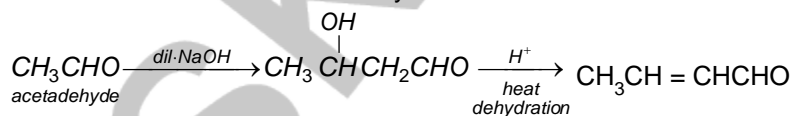
- Q 27.** Write the equation of chemical reaction and name of reaction to obtain following compounds (A) and (B) from CH_3CHO .
- (A) But - 2 - enal
 (B) Chloroform

OR

Write the equation of chemical reaction and name of reaction to obtain following compounds (A) and (B) from CH_3COOH .

(A) Ethane
 (B) Mono chloro acetic acid.

- Ans 27.** (A) But-2-enal from CH_3CHO
 \Rightarrow aldol condensation followed by reduction

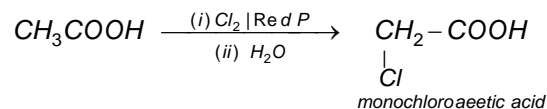


This is oxidation of aldehyde with sodium hypo chlorite & it is known as Haloform reaction.

OR

- (A) Reduction of carboxylic acid to alkane with hydroiodic acid and red phosphorous at 473 k
- $$\text{CH}_3\text{COOH} + 6\text{HI} \xrightarrow{\text{Red P, 473k}} \text{CH}_3\text{CH}_3 + 2\text{H}_2\text{O} + 3\text{I}_2$$
- Ethane

(B) Hell – volhard Zelinsky reaction –



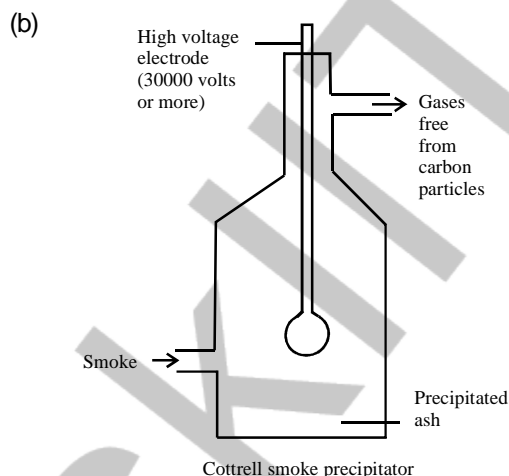
SECTION-D

- Q 28.**
- (1) One of the factory of city bained by pollution board because factory owner not arrange a chamber on chimney.
 - (a) Write the name of chamber which not installed by factory owner.
 - (b) Draw neat and labelled diagram of above chamber.
 - (2) (a) Define coagulating value of sol.
 (b) Arrange the following ions in increasing order on the basis of their coagulating values.
 PO_4^{3-} , Cl^{-1} , SO_4^{2-}

OR

- (1) (a) Which type of emulsion is 'Vanishing cream'. Write its appropriate name.
 (b) Draw neat and labelled diagram of above emulsion.
- (2) (a) What is shape selective catalysis?
 (b) Write the name of adsorbent used in following-
 (i) To remove colouring matter form solution
 (ii) In gas mask.

Ans 28. (1) (a) Electrical precipitator (cottrell smoke precipitator)



- (2) (a) Coagulation value of sol is the minimum value of an electrolyte (in millimoles) that must be added to one litre of a colloidal solution leads to bring about the complete coagulation is called coagulation value or flocculation value.
 (b) $Cl^{-} > SO_4^{2-} > PO_4^{3-}$

OR

- (1) (a) "oil in water"
 (b)



Oil in water

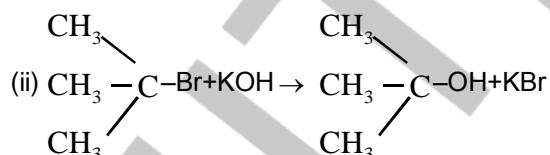
- (2) (a) A catalytic reaction which depends upon pore structure of the catalyst and on the size of reactant and the product molecules is called shape selective catalysis
Ex. Zeolites
 (b) (i) animal charcoal
 (ii) activated charcoal

Q 29.

- (1) Write the chemical equation of following reaction.

- (a) Swarts reaction
 (b) Sandmeyer's reaction.

- (2) (a) (i) $\text{CH}_3 - \text{Br} + \text{KOH} \rightarrow \text{CH}_3\text{OH} + \text{KBr}$



Which types of nucleophilic substitution are in above reaction (i) and (ii).

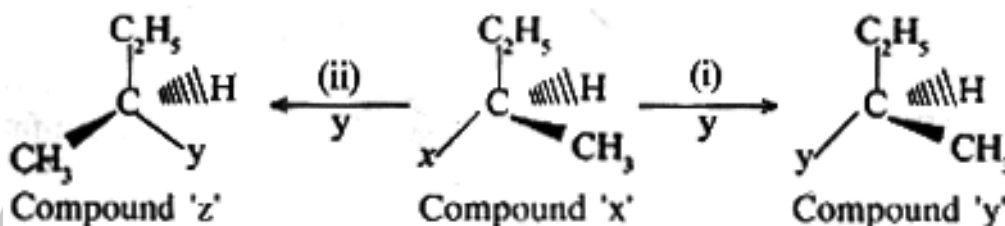
- (b) Write two differences between mechanism of reaction (i) and (ii).

OR

- (1) Write the chemical equation of following reaction

- (a) Wurtz reaction
 (b) Finkelstein reaction

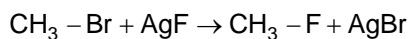
- (2) (a)



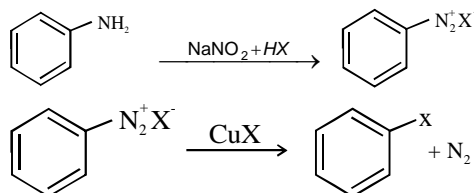
Write the names of process to obtain compound (y) and compound (z) form compound (x) in above nucleophilic reaction (i) and (ii).

- (b) Which type of nucleophilic substitution mechanism involved to obtain compound (z) from compound (x). Write the name of mechanism.

Ans 29. (1) (a) Swartz Reaction :-



(b) Sandmeyer reaction :-



(2) (a) (i) SN_2 reaction

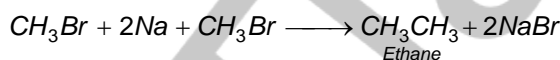
(ii) SN_1 reaction

(b) Difference between the mechanism of SN_1 and SN_2 reactions.

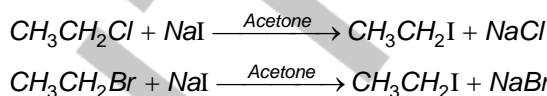
	SN_1	SN_2
Rate law	Unimolecular (substrate only)	Bimolecular (substrate and nucleophile).
Alkyl halide (electrophile)	$3^\circ > 2^\circ \gg 1^\circ$	$1^\circ > 2^\circ \gg 3^\circ$

OR

(1) (a) Wurtz Reaction:-



(b) Finkelstein Reaction.



(2) In the given nucleophilic reaction.

(i) The process is called retention of configuration & in nucleophilic reaction (ii) the compound (2) is obtained from compound (x), the process is called inversion of configuration.

Q 30.

- Define primary and secondary valency of metal ions proposed by Werner theory.
- Write primary and secondary valency of Co in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$.
- Write structural formula of $\text{Ni}(\text{CO})_4$ and $\text{Cr}(\text{CO})_6$.
- Draw the structure which shows Synergic bonding interaction in a carbonyl complex.

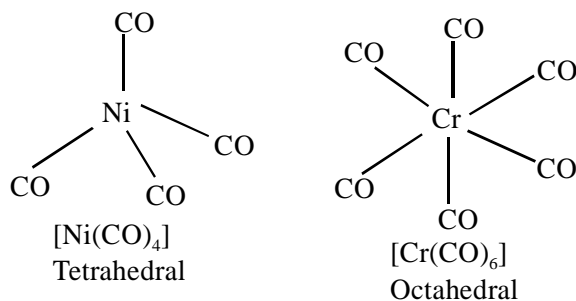
OR

- Define linkage and ionisation isomerism.
- Which isomerism show by $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$. Write name.
- Draw the diagram which show the transition of an electron in $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$.
- What impact takes place on metal complex due to transition of an electron in $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$.

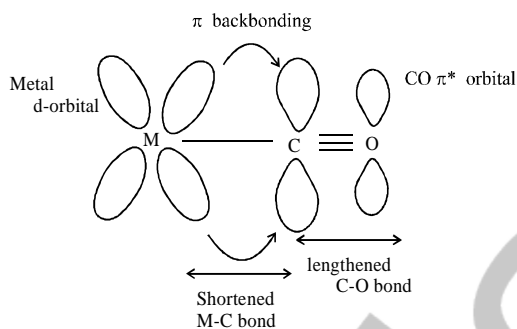
Ans 30.

- According to werner's theory In co-ordination compound metal atoms exhibit two types of valency namely, the primary valency and the secondary valency.
The primary valency is ionizable whereas the secondary valency is non-ionizable.
- primary valency of Co in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ is 3 secondary valency of Co in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ is 6

(iii)



(iv)



(i) **linkage isomerism :-**

The compounds which have the same molecular formula but differ in the mode of attachment of a ligand to the metal atom or ion are called linkage isomers

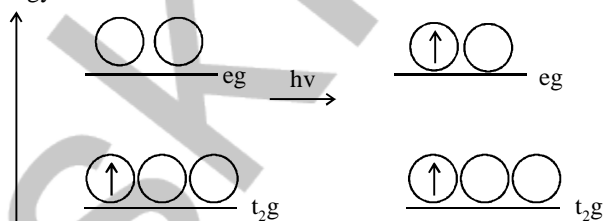
Ionisation isomerism :-

The compounds which have same molecular formula but give different ions in solution are called ionisation isomers.

(ii) Coordination isomerism

(iii) $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$

$\text{Ti}^{3+} - 3d^1$
 energy



The metal ion has d^1 configuration. In ground state this electron occupies one of the lower set of orbitals when white light passes through the complex, the electron gets excited from lower set to one of the higher set of orbital.

(iv) The complex $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ looks purple in colour due to d-d transition.