

Types of solutions

Type of solution	solute	solvent	Common exam- ples.
Gaseous solutions	Gas	Gas	Mixture of oxygen and nitrogen gases.
	Liquid	Gas	Chloroform mixed with nitrogen gas
	Solid	Gas	Camphor in nitrogen gas.
Liquid solutions	Gas	Liquid	oxygen dissolved in water.
	Liquid	Liquid	Ethanol dissolved in water.
	Solid	Liquid	Glucose dissolved in water.
Solid solutions	Gas	Solid	solution of hydrogen in palladium.
	Liquid	Solid	Amalgam of mercury with sodium.
	Solid	Solid	Copper dissolved in gold.

Date / / Page

unit $\rightarrow \text{ohm}^{-1} \text{cm}^{-1}$ or S cm^{-1}
 SI unit $\rightarrow \text{Sm}^{-1}$

* Cell constant :-

The ratio of separation (l) between the two electrodes divided by the area of cross-section (a) of the electrode is called the cell constant.

It is represented by G^* or σ .

$$G^* = \frac{l}{A} = \text{cell constant}$$

also,

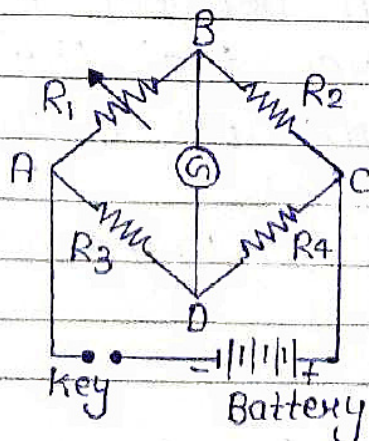
Conductivity (K) = Conductance (G) $\times$ cell constant (G^*)

$$K = G \times G^*$$

Note :- Conductance can be observed by measurement of resistance and also can be found by the Wheatstone Bridge Method.

It consists of four arms containing resistance R_1 , R_2 , R_3 and R_4 .

R_1 is variable resistance and R_2 is unknown resistance.



Rate - Average and Instantaneous :-

Average rate of reaction is change in concentration of any of the reactant or any of product per unit time over a specified interval of time.

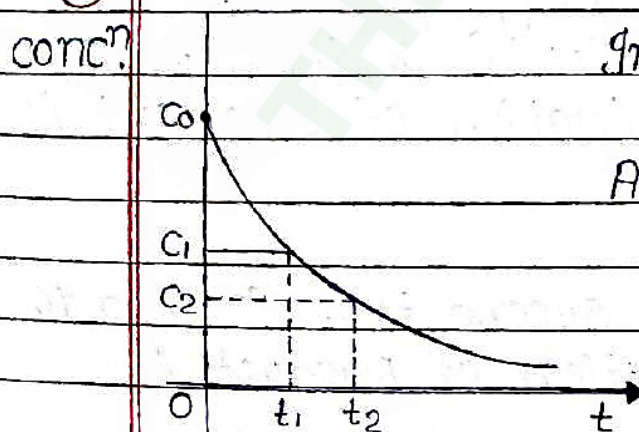
$$\text{Rate avg.} = \frac{-\Delta[R]}{\Delta t} = + \frac{\Delta[P]}{\Delta t}$$

Instantaneous rate of reaction i.e. rate of reaction at any instant of time is rate of change of conc. of any one of reactant or product at particular instant of time.

$$\text{Rate}_{\text{inst}} = \frac{-d[R]}{dt} = + \frac{d[P]}{dt}, \text{ as } \Delta t \rightarrow 0.$$

Graphically :-

(1)

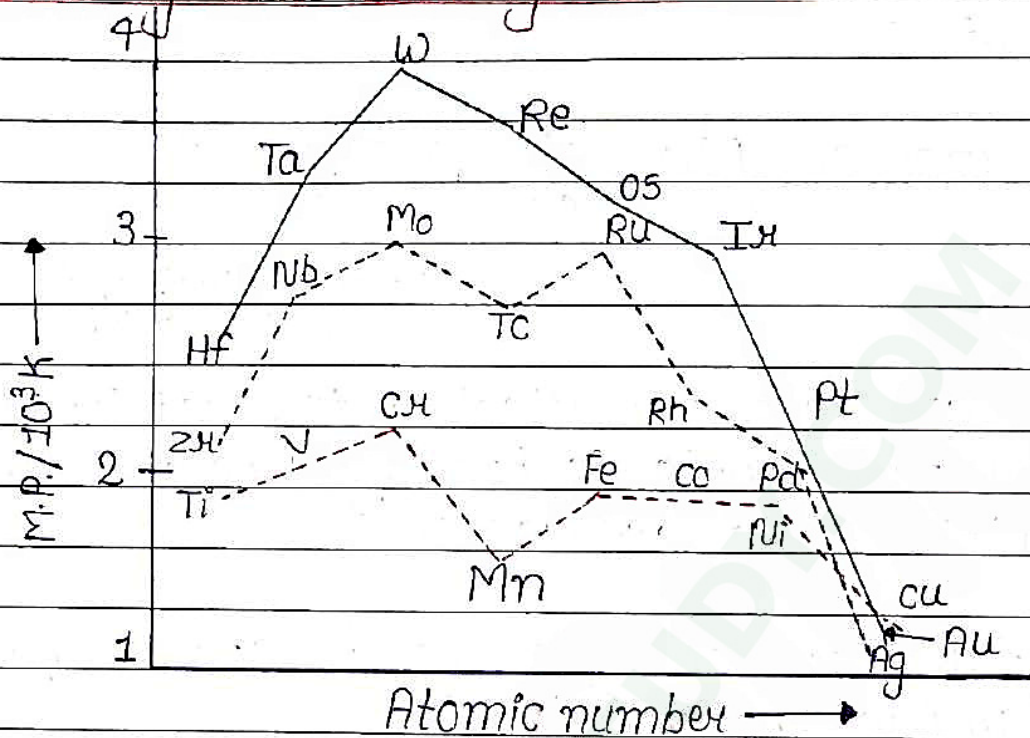


$$\text{Inst. rate} = \frac{-d[R]}{dt} = \text{slope of tangent.}$$

$$\text{Average rate} = \frac{-\Delta[R]}{\Delta t} = - \frac{(c_2 - c_1)}{t_2 - t_1}$$

$$c_1 > c_2$$

ii) Melting and Boiling Point :-



upto to Cr, Mo, W : the melting point
(3d) (4d) (5d)

seems to increase but Mn, Tc, Re :
Sudden decrease in melting point

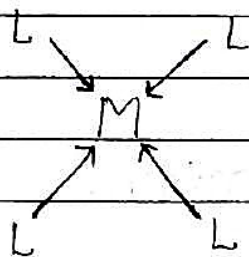
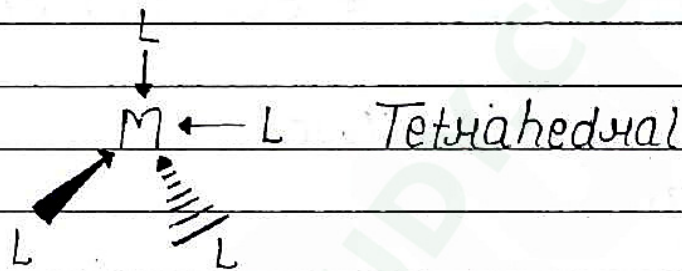
upto the middle M.P seems to increasing and
later on MP starts decreasing.

Reason : upto the middle of series the number
of unpaired e^- increases and therefore stronger
will be the metallic bonding and higher
will be the energy of atomisation and hence
higher will be the melting point later on
upto the end of series number of unpaired
 e^- start decreasing ; weaker the metallic

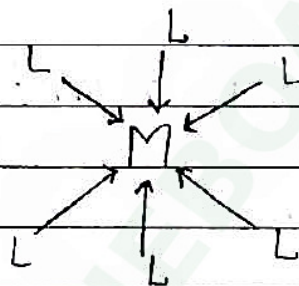
* Ligand surround the metal (CMI) in a specific form and the compounds gains a specific shape.

(4) Coordination Polyhedron :-

When ligands surround CMI they obtain a particular shape called as coordination polyhedron.



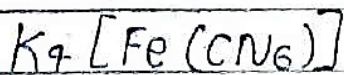
Square planar.



Octahedral

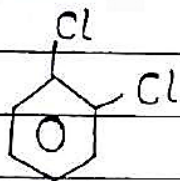
(5) Coordination Entity :-

Coordination Entity comprises the CMI & ligand and are represented under a square bracket. It is also known as COORDINATION SPHERE.

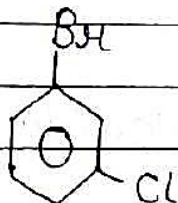


→ Coordination sphere.
(non-ionisable).

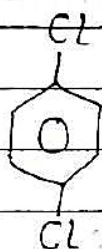
benzene :-



o-dichlorobenzene



m-dichlorobenzene

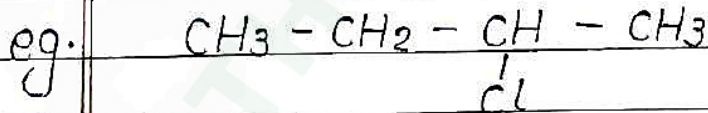


p-dichlorobenzene

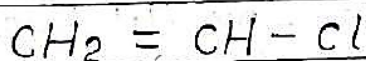
(2) IUPAC nomenclature :

→ note the point for nomenclature :

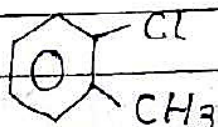
- ▷ longest C-chain
- ▷ lowest sum rule
- ▷ in case of = / $\equiv$ prefer them rather than halogen.



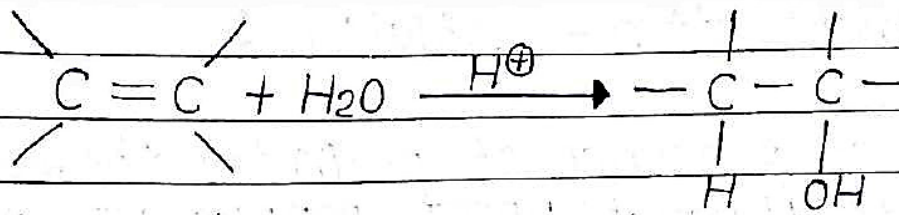
2-chlorobutane



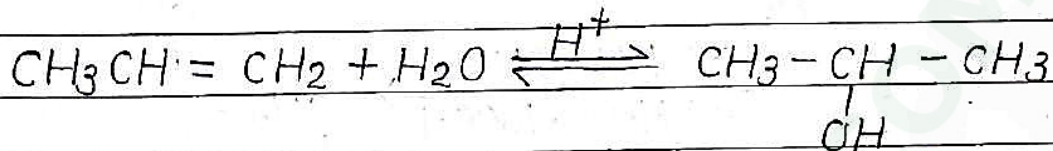
1-chloroeth-1-ene.



2-chlorotoluene



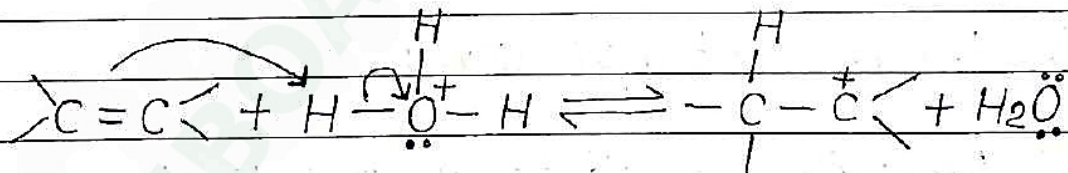
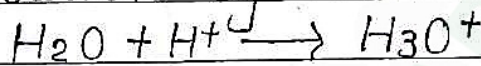
Markovnikov orientation



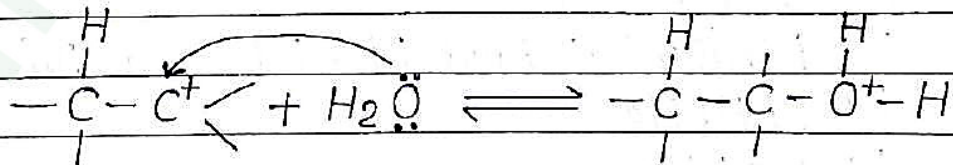
Mechanism -

The mechanism of the reaction involves the following three steps:

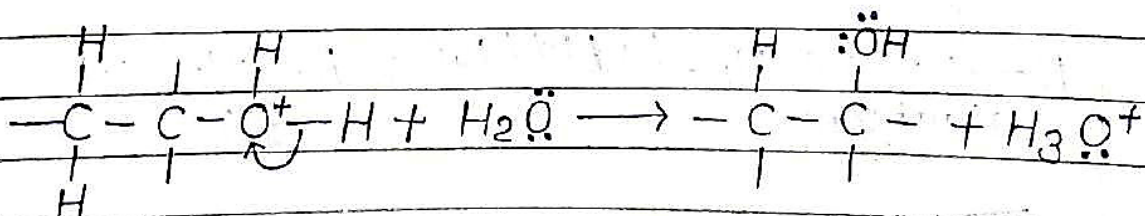
Step 1: Protonation of alkene to form carbocation by electrophilic attack of H_3O^+ .

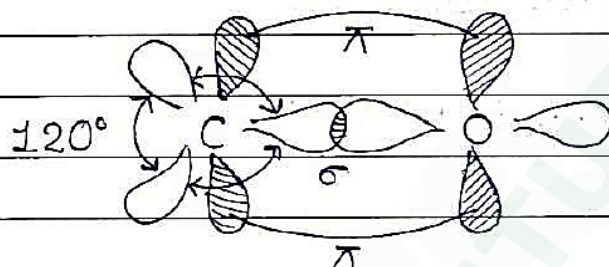
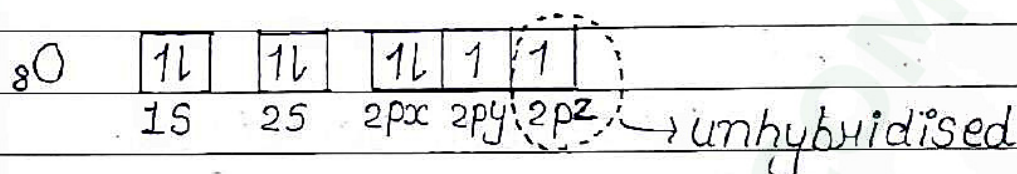
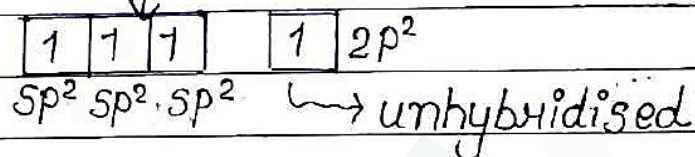
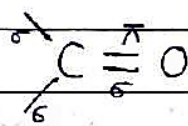
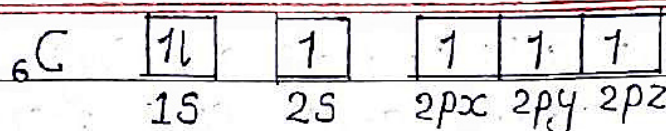


Step 2: Nucleophilic attack of water on carbocation.



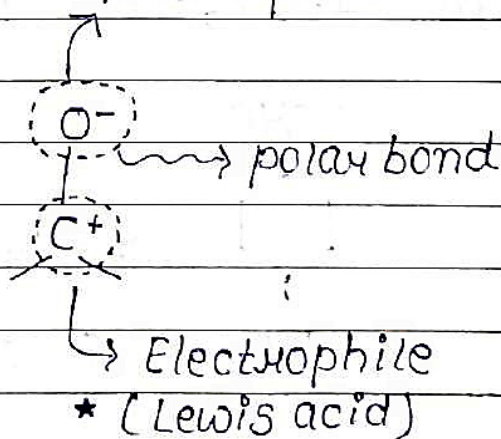
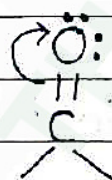
Step 3: Deprotonation to form an alcohol.





- ↳ sp^2 hybridised
- ↳ 120°
- ↳ Trigonal planar

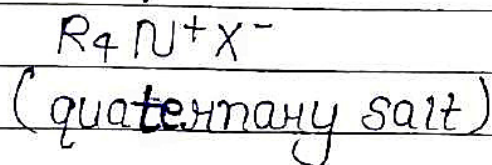
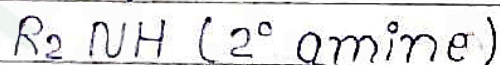
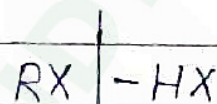
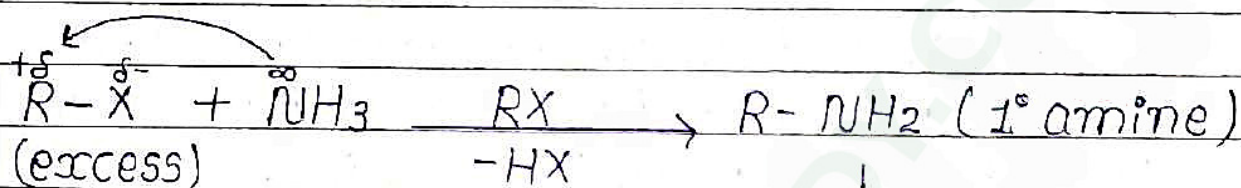
★ (Lewis Base)
 Nucleophile



Dipolar nature

4. Ammonolysis (Hoffmann's Ammonolysis).

When alkyl Halide ($R-X$) reacts with alcoholic solution of ammonia, halogen atom of alkyl halide is replaced by NH_2 group of ammonia. This process of cleavage of $R-X$ by ammonia is known as ammonolysis.



→ For RNH_2 as major product take ammonia in excess.

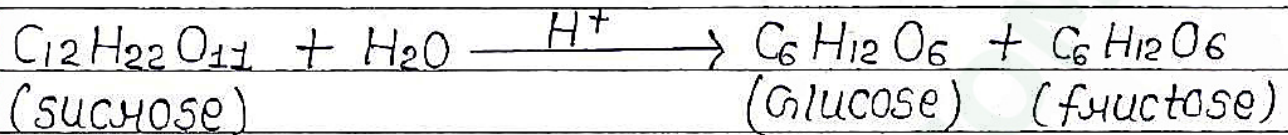
Draw back :

→ By this reaction, a mixture of 1° , 2° and 3° amine and quaternary salts are obtained.

Glucose :-

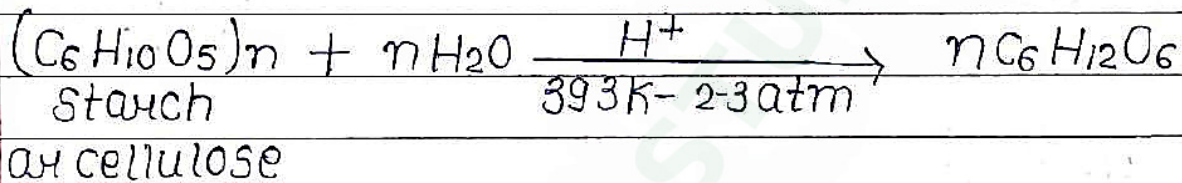
Preparation of glucose :

(1) From sucrose (cane sugar) :



(2) From starch :

Commercial method.



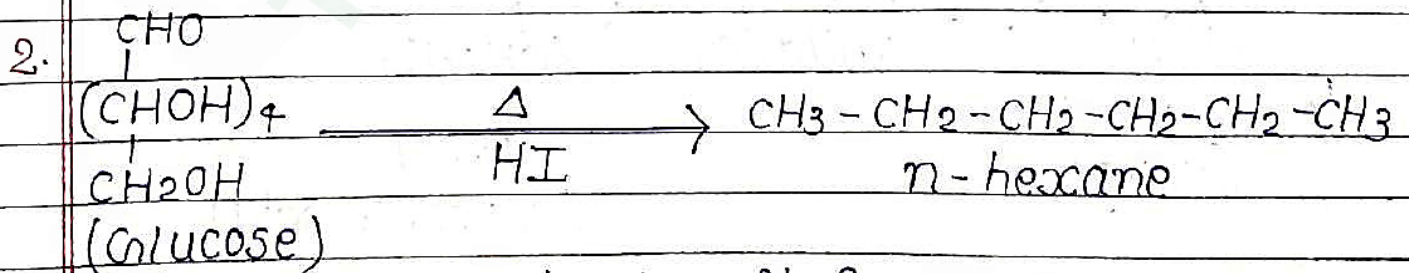
Structure of Glucose :

Aldohexose

Dextrose

Most abundant organic compound on earth.

1. Molecular formula $\rightarrow \text{C}_6\text{H}_{12}\text{O}_6$ and M. mass - 180u.



On heating with HI, it forms n-hexane, suggesting that all the six carbon atoms are linked in straight chain.