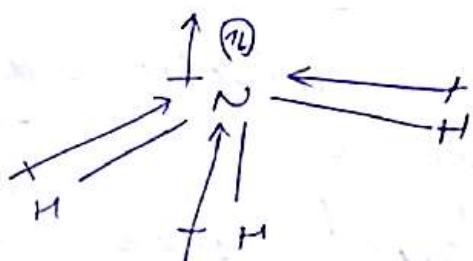
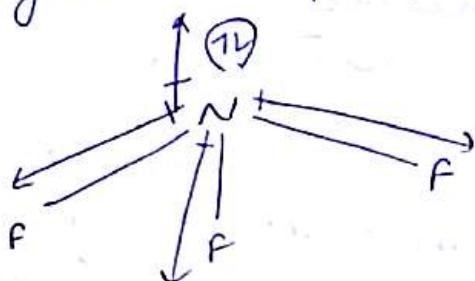


CLASS 1.

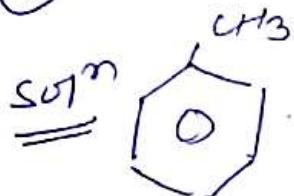
- ① Although more polar NF_3 (-26 D) has smaller dipole moment as compared to NH_3 (1.46 D)

$\text{N}-\text{F}$ bonds are much than $\text{N}-\text{H}$ bonds.

Sol'n Because in NF_3 , the μ due to $\text{N}-\text{F}$ bond and μ due to electrons is in opposite direction while in NH_3 both are in same direction so they add up giving higher dipole moment.



- ② Toluene possesses a dipole moment



due to $\text{sp}^3 - \text{sp}^2$ has electronegativity difference

- ③ Dipole moment of FURAN is smaller than pyrrole.

furan



pyrrole



- (a) O is more electron-negative than N
 (b) e^- are more delocalised in pyrrole as compared to furan.

4) Although HF (0.92 \AA) molecule is smaller than HCl (1.27 \AA) it has higher μ (dipole moment)

Soln $\mu = \frac{d \times e}{\text{distance}} \rightarrow \text{charge}$.

∴ has greater charge than Cl

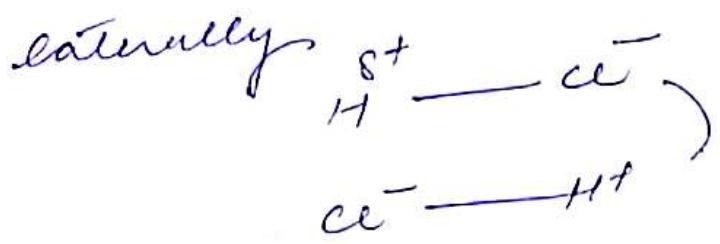
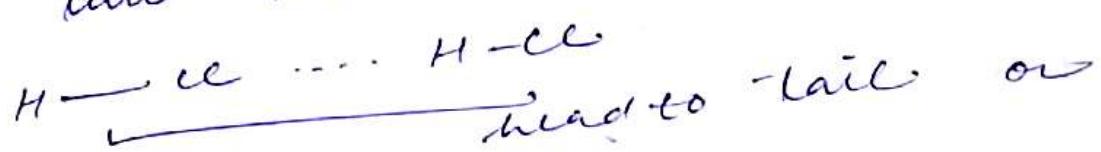
Tuesday

4 → 5:30 pm

26 July

DIPOLE - DIPOLE INTERACTION

What is dipole-dipole interaction
→ This is the attraction between positive polar molecule and the negative polar molecule is known as dipole-dipole interaction - it is a very weak force. Generally 2 kcal/mole
head to tail interaction or



important for the significance of physical properties

what are the substituents?

 X is a measure of dipole moment
let us consider dipole-dipole interaction which is indicated by

$$M_{x_1, x_2} = \sqrt{M_{x_1}^2 + M_{x_2}^2 + 2 M_{x_1} M_{x_2} \cos \alpha}$$

where $\cos \alpha$ is the cosine of angle b/w.

X₁ and Y₂ calculate dipole moment isomeric what are the enantiomer of dichlorobenzene if its resultant moment is 1.55 D

(1) ortho

$$\text{Angle} = 60^\circ$$



$$\cancel{1.55} = \sqrt{x^2 + x^2 + 2x^2 \times \cos 60^\circ}$$

$$\cancel{1.55} = \sqrt{\cancel{2}x^2 + x^2} = \sqrt{3}x = 1.55.$$

$$x = \frac{1.55}{\sqrt{3}}$$

$$x = 0^\circ \quad \boxed{D}$$

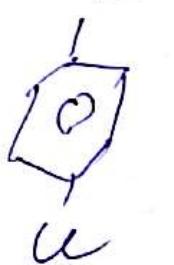
$$\underline{= 2.055 D}$$

here $x = 1.55 D$

(B) meta $\alpha = 120^\circ$
so Resultant = 1.55 D

(C) para $\alpha = 180^\circ$

Resultant = 0 D
No dipole moment



Problem: Dipole moment of a bond gives the ionic character of the bond.

Calculate the percentage of ionic character of H-Cl bond which has a dipole moment of 1.04 D and the bond length is 1.275 Å.

$$\mu_{\text{ionic}} = d \times e = exd$$

$$= 4.8 \times 10^{-10} \text{ esu} \times 1.275 \times 10^{-8} \text{ cm}$$

$$= 6.12 \text{ D}$$

$$\mu_{\text{calculated}} = 1.04 \text{ D} = \mu_{\text{observed}}$$

$$\% \text{age ionic character} = \frac{\mu_{\text{observed}}}{\mu_{\text{ionic}}} \times 100$$

$$= \frac{1.04}{6.12} \times 100$$

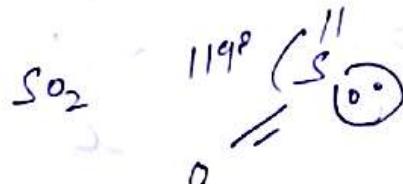
$$= \boxed{17.11 \%}$$

Ques what are the dipole moments of CO_2 , SO_2 (linear structure)

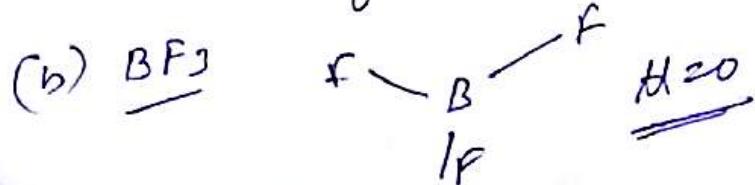
$$\text{O} = \text{C} = \text{O}$$

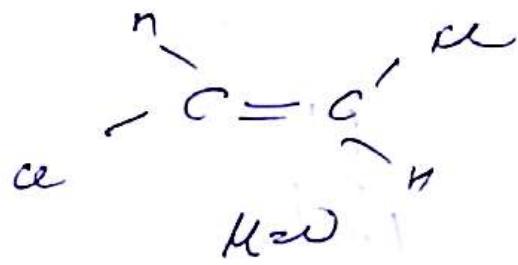
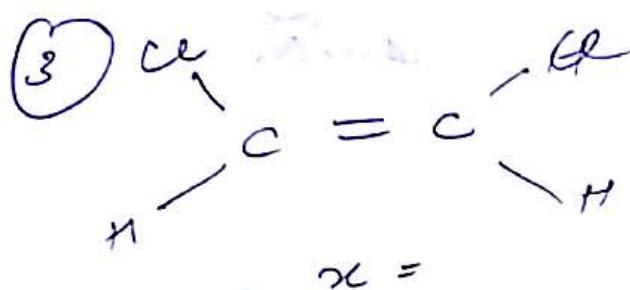
$$\mu = 0$$

(Pyramidal structure)

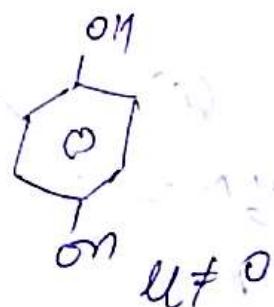
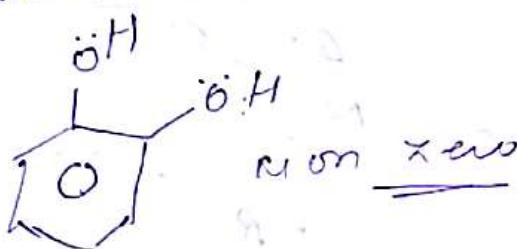


$$\mu = \boxed{x \text{ D}} = 1.6 \text{ D}$$





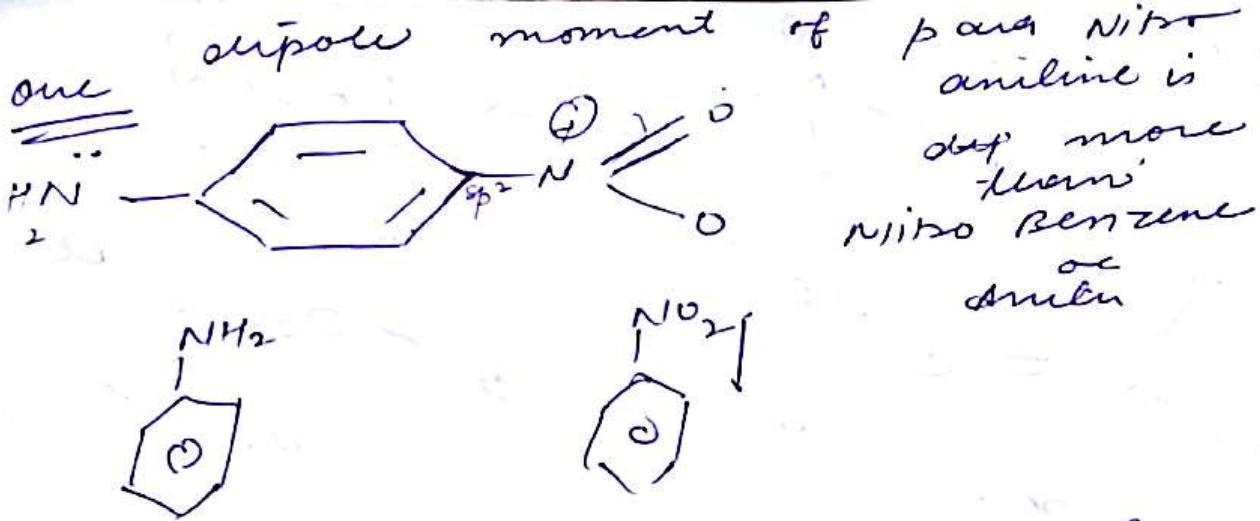
what is the dipole moment of ortho para dioxy Benzene?



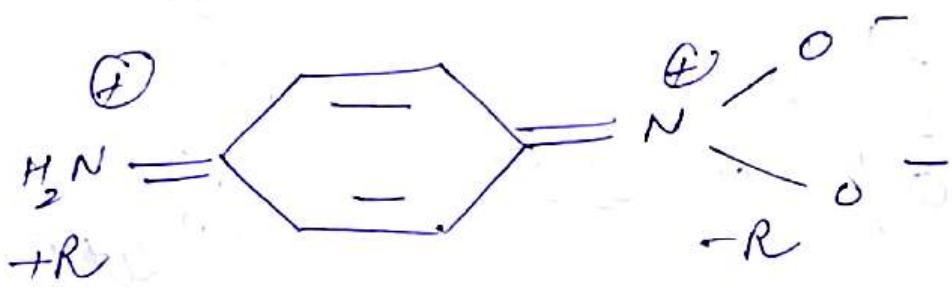
μ $\neq 0$ both OH bonds are not in same plane. one $- \text{OH}$ bond is above the plane.



Net dipole moment created by 2 hydroxyl group donot lie in the same plane of hexagon, thus they make an angle of 83° . maximum polarisability takes place in $\text{C}-\text{O}$ bond so it gives a dipole moment 1.4 D .



$\delta\vec{D}^N$ + R effect of NH_2 and $-R$
effect of NO_2

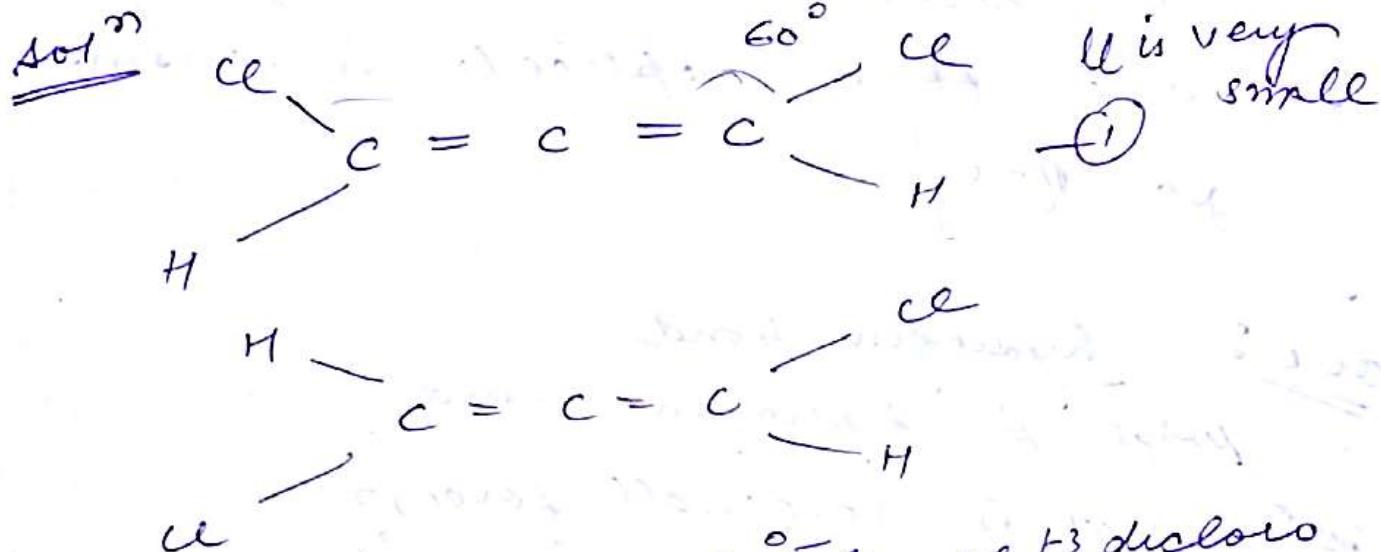
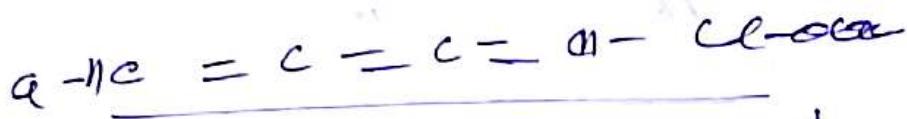


due to the resonance effect, we have no more dipole moment

one from methane and chloromethane both, but F is more electronegative than Cl, but the dipole moment of chloro-methane is more

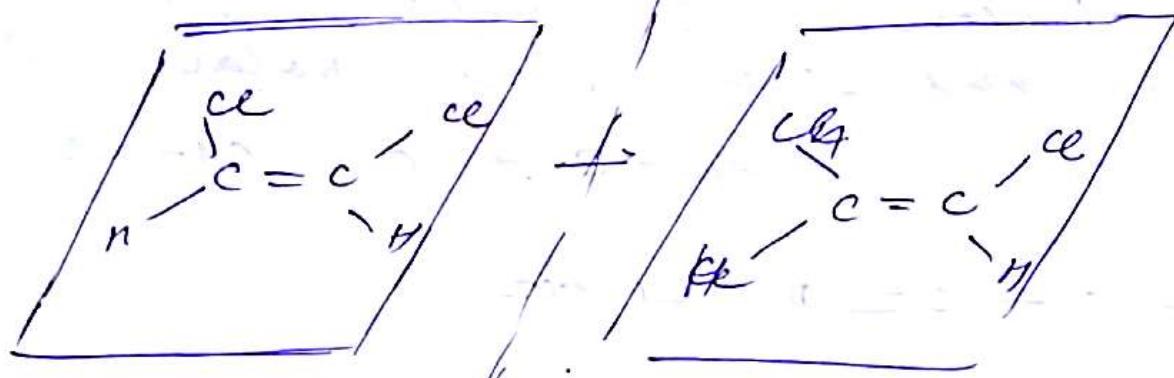
$\delta\vec{D}^N$ $\text{CH}_3 - \text{F}$ $\text{CH}_3 - \text{Cl}$
bond length of $\text{CH}_3 - \text{Cl}$ (1.47 \AA)
is more than $\text{CH}_3 - \text{F}$ (1.27 \AA)

one unlike 1-3 dihalo propo-1-2 diene
1,1,-4 dihalo 1,2,3 diene is polar
 is polar and other is non-polar.



The outside π orbital of ^{1,3} dichloro prop 1-2-diene are at right angle to the central carbon atom which are sp hybridised, thus CH-Cl are co-planar exhibit geometrical isomerism. In cis compound $\alpha-\text{ce}$ bond making an angle of 60° ce 60° ie so they exhibit more magnitude of dipole moment which is ($\mu=0$) very small and it is polar. But in the trans case, their dipole moment are canceled by both hydrogen in carbon atom so the dipole moment ($\mu=0$), non-polar.

But in the case of



c-ce bond makes an angle of 180° and form optical isomerism
eg $\boxed{\theta = 0}$.

one: hydrogen bond

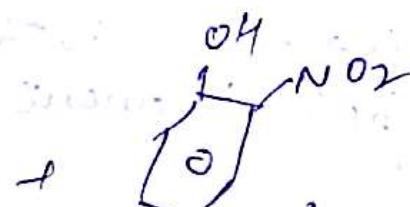
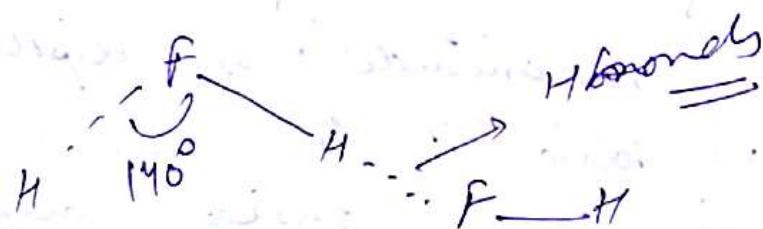
what is hydrogen bond?

so what is vanderwall forces?

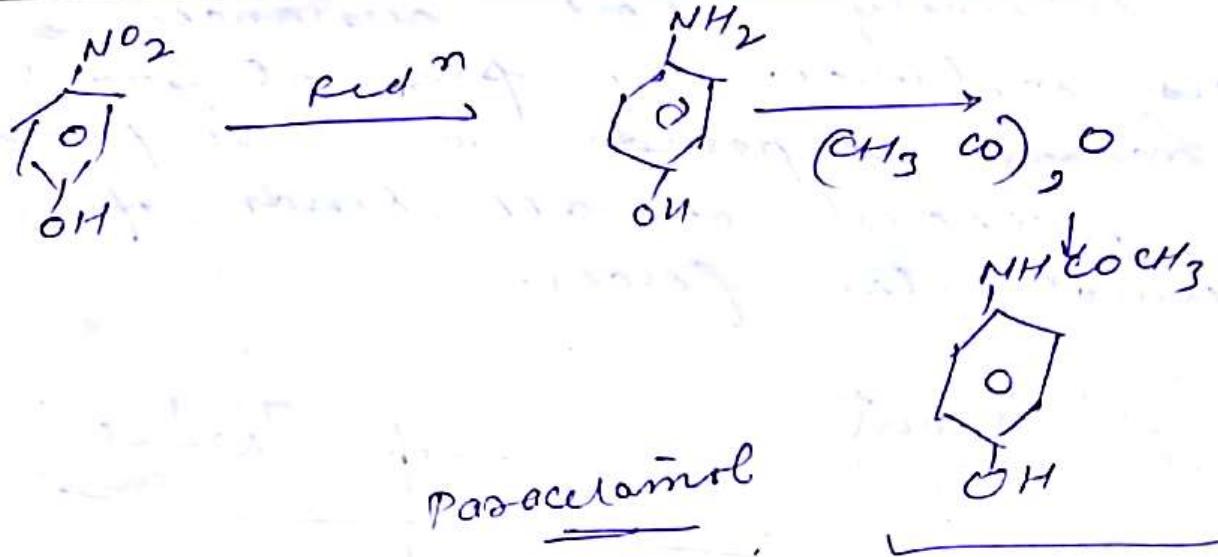
what is pH value?

so This is the attraction between H-atoms with the more electro-negative atoms which are covalently bonded. Energy of H atoms is 5100 kcal/mol.

eg



steam volatile
n is separate



VANDER WAAL FORCES $\stackrel{\text{defn}}{=}$ Non-polar molecules are held together by very weak forces of attraction known as vanderwall forces. Such interactions are also referred as instantaneous dipole induced-dipole attraction. In non polar molecules e.g. methane is the centre of +ve charge density coincides with the center of negative charge density and so the molecules possess no net dipole moment. However due to random movement of e^- around the Nucleus, momentary distortion may occur, this instantaneous dipole-induced dipole in the second molecule, these dipoles then attract each other and causes the molecules to hold together.

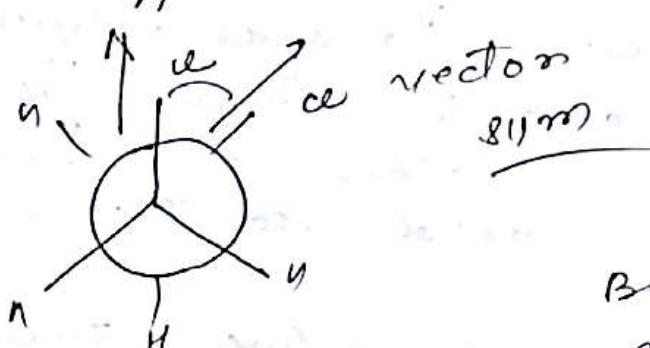
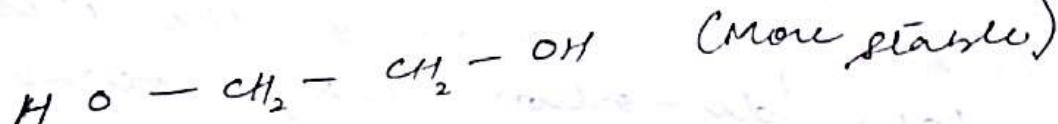
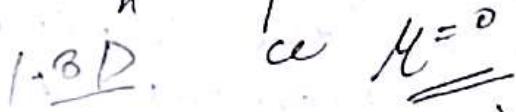
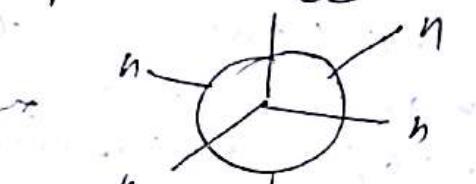
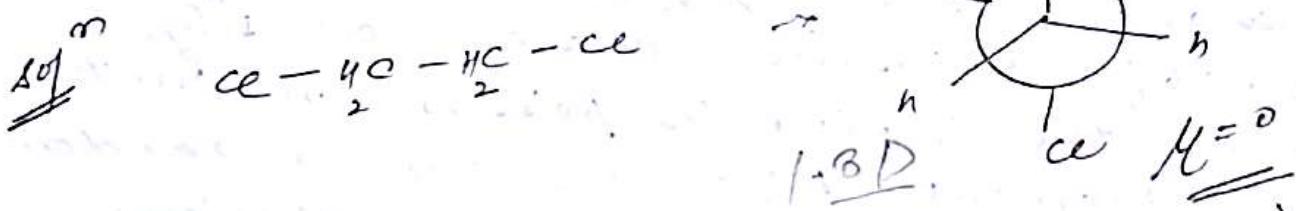
So there \rightarrow since these forces act between the surface of molecule which is known as vanderwall forces, they are proportional to molecular mass, volume, Kcal/mol . Strength of the force

at extremely short distance. These forces influence the physical properties of many compounds as these forces are weakest of all kinds of intermolecular forces.

2nd August

from Sophie about Debye

After Pauling \rightarrow H. Bond
over 1-2 dichloroethane has small
dipole moment but 1-2-ethane don't
has considerable dipole moment

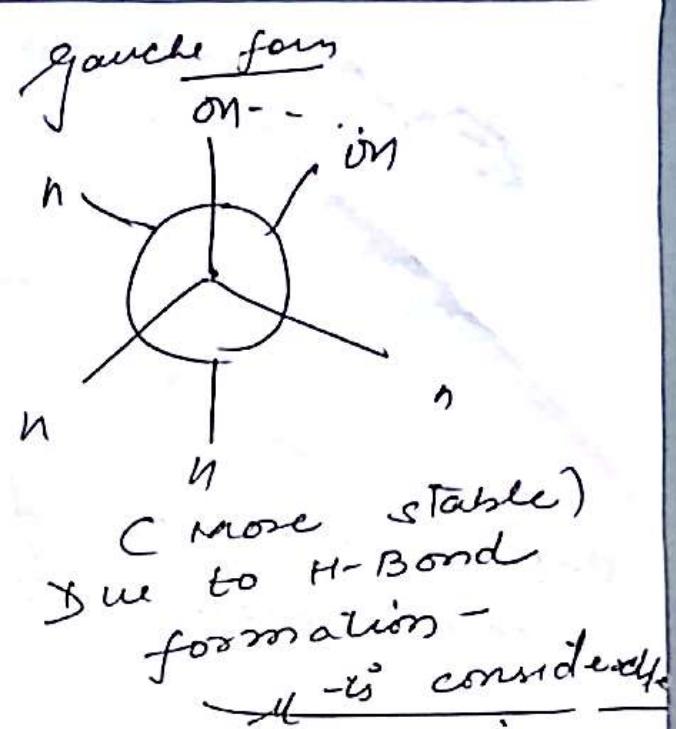
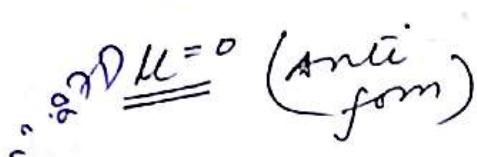
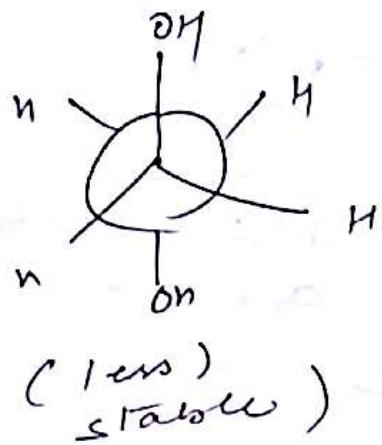


Both mixtures has a
dipole moment

$\approx 1.2 \text{ D}$

Gauche form
(less stable)

Ethane di-ole.

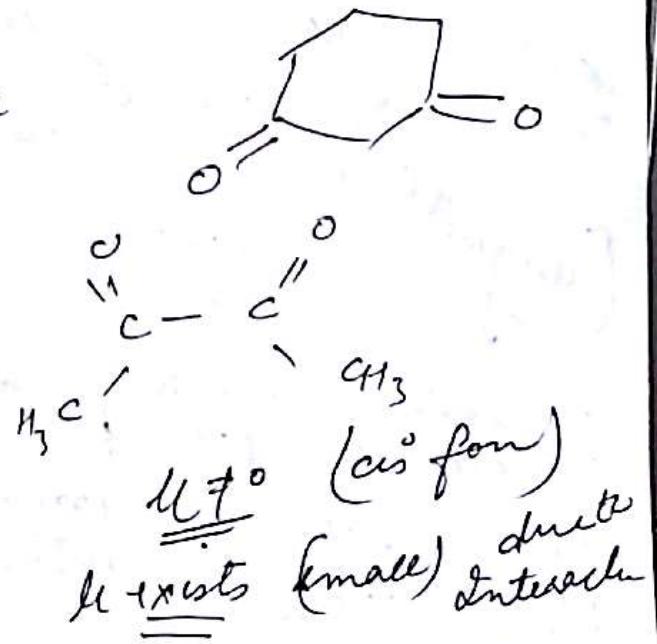
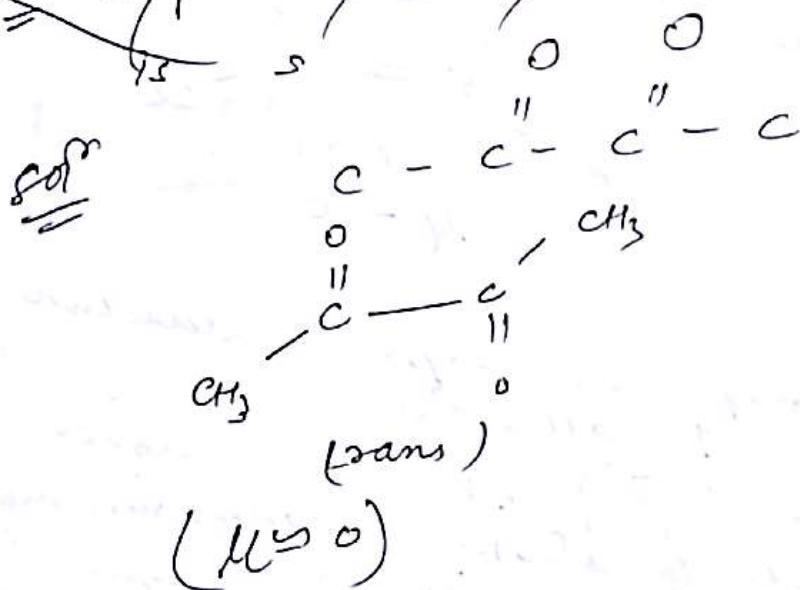


2 As the temperature inc. the dipole moment increases of 1,2 dichloroethane

soⁿ As the temp inc, the Gauche of oixn of 1,2 dichloro ethane inc so. dipole moment also increases

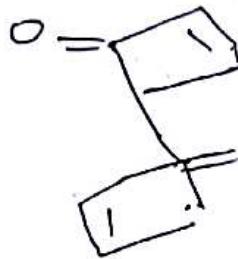
3 Dipole moment of Butane 2,3 dione is very small than cyclohex 3-5 dione

4 Dipole moment of Butane 2,3 dione





cis form

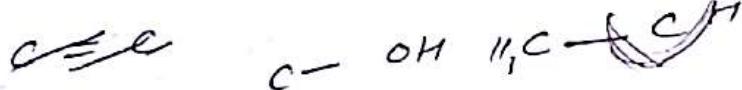


(trans form)

one aldehydes & ketones are
more polar than alkane

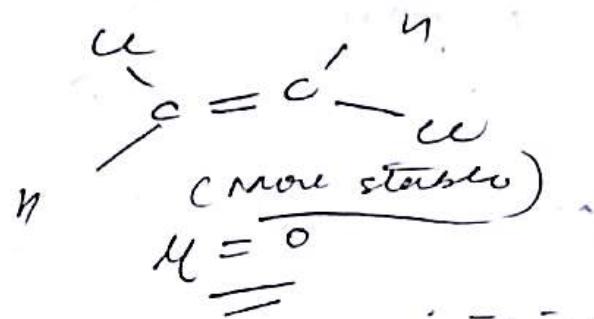
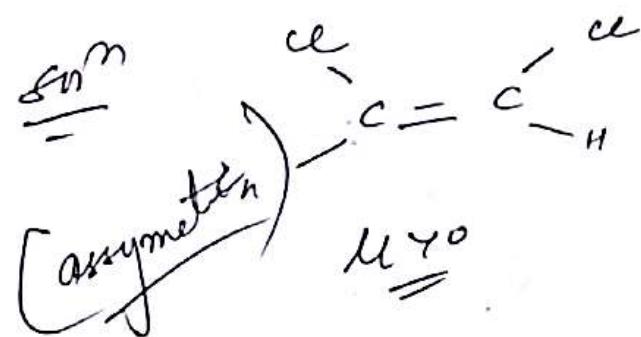


cis



aldehydes & ketones are more polar
STP depending on the "symmetric"
structure

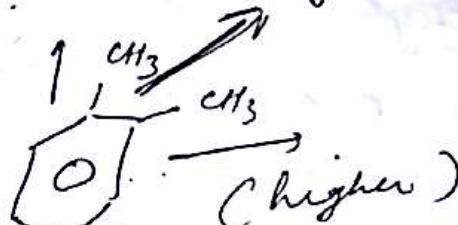
or
cis-isomer of
at higher temp but melts at lower
temp than the trans isomer. Again
cis isomer is more soluble than
trans-isomer in a solvent.



Boiling temp depends upon interaction
depends upon forces of attraction
More stable (symmetric), melts at higher
Melting Point → structure & shape → more symmetry
Temperature → higher melting point

~~of one~~ paracylene boils at lower temp than ortho xylene (diff of boiling point is not very high) but melts at a higher temperature than ortho xylene.

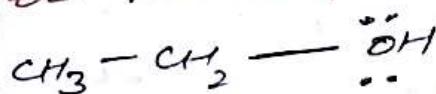
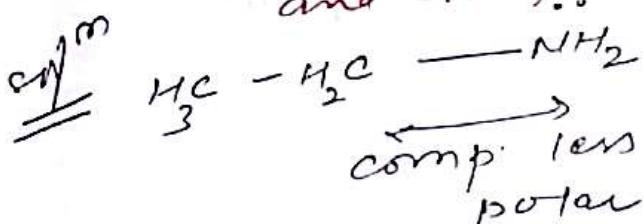
~~same as
Previous xylene
interactions
B.P. shape
M.P.~~
whether it is more symmetrical



(smaller interaction)
Polarity develops due to dipole-dip. int.

Alcohols

give ~~amines~~ ~~amines~~ are more water soluble than ~~alcohols~~ of similar molecular & mass. Bcoz O is more electronegative and OH forms stronger H-Bond



more polar bond

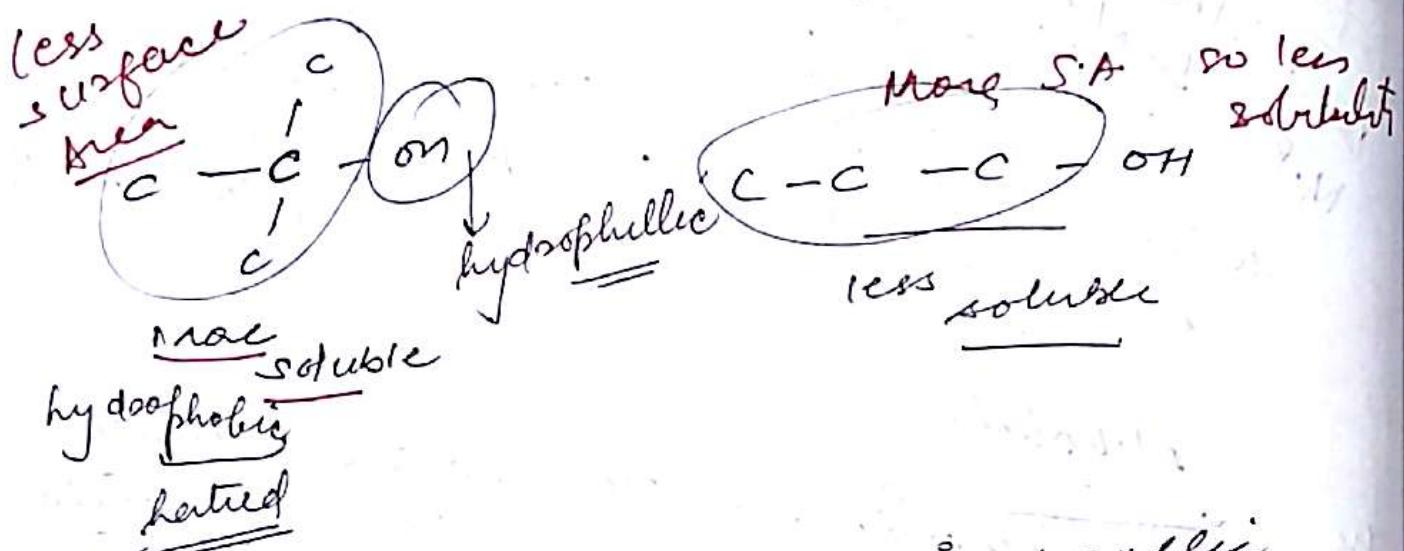
Greater Polarity, More will be the solubility. More polar bond should be more water soluble.

$\xrightarrow{\text{R}-\text{N}-\text{R}}$ $\xrightarrow{\text{more } \text{e}^- \text{ donation to H-bond}}$

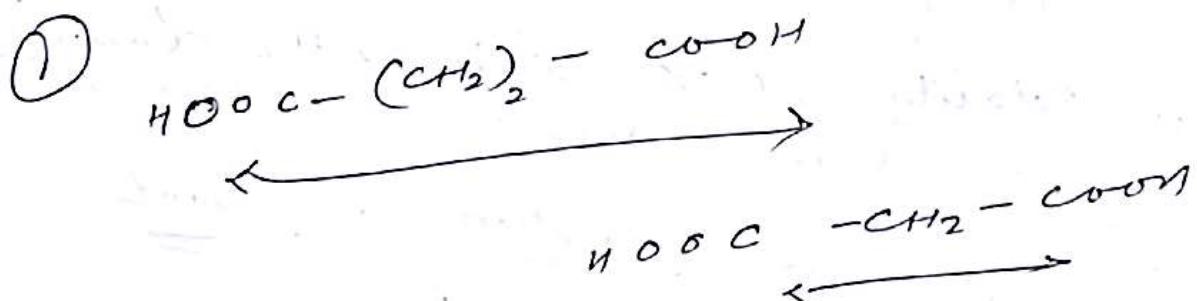
M:	DCP
Z:	-81.47°C
$(\text{trans}) \text{ E:}$	-49.44°C
B.P	21
$(\text{trans}) \text{ E:}$	60.2°C
E:	48.5°C
	Dip
	Mom

one why the single alcohol, straight chain alcohol is ~~more~~ soluble than the Branched filing chain alcohol?

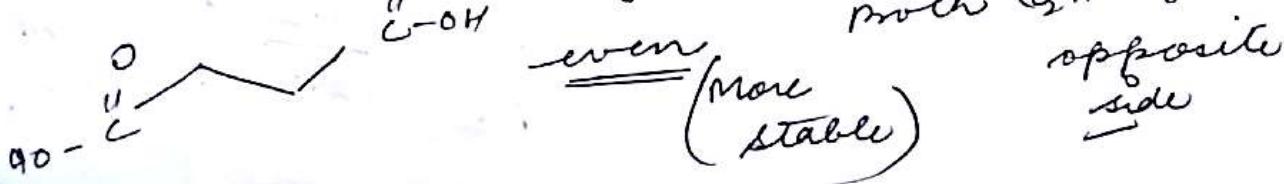
Ethyne - alcohols more soln than the oxyalcohols
and branched chains alcohol is more soluble than long chain alcohols

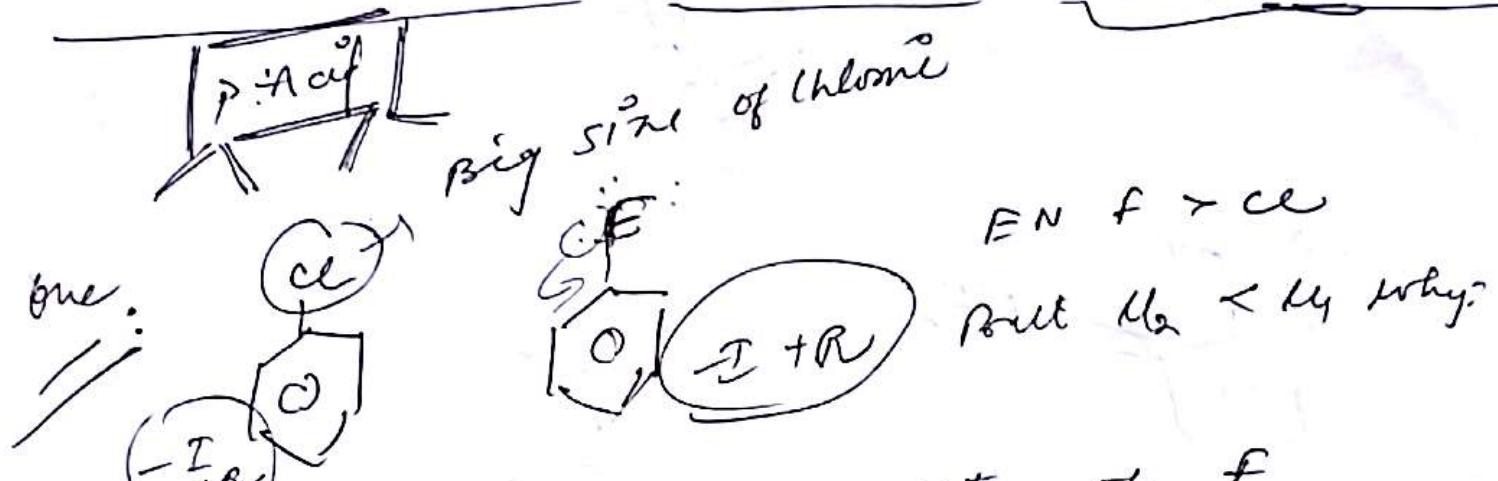
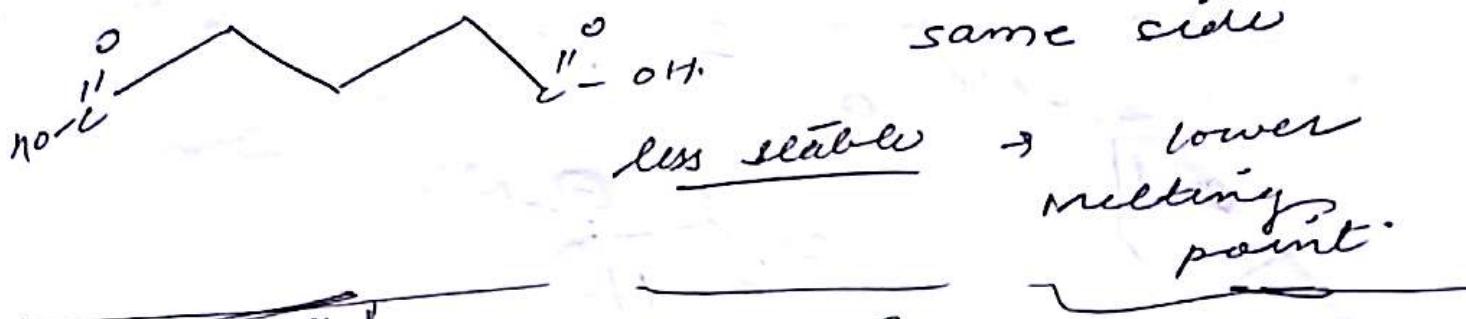


one: meeting point of dicarboxylic acid having even no. of carbons atoms is always higher than the acid having odd no. of C atoms



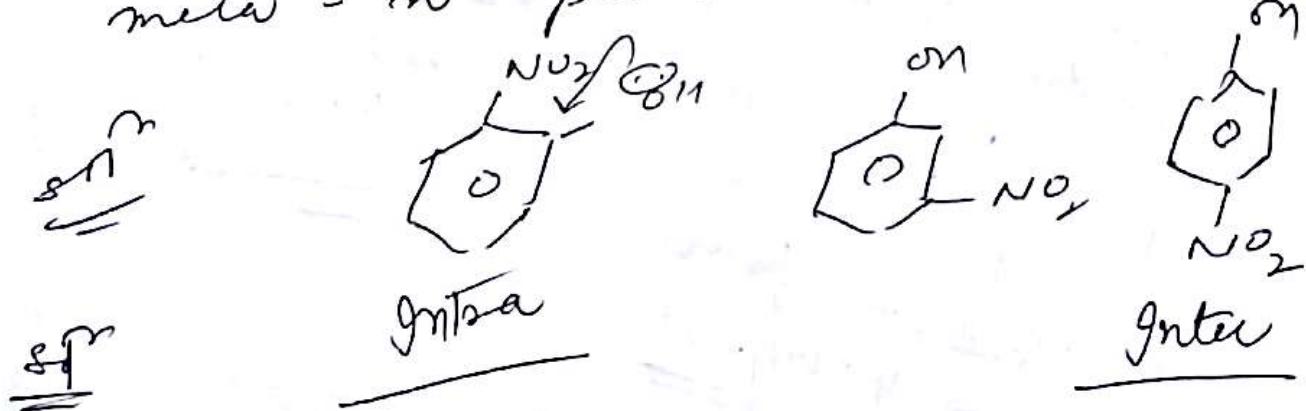
soln
Even \rightarrow symmetric
odd \rightarrow unsymmetric

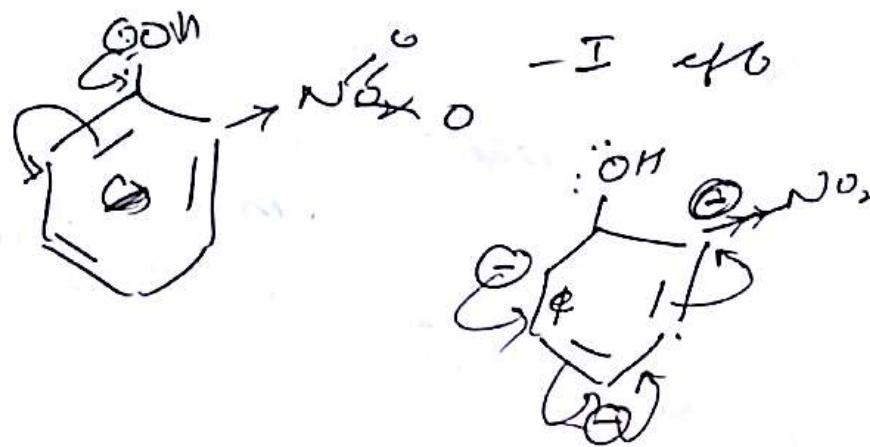




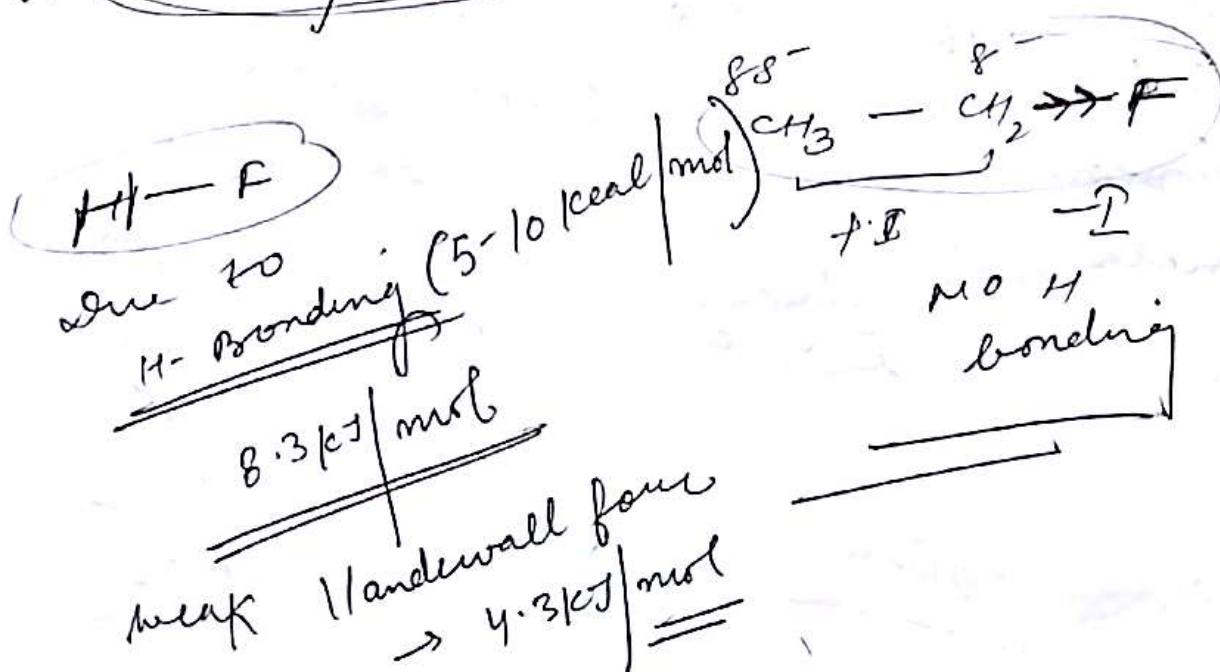
due to more δ effect of F
 due to size of chlorine is more
 δ is more pronounced than $+R$
 δ and $+R$ are balanced
 in due to p orbital overlap with p orbital of C.

Q. Why ortho-nitrophenol has less water solubility than meta- or para-nitrophenol?

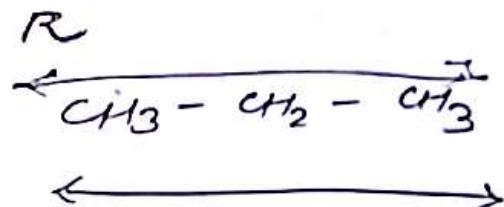
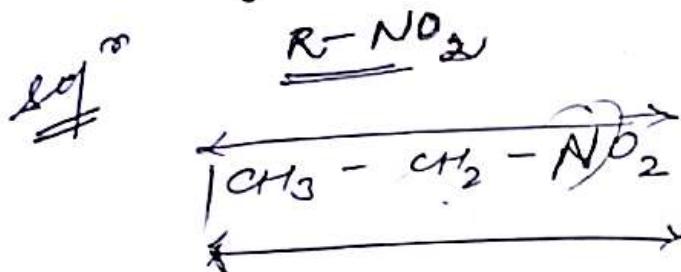




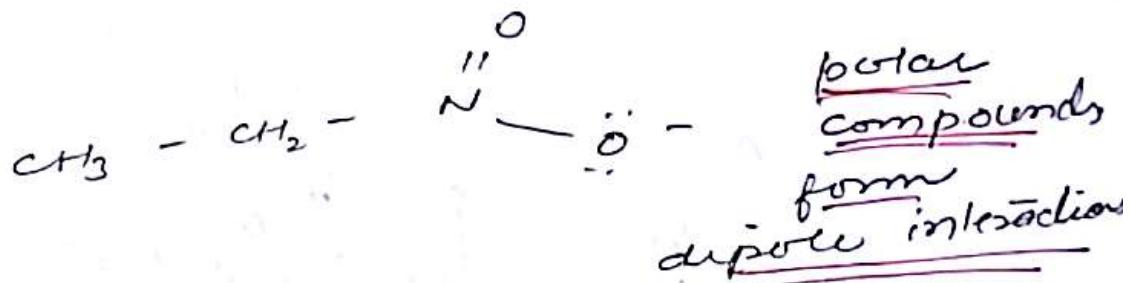
one hydrogen fluoride has a $\mu \rightarrow 1.82 D$
 Boiling point is $19.34^\circ C$. Ethylene
 fluoride has its almost identical μ
 has or longer molecular weight.
 its boiling pnt is $-37.7^\circ C$?



one :- Nitro - alkane $\underline{R\text{NO}_2}$ boils at much higher temperature than alkanes of comparable molecular weight.



stable



so their B.P. is higher than alkanes which has no polarity.

9 August

why

amides are basic? $\underline{\text{R}-\overset{\text{O}}{\underset{\text{C}}{\text{C}}}\text{NH}_2}$

one way methyl amine is more basic than aromatic amine. Illustrate with Energy diagram



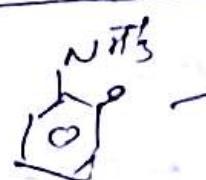
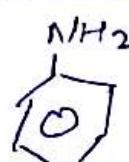
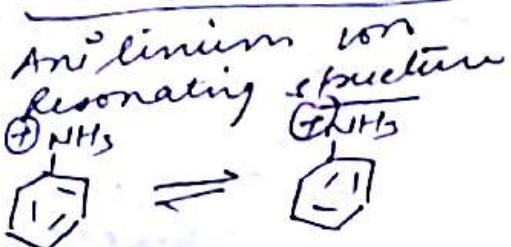
+I effect

makes it more basic

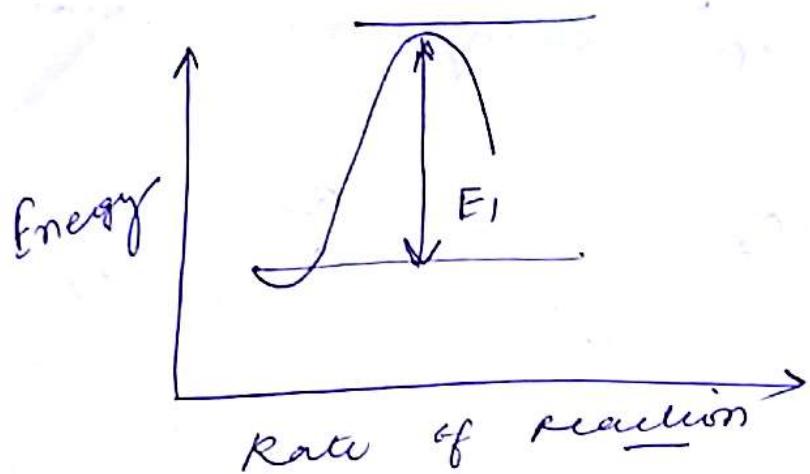


Resonating structure

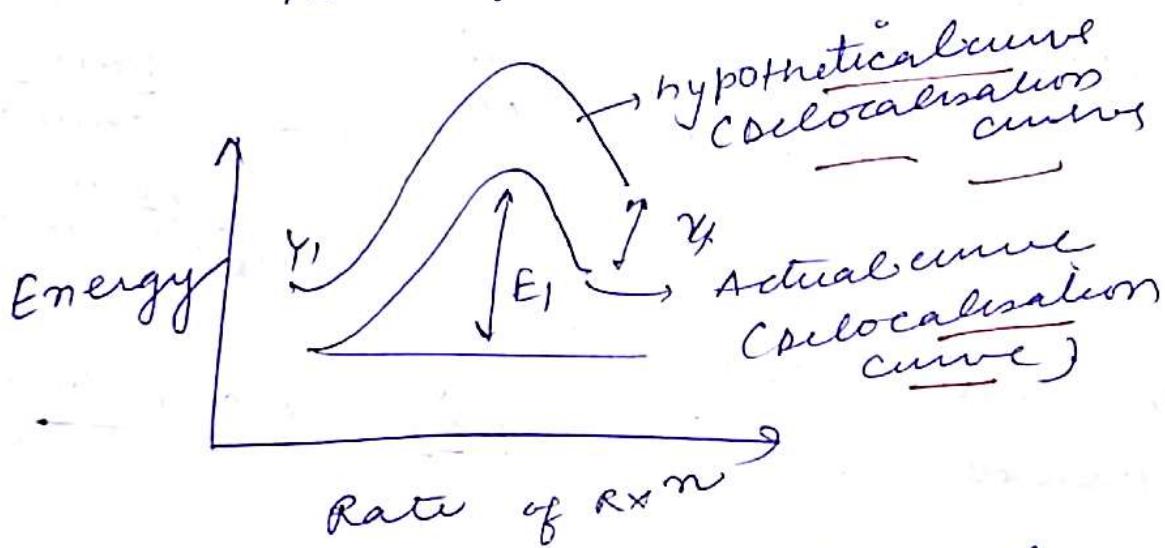
$\text{I} \rightarrow$ Resonating structures



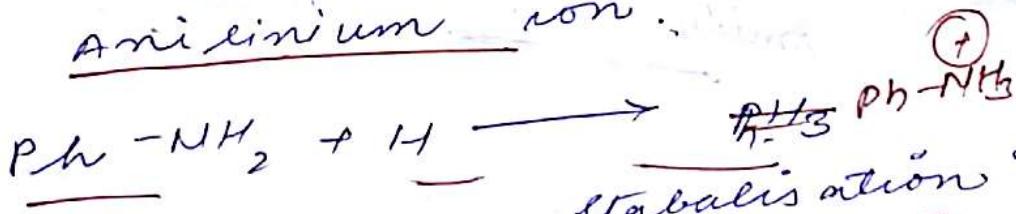
Energy Diagram



~~Explain
kinetic
theory
of reaction
rate~~

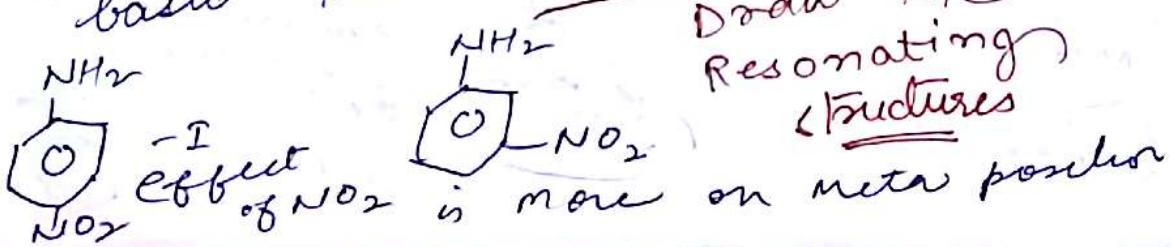


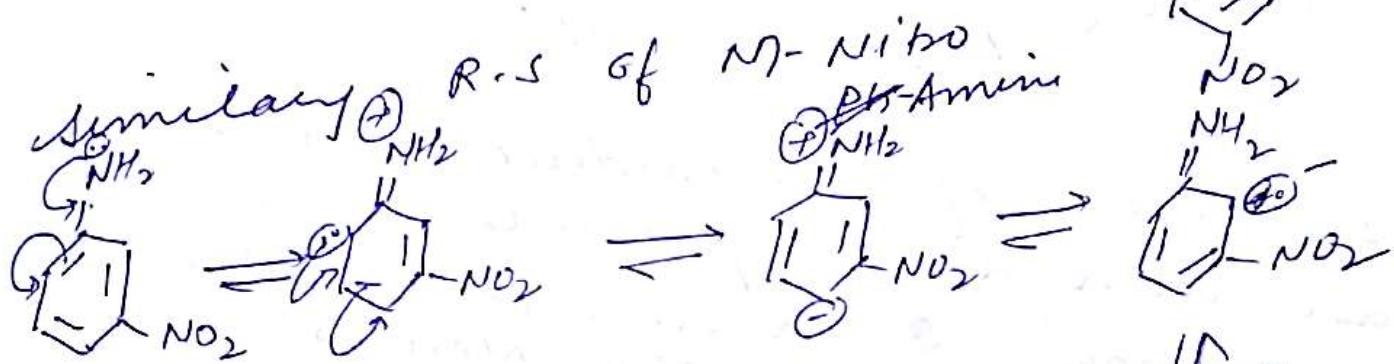
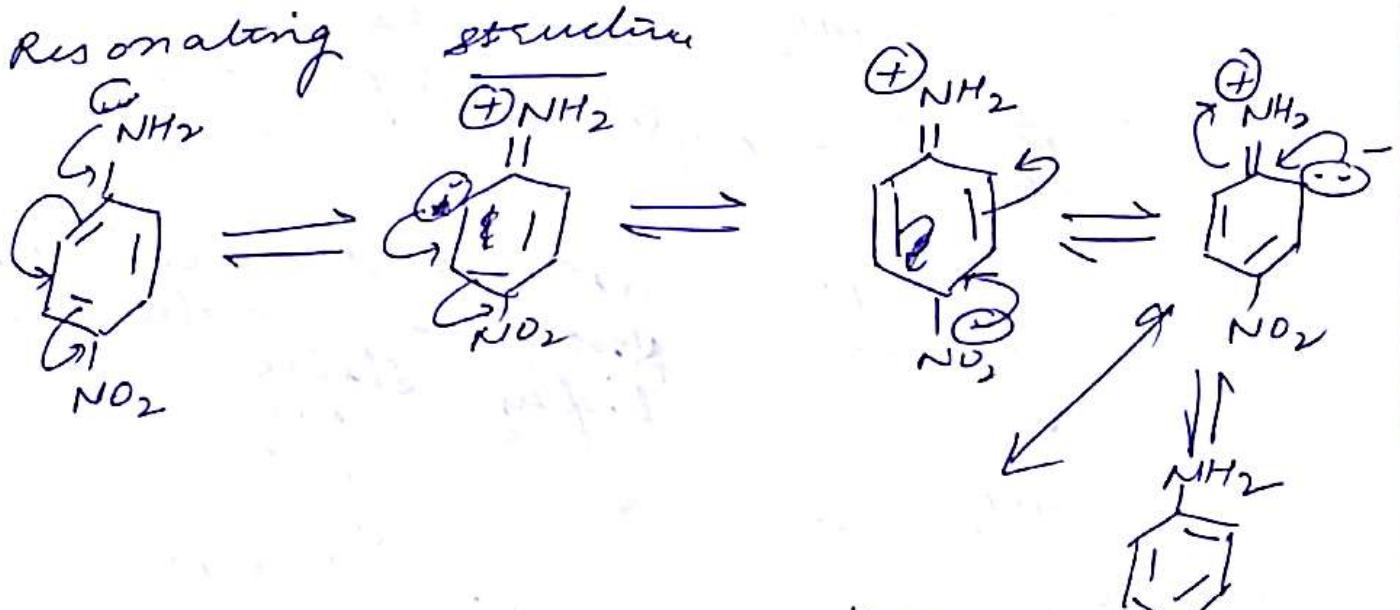
$X_1 \rightarrow$ Resonating structures of anilinium ion.



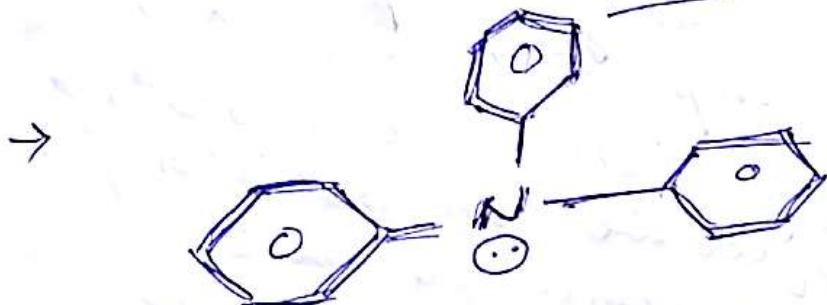
There is resonance stabilisation in anilinium ion has both similar resonating structures.

one why p-nitro aniline is less basic than m-nitro aniline

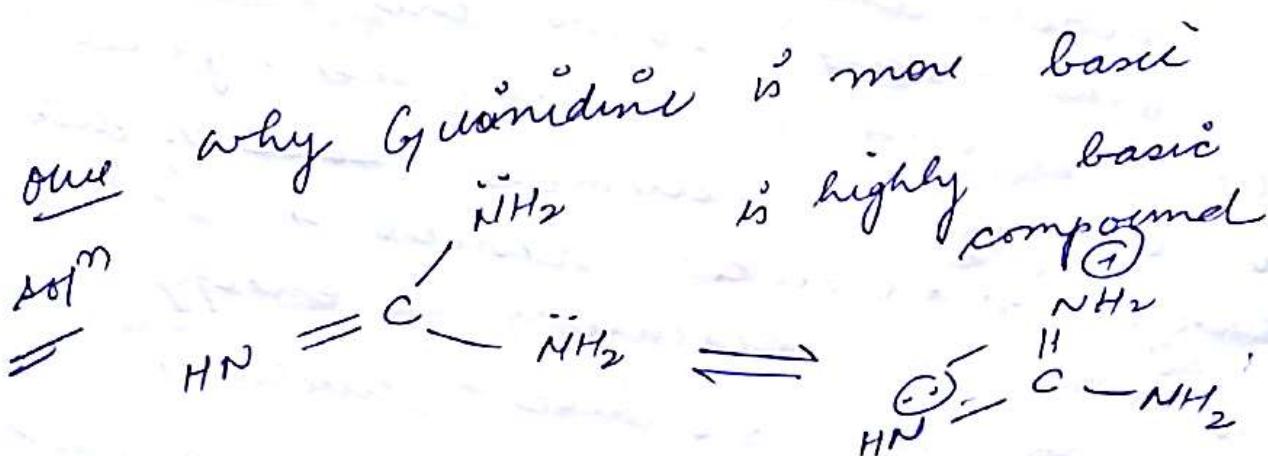




pure triphenyl amine are neutral why?

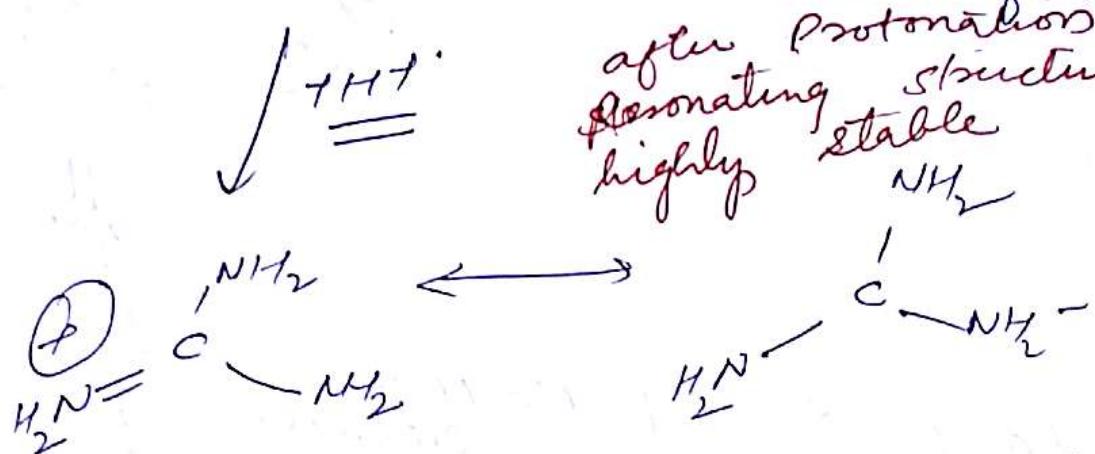


Effect of phenyl
is more prominent





charge separation is not main factor after protonation, the resonating structure highly stable

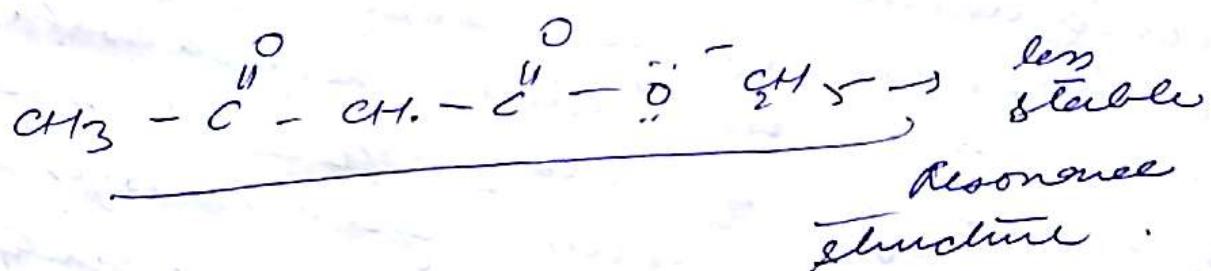
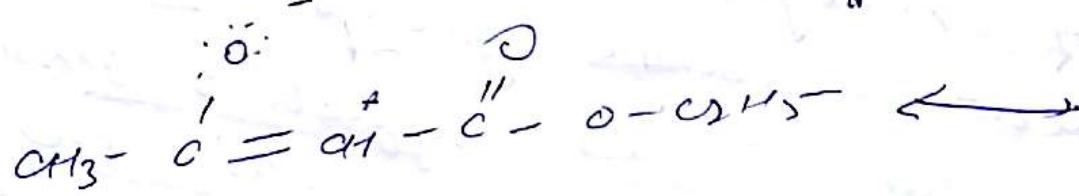
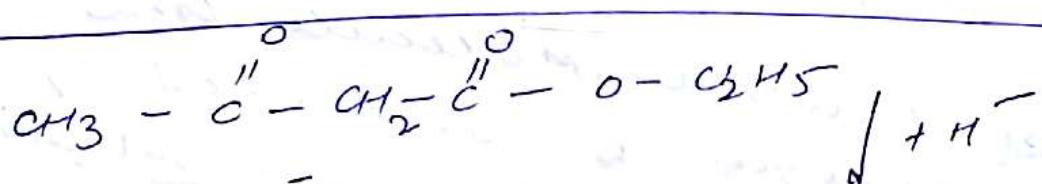
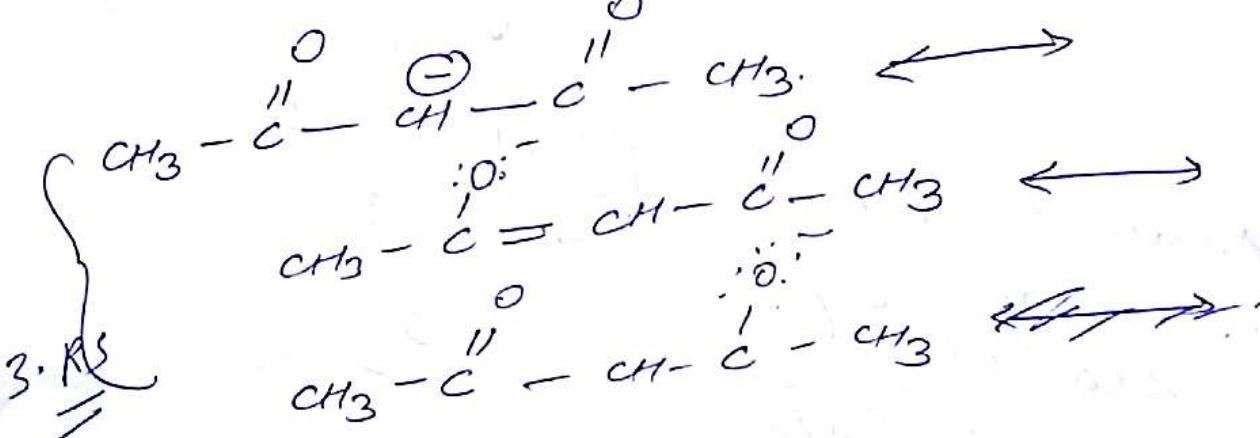
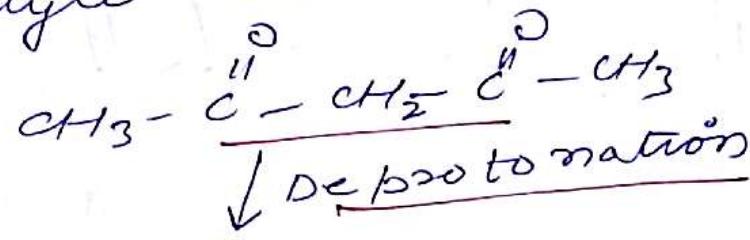


strength of quinidine as a base can be explained by resonance. 3 resonance structures are possible for the neutral atom and cation (Quanidium ion) of the 3 R. structures possible of neutral molecule involve charge separation. These charge separated structures & not important contribute to Resonance hybrid. π -localisation is thus less effective in pellione/ the base and consequently not resonance stabilised. cations on the other hand forms the exactly cation resonance stabilised hybrid so this occur extremely ~~some~~ effective charge molecule. Result is that difference in stability is energy diff. up to the resonance structures it requires very small energy for the protonation of base

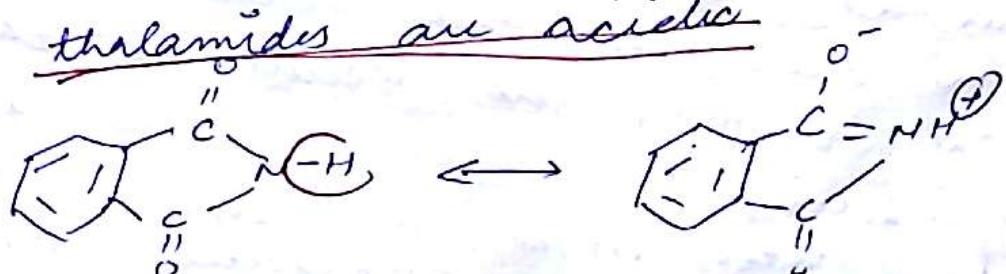
so far this season, we need
guanidine acts as a base

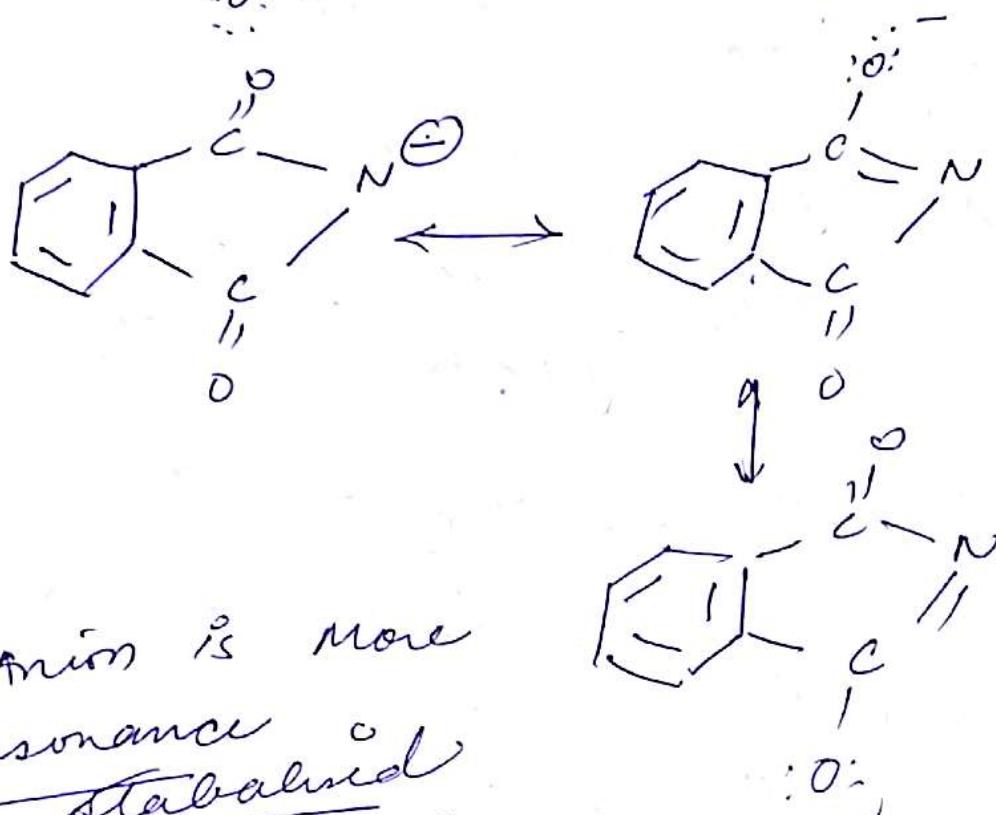
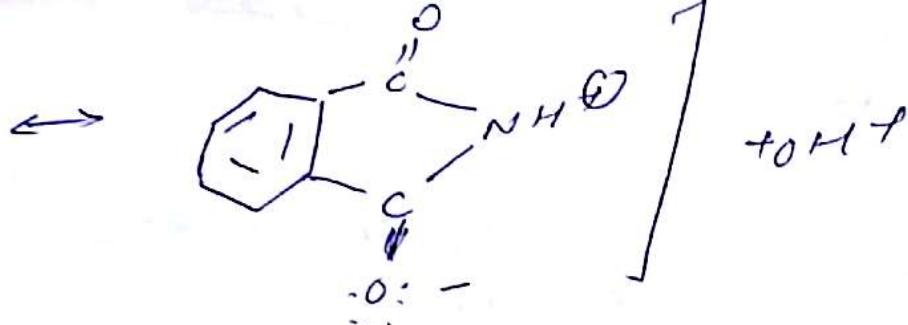
Ques. Why acetylene acetone is more acidic than ethyl aceto acetone.

8d^m Acetyle acetone
o



Ques why thalamides are acidic



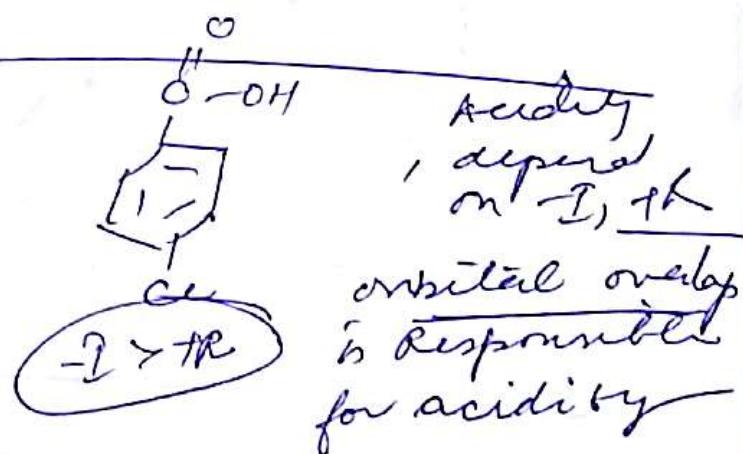
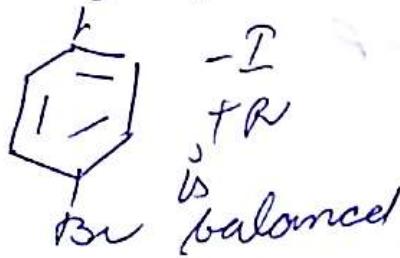
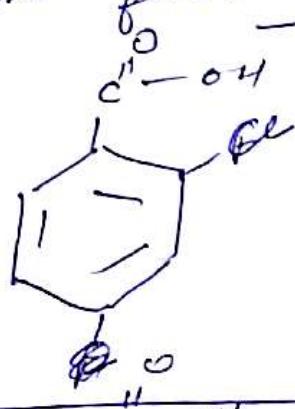


hence it is basic

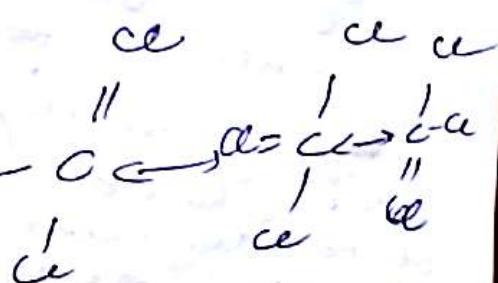
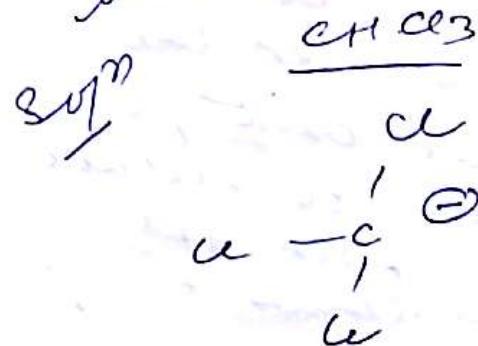
~~In~~ In the neutral molecule lone pair of nitrogen is delocalised by 2 adjacent carbonyl groups. But this delocalisation is less effective because it involves charge separation on other hand in anion, delocalisation of -ve charge is more effective bcoz removal of proton from nitrogen atom decreases the electron affinity of 'N' atom, there occurs no charge separation. Resonance stabilisation is greater in anion than the neutral molecule. Resonance

thus reverse the stability b/w halogenides
 in conjugated base, as a consequence
 ionization becomes much more favorable
 The compounds shows considerable acidity

Ques why Bromo-Benzoic acid is less acidic
 than ~~an~~ Fluoro-Benzoic acid whereas
 as Br is more electron negative
 than ~~fluorine~~ chlorine Br



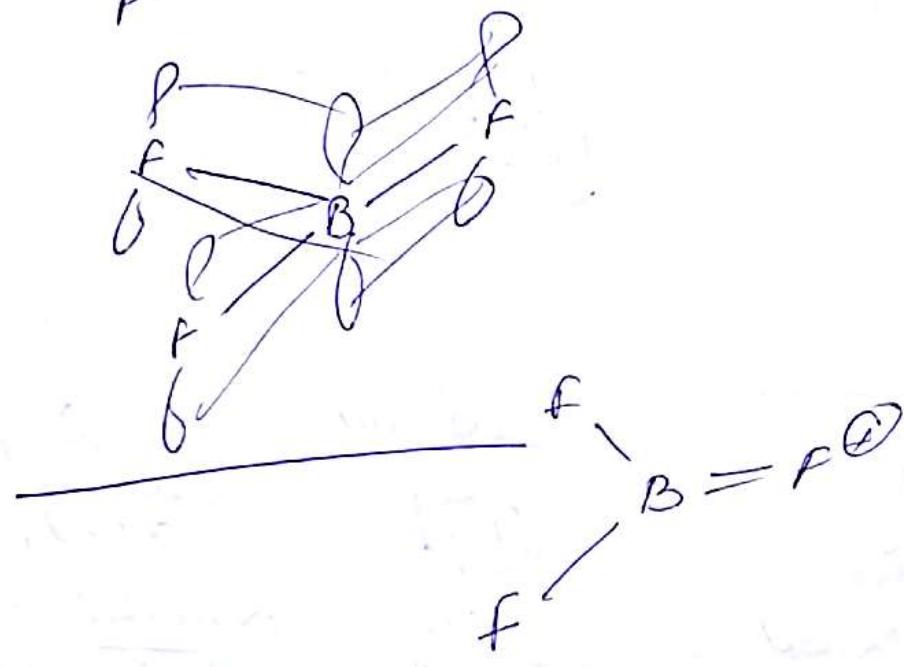
Ques Fluorine is more electronegative than Cl. But fluorofluorom is less acidic than chloroform?.



Fluorine has no d orbitals, so cannot accommodate all e^-

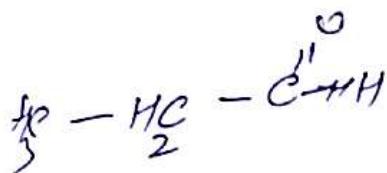
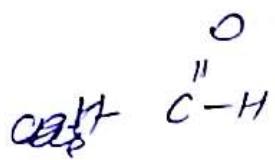
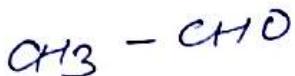
Chlorine has d orbital, so it can easily accommodate. So Chlorine is more acidic though fluorine is more

one BF_3 occurs but BF_3 is not BF_3 because one vacant $2p$ orbital



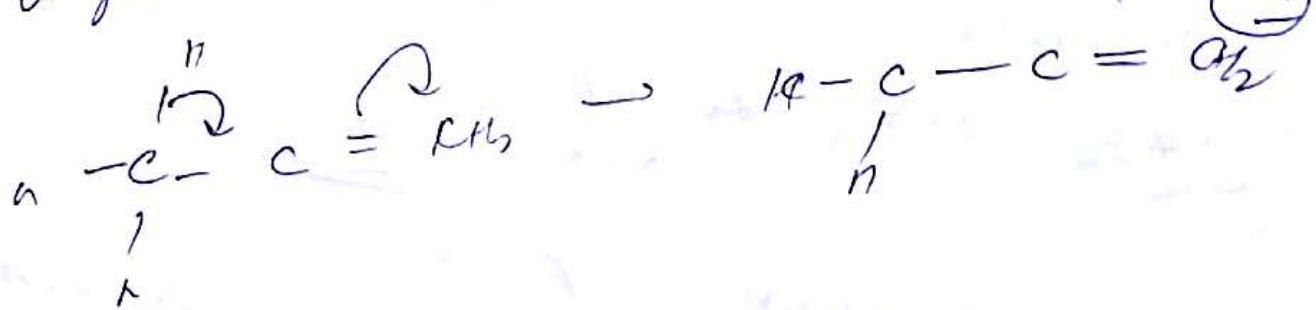
one in BF_3 vacant 2. orbitals of Boron forms σ bonds overlapping with 2p orbitals of chlorine delocalisation of e^- from F^- to B, thus helps to reduce e^- stay effect of Boron, which increases stability of BF_3 to exist. On the other hand BF_3 does not exist, such delocalisation can occur to reduce electron deficit of Boron from BF_3 molecule BF_3 it combines to form B_2H_6

give moment why formaldehyde has a dipole moment $\delta \cdot 27D$ and acetalddehyde $\rightarrow \boxed{\delta \cdot 92D}$

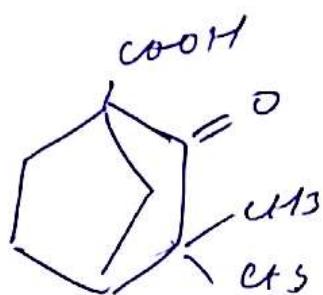
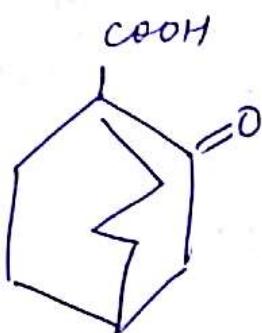


What is hyper conjugation:

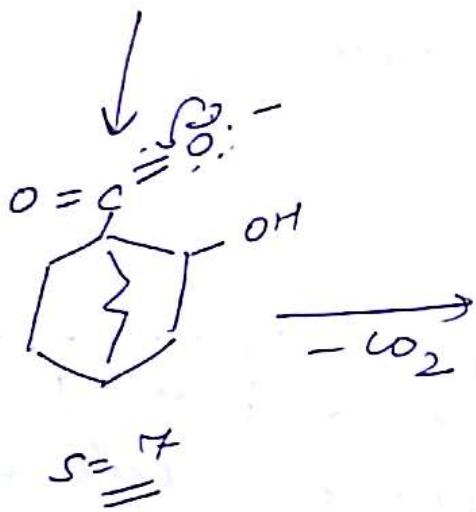
When carbon with at least one hydrogen is attached to an unsaturated bond, its π electrons would invoke delocalization by π electrons in the process of hyper conjugation.



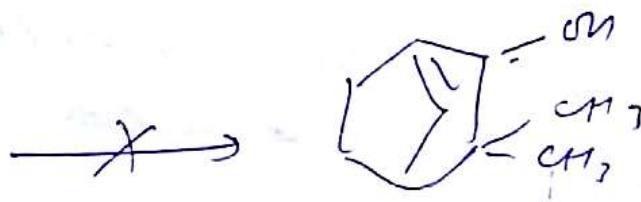
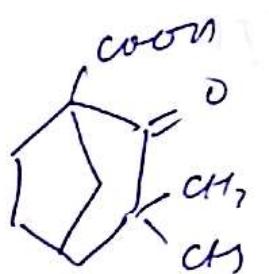
~~Baekel's~~ ~~Baekel's~~ Rule



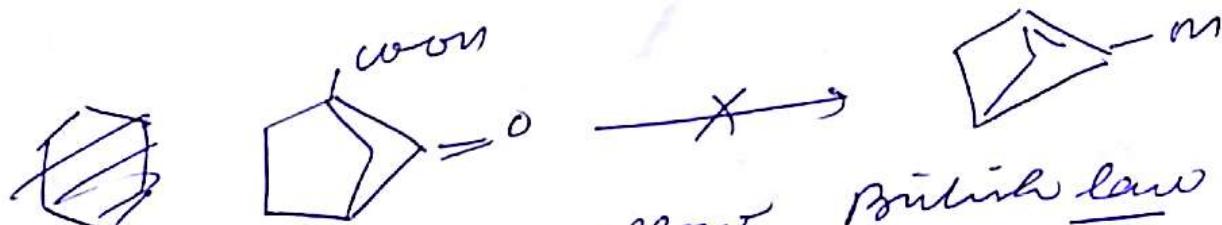
$S = 5 \text{ atoms}$



$S = 7$

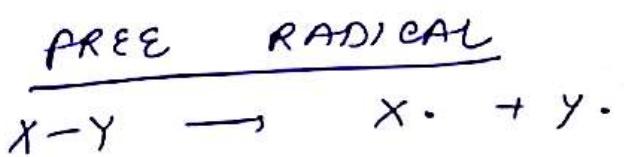


$S \neq 5$ $S < 7$ so it will not release CO_2



will not follow British law

for the carbon no less than 7,
this law is not followed.



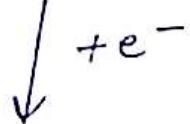
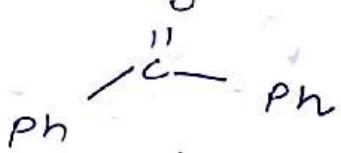
Homolytic fission }

- ① Radical anion of benzophenone is more stable than cyclohexanone
- ② 
- ③ Triphenyl methyl radical ($\text{Ph}_3\text{C}\cdot$) is not so stabilised due to delocalisation of unpaired electron as expected.
- ④ The azo compound of dibenzyle-diarene ($\text{PhCH}_2\text{N}=\text{NCH}_2\text{-Ph}$) decomposes thermally to give nitrogen at a faster rate than dimethyl diazene.

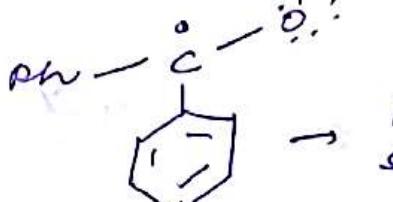
one =



Benzophenone

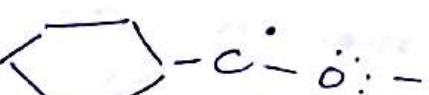
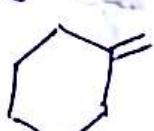


forming free radical



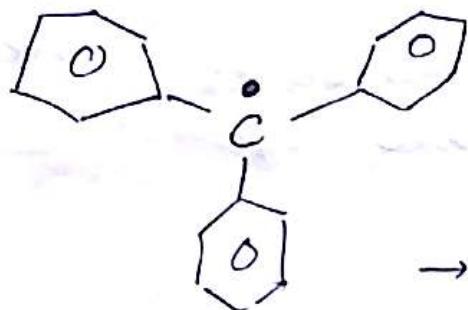
→ Resonance
stabilised
ion.

structure of cyclohexanone

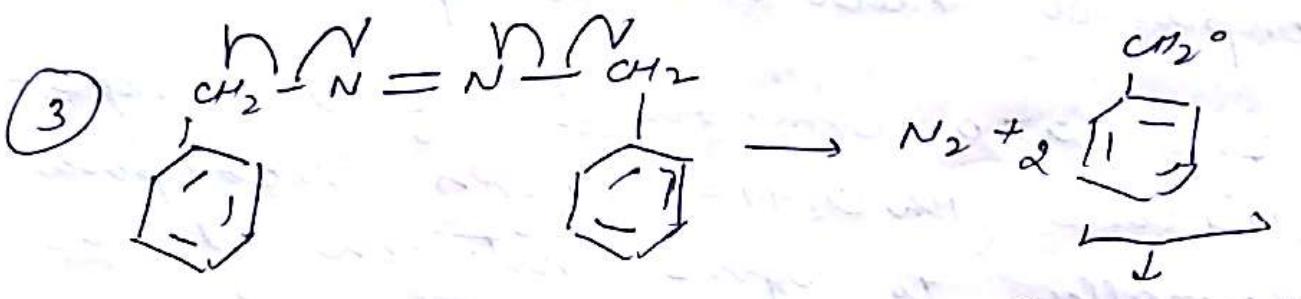


↓ not stabilised

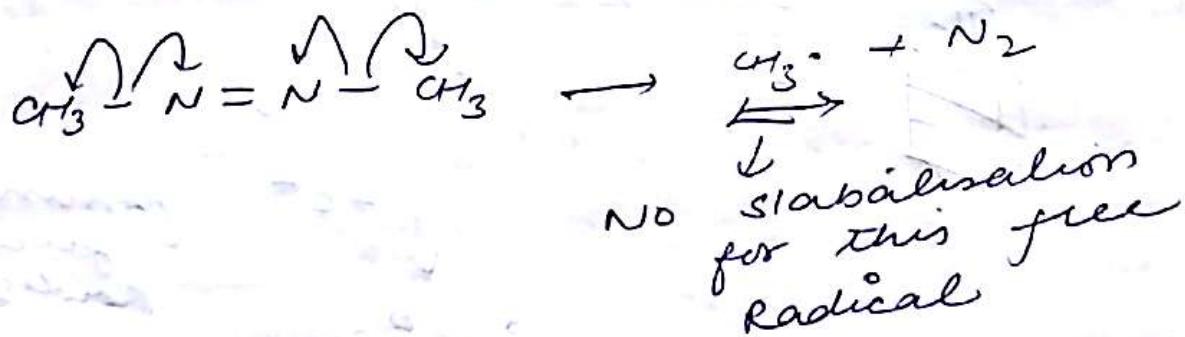
Q. Triphenyl methyl radical



Stability is due to coplanarity
 → but these are making an angle of 30° and hence no stabilization because they are not co-planar.

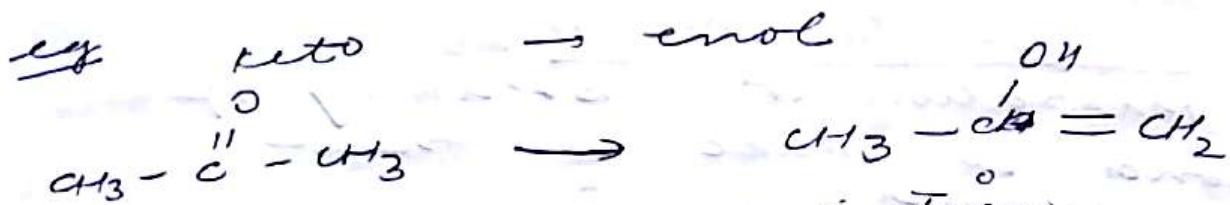


Resonance stabilized



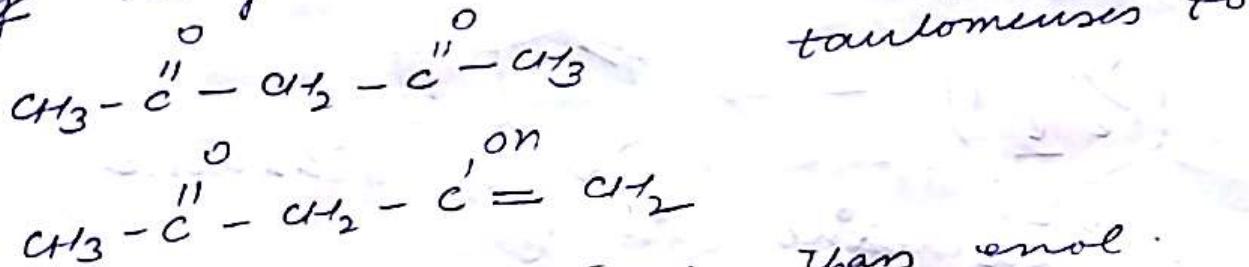
④ What is tautomerism?

~~UV amp~~ ~~Geoge~~
~~so~~ Tautomerism is a phenomenon in which a single compound quickly (interpreting) converted to two structures with the migration of atoms or groups specially hydrogen is called tautomerism (interconvertable)



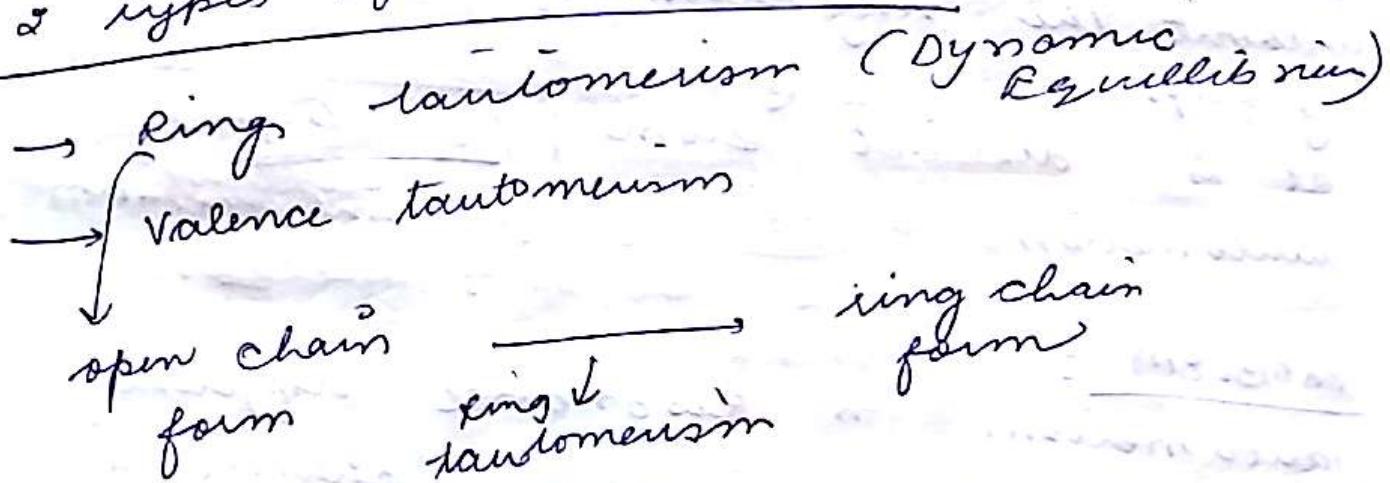
This is called tautomerisation

ex ethylacetylacetate

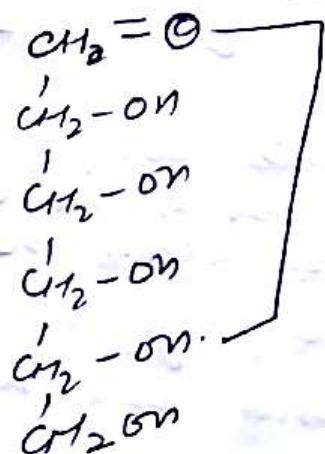


Keto is more stable than enol.
Because C=O bond is more
stronger than C=C bond

2 types of tautomerism



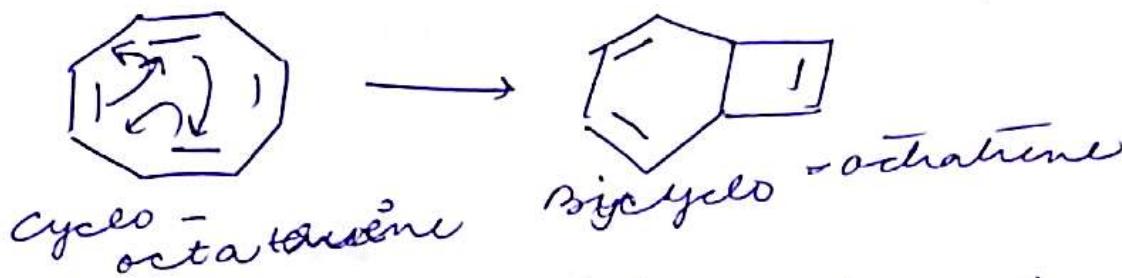
structure of Glucose



Practise

② VALENCE TAUTOMERISM

→ migration or breaking of bonds to make a new compound.
eg → octatetraic



it is a type of tautomerism in which a single bond or double bonds are rapidly formed and ~~bonds~~ broken without the migration of atoms or groups.

It is distinct from prototropic
constant migration
of atoms

PROBLEM :

Tautomerism " resonance difference?

- ① → Tautomerism involves change in the position of atoms (generally H) whereas Resonance involves a change in positions of unshared or πe^-
- ② → Tautomers are definite compounds (ie we can separate both ketone & enone), may be separated in isolated, but resonating structures are only imaginary and cannot be isolated.

③ → 2 Tautomeric acid forms have different structure (ie functional groups) but various resonating structures have the same functional groups.

④ Tautomers are in dynamic equilibrium with each other but resonating structures are not in dynamic equilibrium.

⑤ Tautomerism has no effect on bond length while resonance effects the bond-length, single bond is shortened and double bonds become larger.

⑥ Tautomerism does not lower the energy of the molecule, hence does not play any role in stabilizing the molecule while resonance decreases the energy and increases the stability of the molecule.

⑦ Tautomerism is indicated by \rightleftharpoons and resonance is indicated by \longleftrightarrow

⑧ Tautomerism can occur in planar as well as in non-planar molecule while resonance occurs only in planar molecule

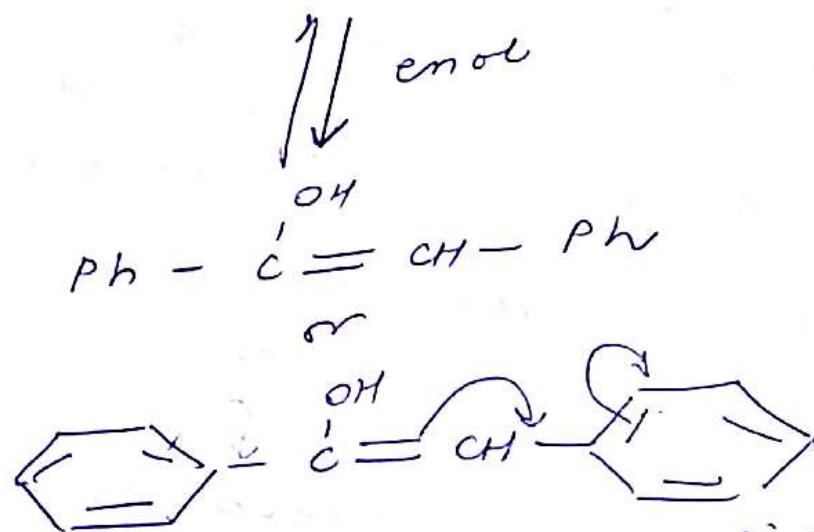
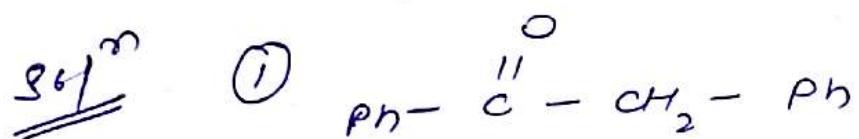
problem

① The enol content of $\text{PhCOCH}_2 \text{Ph}$ is very large

② The enol content of acetylacetone at equilibrium is much larger than ethyl aceto acetate

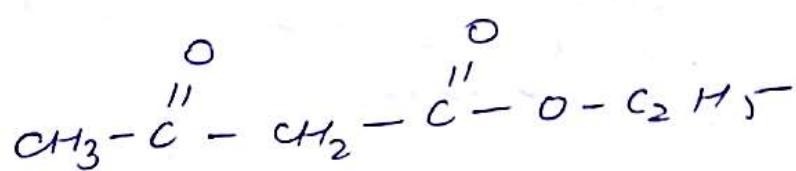
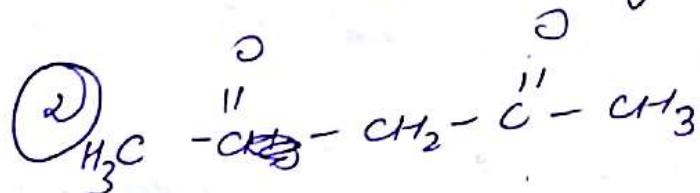
③ $(\text{Me}_3\text{C}\text{CO}_3)_3\text{CH}$ exists in 100% keto form.

④ The enol content of 4,4,4 trifluoro-2-butanol is larger than 2-butane.

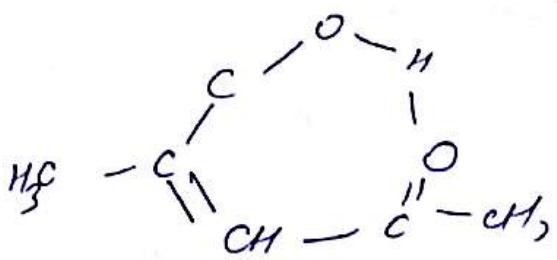


resonance stabilisation

& double bonds increase stability

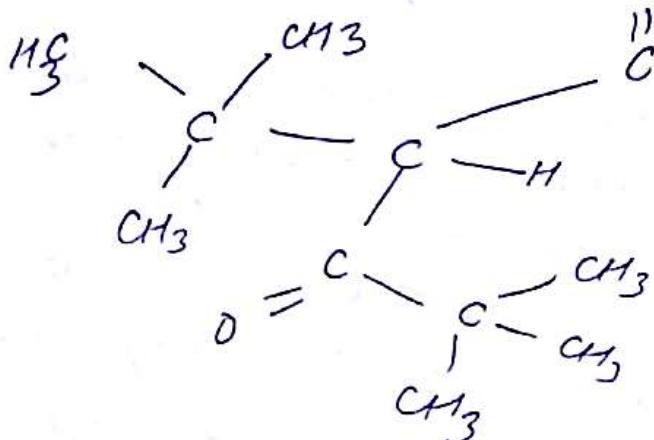


Ester group ^{resonate} contribute to the resonating structure of CO group due to ester group

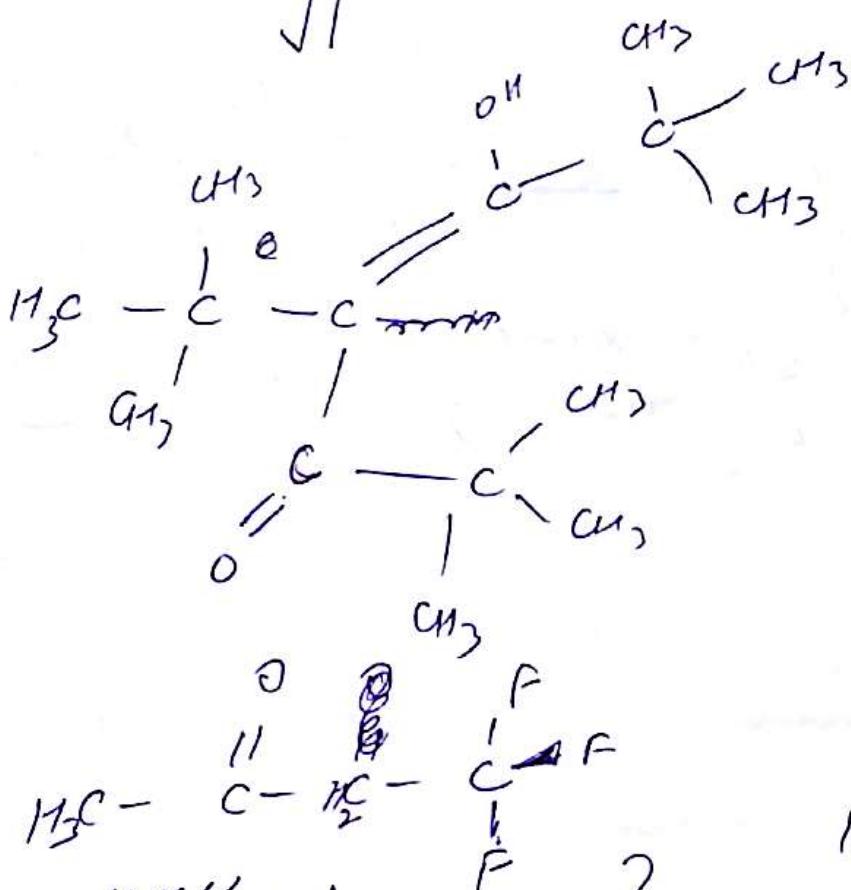


due to ester group
not enol formate

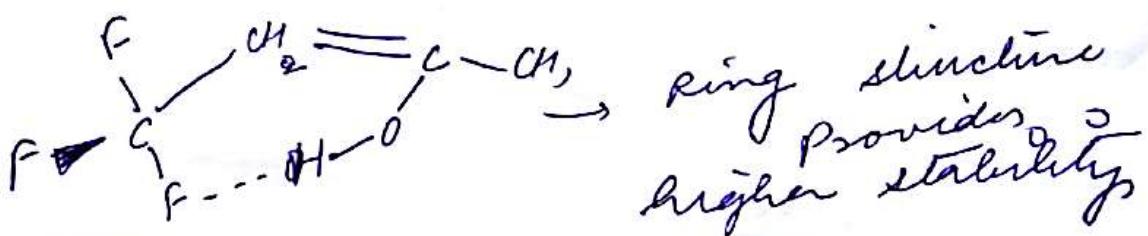
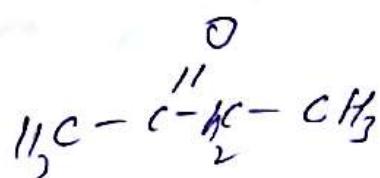
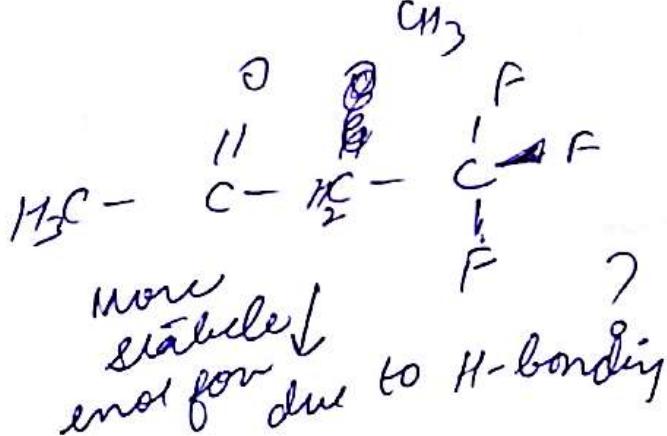
(3)



steric strain
due to steric strain, enol formation is hindered



(4)



Substitution + Elimination Rxn

nucleophilic Sub + Eliminal

Ques what is neighbouring group participation?

In nucleophilic substitution reaction, the nucleophile goes to the reaction centre, involves in the reaction rate or stereochemistry of the compound is called neighbouring group participation.



SN_2 reaction
on it is attacking from back side

~~what are the~~ conditions depend on substitution
and elimination?

- ~~Ques~~ → Nature of the Reactants
→ " " Nucleophiles
→ Nature of the solvent
→ Nature of the leaving group.

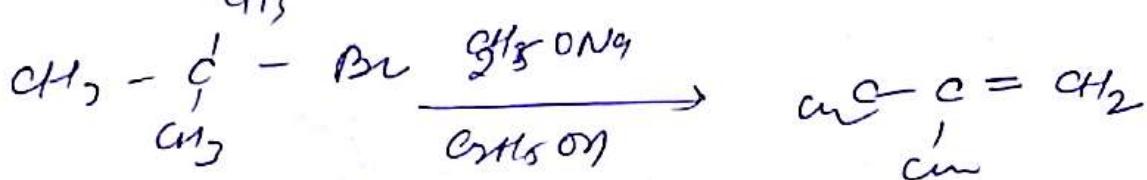
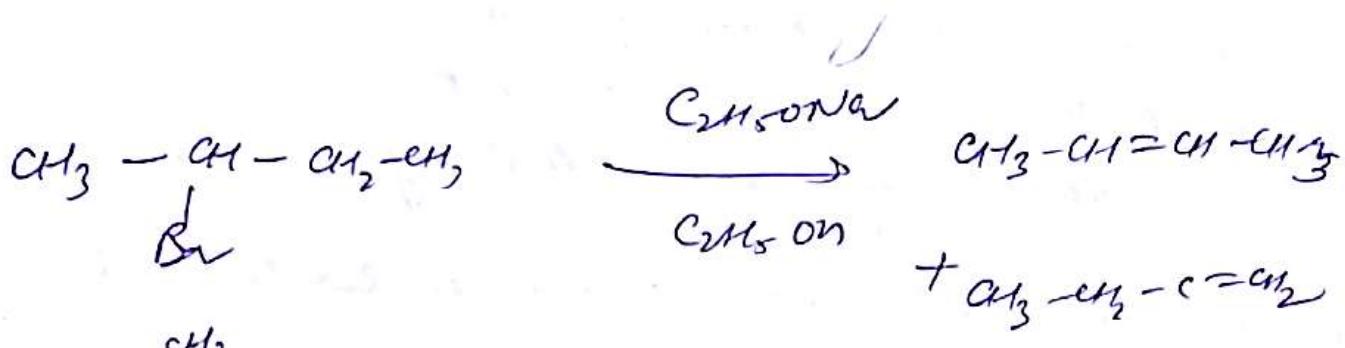
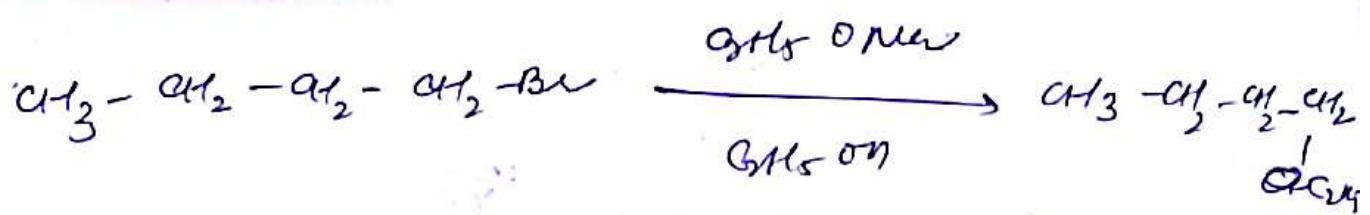
difference between order of reaction & molarity?

~~Ques~~ diff b/w nucleophilicity and basicity

Nucleophilicity of a reagent is the property to donate e^- to a carbon compound. It is a property to donate e^- to any proton. Depends on the activation energy of the compound. Basicity depends upon the total energy of the system.

difference b/w substitution & n elimination

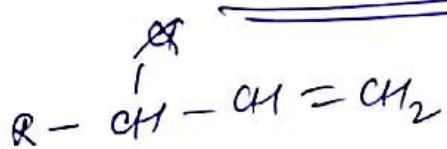
~~Ques~~ weak base prefers substitution Rx² and high concentration of base prefers elimination reaction. Substitution of the reactants prefers elimination by n than substitution reaction.



why benzyl vinyl and aryl cation does not prefer S_{N}^1 and S_{N}^2 reactions
 S_{N}^1 (Vinyl or aryl cations are not so stable)

- ① both due to resonance achieve double bond in the structure
- ② though the appearance of S_{N}^2 reaction from backside supplied by e^- of the double bond of the benzene, it does not favour S_{N}^2 reaction.

What is Molecular Rearrangement Rxn?

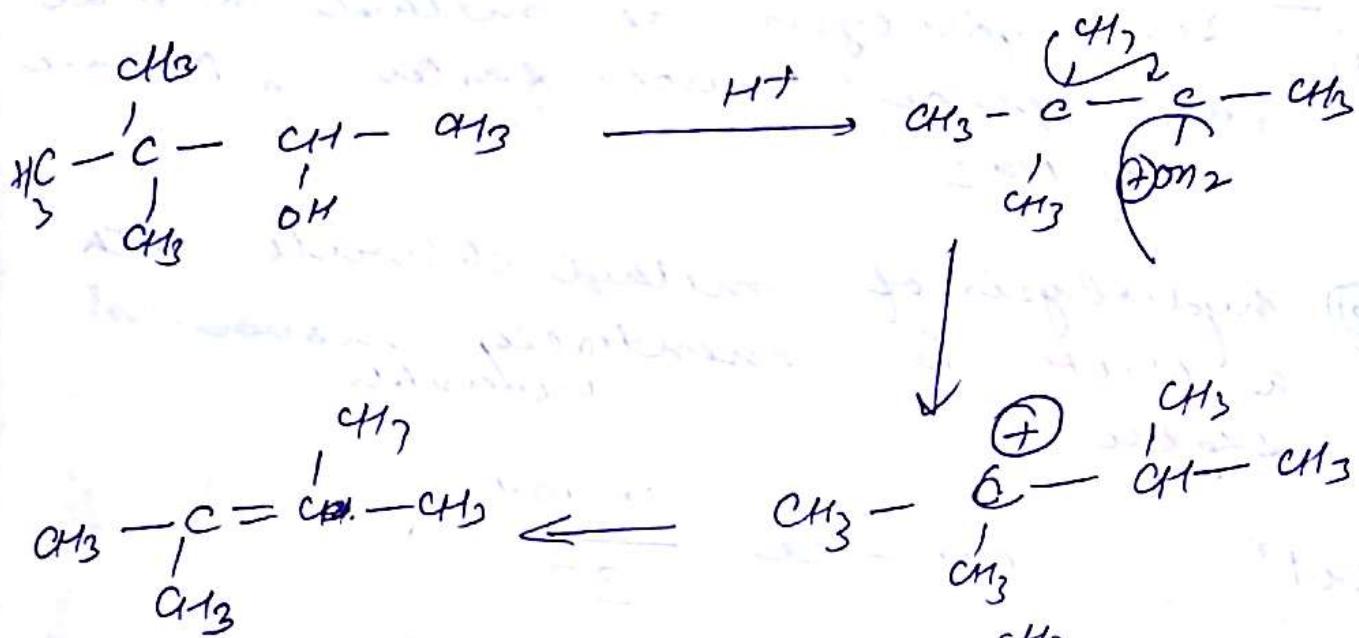


When a group in a Rx^n rearranges from one step to another step in the same reactant is called molecular rearrangement

① ~~Beckmann~~ Beckmann Rearrangement

① ~~Wagner Meerwein~~ Wagner Meerwein Rearrangement

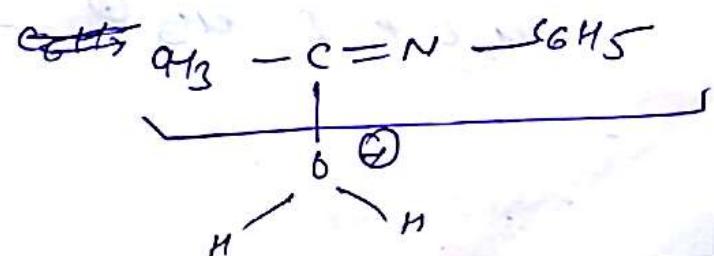
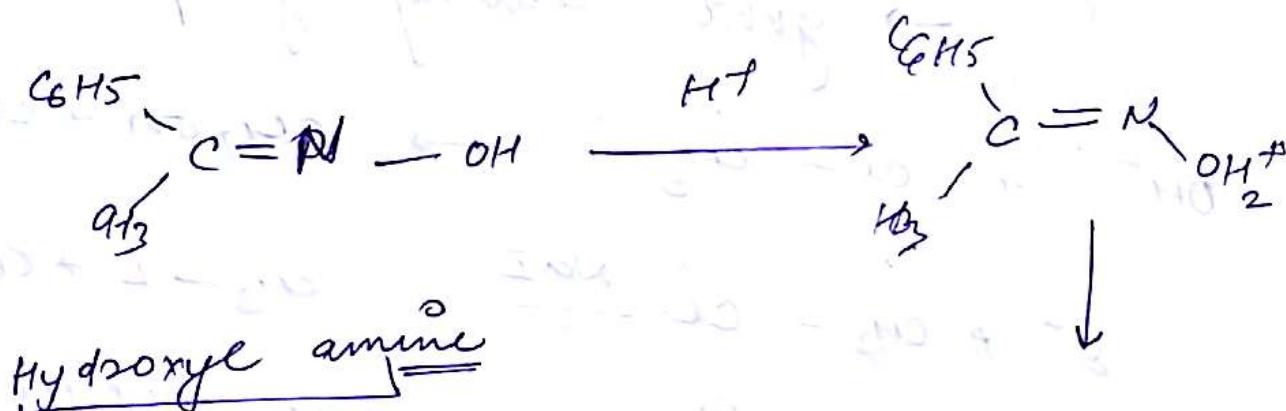
1,2 hydride / 1,2 methyl shift

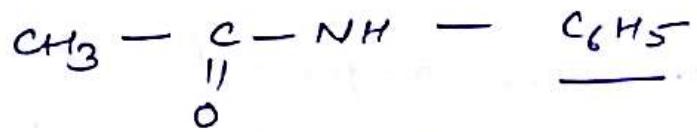


why not we get $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\underset{|}{\text{C}}}} - \text{CH}_2 = \text{CH}_2$

Rather we get 2-Butenone
or one to 1,2 hydride / methyl shift

BECKMANN RARRANGEMENT

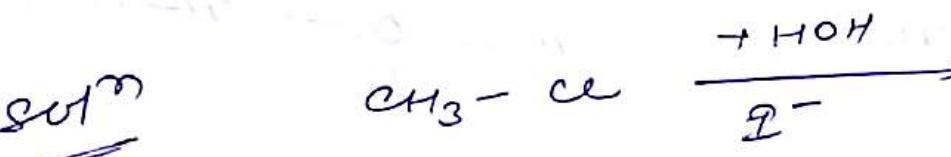




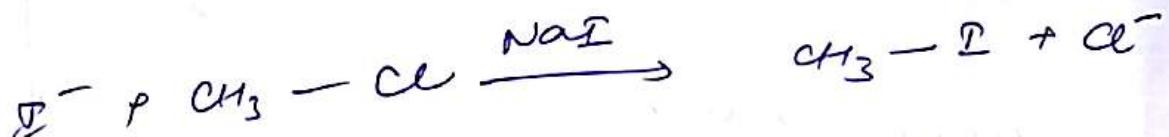
Problems :

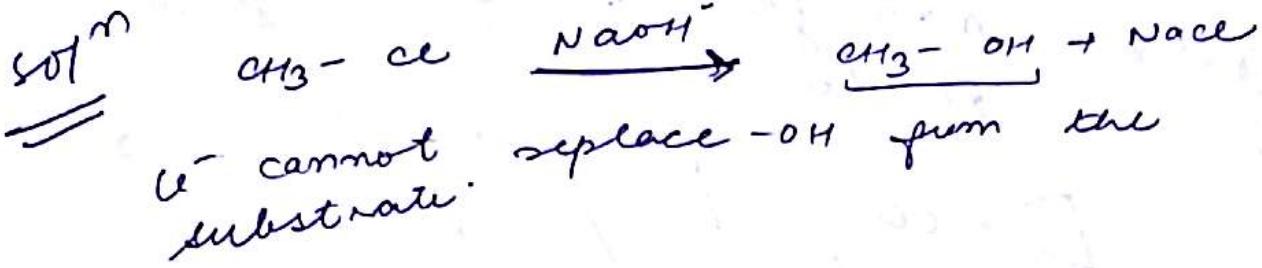
① The hydrolysis of methyl chloride takes place much faster in presence of NaI

② Hydrolysis of methyl chloride with aq. NaOH is essentially never not reversible



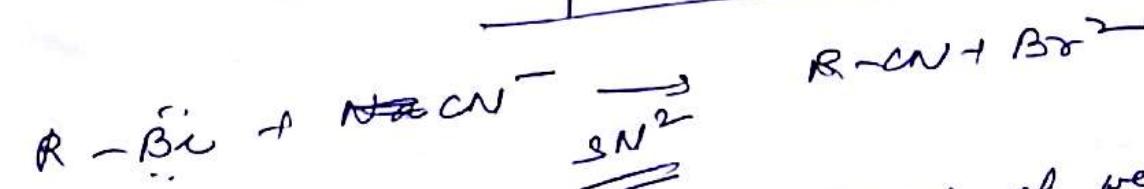
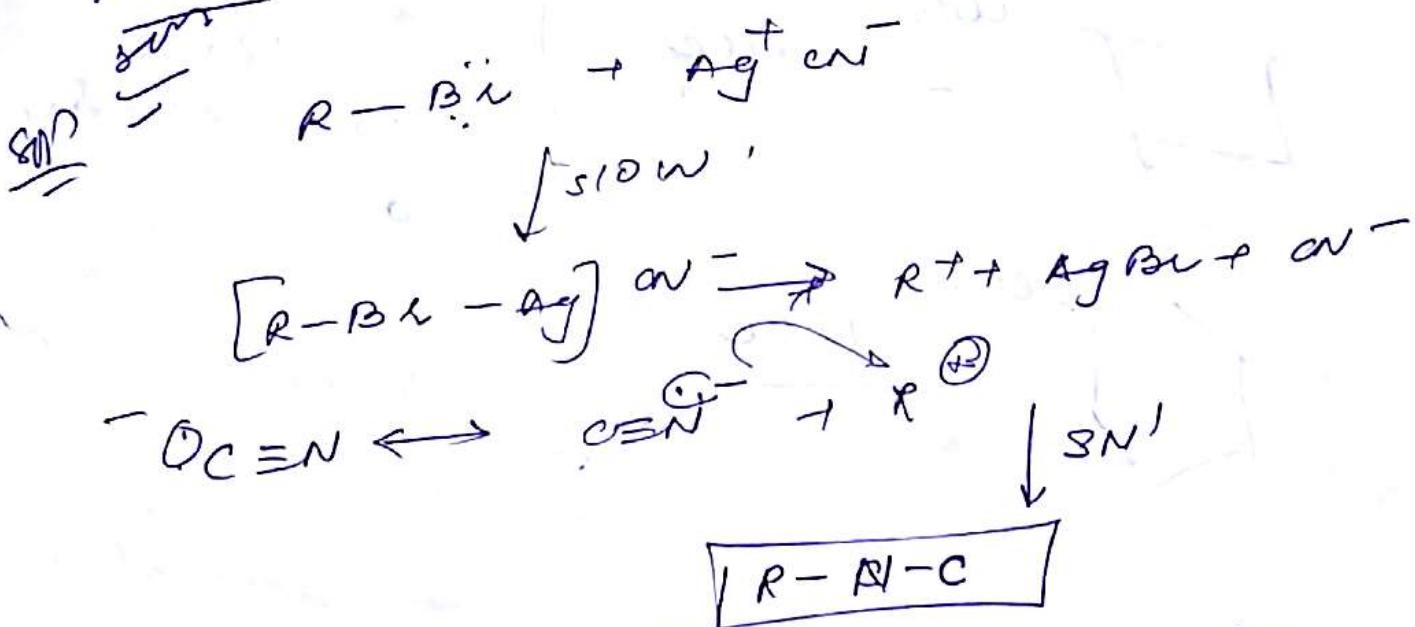
$\text{O} \rightarrow$ polarisability is less
 \rightarrow strong more electronegative
so the hydrolysis process is slow
But $\text{I}^- \rightarrow$ more polarisability
 \rightarrow big charge cloud
 \rightarrow solvation is small
 \rightarrow good leaving group





one Ethyl Bromide reacts with Ag CS
 forms R-NC alkyl isocyanide
 but with NaCl R-CN alkyl cyanide

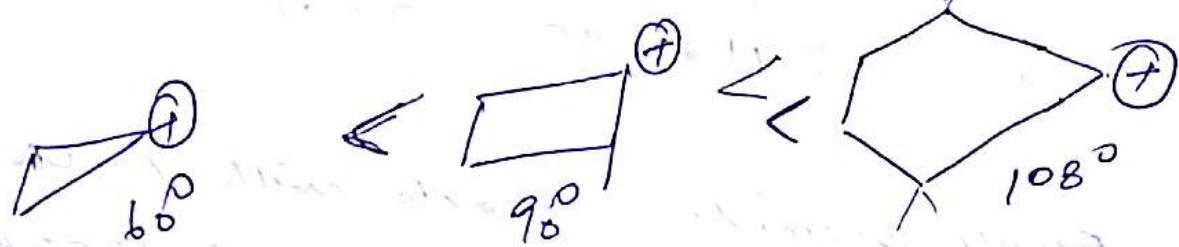
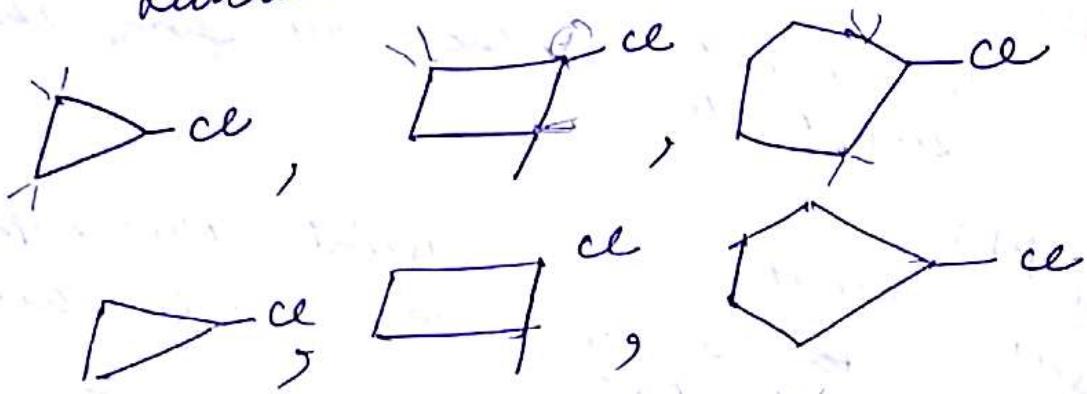
Reason:



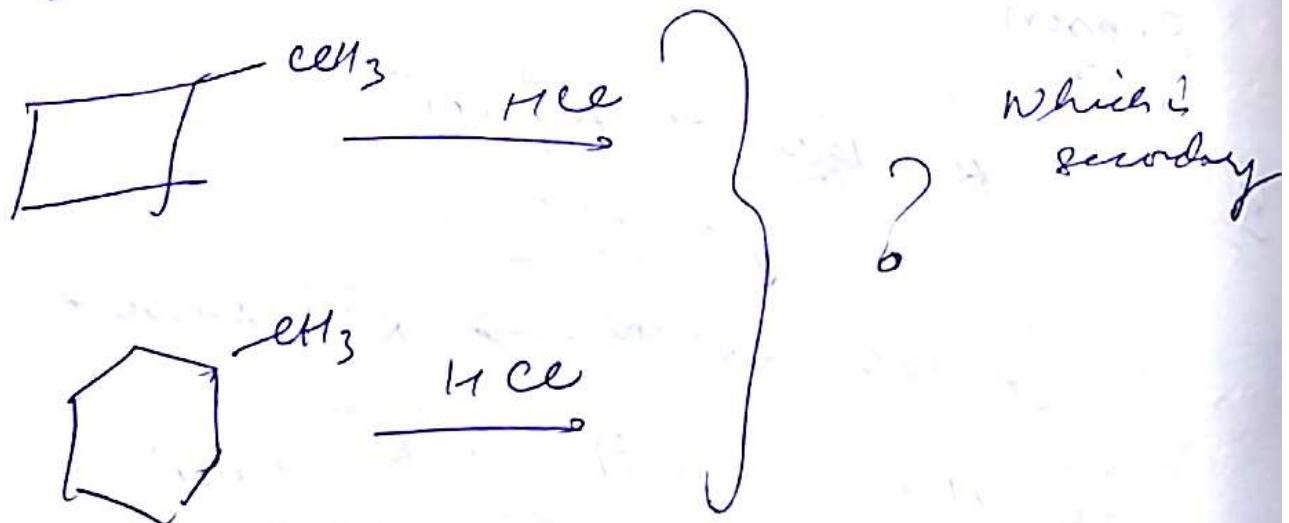
Stay
cool & strong
here

concept of weak base
w f weak acid

Ques 8
Arrange the following SN₁ reaction

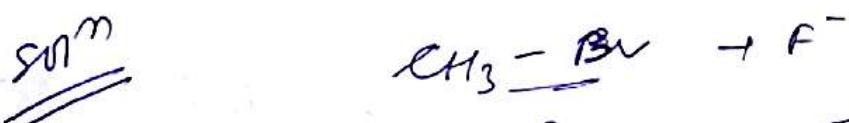


∠ C between 2 bonds $\rightarrow 120^\circ$
deviations from SN₁ (120°) more or less SN₁ probability



~~tri~~ methyl amine $(CH_3)_3N$ is a good nucleophile while trifluoromethyl amine $(CF_3)_3N$ is complete non nucleophile

one on the gas phase, the order of reactivity of halides towards bromo methane is $F^- > Cl^- > Br^- > I^-$



SN1 there is no solvation, so charge distribution is uniform so it acts as a better nucleophile

- ① upto aliphatic nucleophilic Electrophilic substitution
- ② aliphatic elimination $\xrightarrow{E2}$ (10 Marks)

ORGANIC

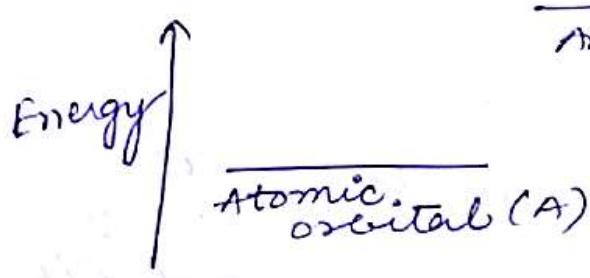
→ Peter Sykes

① ~~structure, reac^ts~~

chapters 1, 3, 4, 5, 7, 8, 9,
11

Chapter - 1

Structure n mechanism



antibonding (σ^*)

Atomic orbital (B)

Bonding (σ^*)

→ INDUCTIVE EFFECT

It is an electronic effect due to the polarisation of σ bonds within a molecule or an ion. This is due to the electron-negativity difference between the atoms.

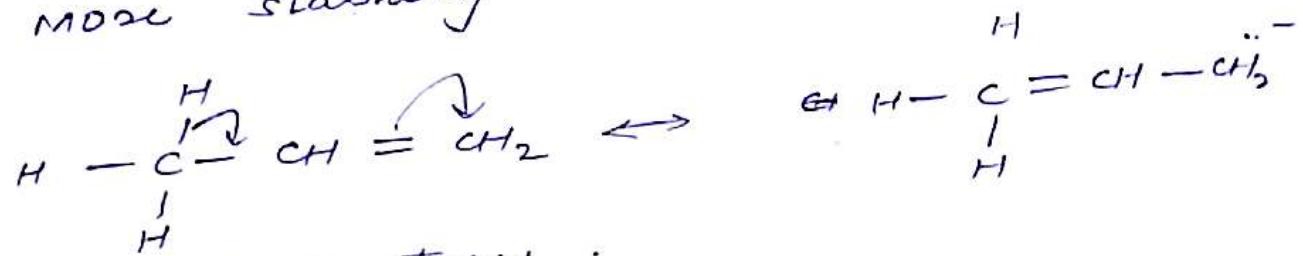
→ RESONANCE : / MESOMERIC EFFECT

This describes the electron withdrawing and releasing capacity of the substituent based upon relevant resonating structures. This effect is present in a compound having at least 2 double bonds or at least a conjugation is present.

→ HYPERCONJUGATION

Interaction of bond electrons with an adjacent empty or partially filled p or π^* orbital to increase the stability of the system.

more no. of α -hydrogen implies, more no. of hyperconjugating structures are more stability.



similar 3 structures.

REACTION TYPES

→ Displacement (Substitution)

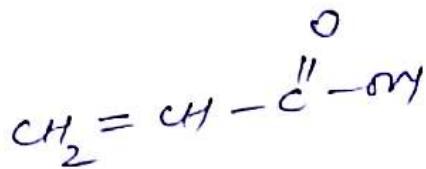
→ Addition

→ Elimination

→ Rearrangement

STRENGTHS OF ACID AND BASE

→ Propenoic acid is stronger than propanoic acid.



NUCLEOPHILIC SUBSTITUTION AT A SATURATED CARBON ATOM

conditions on which substitution and Elimination depends.

- Nature of the
- (i) solvent
 - (ii) substrate
 - (iii) Reactants
 - (iv) nucleophiles
 - (v) leaving group.

ORDER OF A REACTION

order is the sum of the exponents in the rate law Equation

MOLECULARITY OF A REACTION

No. of molecules taking part in a reaction

NUCLEOPHILICITY

It is the property of donating e^- pairs to a carbon atom in general

→ depends upon the activation Energy of the reaction

BASICITY

Property of donating ~~proton~~ e^- to any proton

Thermodynamic concept
→ depends upon the total Energy of the overall reaction

SUBSTITUTION

Preferred by
weak bases

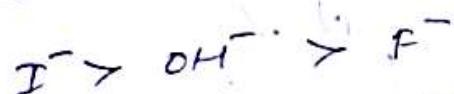
v/s

ELIMINATION

strong bases
prefer elimination

Nucleophilicity

protic \rightarrow (water)

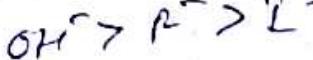
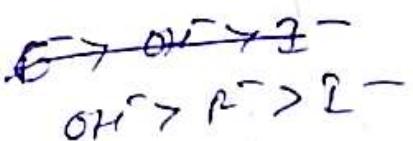


HOW good something
reacts

(more)

AProtic

(Basicity Matter)



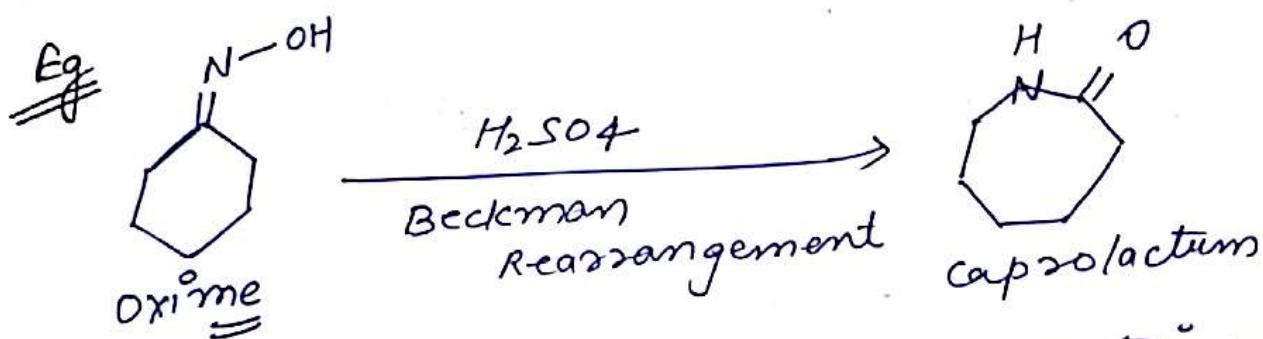
SN_1

THE REARRANGEMENT REACTIONS

Reactions in which an atom or a substituent rearranges from one step to another within the same reactant are called rearrangement reactions.

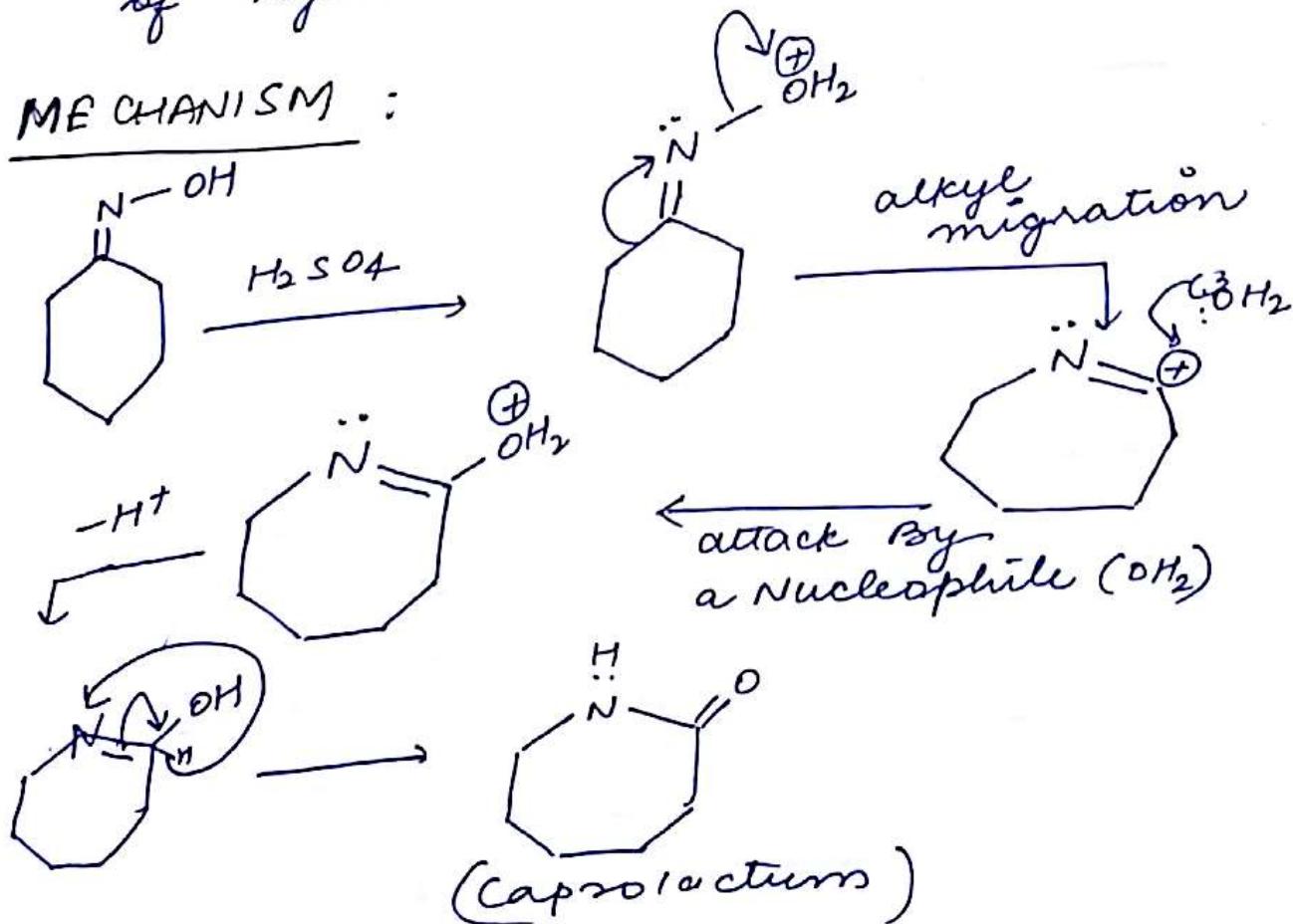
① BECKMAN REARRANGEMENT

fundae: Oxime $\xrightarrow{\text{H}_2\text{SO}_4}$ ~~amide~~ or caprolactum



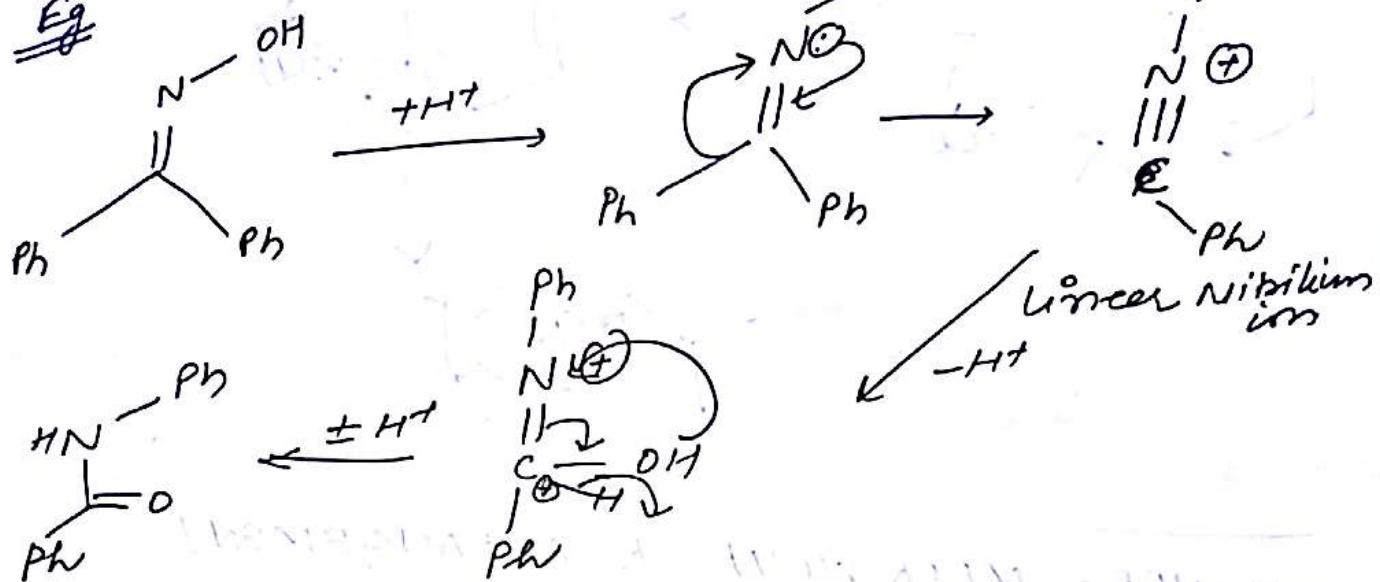
→ This is used in the production of Nylon.

Mechanism:



Product cation is better represented as Nitinium ion: N^{\oplus}

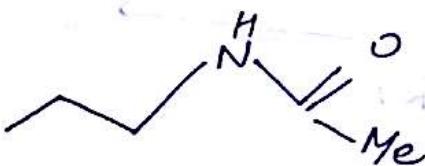
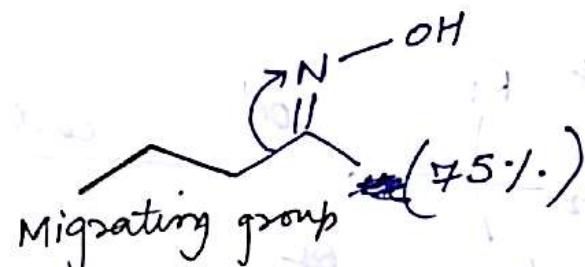
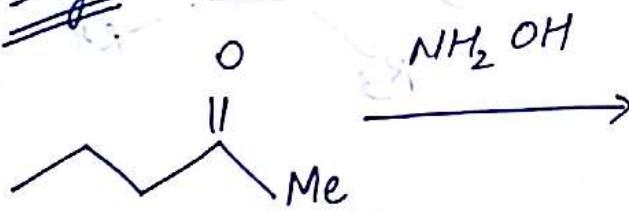
Eg



WHICH GROUP WILL MIGRATE IN BECKMAN REARRANGEMENT?

Sol^m while oxime formation is trans to OH
Migrating group

Eg

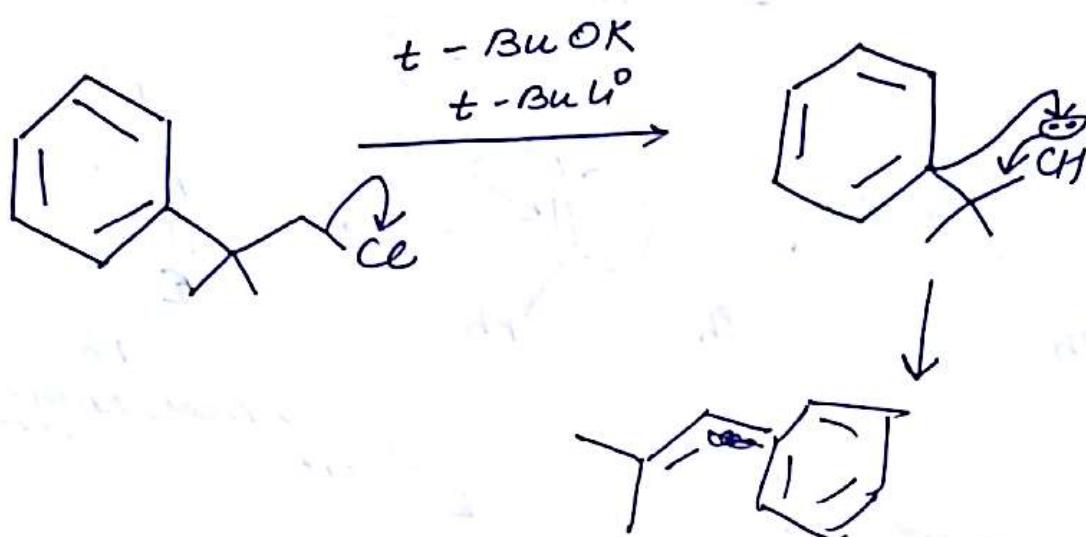


H₂C:

Beckman

(Al₂O₃)

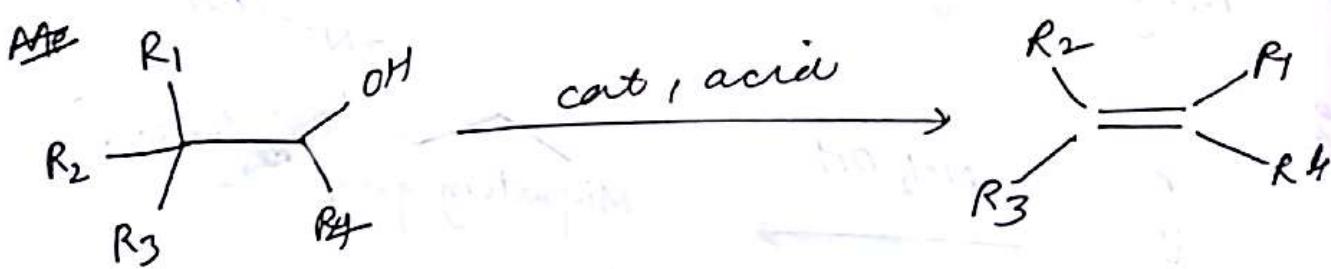
Few rearrangement Reactions



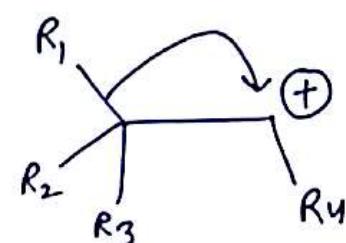
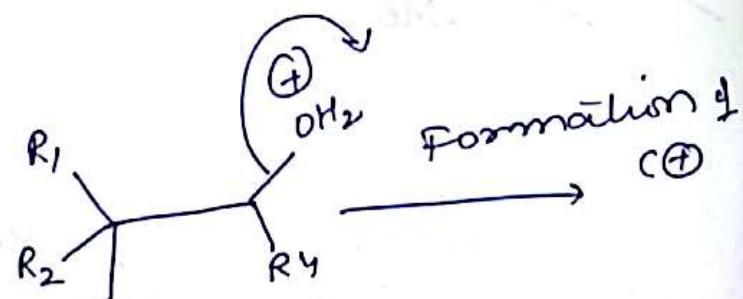
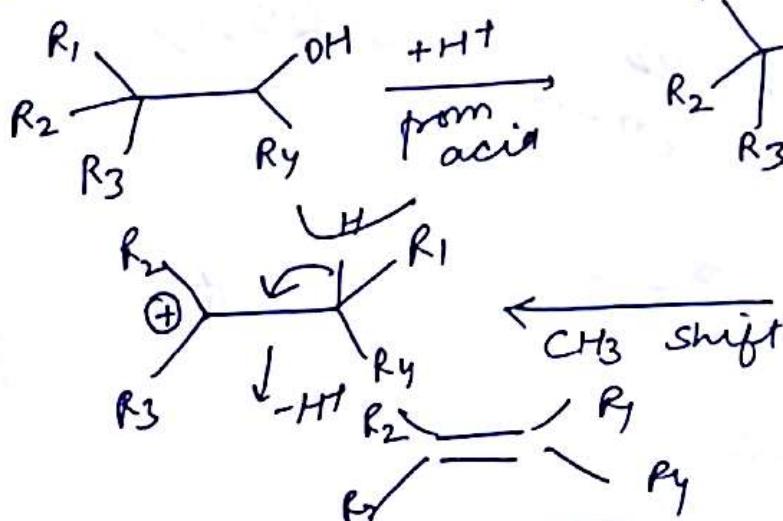
WAGNER - MEERWEIN REARRANGEMENT

Basic fundae

$$\begin{array}{c} \text{c function} \\ \text{alcohol} \end{array} \xrightarrow[\text{acid}]{\text{catalyst}} \begin{array}{c} \text{olefin} \\ (\text{C}=\text{C}) \end{array}$$



Mechanism ① Protonation



One STEREO SPECIFIC Reaction

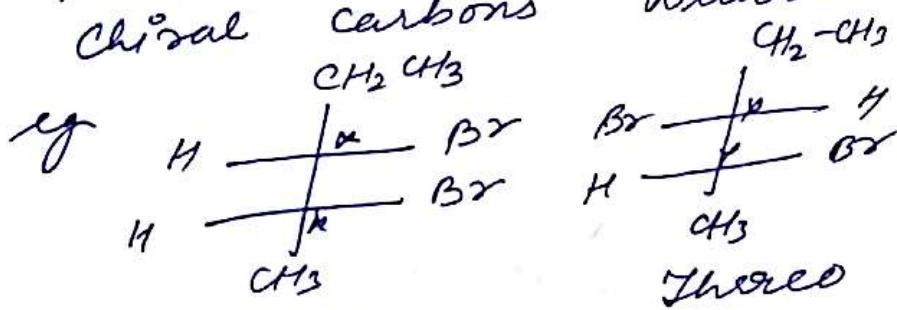
Stereochemistry of reactants completely determine the stereochemistry of products without any other option.

Stereoselective Reactions

Reactions in which there is a choice of pathway, but the product stereochemistry is formed due to its reaction pathway being more favourable than others available.

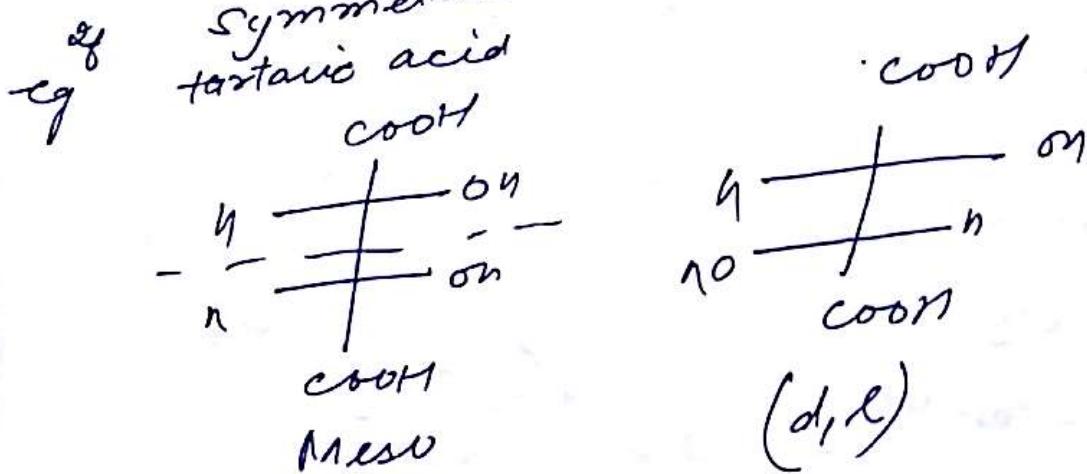
Erythro \leftrightarrow Threo

for Diastereoisomers with α adjacent chiral carbons without symmetric ends



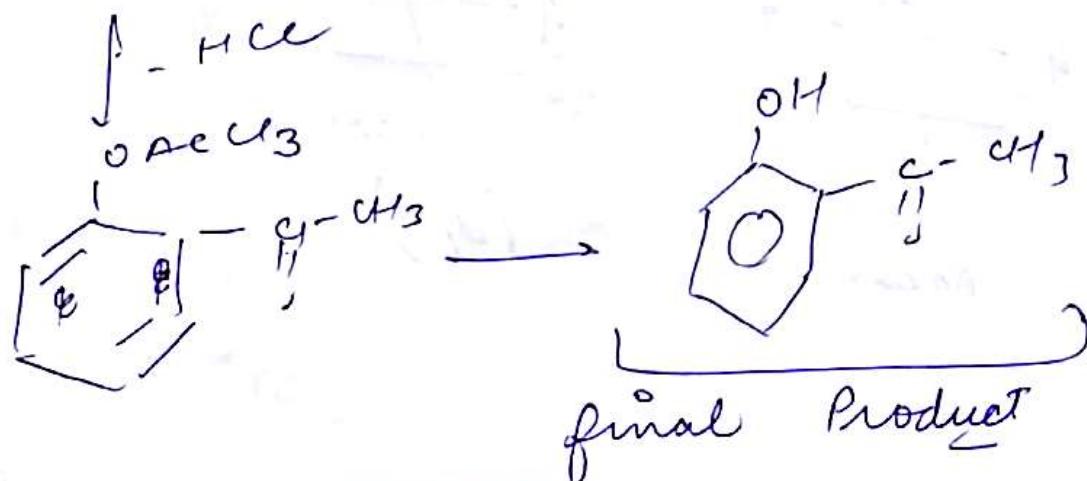
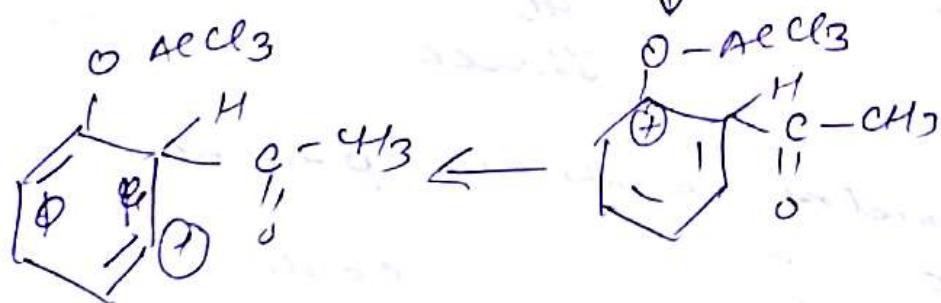
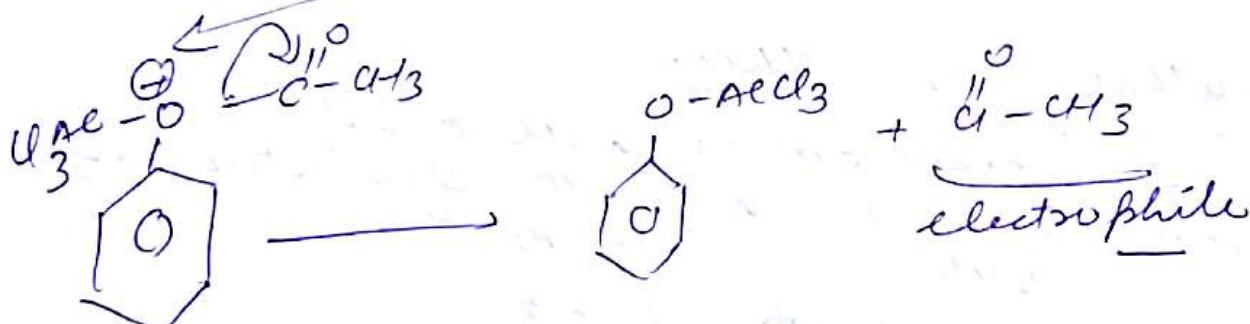
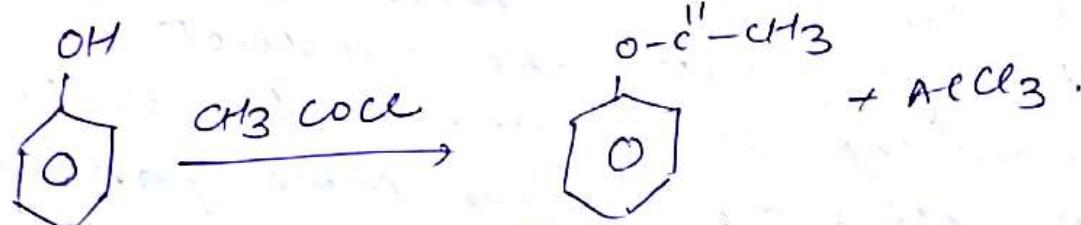
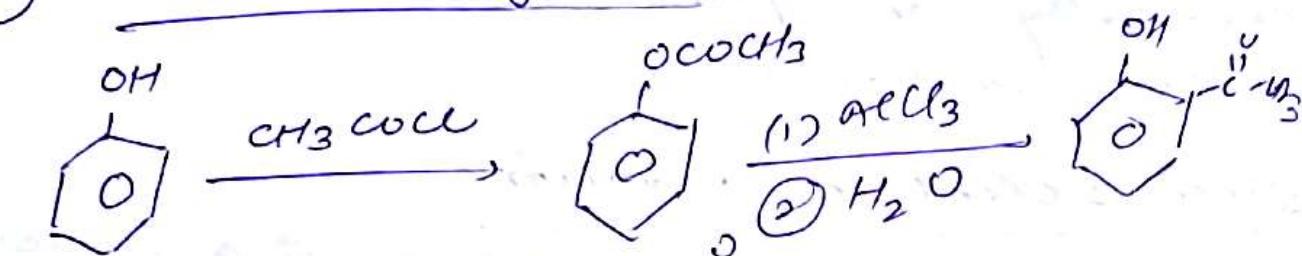
Erythro

Symmetric ends are present



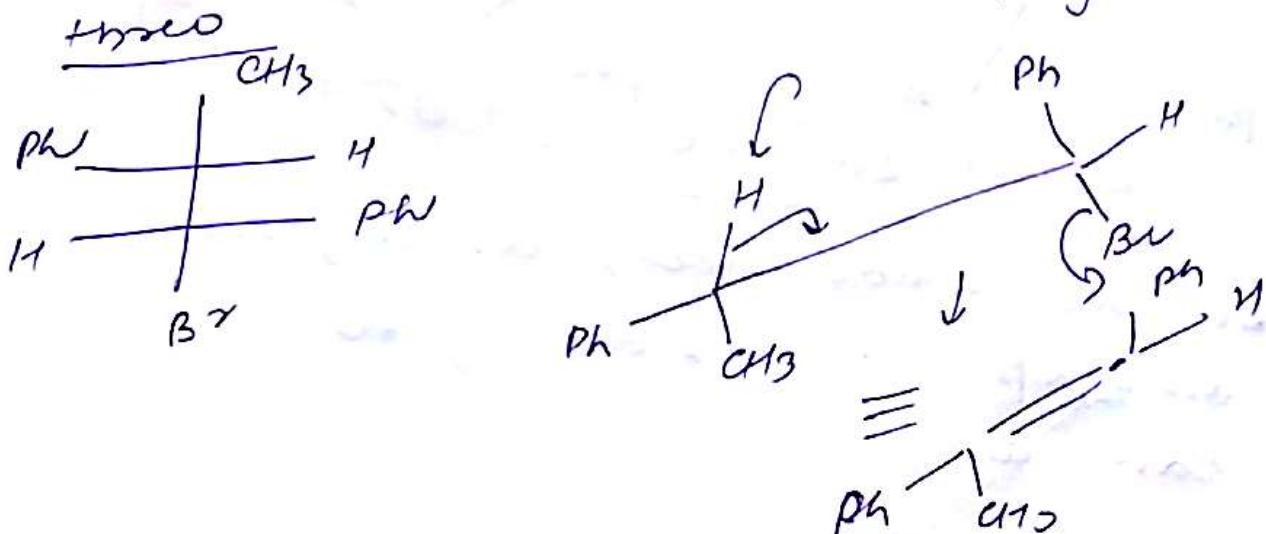
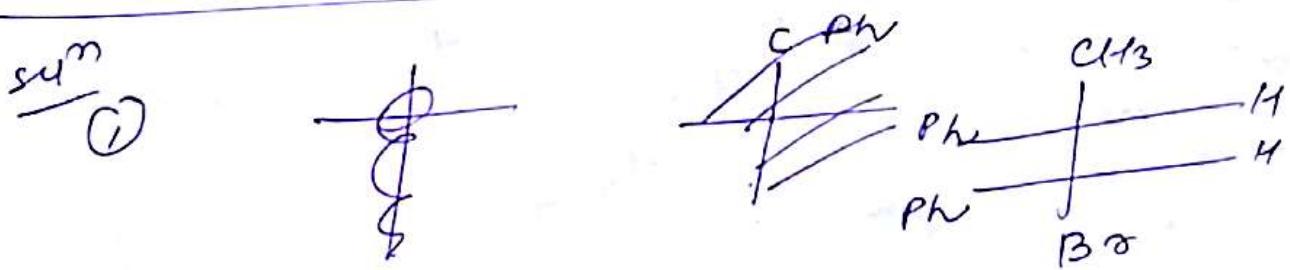
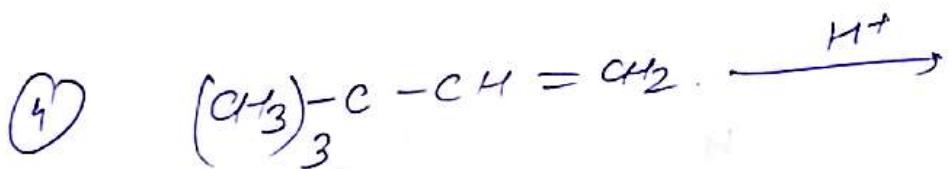
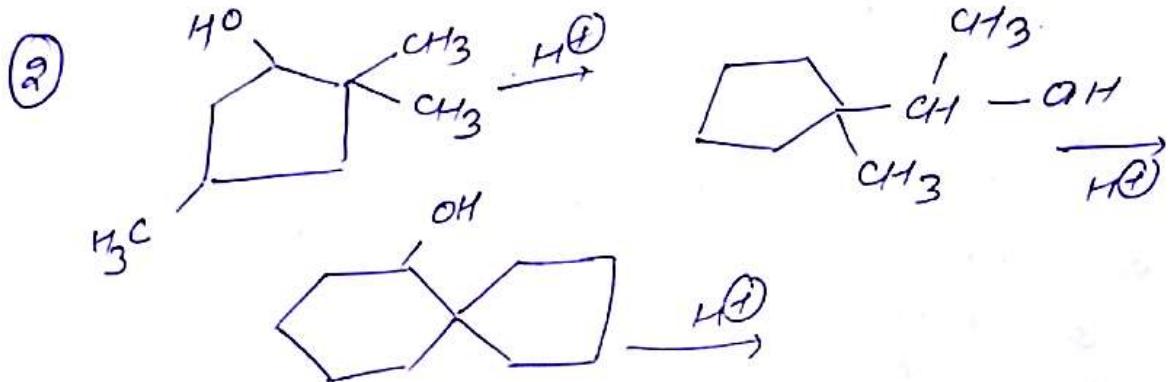
Pinnacole Pinnawlene Rearangement

① Fries Rearangement

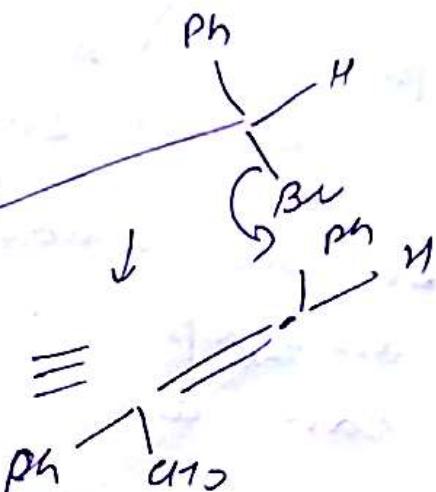


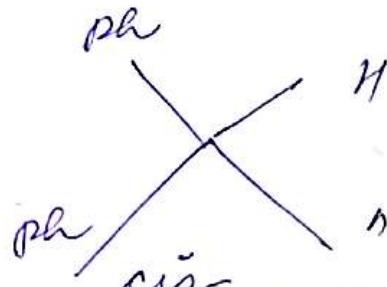
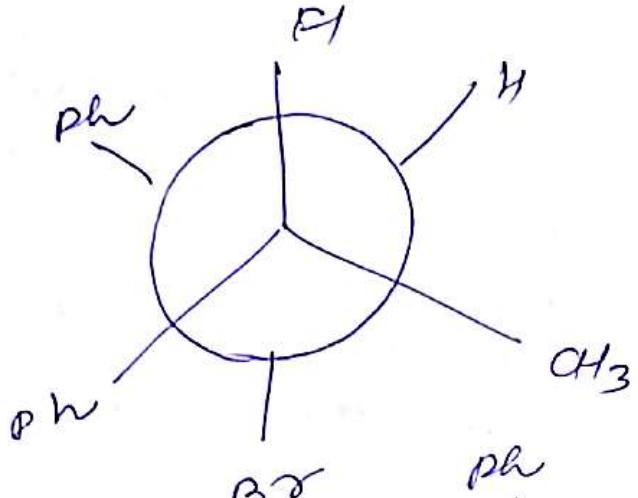
one ① Erythro isomer of
1-bromo 1,2-diphenyl
propane undergoes base
induced dehydrobromination at much
slower rate than the two isomer.

→ Basic principles
→ $\text{S}N' \text{ or } \text{S}N^2$
→ $E_1 \text{ or } K$



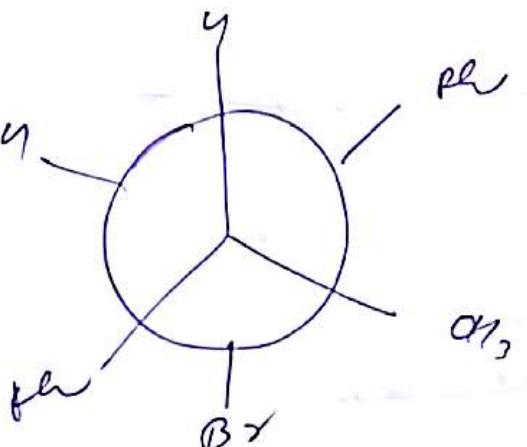
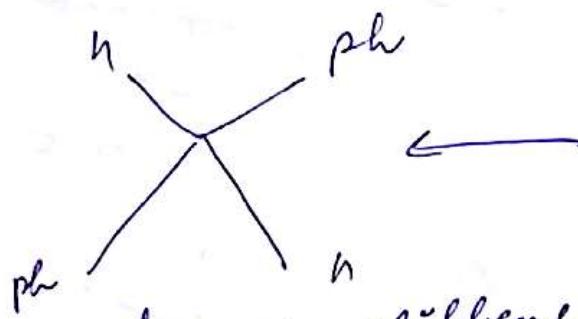
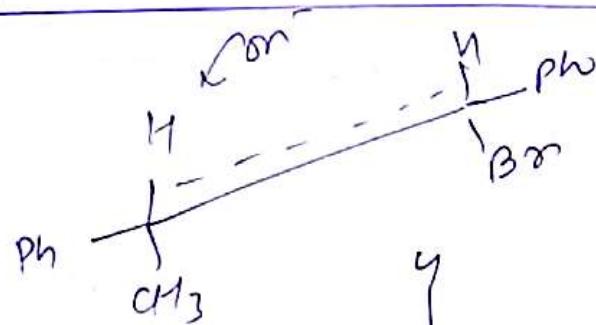
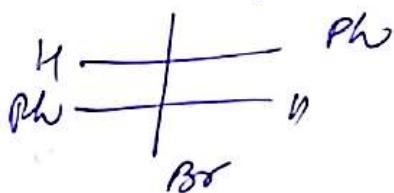
Erythro.





due to
Bromination
Ph are on same
side or backness
and then they hinder
the attack so ethyro is
slower

for threo



trans stilbene

so no hindrance, as they are
on the opposite side, so
can a

