SECTION - B

NOTE Attempt any ten Short Questions :

Part (i) :-

Ionization energy :-

Ionization energy refer to energy required to remove electron from the outermost shell of the atom.

Phosphorous and Sulphur :-

The electronic configuration of phosphorus is given as :-

P_{15} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p_x^1\ 3p_y^1\ 3p_z^1$

↑ ↑ ↑

Electronic configuration of Sulphur is given as :-

S_{16} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p_x^2\ 3p_y^1\ 3p_z^1$

↑↓ ↑ ↑

Phosphorus has half-filled orbitals which are more stable the sulphur thus it required more energy to remove electron from outer most shell.

Part (iv) :-

Metamerism :-

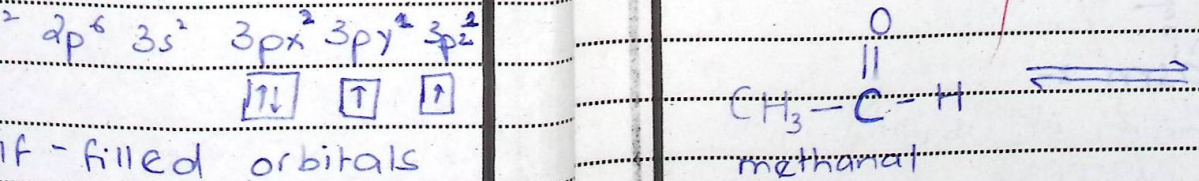
It is the type of isomerism in which their is the difference of distribution of carbon on either side of functional group. for example :

$CH_3CH_2-O-CH_2CH_3$ — diethyl ether

$CH_3-O-CH_2CH_2CH_3$ — methy propyl ether

Tautomerism :-

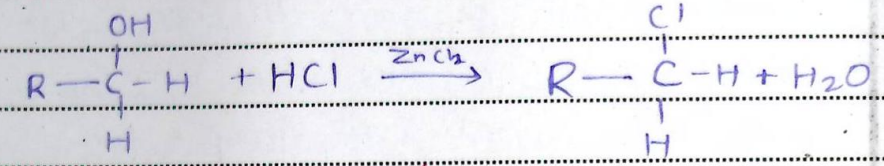
It is the type of isomerism which have same molecular formula but they have different position of proton in it. They exist in equilibrium.



methanal ⇌ ethenol

Part (vii) :-

Luras test is used to distinguish between primary, secondary and tertiary alcohols. It is the conc. and HCl $ZnCl_2$ (zinc chloride) it reacts with alcohols and produce alkyl Halide.

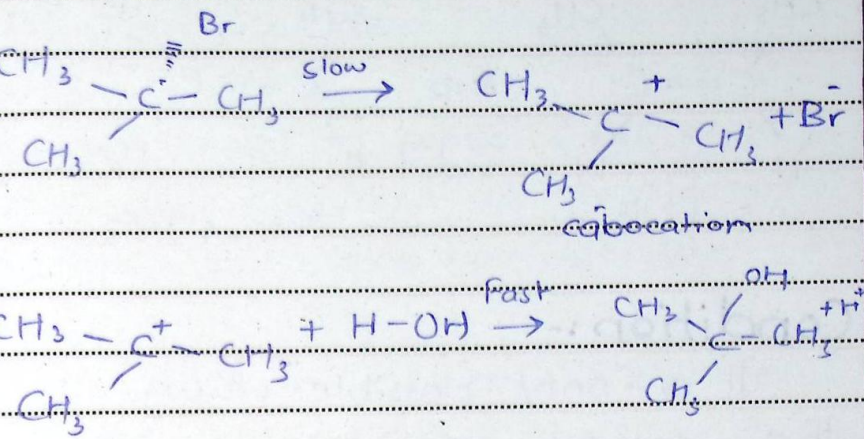


This produces white precipitates. The time taken by the reaction to proceed is used to distinguish between alcohols, primary alcohols reacts immediately while secondry alcohols take 5-10 mins and tertiary alcohols do not react with HCl.

Part (vi) :-

SN_1 Mechanism :-

SN_1 mechanism is usually followed by tertially halides.

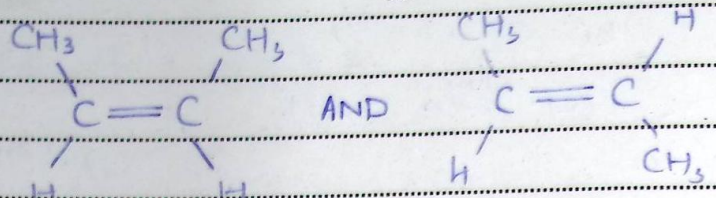


tertiary alkyl halides follow SN_1 mechanism due to the reason that it contain three alkyl electron donating groups. This produces most stable carbocation ion and another reason for this is due to polar protic solvent.

Part (v) :-

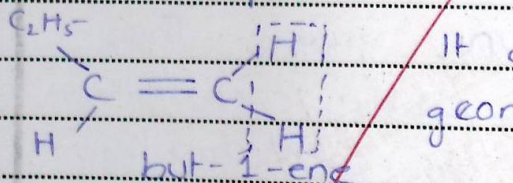
Geometric Isomerism :-

It is a type of steometric isomerism In this isomerism the two atom differ in the arrangement in space for example cis- and trans- given as.



Condition :-

It is only possible when the carbon atom has two different groups attached with it otherwise it will not follow geometrical isomerism for example :-



It doesn't show geometrical isomerism.

As carbon containing double bond has same group attached with it thus it doesn't show geometrical isomerism.

Part (xi) :-

Uses of (PVC).

The following are the uses of

poly-vinyl-chloride :-

i) PVC are used in pipes (PVC pipes). They are efficient as they do not rust and are some how flexible.

ii) PVC is used in medical field for example in syringes etc.

iii) PVC is used in vinyl flooring and wall panel.

iv) PVC is used in furniture and as artificial glass.

v) PVC also produce leather Resins.

Part (xii) :-

Smog :-

Smog is basically the mixture of smoke and fog. This decreases the visibility. There are two types of smog :-

i) Photochemical smog
ii) Industrial smog.

Photochemical smog:-

The smog produced naturally by natural elements like plants, rain etc is called photochemical smog.

Formation:-

It is formed due to the atmospheric reasons such as change in humidity level, acid rain and by mixture of chemicals with gases in air.

Part (x):-

Enzymes:-

Enzymes are catalyst to the biological reactions. Activity of enzymes refer to the most catalytic state of enzyme. Enzymes have acidic environment.

Effect of temperature and PH on activity of enzymes:-

Activity of enzymes is maximum at the optimum temperature. If the temperature is increased beyond optimum temperature the activity of enzyme decreases and decreasing pH. Activity of enzymes also decreases when the temperature is reduced below the optimum temperature thus changes it's pH.

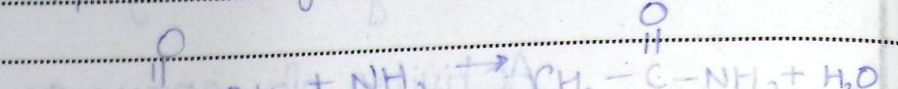
Part (ix):-

Carboxylic acids and it's derivatives:-

Carboxylic acids can be converted into it's derivaties such as amides and anhydrides.

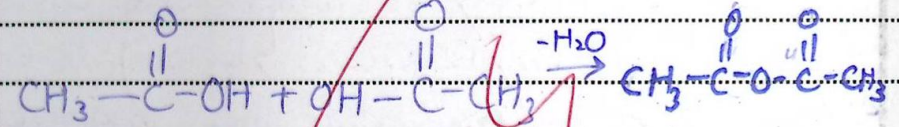
To acid amides:-

It can be converted into amides by reacting with ammoia.



To acid anhydrides:-

Inter molecular dehydration of carboxylic acid result in the formation of acid anhydrides.



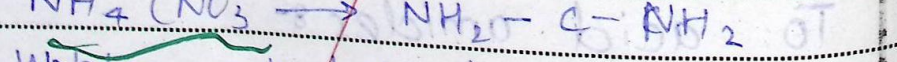
The mentioned above are the derivatives of carboxylic acid.

Part (iii):-

Wohler's Work:-

Wohler was a scientist who synthesized urea compound from inorganic constituents.

Reaction of urea:-



Wohler work helped in rejecting

Importance:-

the vital force theory which stated that organic compound can not be synthesized.

Wohler work proved that organic compounds can be synthesized in labortary.

SECTION- C

Question No 5:-

Grignard reagent:-

Grignard reagent is the reagent which has at least one metallic bond with alkyl group. For example R-Mg X is most commonly used reagent. R-Mg I is most reactive but R-Mg Br is used due to its excess abundance and cheapness.

Preperation:-

It can be prepared by following

method

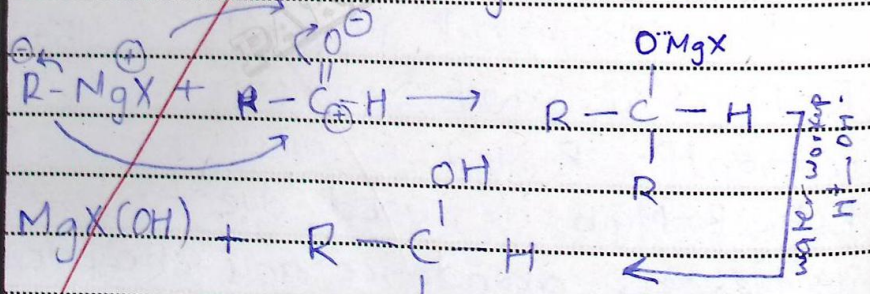
$R-OH + MgX \longrightarrow R-MgX + OH^-$

R-MgX do not require any catalyst to proceed the reaction they are produced in ethereal solution and used to produce alcohols, and carbonyl compounds.

CHEMICAL REACTIONS :-

i) Aldehyde :-

Grignard reagent reacts with aldehyde to produce alcohols. It's reaction is given as.

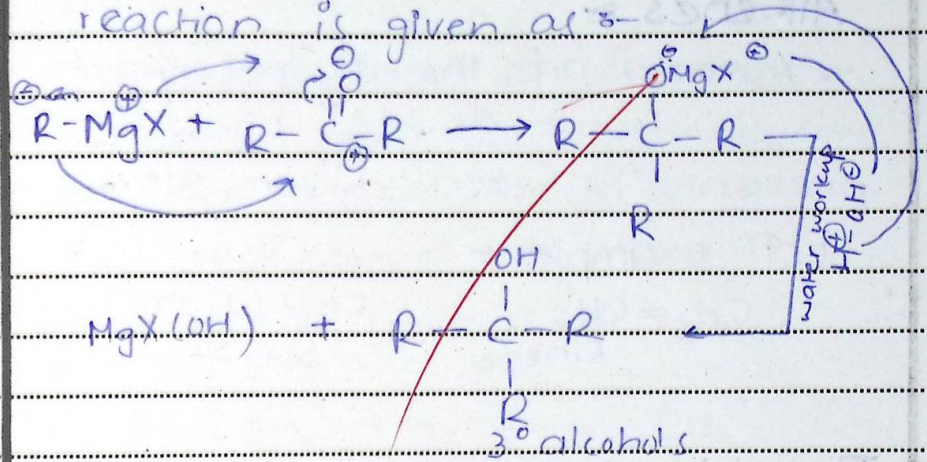


2° alcohols

Formaldehyde react with R-MgX to produce 1° alcohols.

2) Ketones :-

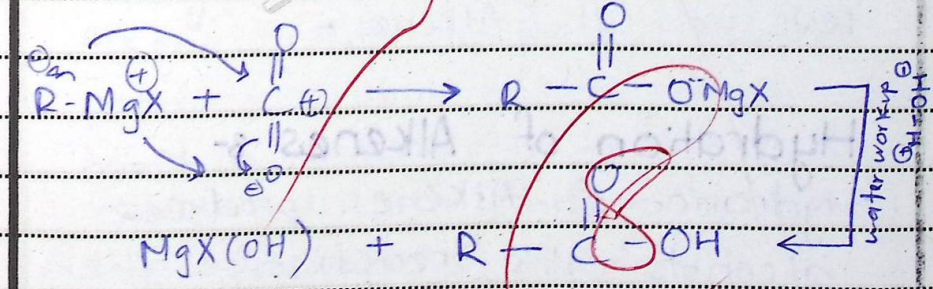
R-MgX react with ketones to produce 3° alcohols their reaction is given as :-



3° alcohols

3) Carbon dioxide :-

R-MgX react with carbon dioxide to give carboxylic acids. It's reaction is given as :-



This is how carboxylic acid is prodreed.

Question No :- 4 :-

Alkenes :-

Alkenes are the hydrocarbon which have double bond present between carbon atoms.

For example :-

$CH_2 = CH_2$ Ethene

$CH_3 - CH_2 = CH_2 - CH_3$ but-2-ene

Important reactions :-

Alkenes react with different compounds and produce alkanes, haloalkanes, alcohols, ozonolysis etc. The following are some important reactions of Alkenes :-

Hydration of Alkenes :-

Hydration of Alkenes produces alcohols. It's reaction is given as :-

$$CH_2 = CH_2 + H_2O \longrightarrow CH_2(OH) - CH_3$$

Ethene + water → Ethanol

Hydrogenation of Alkenes :-

Alkenes react with hydrogen to produce saturated alkanes this reaction of alkene with hydrogen is given as :-

$$CH_2 = CH_2 + H_2 \longrightarrow CH_3 - CH_3$$

Ethene + hydrogen → Ethane.

Hydrogenation of Ethene produces Ethane.

Halogenation of Alkenes :-

Alkenes react with Halogen to produce alkyl halide. The double bond is broken and halide is attached with the alkyl group. It's reaction is given as :-

$$CH_2 = CH_2 + Br_2 \longrightarrow CH_2(Br) - CH(Br)$$

Ozonolysis :-

When alkenes react with ozone they form ozonide which is further broken to produce aldehydes. This reaction is given as :-

$$CH_2=CH_2 + O_3 \longrightarrow CH_2-CH_2 \text{ (ozonide)}$$

On rearrangement :-

$$CH_2-CH_2 \longrightarrow 2\ H-C(=O)-H + O^-$$

formaldehyde

Hydrohalogenation :-

Alkenes react with Alkyl halide and produce alcohols. The double bond is broken. The reaction is given as :-

$$CH_2=CH_2 + HBr \longrightarrow CH_3-CH_2Br$$

Ethene — Alkyl halide — Bromo Ethane

The above mentioned are the important reactions of alkenes.

QUESTION No 6 :-

Aldehyde and Ketone :-

Both aldehyde and ketone has carbonyl group attached to them whereas the basic difference between aldehyde and ketone is that Aldehyde is attached with one alkyl group whereas ketone is attached to two alkyl groups. For example :

$$R-C(=O)-H$$

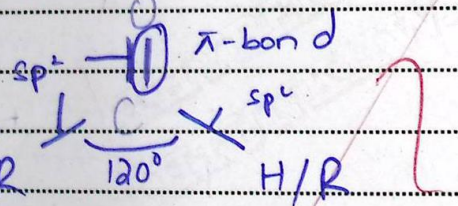
Aldehyde

$$R-C(=O)-R$$

Ketone.

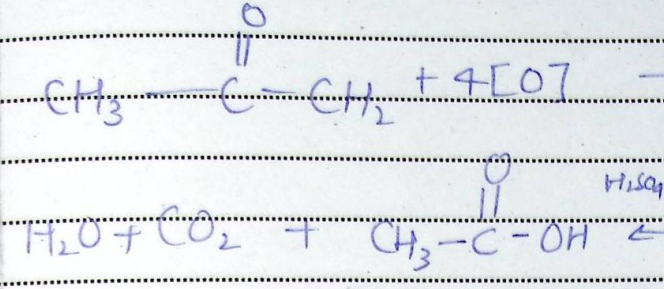
Structure of Aldehydes & Ketone :-

Aldehyde and ketone have sp^2 hybridization which form head to head overlap with alkyl group carbon and hydrogen in aldehydes. The remaing p-orbital of hybridization forms pi-bond with oxygen (double bond). The bond angle between them is 120°c approximately and has the shape of trigonal planar.



Oxidation of ketone:

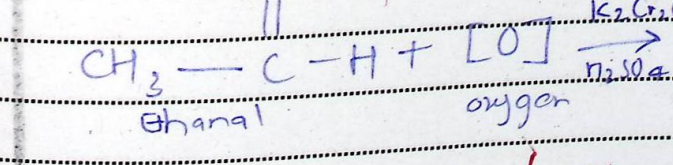
Ketone undergoes oxidation reaction and produces carboxylic acid along with CO_2 and H_2O. The oxidation reaction of ketone is given as:



The above is the oxidation reaction of ketone.

Oxidation of Aldehyde:

Aldehyde undergo oxidation reaction and produces carboxylic acid with no by product. The reaction of Aldehydes with oxygen or oxidation reaction is given as:



Thus the reaction of Aldehyde which is Ethanal produces Ethanoic acid.