

SECTION : B

SHORT

ANSWER

Answer : 01

Ionization Energy:

Def:

The amount of energy required to remove an electron from the outermost shell of an isolated gaseous atom is called Ionization Energy.

Dependence :

Ionization Energy depends on following factors.

- (i) $I.E \propto \text{Nuclear charge}$
- (ii) $I.E \propto \frac{1}{\text{Distance}}$
- (iii) $I.E \propto \frac{1}{\text{shielding effect}}$

General Trend :

(i) For Periods:

The I.E increases from left to right as nuclear charge increases due to addition of electrons.

(ii) For Group :

The I.E decreases down the group as the combined effect of nuclear charge, distance is

lesser than that of the nuclear charge of nucleus on electrons.

Phosphorus I. Energy $>$ Sulphur I. Energy

Electronic Configuration:

Phosphorus - $Ne (ns^2, np^3)$

Sulphur - $Ne (ns^2, np^4)$

Stability:

As we know that an atom is more stable in its half filled state.

So In comparison to Sulphur & phosphorus, Phosphorus is half filled and stable as compared to Sulphur.

Phosphorus Ionization energy is greater than Sulphur as it is stable.

Sulphur has partially filled electrons

so it ^{readily} release its electron to become stable due to which it has lower Ionization Energy. $\hookrightarrow$

Answer : 03

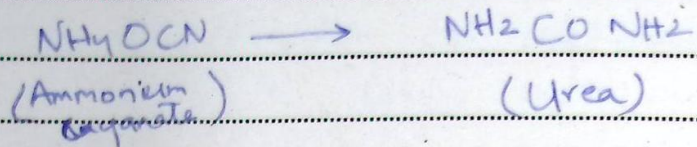
Vital Force Theory:

It stated that no organic compound can be synthesized in laboratory but can be extracted from other organic compound.

Wohler's Work:

* Rejection of Vital Force Theory:

Fredric Wohler rejected the vital force theory when he accidentally discovered the synthesis of Urea which is organic compound from Ammonium carbonate.



Result:

After rejection of Vital Force Theory, many organic compounds have been synthesized in laboratory which are used in modern days applications nowadays.

Answer : 04

Metamerism:

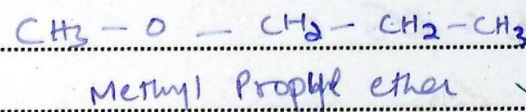
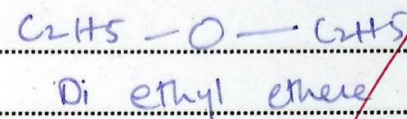
Def:

The organic compounds having same molecular formula but there is unequal distribution of carbon atoms on either side of functional group is called Metamerism.

Important Points:

- * They have same functional group
- * They exist in different atomic form

Example:



Tautomerism:

Def:

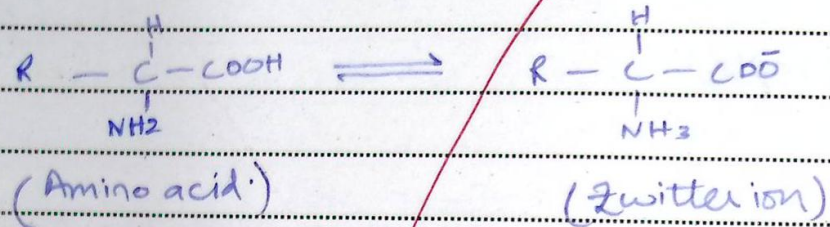
The organic compounds having same molecular formula but difference in position of functional group is called Tautomerism.

Points to Ponder:

- * They have different functional group

* They exist in equilibrium form.

Example:



Answer: 05

Geometrical Isomerism:

Def:

The organic compounds having same molecular formula but have different spatial arrangement keeping the rotation of molecule restricted. is called **Geometrical Isomerism**.

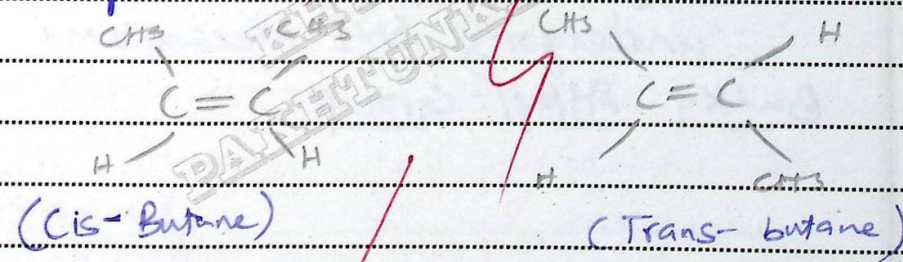
Conditions:

There are two conditions for organic compound to follow geometrical isomerism.

(i) There should be no rotation of substituents

(ii) The substituents attaching to carbon must be different.

Example:



⇒ From both substituents we can observe that the attaching substituents are different

Answer : 06

SN₁ Mechanism:

The unimolecular substitution reaction is called SN₁ reaction.

Steps:

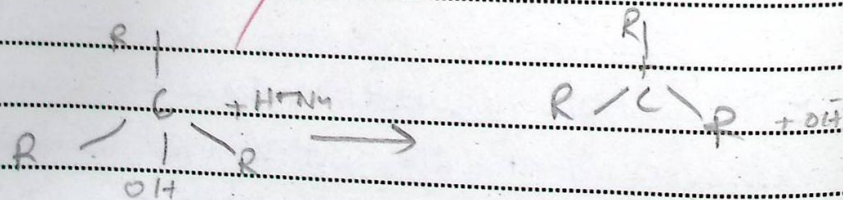
It occurs in two steps

- (i) Formation of Carbocation
- (ii) Attack of nucleophile.

Reason for Tertiary Alkyl Halide undergoing SN₁ Mechanism:

Bulky Alkyl Group:

As we know that formation of carbocation occurs:



So carbocation of tertiary Alkyl halide

has three Alkyl Bulky groups which provide steric hindrance.

Result:

As a result of steric hindrance the carbocation cannot go any other reaction which ultimately results in substitution. i.e. SN₁ reaction.

Answer : 07.

Lucas Test :

It is the test used for identification of ^{reactivity of} alcohols and distinguishing of alcohols.

Reagent:

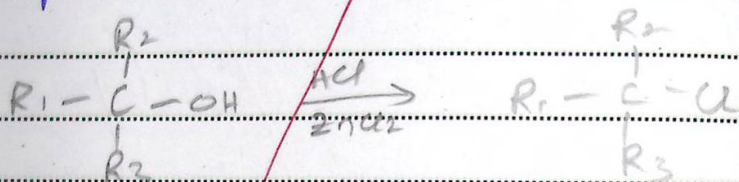
The reagent that is used is called Lucas Reagent.

(ZnCl₂ + HCl conc.)

Alcohol identification:

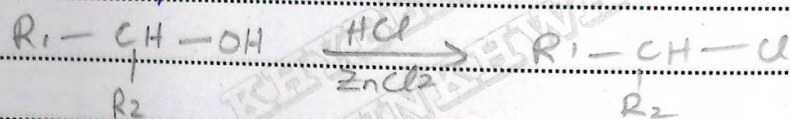
Tertiary alcohols are most reactive followed by Secondary and then Primary alcohols.

Tertiary Alcohols:



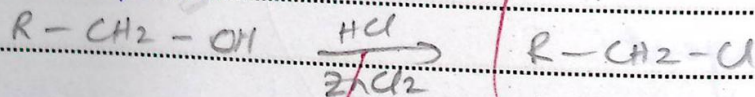
Result: directly reacts and show cloudiness

Secondary Alcohols:



Result: reacts after 5-10 minutes and form cloudiness

Primary Alcohols:



Result: reaction after boiling of Alcohol.

Hence:

Alcohols are distinguished.

Answer: 08

iv Tollen's Test:

→ It is also called Silver Mirror Test.

→ It is done for Aldehydes.

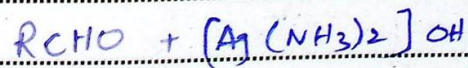
Composition:

It forms Ammonical Silver Nitrate from Ammonium hydroxide and Silver Nitrate.

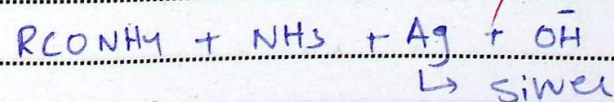


This is called Tollen's reagent.

Reaction:



↓



This silver ion depositions in flask giving silver mirror.

Fehling's Solution Test:

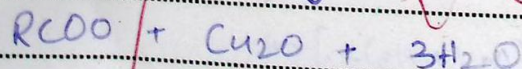
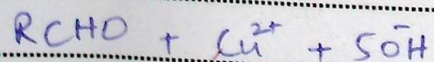
It is also used for Aldehydes.

Composition:

($\text{CuSO}_4 + \text{Tartaric acid} + \text{NaOH}$)

- * It has Fehling reagent.
- * It consists of copper sulphate, tartaric acid and sodium hydroxide.

Reaction:



Importance:

They are both solutions used for oxidation of aldehydes.

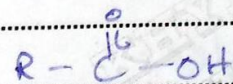
Answer: 09

Carboxylic Acids:

Def:

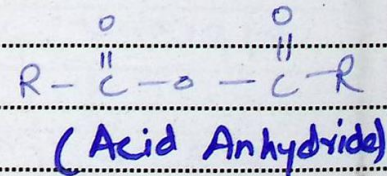
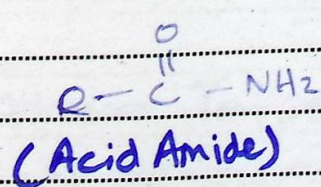
The compound which consist of carbonyl and hydroxyl group are called **carboxylic acids**.

Structure:



Notes

Acid amide and acid anhydrides are derivatives of carboxylic acids.

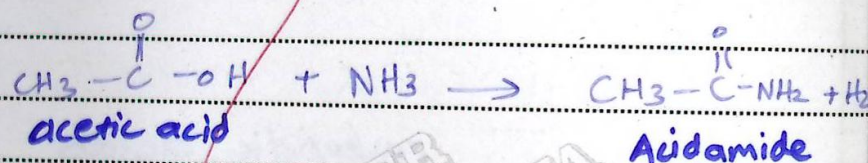


Conversion from Carboxylic Acid:

(i) Acid Amides:

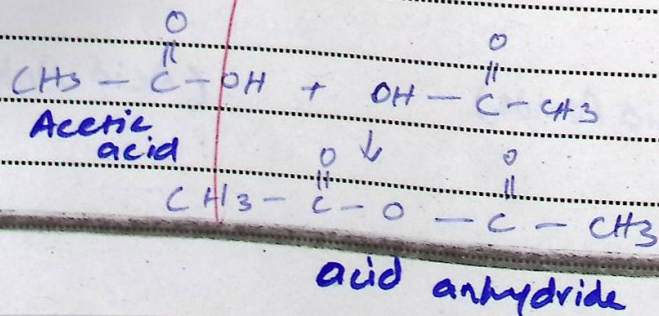
Carboxylic acid reacts with ammonia to form acid amides, with water released as byproduct.

consider acetic acid:



(ii) Acid Anhydrides:

When two carboxylic acids react with each other, they give anhydride along with water as byproduct.



Answer : 10

Enzymes:

Biological catalysts that speed up chemical reaction without being altered are called Enzymes.

Dependence:

- i. Effect of Temp
- ii. Effect on PH:

Effect of Temp:

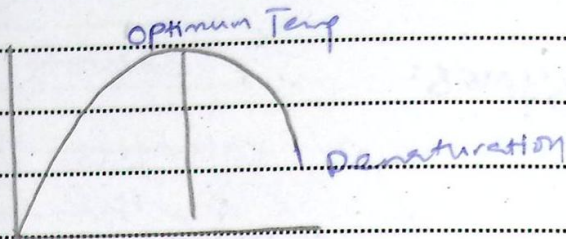
The increase in temperature, increases the kinetic energy of molecules that result into ^{effective} collisions. Hence rate of reaction increases with increase in temperature.

Optimum Temperature:

The temperature at which the rate of reaction is faster.

For animals: 37°C optimum

Diagram:



(ii) Effect of PH:

PH also has a great effect on activity of enzymes. A very small change in PH changes the whole reaction.

Optimum PH:

The PH in which reaction is faster is called Optimum PH.

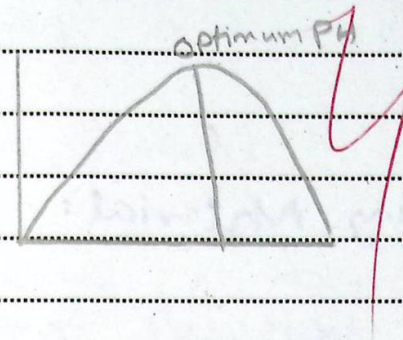
P.H = 7-8

Examples:

Pepsin works at 2 PH

Trypsin works at 8-9 PH.

Diagram:



Answer : 11

Polyvinyl Chloride : (PVC)

Def:

It is very important compound used in Industries.

Uses:

(i) Pipes:

It is used in making pipes.

(ii) Stockings:

It is also used in formation of stockings.

(iii) Tapes:

It is used in formation of Tapes.

(iv) Insulating Material:

It is used in formation of insulating material.

(v) Leather:

It is used in formation of Leathers.

SECTION: C

Answer: 04

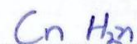
Alkenes:

Def:

Unsaturated compounds

having double bonds are called alkenes.

General Formula:

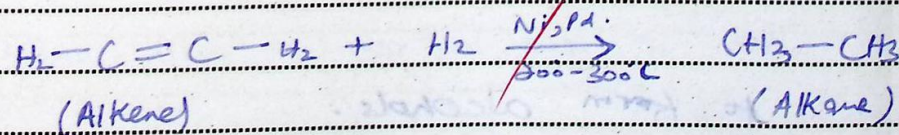


Important Reactions of Alkenes:

It undergoes Electrophilic addition reactions.

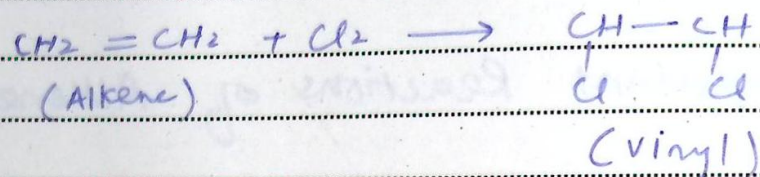
i. Hydrogenation:

It undergoes reaction under presence of Nickel, Palladium catalyst and under 200°C to 300°C .



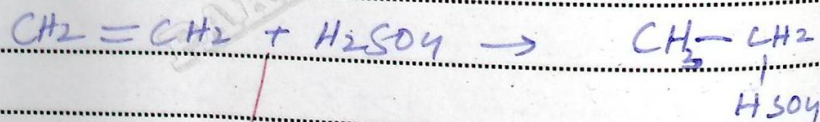
(ii) Halogenation:

The halogen atoms say chlorine undergo halogenation vinyl alkyl chloride.

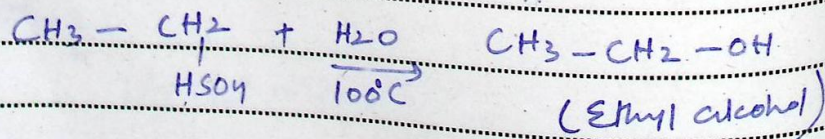


(iii) Hydration:

Alkenes undergo hydration in presence of sulphuric acid as they are insoluble in water.

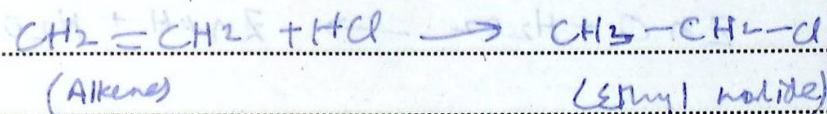


Then it goes in reaction with water to form alcohols.



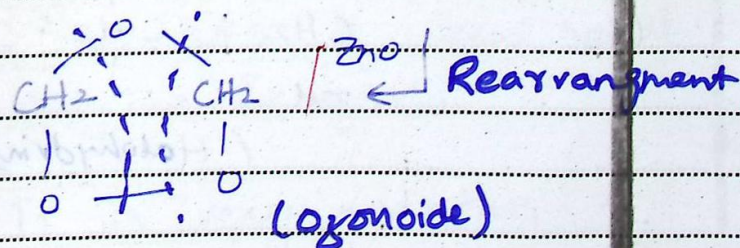
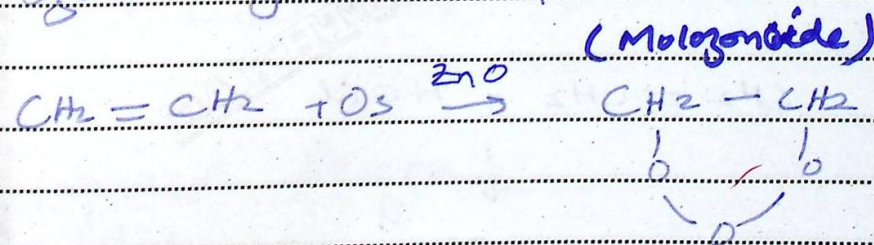
(iv) Hydrohalogenation:

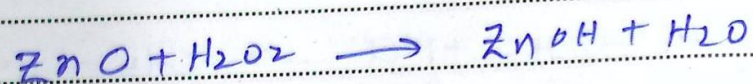
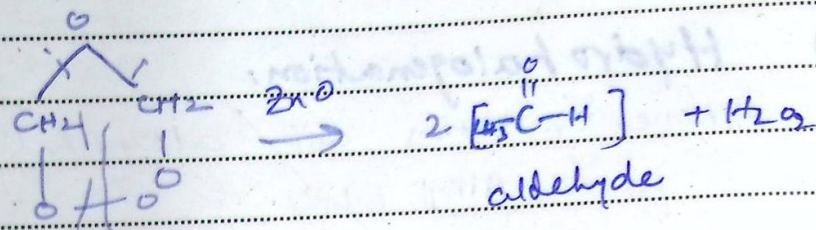
Alkenes reaction with alkyl halides to form alkyl halides.



(v) Ozonolysis:

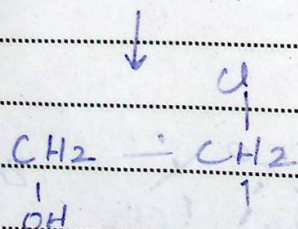
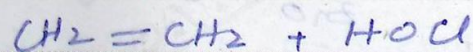
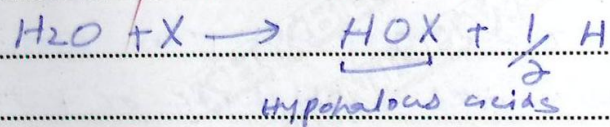
Alkenes react with ozone (O_3) to form molozoneide, then molozoneide after rearrangement forms ozonide. Ozonide gives aldehyde or ketones.





(vi) Halo Hydration:

Addition of Hypohalous acid is called Halohydration.



(Halohydrin)

7) Polymerization:

Small molecules when give rise to a large molecule, it is called Polymerization.



QUESTION: 05

Grignard Reagent:

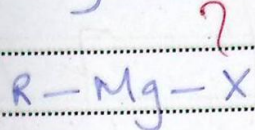
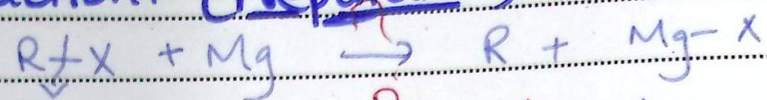
Def:

The derivative of Alkyl halide is called Grignard Reagent.

Important: * It is very reactive.

* It is from family of Organo metals.

Reaction: (Preparation)



* Any halide can be used.

* Iodide is most reactive but Bromide used as it is economic.

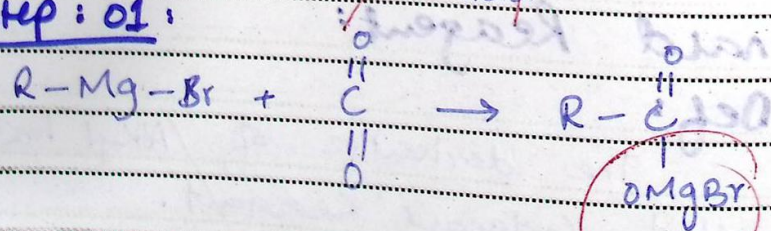
Chemical Reactions:

(i) Carbondioxide:

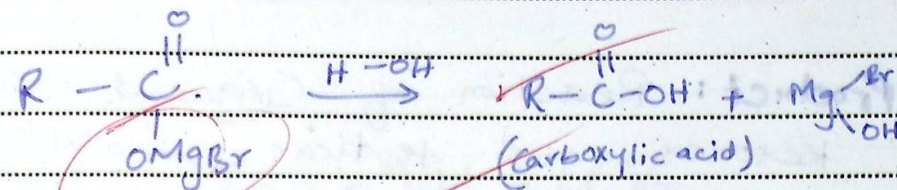
* It is also called Carbonation

Product formed: It gives carboxylic Acid.

Step: 01:



Step: 02



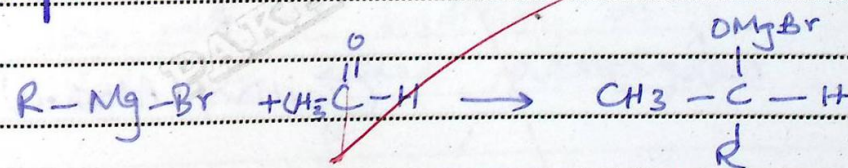
(ii) Aldehydes:

Grignard also reacts with aldehydes

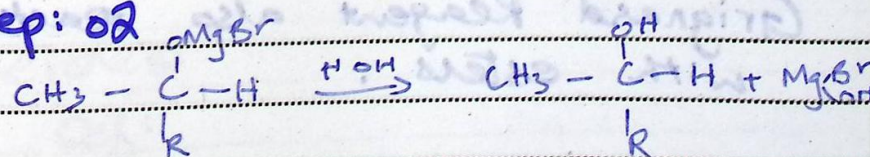
Product formed: It gives secondary and Primary alcohols.

Secondary if acetaldehyde, Primary if formaldehyde

Step: 01.



Step: 02

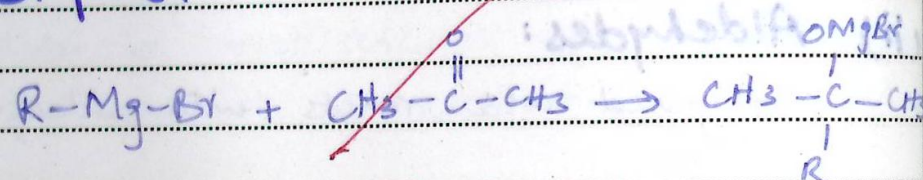


(Secondary Alcohol)

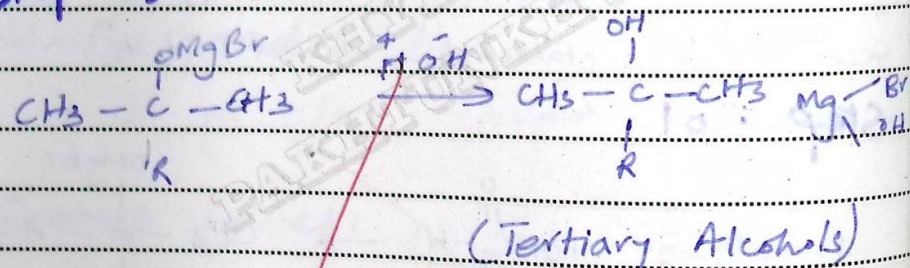
(iii) Ketones:

Product: Reaction of Grignard with ketones give tertiary alcohols

Step: 01



Step: 02



Grignard Reagent also reacts with esters.

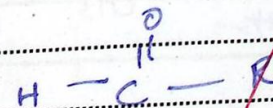
QUESTION: 06

Answer:

Aldehyde:

Def:

Compounds in which carbonyl group is present and alkyl group as well as hydrogen on sides are called aldehydes.

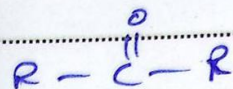


Ketones:

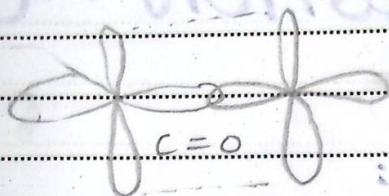
Def:

Compounds in which carbonyl group is present and alkyl

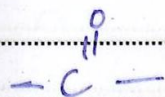
groups are present at both sides.



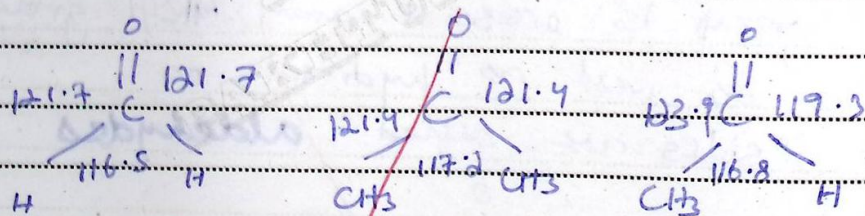
Structure:



C = sp^2 hybridized
O = sp^2 hybrid



Bond angle: depends on nature of atoms attached.



Generally bond angle is 120° .

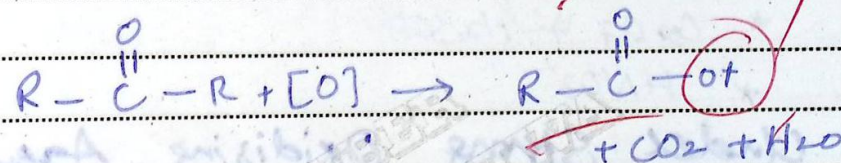
Bond length: The bond length between C=O is 120° .

Structure: Trigonal Planar structure

Oxidation Reactions:

(i) Ketone:

Ketone undergoes oxidation only in presence of strong catalyst i.e. $KMnO_4$, H_2SO_4 .



Final product:

Carboxylic acids are produced and CO_2 , H_2O are produced as by product.

(ii) Aldehydes:

Aldehydes undergo oxidation reaction in presence of mild as well as strong oxidizing.

agent.

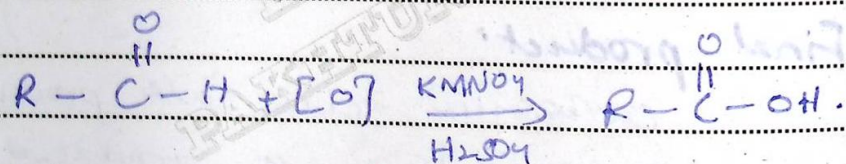
(a) Mild:

- i) Tollen's Reagent
- (ii) Benedict Reagent
- (iii) Fehling Reagent.

(b) Strong:

- * $\text{KMnO}_4 + \text{H}_2\text{SO}_4$.
- * $\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$
- * HNO_3

(b) Under Strong Oxidizing Agent:

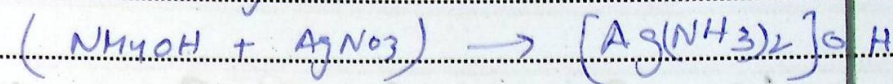


(a) Under Mild Oxidizing Agents:

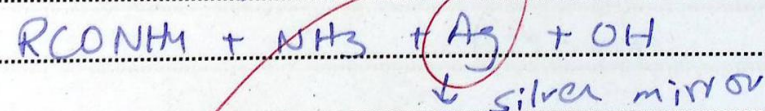
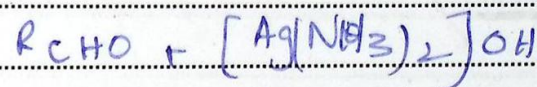
i) Tollen's Reagent:

It is also called silver mirror test.

Tollen's Reagent:



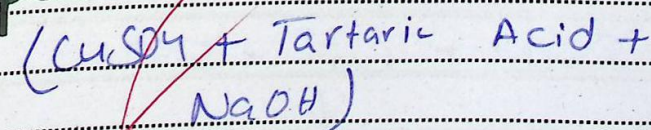
Reaction:



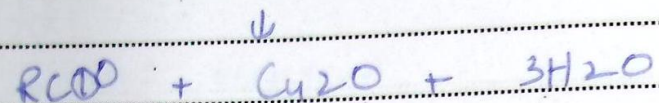
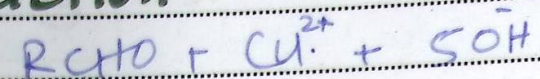
Silver dissipation gives silver mirror test.

(ii) Fehling Reagent:

Composition:



It is composed of copper sulphate, tartaric acid and sodium hydroxide.

Reaction:**(iii) Benedict's Reagent:**Composition:

($CuSO_4$ + cupric acid + $NaOH$)

It consists of copper sulphate, cupric acid and sodium hydroxide.

Reaction:

It is same as Fehling's test

