SECTION 'B'

QUESTION 2:

-: (vii) :-

ANSWER:

LUCAS TEST:

Lucas test is used to distinguish between primary, secondary and tertiary alcohols. In this test, alcohols are treated with anhydrous Zinc chloride and concentrated HCl acid.

After this test, cloudiness appears which determines the presence of alkyl halide.

LUCAS REAGENT:

The mixture of anhydrous zinc chloride and concentrated HCl acid is called Lucas reagent.

Effect of LUCAS REAGENT ON ALCOHOLS

Lucas reagent effects the alcohols as follows:

TERTIARY ALCOHOLS:

Tertiary alcohol react very

fastly with Lucas reagent and appear as cloudiness.

SECONDARY ALCOHOL

Secondary alcohol react moderately with Lucas reagents and cloudiness appears in 5-10 minutes.

PRIMARY ALCOHOLS:

Primary and methyl alcohol does not react with lucas reagent.

-:(xi):-

ANSWER:

USES OF PVC:

(Polyvinyl chloride)

Following are some of the uses of polyvinyl chloride.

PRODUCTION OF REXINE:

PVC is use in the production of rexine by the manipulation of leather and plastic.

MANUFACTURE OF PANNLES:

PVC is used in the manufacture of PVC pannels.

3- PRODUCTION OF PLASTIC BAGS AND BOTTLES:

PVC is used in the production of plastic bags and bottles.

4. MEDICAL TUBING:

PVC is used in the medical tubing. It is used for many other processes in daily life.

-:(X):-

ANSWES:

ENZYME:

The substance which changes the rate of chemical reaction but remain chemically unchanged at the end of reaction.

EFFECT OF PH AND TEMPERATURE ON ENZYME ACTIVITY:

EFFECT OF TEMPERATURE:

Temperature affect the activity of enzyme. when temperature rises, kinetic energy of molecules increases. As a result fruitful collisions increased and rate of reaction become fast. The temperature at which enzyme works best is called optimum temperature.

In human, optimum temperature is 37°C. when temperature decrease enzyme activity decrease and at 0°C enzyme activity stops.

EFFECT OF PH:

PH also affect activity of enzyme. Different enzymes work at different pH. Some enzymes work best in acidic pH while other in alkaline pH. The pH at which enzyme works best is called optimum pH.

for example;

Pepsin works best at around 2.0 pH while trypsin work at 8-9 pH

:(xiii):-

ANSWER:

IR SPECTROSCOPY:

Following are some of the applications of IR spectroscopy

1. IDENTIFICATION OF FUNCTIONAL GROUP:

IR spectroscopy is used for indentification of functional group.

2. IDENTIFICATION OF COMPOUND:

IR Spectroscopy is used for identification of unknown compound.

IDENTIFICATION OF IMPURITIES:

IR spectroscopy is used for identification of impurities.

FINGER PRINTING:

IR spectroscopy is used to identify finger print.

-:(viii):-

ANSWER:

TOLLEN'S REAGENT TEST:

TOLLEN'S REAGENT:

Tollen's reagent is ammonical silver nitrate solution. It is obtained by adding ammonia in silver (I) oxide in silver nitrate and sodium hydroxide solution. Ammonia forms a water soluble complex of diamine silver (I) hydroxide. This reagent is called Tollen's reagent.

When aldehyde is heated with Tollen's reagent, it oxidizes aldehyde to carboxylate ions and silver ions are reduced to metallic silver which precipitate on metallic tube and form silver mirror. Therefore it is called silver mirror test.

REACTION:

$$RCOH + 2[Ag(NH_3)_2]OH \rightarrow RCOONH_4 +$$

Aldehyde Tollen's reagent Ammonium carboxyla

$$3NH_3 + 2H_2O$$

FEHLING'S SOLUTION TEST:

Fehling's solution is the mixture of cupric ions

with tartarate ions.
When this solution is heated/ mixed with alhydehyde gently it oxidizes aldehyde to carboxylate ions and cupric ions are reduced to cuprous oxide which form red precipitate.

$$RCOH + Cu^{+2} + 5OH^- \longrightarrow RCOO^- + Cu_2O\downarrow + 3H_2O$$

IMPORTANCE OF THESE TESTS:

These tests are used for identifical of aldehydes.

-: (i) :-

ANSWER:

IONIZATION ENERGY:

The amount of energy required to remove the valence electron from an atom is called ionization energy.

IONIZATION ENERGY OF PHOSPHORUS IS HIGHER THAN SULPHUR

The ionization energy of phosphorus is higher than sulphur due to small size and high charge density.

of phosphorus.

Sulphur has large size and small charge density That's why ionization of phosphorus is higher than sulphur.

-: (ii) :-

ANSWER:

TYPICAL TRANSITION ELEMENTS:

DEFINITION:

Those transition elements which have partially filled d-orbitals either in their

atomic or in any common oxidation state is called typical transition elements.

These elements form coloured compounds.

EXAMPLES:

Iron (Fe)
Nickle (Ni)
Chromium (Cr)

NON-TYPICAL TRANSITION ELEMENTS:

DEFINITION:

Those transition elements which have completely filled d-orbitals either in their atomic or in any common

oxidation states is called non-typical transition elements.

→ These compounds are often colourless

→ These include in Group II B and Group III B

EXAMPLES:

Zinc (Zn)
Cadmium (Cd)
Mercury (Hg)

-:(xii):-

ANSWER:

PHOTOCHEMICAL

SMOG:

It is a type of smog produced by photochemical processes like industrial, chemical and due to NO_x and unburned hydrocarbons.

PREPARATION.

$$NO_2 \longrightarrow NO + O^{\cdot}$$

$$O_2 + O^{\cdot} \longrightarrow O_3$$

$$NO + O_3 + \text{hydrocarbon} \longrightarrow PAN$$

PAN → Peroxyacetyl nitrate

Reduction of Photochemical smog

Photochemical smog is reduced by decreasing use of NO_2 in industries.

-: (iii):-

ANSWER:

WOHLER'S WORK:

Fredrich wohler in 1928 performed an experiment in which he prepared urea in the laboratory

Although in 1815 Berzellius put forward a theory in which he says that organic compounds cannot be prepared in the laboratory, it is only obtained from living organisms.

→ But in 1928, Friedrich rejected the theory of -

Berzellium and synthesize urea in the laboratory from inorganic compound, outside the living body in the laboratory.

IMPORTANCE:

The importance of wohler's work is that it prepared organic compound in the laboratory and rejected vital force theory presented by Berzelius. Thus due to wohler's work it it known by all people that we can prepared organic compound in the laboratory.

-:(vi) :-

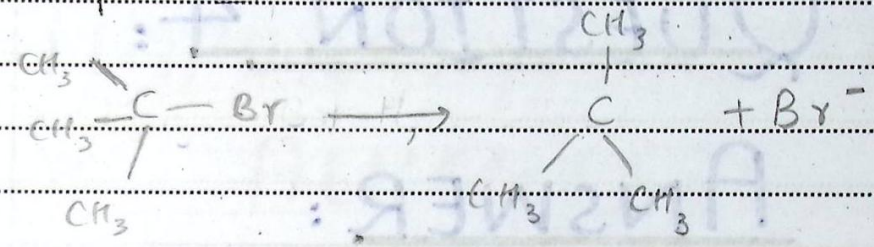
ANSWER:

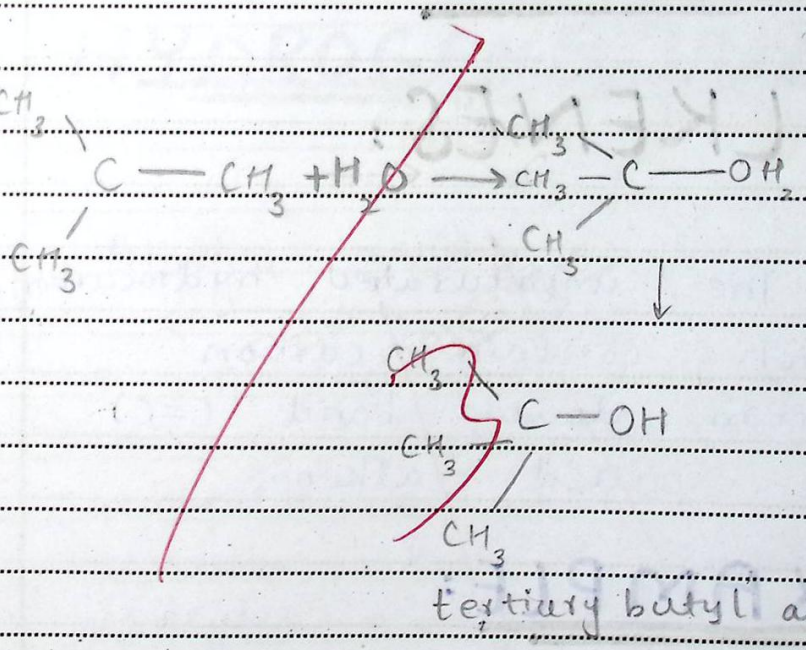
SN_1 MECHANISM BY TERTIARY ALKYL HALIDE:

Tertiary alkyl halide is followed by SN_1 mechanism because it is two step reaction And tertiary alkyle halide ie electron rich specie Therefore nucleophile easily attact on tertiary alkyl halide.

$$(CH_3)_3C\text{-}Br + H_2O \longrightarrow (CH_3)_3C\text{-}OH + HBr$$

Step 1:





tertiary butyl alcohol.

SECTION C:

QUESTION 4:

ANSWER:

ALKENES:

The unsaturated hydrocarbons which contain carbon carbon double bond (C=C) are called alkenes.

EXAMPLE:

Butene
Propene
Cydobutene.

IMPORTANT REACTIONS OF ALKENES:

1) HYDROGENATION:

(Addition of Hydrogen)

Alkenes readily add hydrogen to form alkanes in the presence of Nickle Platinum, Palladium as a catalyst and (1-5 atm) pressure. This is called catalytic hydrogenation of alkene

EXAMPLE:

$$CH_2 = CH_2 + H_2 \xrightarrow{Ni\,|\,Pt\,|\,Pd} CH_3 - CH_3$$

Ethene — Ethane

$CH_3 - CH = CH_2 + H_2 \xrightarrow{Ni|Pt|Pd} CH_3 - CH_2 - CH_3$

Propene — Propane

2) HYDROHALOGENATION:

Alkenes add halogen acid (H-X) to form alkyl halide.

EXAMPLE:

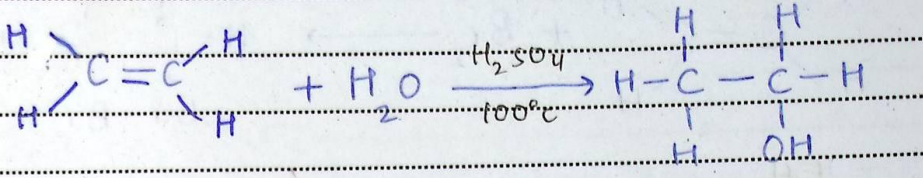
$CH_2 = CH_2 + H - Br \longrightarrow CH_3 - CH_2 - Br$

Ethene — Ethyl bromide

3) HYDRATION:

Alkenes react with water to form alcohols. This process is known as hydration of alkene Hydration of alkenes take place in the presence of sulphuric acid or phosphoric acid

EXAMPLE:



Ethene — Ethyl alcohol

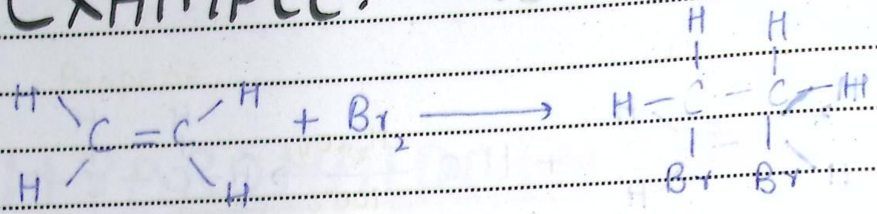
4) HALOGENATION:

Alkenes react with halogen in the presence of inert solvent (CCl_4) to form vicinal dihalide

Vicinal dihalide:

Vicinal dihalide are compound having halogen atoms on adjacent carbon atoms

EXAMPLE:

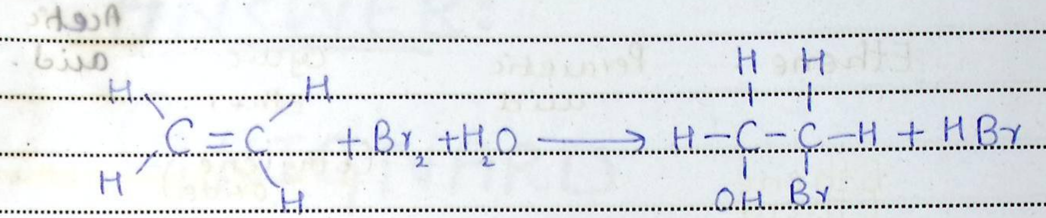


Ethene

5) HALOHYDRATION:

If halogenation of alkene is carried out in aqueous solution then two groups are attached at Carbon-carbon double bond. Hydroxyl group is attached one one carbon and halogen is attach on other carbon atom.

EXAMPLE:

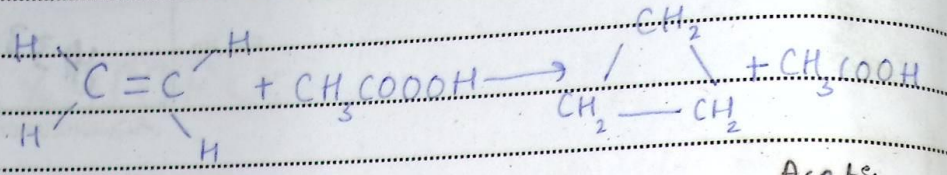


6) EPOXIDATION:

Alkenes react with peroxyacids to form cyclic ethers, the cyclic ether is called epoxides and this process is called epoxidation.

EXAMPLE:

Alkene react with peracetic acid to form cyclic ether, and it is called epoxide



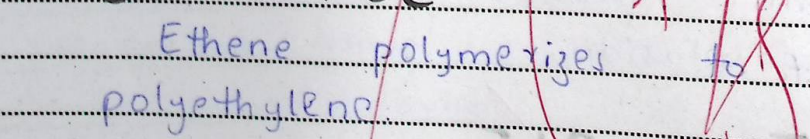
Ethene | Peracetic acid | Cyclic ether (Ethylene oxide) | Acetic acid.

7) POLYMERIZATION:

Small units (monomers) combine to form large units (polymers) the phenomenon is called polymerization

EXAMPLE:

Ethene polymerizes to polyethylene.



Ethene | Polyethylene

QUESTION 5:

ANSWER:

GRIGNARD REAGENT:

Alkyl or aryl magnesium halide is called gridnard reagent These compounds are called organomagnesium compound.

GENERAL FORMULA:

$R - Mg - X$

where X = F, Cl, Br, I

EXAMPLE:

$CH_3 - Mg - I$

methyl magnesium iodide

$CH_3 - CH_2 - Mg - Br$

Ethyl Magnesium Bromide

PREPARATION:

Grignard reagent can be prepared by action of alkyl or aryl halide on freshly prepared magnesium metal in anhydrous or dry ether i-e diethyl ether.

General reaction:

$$R - X + Mg \longrightarrow R - Mg - X$$

EXAMPLE:

$$CH_3 - I + Mg \longrightarrow CH_3 - Mg - I$$

$$CH_3CH_2 - Br + Mg \longrightarrow CH_3CH_2 - Mg - Br$$

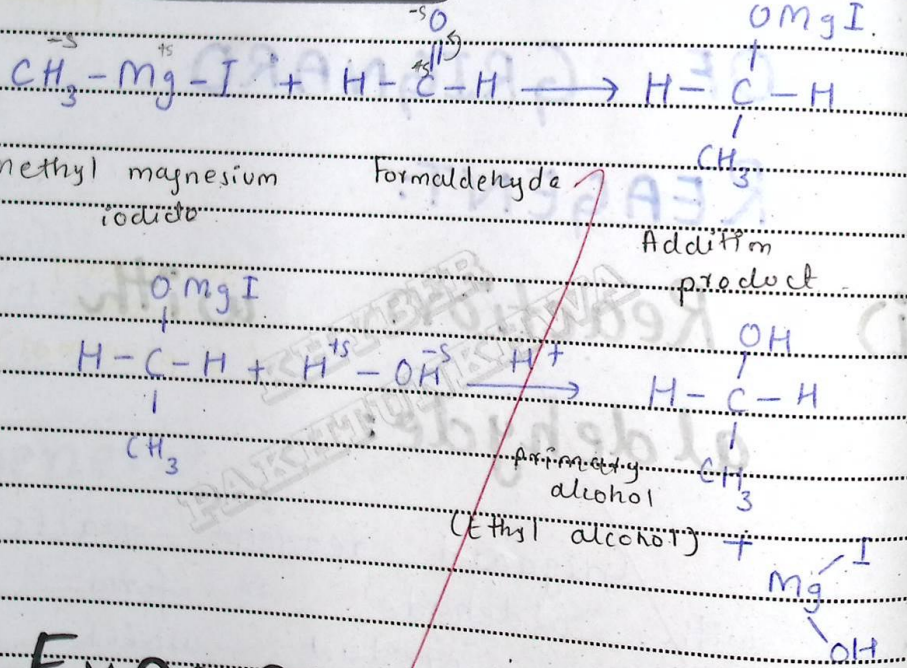
CHEMICAL REACTIONS OF GRIGNARD REAGENT:

(i) Reaction with aldehyde:

Grignard reagent reacts with aldehyde to form addition product which on acid hydrolysis gives primary and secondary alcohol.

EXAMPLE 1:

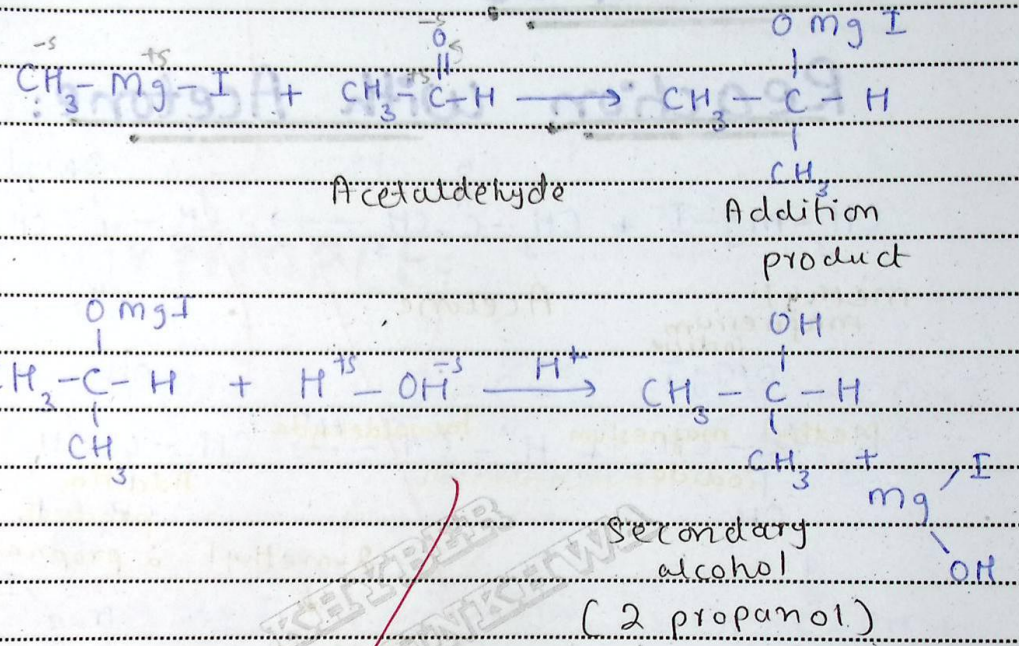
REACTION WITH FORMALDEHYDE:



EXAMPLE 2:

REACTION WITH

ACETALDEHYDE:

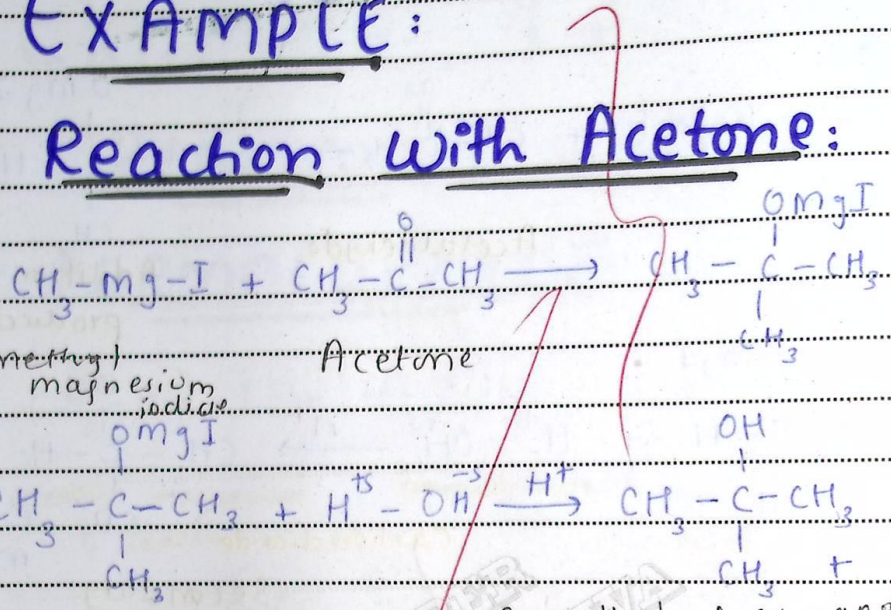


(ii) REACTION WITH KETONE:

Grignard reagent react with ketone to form tertiary alcohol.

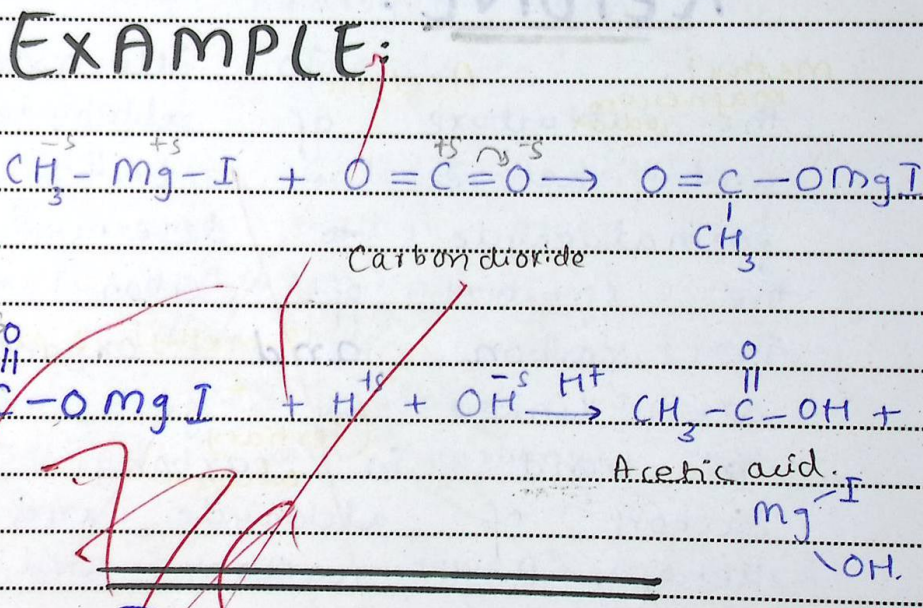
EXAMPLE:

Reaction with Acetone:



(iii) REACTION WITH CARBON DIOXIDE (CO_2):

Grignard reagent with CO_2 to form addition product which on acid hydrolysis gives acetic acid.



EXAMPLE:

QUESTION 6:

ANSWER:

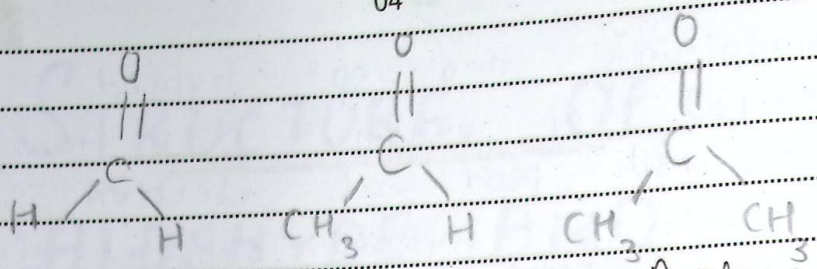
STRUCTURE OF ALDEHYDE AND KETONE:

To illustrate the structure of aldehyde and ketone we take formaldehyde to determine the structure of carbonyl group The carbon and oxygen are linked by sigma and pi bond in carbonyl carbon of aldehyde and ketone. Both carbon and oxygen in carbonyl carbon are sp^2 hybridized. The carbon and oxygen sigma and pi bond are formed by linear sp^2-sp^2 overlap and sidewise overlap of p-orbital respectively. The

remaining two sp^2 hybrid orbital of oxygen has two unshared pair of electron. while sp^2 hybrid orbital of carbon overlap with s-orbital of two hydrogen atoms, in case of formaldehyde but in case of acetaldehyde (aldehyde) carbon is attach with with one methyl group and one hydrogen.

In case of acetone (ketone) two alkyl groups are attached with carbonyl carbon atom.

The three groups attached with carbonyl carbon arranged in trigonal planar form while angle around carbonyl group are approximately equal to 120°.



Formaldehyde Acetaldehyde Acetone (Ketone)

Oxidation Reactions of Aldehyde:

Aldehyde perform various oxidation reactions. These oxidation reactions are also important for identification of aldehyde.

(i) Tollen's REAGENT TEST:

Tollen's Reagent:

Tollen's reagent is ammonical silver nitrate solution. It is obtained by adding ammonia in silver (I) oxide present in silver nitrate ($AgNO_3$) and sodium hydroxide ($NaOH$) solution.

Ammonia forms a water soluble complex of diamine silver (I) hydroxide. This reagent is called Tollen's reagent.

⇒ When aldehyde is heated with Tollen's reagent. it oxidizes aldehyde to carboxylate ions and silver

ions are reduced to metallic silver which precipitate on metallic tube and form silver mirror. It is called silver mirror test.

Reaction:

$$RCOH + 2[Ag(NH_3)_2]OH \longrightarrow RCOONH_4 + 3NH_3 + 2H_2O$$

FEHLING'S SOLUTION TEST:

Fehling's solution is the mixture of cupric ions with tartarate ions when solution is heated with aldehyde it oxidizes aldehyde to carboxylate ions and cupric ions are reduced to cuprous oxide

Reaction

$$RCOH + Cu^{+2} + 5OH^- \longrightarrow RCOO^- + Cu_2O\downarrow + 3H_2O$$

BENDICT'S SOLUTION TEST:

It is solution which is formed by mixture of cupric ions with citrate ions. It oxidizes aldehyde and itself reduces to cuprous oxide

$$RCOH + Cu^{+2} + 5OH^- \longrightarrow RCOO^- + Cu_2O + 2H_2O$$

Carboxylate ions.

Oxidation of Ketone:

Ketone does not oxidize due to absence of α- Hydrogen.

Therefore it also donot do that tests which occur by aldehyde.