SECTION: B

Q: No 2

PART: (ix)

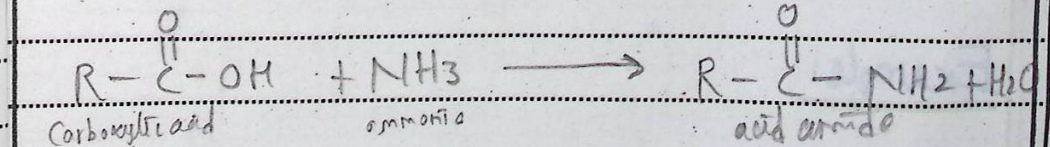
ANSWER:

~~Conversion~~ of Acid Amide to Carboxylic

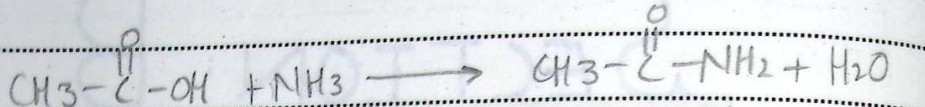
Conversion of Carboxylic acid to Acid Amide:

Carboxylic acids can be converted to acid amides by reaction of ammonia with carboxylic acid.

Generally:



Example:

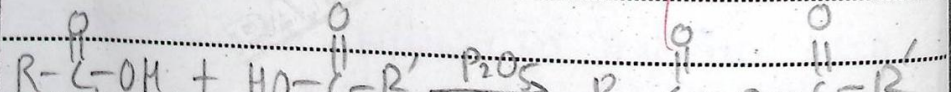


acetamide

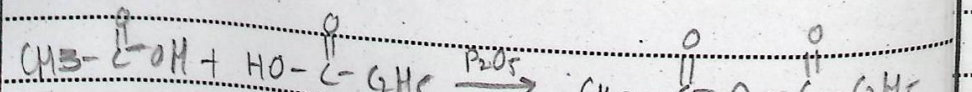
Conversion to Anhydrides:

Carboxylic acids can be converted to acid anhydrides by reacting two molecules of carboxylic acids in presence of P_2O_5 catalyst and elimination of water molecule.

Generally:



Example:



ethanoic methanoic anhydride

PART: (X)

ANSWER:

Enzymes:

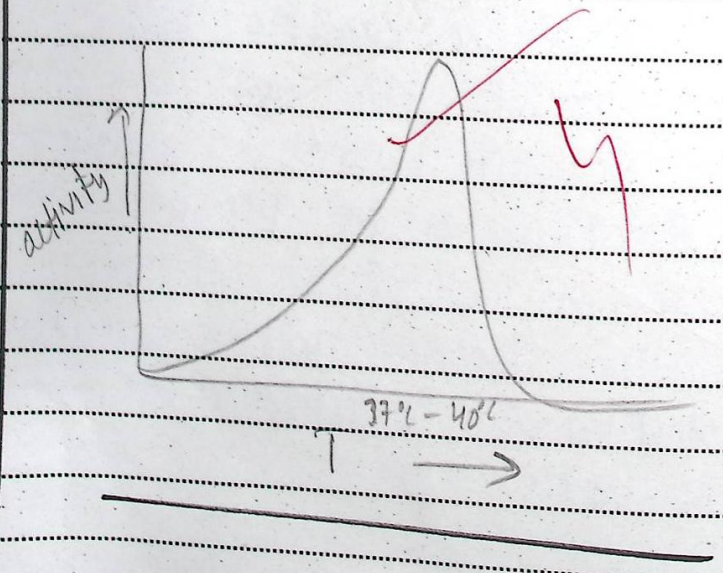
Enzymes are the biological catalyst found in the bodies of organisms that speed up chemical reactions without being consumed in the reaction.

Effect of pH on Enzyme Activity:

One of the factors that affect Enzyme activity is pH. Each enzyme works best at a specific pH, which is known as optimum pH. For example trypsin works at alkaline pH (pH = 8-9) whereas pepsin works at acidic pH (pH = 2-3). If a pH of solution doesnot suit enzyme, it will either remain inactive or with denature.

Effect of Temperature:

Temperature also affects activity of enzymes. Enzymes work best at a specific temperature called optimum temperature. For most enzymes in human body this range is 37°C - 40°C. If it goes above it, activity will decrease because enzymes denature. Up till optimum temperature activity increases because of greater collision between substrate and enzymes.



PART: (VII)

ANSWER:

Lucas Test:

Lucas Test is a process used to distinguish between tertiary, secondary and primary alcohols.

Lucas Reagent:

HCl + anhydrous $ZnCl_2$.

Process:

Alcohols react with HCl in presence of anhydrous $ZnCl_2$. When alcohols react with it, they produce alkyl halide which produces cloudiness in test tube which indicates presence of type of alcohol.

If cloudiness appears immediately, it is tertiary alcohol. If cloudiness appears after some time, it indicates alcohol used is secondary alcohol

and if cloudiness doesnot appear it shows that alcohol present is primary alcohol.

Reactions:

$$R-OH + HCl \xrightarrow{ZnCl_2} \times$$

(1° alcohol) — No cloudiness appears

$$R-\underset{\displaystyle R}{\overset{\displaystyle H}{\underset{|}{\overset{|}{C}}}}-OH + HCl \xrightarrow{ZnCl_2} R-\underset{\displaystyle R}{\overset{\displaystyle H}{\underset{|}{\overset{|}{C}}}}-Cl + H_2O$$

(2° alcohol) — (2° alkyl halide) — cloudiness appear after some time 5-10 minutes

$$R-\underset{\displaystyle R}{\overset{\displaystyle R}{\underset{|}{\overset{|}{C}}}}-OH + HCl \xrightarrow{ZnCl_2} R-\underset{\displaystyle R}{\overset{\displaystyle R}{\underset{|}{\overset{|}{C}}}}-Cl + H_2O$$

(3° alcohol) — (3° alkyl halide) — cloudiness appears immediately

PART: (Xi)

ANSWER:

PVC:

"PVC" stands for polyvinyl chloride.

Uses of PVC:

The following are the uses of PVC:

Raxine:

PVC is used to produce raxine, which is a synthetic leather used for car seats etc.

Pipes:

PVC is used to produce pipes as it is a strong material. This prevents leakage.

Water Bottles:

Poly vinyl chloride (PVC) is used to produce water bottles. Its a strong material so it prevents leakage.

Insulator in Electrical Wires:

PVC is used as insulator cover for Electrical wires. As its an insulator so due to electrical shocks deaths can be prevented by using PVC as insulator in electrical wires.

PART: (XIII)

ANSWER:

IR Spectroscopy:

The type of spectroscopic technique that is used to determine and analyze the structure of organic compounds.

Radiation Used:

It uses infrared radiation. The radiations of wavelength 0·2μm to 16μm are used.

Application:

Spectrum: Functional Group Region:

It is a part of IR spectrum that gives information about functional present in organic compound. It corresponds to wavenumber 4000 cm^{-1} to 1500 cm^{-1}

Spectrum: Finger Print Region:

It is a part of IR spectrum that gives information about the structure of organic compound. Each compound has a different finger print region.

Presence of Impurities:

Different peaks in finger print region indicate that some sort of impurity is present in the structure of organic compound. As each compound has different finger print region.

Accurate Results:

It produces accurate results than other techniques.

Less Time Consuming:

It is less time consuming that other techniques.

Non-Destructive Method:

It is a non-destructive method that uses little amount of substance without causing harm to it.

PART: (XII)

ANSWER:

Smog:

Its a combination of two words Smoke and fog.
It has two types.
Industrial smog.
Photochemical smog.

Photochemical Smog:

Pollutants from industrial exhausts and vehicular emission are main causes of photochemical smog.
It results in formation of ground level ozone which is harmful, PAN is also

formed which is a lung and eye irritant.

Formation:

When NO_2, Hydrocarbon and Oxygen react in UV light O_3 is produced as follows:

$$NO + VOC \longrightarrow NO_2$$

$$NO_2 \xrightarrow{UV} NO + O$$

$$O + O_2 \xrightarrow{UV} O_3$$

$$NO_2 + VOC \rightarrow PAN$$

Overall Reaction

$$NO_x + VOC + O_2 \xrightarrow{UV} O_3$$

PART: (II)

ANSWER:

Wohler's Work.

Friedrich Wöhlers work is of prime importance in organic chemistry Prior to his work people believed in vital force theory, which stated that under influence of some vital forces in living organisms organic compounds are created in them and Organic compounds are not found in nature.

Process:

Wöhler reacted ammonium chloride with potassium cyanate and upon heating the product he obtained urea which is a organic compound.

$NH_4Cl + KCNO \longrightarrow NH_4CNO + KCl$

$NH_4CNO \xrightarrow{heat} NH_2CONH_2$

urea

First he obtained ammonium cyanate and potassium chloride. He heated ammonium cyanate and obtained urea. Which is a oryanic compound. This showed that vital force theory wrong and Organic compounds can be produced laboratory.

(3) Importance Not mentioned Clearly

PART: (iv)

ANSWER

Metamerism:

This type of isomerism in which compounds have same molecular formula in their structural formula they differ in distribution of carbon atoms on either side of function group.

Example:

diethyl ether

$CH_3-CH_2-O-CH_2-CH_3$

$CH_3-O-CH_2-CH_2-CH_3$

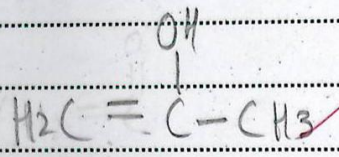
ethyl propyl ether

Tautomerism:

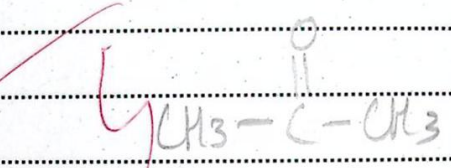
Type of isomerism in which different compounds have same molecular formula but differ from another by a proton (or may be a π bond) in structural formula.

Example:

Propene-2-ol



propanone.



PART: (ii)

ANSWER:

Transition Elements:

The elements of periodic table that show partially filled (n-1) d orbitals are called transition elements.

Types

There are two types of transition elements.

Typical Transition elements.

Non typical elements.

Non-Typical Elements:

Non-typical transition elements are those elements which donot follow characteristic properties of transition elements.

These are;

Sc, Y, La, Zn, Cd and Hg.

Typical Transition Elements:

These are the elements that follow the characteristic properties of transition elements.

All transition elements other than; Sc, Y, La, Zn, Cd, Hg are typical transition elements.

PART: (i)

ANSWER:

Ionization Energy:

The amount of energy required to remove valence electron from outermost shell of isolated gaseous atom to form an ion in the gaseous state

It's an endothermic process so energy is required.

$Mg \longrightarrow Mg^{+2} + e^{-} \quad \Delta H = 737 kJ/m$

I.E of Phosphorous greater than Sulphur:

I.E of phosphorous is greater than sulphur due to following reason;

Electronic configuration of phosphorous is

$P^{15}: [Ne], 3s^2, 3p_x^1, 3p_y^1, 3p_z^1$

In this case, P-subshell is half filled and we know half filled and complete subshell are stable so phosphorous requires more energy for removal of electron from p-orbital.

In case of Sulphur:

Electronic configuration of sulphur is given as;

$^{16}S: [Ne], 3s^2, 3p_x^2, 3p_y^1, 3p_y^1$

complete

Here p-subshell is partially filled and we know less energy is required to remove electron from partially filled subshell or orbital.

so we conclude that is the main reason for lower I.E of sulphur than phosphorous or we can say it's the reason for high I.E of phosphorous than sulphur.

SECTION: C

Q:No 3

ANSWER: 8

Alkaline Earth Metal:

The elements of group IIA of periodic table are known as alkaline earth metal.
Their valence shell electronic configuration is ns^2.
They can lose two valence electrons to form di positive ions.
They are not found in free state and always occur in combined state.
Ca and Mg are abundant alkaline earth metals.

Their oxides and hydroxides react with water to form bases.

Solubility of Hydroxides:

The solubility of hydroxides of alkaline earth metals increases as we move down the group.

$Be(OH)_2$ and $Mg(OH)_2$:

$Be(OH)_2$, Beryllium hydroxide is insoluble in water. $Mg(OH)_2$, Magnesium hydroxide appears to be insoluble however when it is shaken and stirred thoroughly and pH of solution is determined it shows that pH is 9.0 so some part of it has dissolved

$Ca(OH)_2$:

When calcium hydroxide is dissolved in water it readily dissociates into Ca^{++} ions and $2(OH)^-$ ions. When pH is determined

it shows that pH = 11. So it dissolves more than $Mg(OH)_2$.

$Ba(OH)_2$:

$Ba(OH)_2$ dissolves to give $0.1\ mol\,dm^{-3}$ of solution. It's pH is high. This shows hydroxides dissolve more as we move down the group.

Solubility of Sulphates:

Solubility of Sulphates of Group IIA decreases as we move down the group. This trend is followed if we take hydrated beryllium sulphate ($BaSO_4 \cdot 5H_2O$). This trend is broken at $Ba(SO_4)$.

Solubility of Carbonates:

Solubility of Carbonates of Group IIA decreases as we move down the group. But $Ba(CO_3)$ dissolves because, distance between both

ions is large and it become easier to break this long bond.

Q.No 3 ✓

ANSWER:

Grignard Reagent:

When an alkyl group is attached to $-MgX$, it is called grignard reagent. It's a magnesium containing compound. As magnesium is a metal so its a organo-metallic compound.

General Formula:

$R-MgX$

Example:

CH_3-MgI (methyl magnesium iodide).

The partial negative ⁻ve on alkyl group makes it a nucleophile.

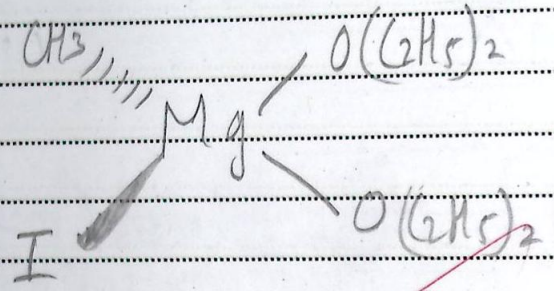
Preparation:

Grignard reagent is formed when alkyl halide reacts with solid magnesium in ethers presence. Ether provides a medium for reaction.

$$R-X + Mg \xrightarrow{\text{ether}} R-MgX.$$

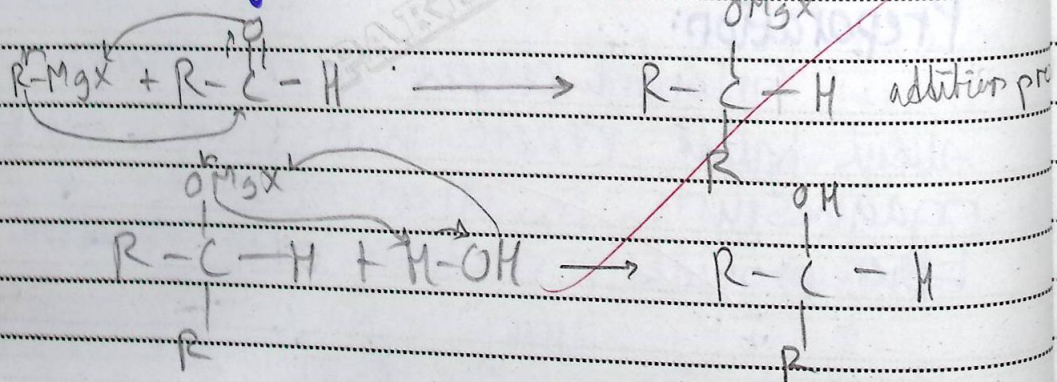
$CH_3-I + Mg \longrightarrow CH_3-MgI$

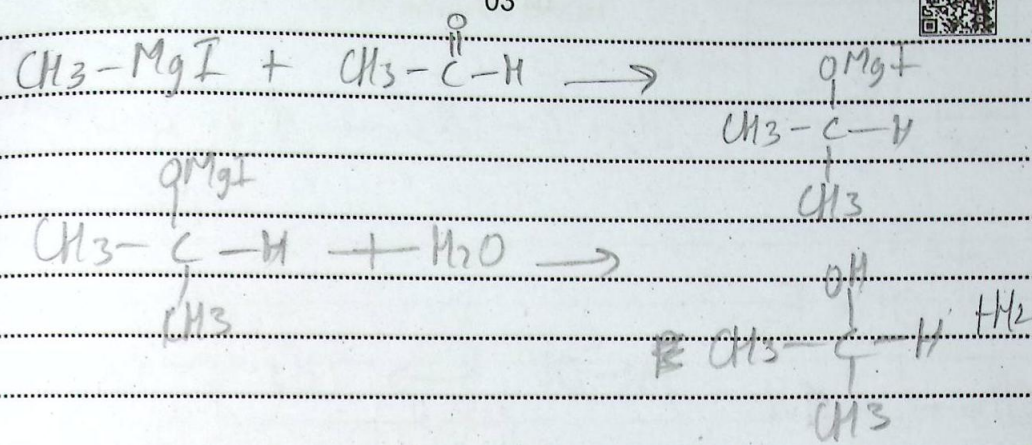
If we try to extract grignard reagent in crystalline form, magnesium becomes diethetate



Reactions:

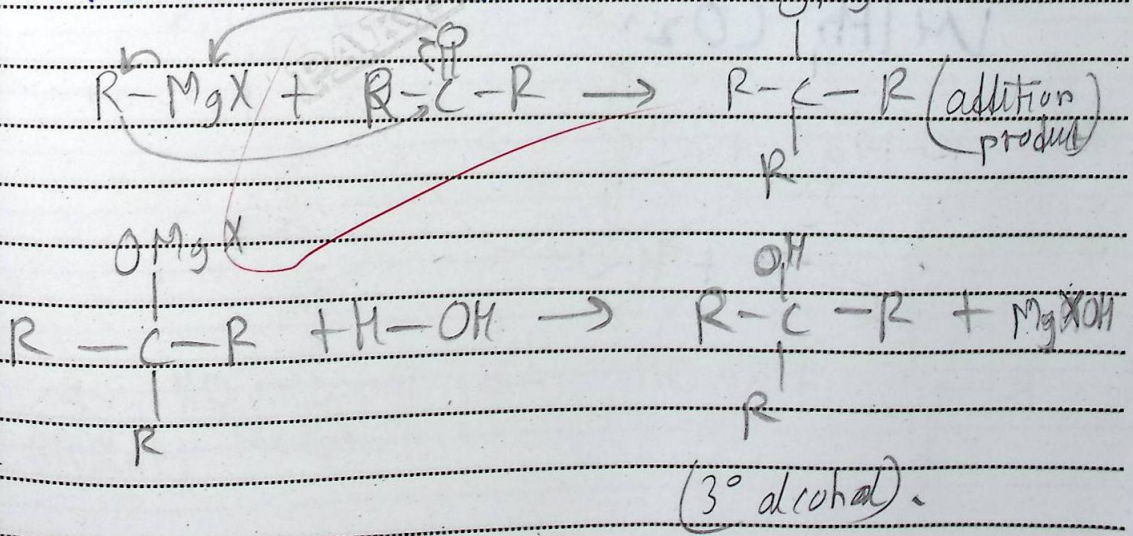
with Aldehydes



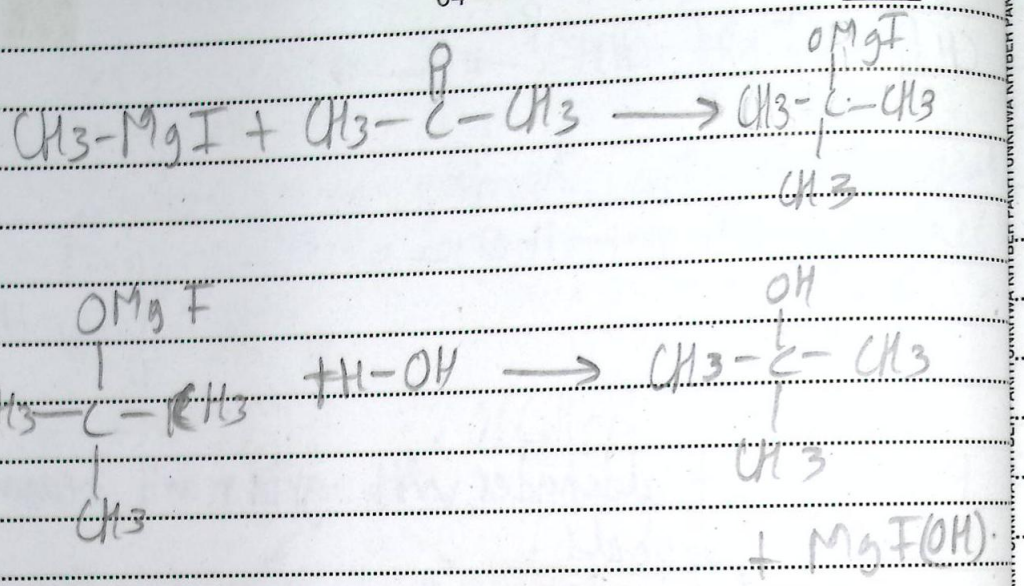


Reaction of aldehydes with grignard reagent gives alcohols.
Formaldehyde gives primary alcohol while higher give secondary alcohols.

Reaction with Ketone.

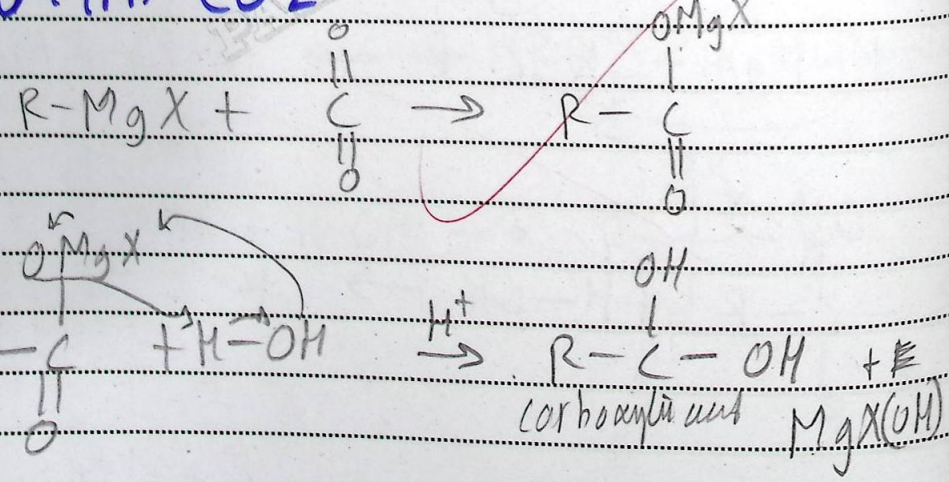


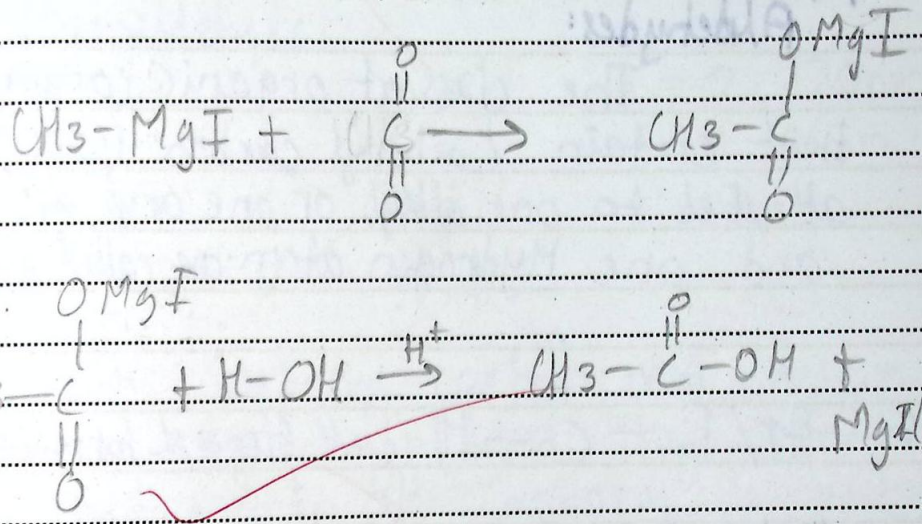
(3° alcohol).



Reaction with ketones give tertiary alcohols.

With CO_2:





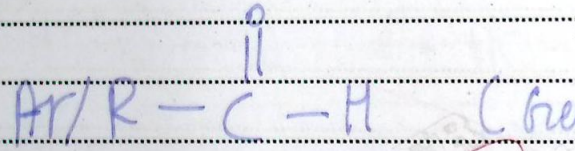
Grignard reagent upon reaction with CO_2 give carboxylic acids.

Q: No 6

ANSWER:

Aldehydes:

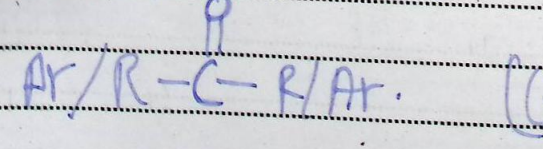
The class of organic compounds that contain Carbonyl carbon (C=O) attached to one alkyl or one aryl group and one Hydrogen atom are called aldehyde



Ar/R — C — H (General formula)

Ketones:

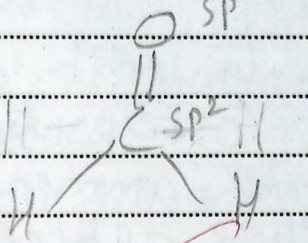
The class of organic compounds in which two alkyl groups or two aryl groups or one alkyl group and one aryl group are attached to carbonyl carbon (C=O) from either side are called Ketones.



Ar/R — C — R/Ar. (General formula)

Structure:

In order to understand structure of both we will consider H-C-H formaldehyde.



C=O 120pm.
C-H 96pm.

Both Carbonyl carbon and oxygen are sp^2 hybridized. This remains constant in all Carbonyl compounds (aldehydes and ketones).

Bond angles are nearly 120° but there are some exceptions.

Oxidation of Aldehydes and Ketones:

Aldehydes are more readily oxidized than ketones. This could be taken as an indication to determine whether solution is aldehydic or ketonic

Test 1:

Tollen Test:

This involves tollen's reagent diammine silver (I) hydroxide $[Ag(NH_3)_2]OH$. It reacts only with aldehyde and produces corresponding carboxylate ion and water, ammonia and silver. Silver settles down and gives shiny appearance (like mirror) so it is called called silver mirror test.

$$R-CHO + 2[Ag(NH_3)_2]OH \rightarrow R-COO^- + H_2O + NH_3 \text{ and } Ag$$

This reaction gives only idea

Fehling Solution:

This is also done to determine whether solution is aldehydic or ketonic. It uses cupric ions with tartarate ions. If red ppt appears at end of reaction, solution is aldehydic if not, then its ketonic.

$$R-CHO + 2Cu^{+2} + 5OH^- \rightarrow R-COO^- + Cu_2O \downarrow$$

red ppt

Benedict Test:

It uses cupric ions with citrate ions. If precipitate appears, solution is aldehydic If not, solution is ketonic.

Oxidation of ketone:

Ketones donot undergo oxidation like aldehydes however in presence of acidified $K_2Cr_2O_7$ or H_2SO_4 ketone undergo oxidation to carboxylic acids. It follows pupof rule