★(Section B)★

★QNO2:-★

(iii) ★(Answer)★ :-

★Wohler's Work:-★

In 1828, Friedrick Wohler prepared Urea which is organic compound from Ammonium cyanate which is inorganic compound. He heated Ammonium cyanate which was converted into urea or Carbamate

★Reaction:-★

$$NH_4COONH_2 \xrightarrow{\Delta} NH_2CONH_2 + H_2O$$

★Importance of Wohler's work:-★

Before Wohler, in 1815 a theory

called Vital force theory was proposed. According to this theory, organic compounds can only be produced from living organism. But when Friedrick prepared Urea by heating ammonium cyanate which is non-living, then it was proved that organic compounds can also be synthesized in laboratory from non-living thing.

So major importance of Wohler's work was to provide the idea that organic compounds can also be synthesized in laboratory.

(iv) ★ **Answer:-** ★

★ **Metamerism:-** ★

Type of structural isomerism in which compounds have same molecular formula but have different structural formula due to

unequal distribution of carbon atoms or alkyl group on either side of functional group.

Metamerism is shown in same homologous series.

★ **Metamers:-** ★

Isomers which exhibits the phenomenon of metamerism is called metamers.

★ **Examples:-** ★

① Dimethyl ether and ethyl methyl ether exhibit metamerism

② But-1-ene and But-2-ene exhibit the phenomenon of metamerism.

$H_2C=CH-CH_2-CH_3$ But-1-ene

$H_3C-CH=CH-CH_3$ But-2-ene

★Tautomerism:-★

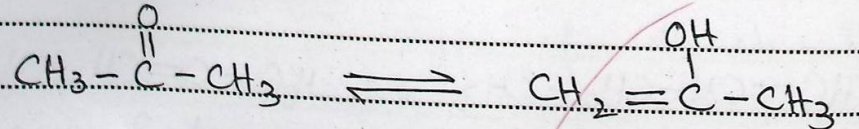
Type of structural isomerism in which compounds have same molecular formula but different structural formula due to position of double bond or proton.

★Tautomers:-★

Those isomers which exhibits the phenomenon of tautomerism are called tautomers.

★Example:-★

Keto-enol tautamerism is an excellent example of tautomerism in alcohols and ketones.



Keto enol

(viii) ★Answer:-★

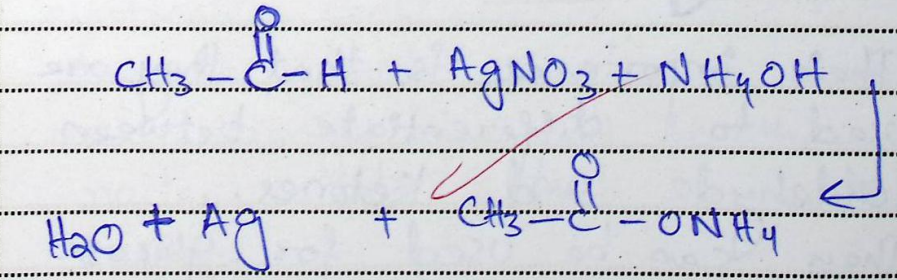
★Tollen's Test:-★

Ammonical solution of silver nitrate which on reaction with organic compound form silver mirror on the wall of test tube.

$NH_4OH + AgNO_3$

★Condition for tollen's test:-★

Those carbonyl compounds gives positive Tollen's test which contain at least on methyl group attatched to them.

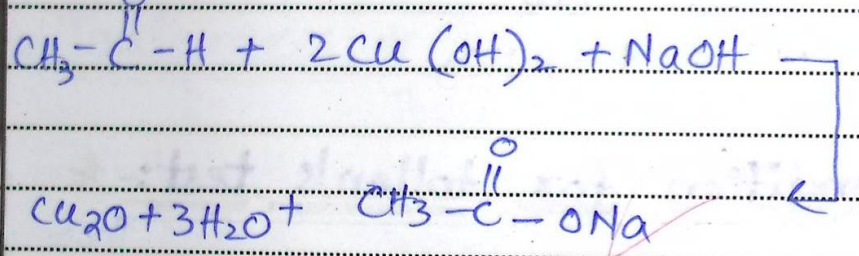


$H_2O + Ag +$

Aldehydes react with tollen's test to form silver mirror.

★Fehling's solution test:-★

when aldehyde reacts with fehling solution and deep blue colour of cupric ion is turn into red precipitate of cuprous ion



★Importance of Tollen's and Fehling test:..★

Their importance is that they are used to differentiate between aldehyde and ketones.
They can be used for glucose level in the blood.

(i) Answer :-

★Ionization Energy:-★

The minimum energy required to remove an electron from the outer most shell of an atom is called ionization energy.

★Ionization energy of Sulphur and phosphorous:-★

Ionization energy of phosphorous is higher than that of sulphur because of
phosphorous has more stable electronic configuration than sulphur due to which, phosphorous electrons are strongly bounded to the nucleus and cannot be removed easily.
Sulphur has less stable electronic configuration than phosphorous, due

to which electrons of sulphur are not much attracted by nucleus hence they can be easily removed with less amount of energy. Energy required to remove electron from phosphorous is greater than that of sulphur because electro ionization energy of phosphorous is greater than sulphur.

(x) ★Answer:-★

★Effect of PH on Enzymes:-★

PH has a crucial effect on enzyme's function and structure.

★Optimum PH:-★ Each enzyme

work best on some PH which is known is Optimum PH.

★Change in PH:-★

Change in optimum PH for a specific enzyme can distort the structure and function of an enzyme.

★Example:-★

Optimum PH for enzyme "Pepsin" is 1.5 - 1.6. It means that pepsin work best on PH of 1.5 - 1.6. But If the PH is changed to 5 or 5.6, pepsin would stop function and its structure will also be distorted.

★Effect of temperature on Enzyme:-★

Temperature has important effect on structure and function of enzyme.

★Change in temperature:-★

Change in optimum temperature for an enzyme, changes its shape. When shape of enzyme is distorted then it cannot be fitted in substrate's active site and function of enzyme is stopped.

★Example:-★

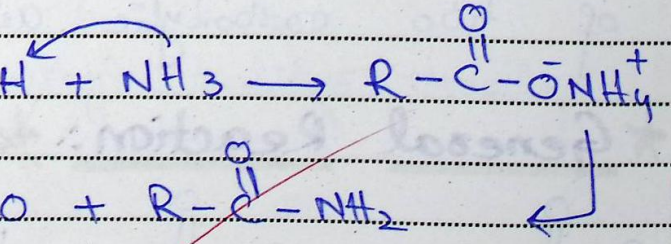
Optimum temperature for thermophilic Bacteria's enzyme is 90°c. At 90°c enzymes of thermophilic bacteria works best but if temperature is reduced to 70-80°c temperature, enzymes of thermophilic bacteria stops work and its structure is distorted.

(ix) ★Answer:-★

★Conversion of Carboxylic acid into acid amides:-★

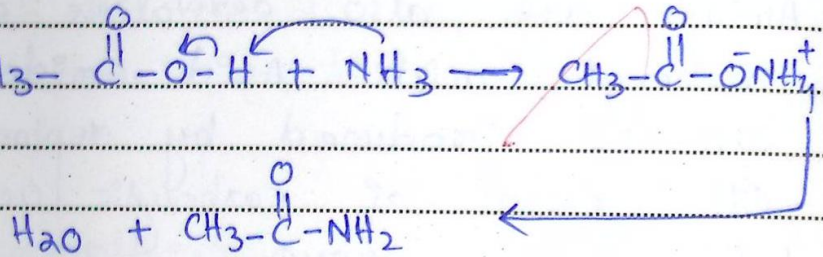
Amides are also derivatives of carboxylic acids. Acid amides can be produced by replacing -OH group of carboxylic acid into $-NH_2$ group.
They can be prepared by the reaction of ammonia with carboxylic acid to form first ammonium salt which on heating produces acid amides.

★General reaction:-★



★Example :-★

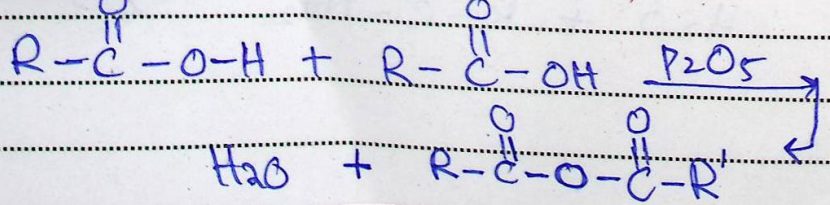
Acetic acid reacts with ammonia to form ammonium acetate which upon dehydration produces acid amide.



★Conversion of Carboxylic acid to acid anhydrides:-★

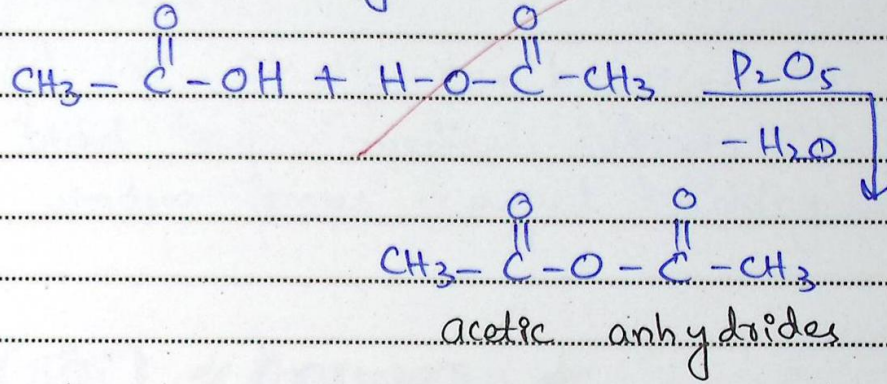
Acid anhydrides are also carboxylic acid derivatives and they can be produce from dehydration of two carboxylic acid molecules.

★General Reaction :-★



★Example :-★

Acetic acid upon dehydration can be converted into acetic anhydrides.



(vi) Answer :-

Tertiary alkyl halides follow * S_N1 mechanism:-

Tertiary alkyl halides usually follow S_N1 mechanism.

(xi) ★Answer:-★

★Uses of polyvinyl chloride:★

polyvinyl chloride PVC has many uses in industrial level. Some of its uses are given:-

① It can be used in making pipes for waters uses.

② PVC plastic pipes are used insulate the electricity ~~pipe~~ wires

which are made up of PVC.

③ PVC plastic is used to manufacture bottles.

④ PVC plastic can be used in blood bags, medical tubing, PVC window frames, carpet backing etc.

(xii) ★Answer:-★

★Applications of IR Spectroscopy:-★

① Used in identification of unknown compounds.

② Used to detect impurities.

③ The progress of most of reaction can be followed by examining IR Spectroscope.

④ Used to determine functional group.

⑤ Used to determine percentage

composition of a mixture.

(vii) ★ Answer :- ★

Lucas test :-

This test can be used to distinguish between primary, secondary and tertiary alcohol

Acohols reacts with Lucas reagent to form their chlorides which are insuloble and form cloudiness in the tube.

$$R-OH + HCl \xrightarrow{ZnCl_2} R-Cl + H_2O.$$

The time taken for cloudiness to appear cassospond to the relate reactivity of alcohals.

Tertiary alcohol immediatly forms cloudiness

Secondary alcohol takes some time to form cloudiness.

primary alcohol and methyl alcohol doesnot form cloudiness.

(ii) ★ Answer :- ★

Non - Typical transition elements.

Elements that donot posses all the properties of transition element are called non- typical transition element.

Elements of IIB and IIIB are non- typical transition elements.

Typical transition elements :-

Elements that posses all the characteristic properities of transition elements are called typical transition elements.

Elements of IB, IV B, V B

VI B, VIII B are typical transition elements.

★(Section C)★

★Q.NO 5:-★

★Answer:-★

★Grignard's Reagent:-★

Those organo metallic compounds in which an atom of magnesium is bonded with a halogen atom and an alkyl or aryl group are called Grignard's reagents.

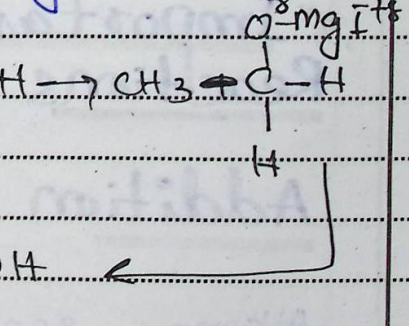
★preparation of Grignard Reagent:-★

Grignard reagent is prepared by the action of magnesium metal on the alkyl halides in presence of dry ether

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

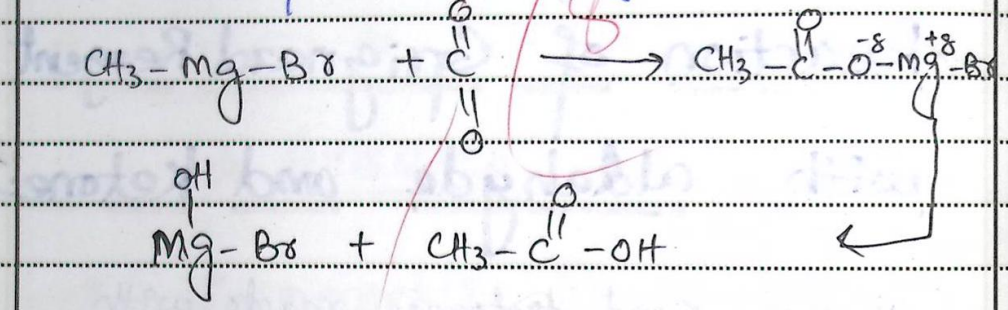
★Reaction of Grignard Reagent with aldehyde and ketones:★

aldehyde and ketones reacts with gridnard reagent to form an addition product which upon acid hydrolysis yeids alcohals.



★Reaction with CO_2 :-★

Grignards reagent reacts with CO_2 forming an addition product. Addition product undergoes acid hydrolysis and form carboxylic acid.



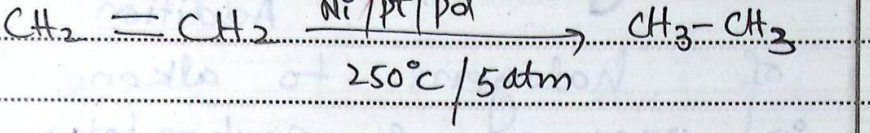
Q No 4 :- ★Answer :-★

★Important Chemical Reactions of Alkenes :-

Addition of Hydrogen :-★

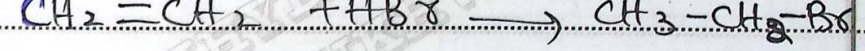
Alkene reacts with hydrogen in the presence of catalyst such as Nickle, platinum and palladium

at 200 - 250°c temperature and 1 - 5 atm pressure and forms alkanes.



★Hydrohalogenation :-★

Alkene reacts with halogen acid to form alkyl halids.



★Hydration :-★

Hydration means addition of water to alkene to produce alkyl hydrogen sulphate, which on hydrolysis produces alcohol at 100°c.

$$CH_2=CH_2 + H_2O \xrightarrow[100]{H_2SO_4} CH_3-CH_2-OH$$

Halogenation:-

Addition of halogens to alkene in presence of carbon tetra-chloride to produce vicinal dihaloalkanes.

$$CH_2=CH_2 + Br_2 \xrightarrow{CCl_4} \underset{\displaystyle Br}{\overset{\displaystyle Br}{CH_2-CH_2}}$$

Q No 6: Answer

Structure of aldehyde and ketones:-

In aldehyde and ketones, carbonyl carbon is sp^2-hybridized. Each carbon in aldehyde and ketone have three sp^2 hybridized orbital and one unhybridized p- orbitals. C-C single sigma bond is formed due to overlapping of sp^2-sp^2 hybrid orbitals of carbonyl carbon. C-H bond is formed due to the overlap of sp^2-s orbital of carbon and hydrogen and C=C double bond is formed due to the overlap of p-p unhybridized orbitals of each carbonyl carbon. In aldehydes and ketone, bond angles are approximately 120° however slight deviation is observed.

Oxidation of Aldehyde:-

oxidation of an aldehyde produces carboxylic acid. The oxidizing reagent used are $KMnO_4$, $K_2Cr_2O_7$ etc. During oxidation, the hydrogen atom attatched to the carbonyl carbon in aldehyde oxidises to -OH group.

$$CH_3-\overset{\overset{O}{\|}}{C}-H + [O] \xrightarrow{KMnO_4} CH_3-\overset{\overset{O}{\|}}{C}-OH$$

Oxidation by Tollen's Reagent:-

When an aldehyde is treated with Tollen's reagent, the silver ions ~~who~~ are reduced to metallic silver which is deposited on the wall of test tube to form silver mirror

$$CH_3-\overset{\overset{O}{\|}}{C}-H + AgNO_3 + NH_4OH \longrightarrow H_2O + Ag + CH_3-\overset{\overset{O}{\|}}{C}-ONH_4$$

Oxidation by Fehling's

Solution:- When aldehyde is treated with fehling solution, the deep blue colour of cupric ion is reduced to red precipitate of cuprous oxide.

$$CH_3-\overset{\overset{O}{\|}}{C}-H + 2\,Cu(OH)_2 + NaOH \longrightarrow 3H_2O + Cu_2O + CH_3-\overset{\overset{O}{\|}}{C}-ONa$$

Oxidation of ketones:-

In case of ketone, there are no α-hydrogen which can be oxidised so for oxidation of ketone very strong oxidizing agents such as $K_2Cr_2O_7$ in H_2SO_4 or $KMnO_4$ in H_2SO_4 is required.

which break the carbon - carbon bond.

$$CH_3-\overset{\overset{O}{\|}}{C}-CH_3 + 4[O] \xrightarrow[H_2SO_4]{K_2Cr_2O_7} CH_3-\overset{\overset{O}{\|}}{C}-OH + CO_2 + H_2O$$

In case of unsymmetrical ketones, the carbonyl group remain with smaller alkyl group, as oxidation takes place at this site.

$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 + 7[O] \xrightarrow[H_2SO_4]{K_2Cr_2O_7} CH_3-\overset{\overset{O}{\|}}{C}-OH + 2CO_2 + 2H_2O.$$