

Section B

Short Question

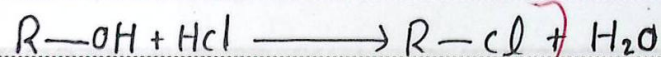
(vi)

Answer

Lucas Test

When an unknown is treated with Lucas reagent the corresponding

alkyl halide / chloride is formed. This is done in alcohol to differentiate among Primary, secondary and tertiary alcohol. It is based on the differences in reactivity of the three classes of alcohol with hydrogen halide via S_N1 reaction.



Test for identification of alcohol

Tertiary Alcohol

Tertiary alcohol immediately form insoluble layer of tertiary alkyl chloride.

Secondary Alcohol

Secondary alcohol

form an insoluble layer of Secondary alkyl chloride 5-10 mint.

Primary Alcohol

Primary alcohol form insoluble layer of primary alkyl chloride on heating.

(I)

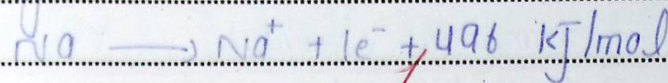
Answer

Ionization Energy

The minimum amount of energy which is required to remove the valance electron from an isolated gaseous atom to form an ion is called ionization

energy -
ionization energy is also called ionization potential.

e.g



Reason

This is because in Sulphur the outer electron are present in partially filled "p" orbital which is less stable than "p" orbital of Phosphorus.

(II)

Answer

Non-Typical Transition Elements

Element which do not

Possess all the properties of transition elements are called non-typical transition element.

Elements of IB, IIB and IIIB are non typical transition elements.

e.g. Zn, Cd

Typical Transition Elements

Elements which possess all the characteristic properties of transition elements are called typical transition elements.

Elements of IB, IIB, VB, VIB and VIIIB sub groups are example of typical transition elements.

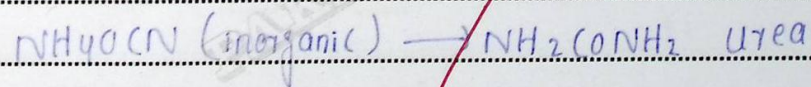
e.g. Fe, Mn, Cr etc.

(III)

ANSWER

Wohler's Work and its importance in organic Chemistry

In 1828 Friedrich Wohler accidentally synthesized urea (an ammonium cyanate) from an inorganic compound.



Importance

This experiment disproved the vital force theory which claimed organic compounds could only be produced from living

organism but fredrick wohler prepared it in laboratory. So vital force theory was rejected.

(v)

ANSWER

Sufficient Condition for Geometrical Isomerism

A molecule can show geometrical isomerism if

There is restricted rotation, typically due to a $C=C$ double bond.

Each carbon of the double bond has two different groups attached to it.

Cis-

Some groups on the same side of the double bond.

Trans-

Some groups on opposite side.

Example

But-2-ene $\rightarrow$ cis-but-2-ene

(XI)

ANSWER

Uses of PVC

pvc or polyvinylchloride is a type of

plastic used in numerous industries
it is durable, inexpensive, and resistant
to heat, water and chemicals.

PVC plastic is manipulated to create
a leather like material called rexine.

PVC are used for pipes.

PVC plastic is used to form insulating
material on electrical wires.

PVC plastic is used to manufacture
bottles.

Other uses of PVC include medical
tubing, PVC window frames, flexible
packaging blood bags etc.

(VI)

ANSWER

In the S_N1 mechanism (substitution,
nucleophilic unimolecular):-

The leaving group departs forming a
Carbocation intermediate.

The nucleophile attacks the Carbocation.

Tertiary alkyl halide form highly stable
Carbocation due to

- 1) Inductive effect of surrounding alkyl
group.
- 2) Hyperconjugation stabilizing the positive
charge.

Therefore, they prefer the S_N1 mechanism
which proceeds via this Carbocation
formation.

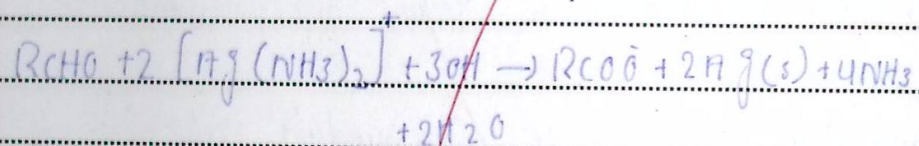
(VIII)

Tollen's Test

uses ammoniacal silver nitrate (AgNO_3).

Aldehydes reduce Ag^+ to metallic

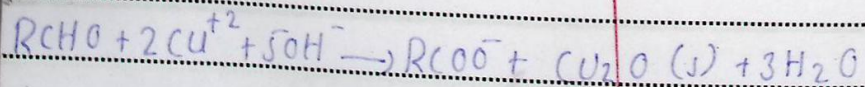
$\text{Ag} \rightarrow$ silver mirror forms.



Fehling's Test

uses alkaline Cu^{2+} solution (Fehling's A + Fehling's B)

Aldehyde reduces Cu^{2+} to $\text{Cu}_2\text{O} \rightarrow$ form brick-red precipitate.



(XII)

ANSWER

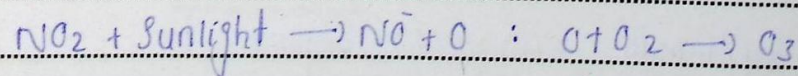
Photochemical Smog

Photochemical smog is a type of air pollution formed when sunlight reacts with nitrogen oxide (NO_x) and hydrocarbon (VOCs) in the atmosphere. This rxn produces secondary pollutants like.

Ozone

peroxyacetylnitrate

Formaldehyde and other oxidants



(x)Effect of pH

- 1) Enzymes work best at a specific optimum pH.
- 2) Deviation from this pH can alter the charge of amino acids.
- 3) Extreme pH (too acidic or too basic) can lead to denaturation, changing the enzyme shape.

EFFECT OF TEMPERATURE

Enzyme activity increases with temperature due to higher molecular movement.

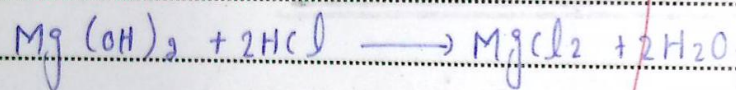
Above optimum enzymes begin to denature.

Section CQuestion no 3AnswerSolubility of Hydroxide

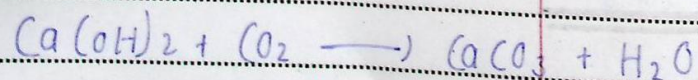
Group II metal hydroxide become more soluble in water as we

go down the Column.

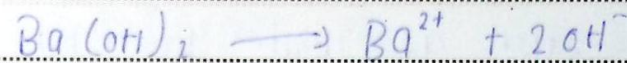
- 1) Magnesium hydroxide appear to be insoluble in water. However if it is taken in water and filtered, the solution is slightly basic ($\text{pH} = 9.0$). This indicate that some hydroxide ions must therefore have been produced by very slight dissolving



- 2) Calcium hydroxide is classed as partially soluble in water. A suspension of Calcium hydroxide in water will appear more alkaline ($\text{pH} 11$) than magnesium hydroxide.



Barium hydroxide is soluble enough to produce a solution with concentration around 0.1 mol dm^{-3} at room temperature. The hydroxide ions present would make the solution strongly alkaline.



Solubility of Sulphates

Group IIA Sulphates becomes less soluble as we down the group. Barium is the least soluble.

The simple trend is true if hydrated beryllium sulphate is considered but not anhydrous beryllium sulphate. Solubility of Magnesium sulphate and Calcium sulphate also vary depending on whether the salt is hydrated or not.

i) A familiar reaction is that between magnesium and dilute sulphuric acid producing hydrogen gas and a colourless solution.

ii) Barium Sulphate exists as white precipitate in solution.

Solubility of Carbonates

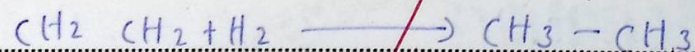
The carbonates become less soluble down the group. All the group 2 carbonates are very sparingly soluble. Magnesium carbonate for example has a solubility of about 0.02 g per 100 g of water at room temp.

QUESTION NO 4

ANSWER

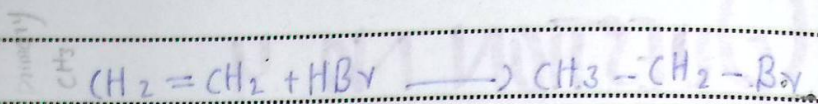
Addition of Hydrogen

Alkene reacts with hydrogen in the presence of catalyst such as nickel, platinum. temp of $200-250^{\circ}\text{C}$ under 1-2.5 atm pressure.



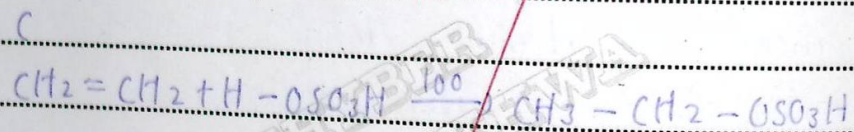
Hydrohalogenation

Alkene reacts with halogen acids and form alkyl halide.



Hydration

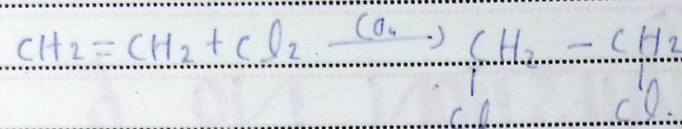
Hydration means addition of water. Alkene reacts with sulphuric acid to produce alkyl hydrogen sulphate at 100°C .



Halogenation

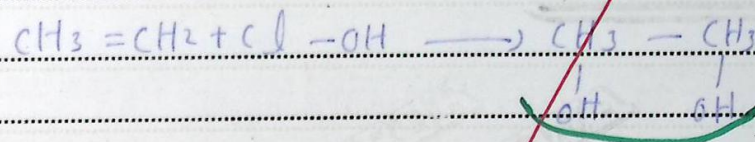
Reactivity order of halogen is $\text{F}_2 > \text{Cl}_2$
 $\text{Br}_2 > \text{I}_2$.

When two halogen atoms are attached adjacent carbon atom is called vicinal dihaloalkanes.



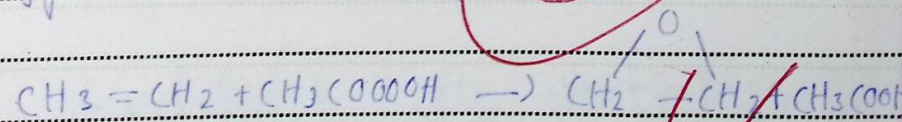
Halohydration

Hypohalous acid = HOX , hypochlorous acid = HOCl .



Epoxidation

cyclic compound in which hetero atom in the three membered ring is oxygen are called epoxides.



QUESTION NO 6

ANSWER

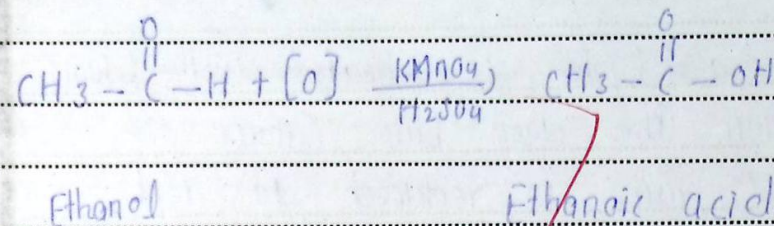
Structure

Let us consider formaldehyde an example to illustrate the structure of carbonyl group of aldehyde and ketone. The Carbon and oxygen in the carbonyl group, present in aldehyde and ketones are linked by sigma bond and a pi bond.

Oxidation of Aldehyde

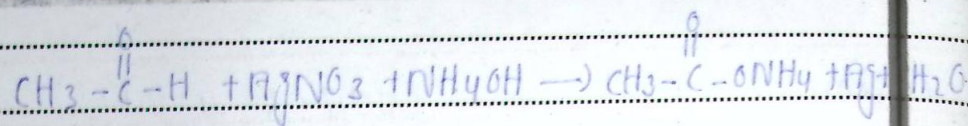
oxidation of an aldehyde produces

Carboxylic acid. The oxidizing agents used are KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, H_2O_2 and $\text{Na}_2\text{Cr}_2\text{O}_7$.



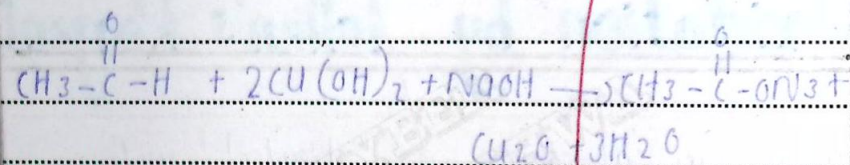
Oxidation by Tollen's Reagent

When an aldehyde is treated with Tollen's reagent, the silver ions present in Tollen's reagent are reduced to metallic silver $[\text{Ag} + \text{e}^-]$ which is deposited on the wall of test tube to form silver mirror. Therefore it is also known as silver mirror test.

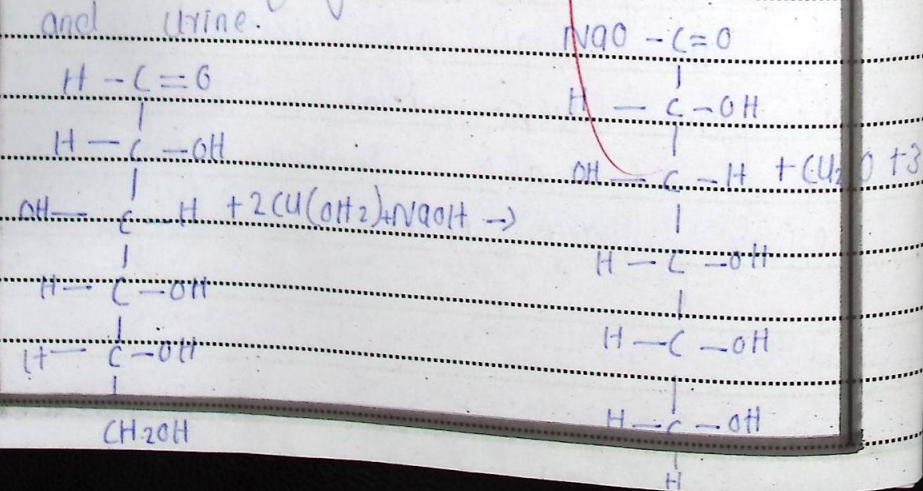


Oxidation by Fehling's Solution

When aldehyde is treated with Fehling solution the deep blue colour of cupric ion is reduced to red precipitate of cuprous oxide.

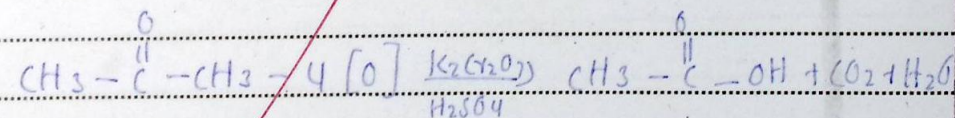


This test is widely used for the estimation of glucose (aldose) in blood and urine.

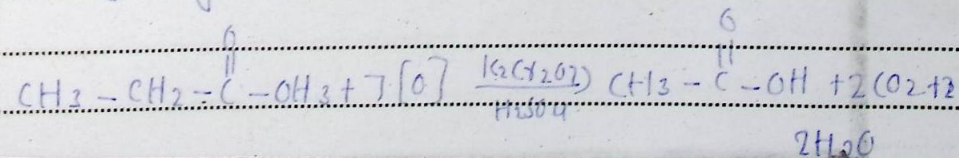


Oxidation of ketones

In aldehyde, oxidation involve hydrogen atom that is directly attached to carbonyl carbon but in case of ketone no such hydrogen exist. Ketone having α -hydrogen can be oxidized in the presence of strong oxidizing agent such as $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$, $\text{KMnO}_4/\text{H}_2\text{SO}_4$.



In case of unsymmetrical ketones the carbonyl group remain with smaller alkyl group.



Benedict's Solution Test

Benedict's solution is an alkaline solution of cupric ion complexed with citrate ion. It reacts in the same way as Fehling's solution.

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