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Preparation of Aldehydes and Ketones

List of methods for the preparation of aldehydes and ketones

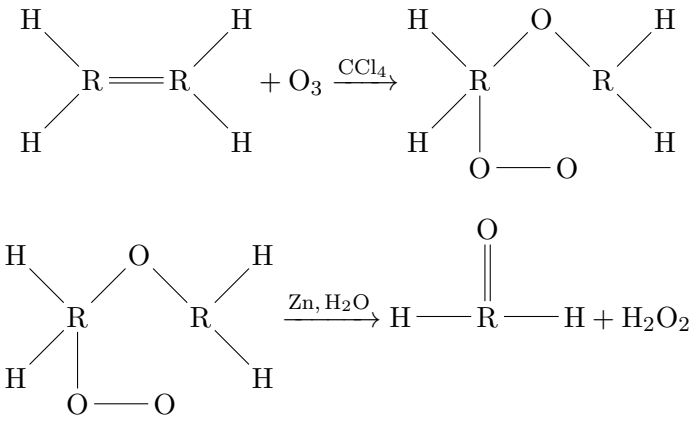
- Alkenes
- Alkynes
- Geminal dihaloalkane
- Alcohols
- Acid chloride

Preparation of aldehydes and ketones from Alkenes

Term for preparation of aldehydes and ketones from alkenes

Ozonolysis

Expression for reaction of preparation of aldehydes and ketones from alkenes



Reactants in preparation of aldehydes and ketones from alkenes

- Alkene
- Ozone

Condition for preparation of aldehydes and ketones from alkenes

- Presence of carbon tetra chloride

Role of carbon tetra chloride in preparation of aldehydes and ketones from alkenes

- Act as solvent

Intermediate product in reaction in preparation of aldehydes and ketones from alkenes

- Ozonoid

Condition for preparation of aldehydes and ketones from alkenes in intermediate product

- Presence of Zinc
- Presence of Water

Products in preparation of aldehydes and ketones from alkenes

- Aldehydes
- Ketones
- Hydrogen Peroxide

Role of Zinc in preparation of aldehydes and ketones from alkenes

- Prevent oxidation of aldehydes and ketones to carboxylic acid.

Hydrogen peroxide is an oxidizing agent. The oxidation of aldehydes and ketones yields carboxylic acid. Zinc prevents the conversion of aldehydes and ketones into carboxylic acid by reacting with the hydrogen peroxide to produce corresponding zinc oxide

Condition for formation of aldehydes in preparation of aldehydes and ketones from alkenes

- Presence of hydrogen at the double bond containing carbon

Condition for formation of ketones in preparation of aldehydes and ketones from alkenes

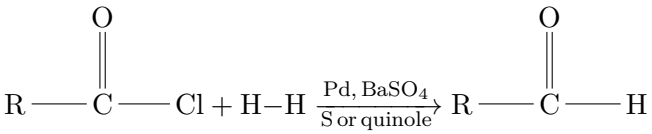
- Absence of hydrogen at the double bond containing carbon

Preparation of aldehydes and ketones from Acid chlorides

Term for reaction involving preparation of carbonyl compounds from acid chlorides

- Rosenmund reaction

Expression for reaction of preparation of aldehyde from acid chloride



Reactants in preparation of aldehyde from acid chlorides

- Acyl chloride
- Molecular hydrogen

Products in preparation of aldehyde from acid chlorides

- Aldehyde
- Hydro chloric acid

Condition for preparation of aldehyde from acid chlorides

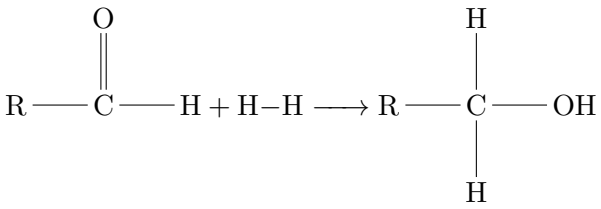
- Palladium
- Barium sulphate
- Sulphur or Quinole

Role of palladium in preparation of aldehyde from acid chloride

- Adsorption of molecular hydrogen

Palladium is a d block element. Palladium gradually attaches the molecular hydrogen to it's surface. This makes the bond between the hydrogen atoms weak and ultimately breaks. The atomic hydrogen attack the chloride of acyl chloride to yield aldehyde.

Expression for reaction of aldehyde with hydrogen in reverse reaction in preparation from acid chloride



Reactants in reaction of aldehyde with hydrogen in reverse reaction in preparation from acid chloride

- Aldehyde
- Molecular hydrogen

Products for reaction of aldehyde with hydrogen in reverse reaction in preparation from acid chloride

- Alcohol

Function of sulphur or quinole in preparation of aldehyde by acid chlorides

- Cover aldehyde

The aldehyde formed from acid chloride in absence of sulphur or quinole is reduced by the molecular hydrogen into alcohol. This is prevented by adding sulphur or quinole to cover the aldehyde molecule.

Cause of inability of using acid chloride for preparation of formaldehyde

- Formyl chloride is unstable

Expression for reaction of diassociation of formyl chloride

Reactants in disassociation of formyl chloride

Formyl chloride

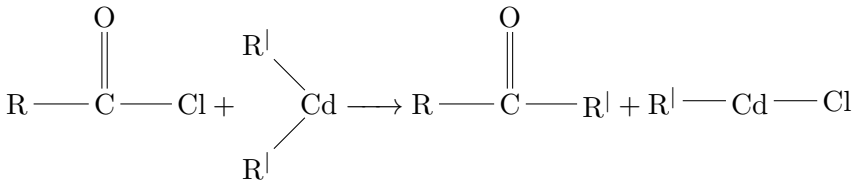
Condition of temperature for disassociation of formyl chloride

Room temperature

Products in disassociation of formyl chloride

- Hydro chloric acid
- Carbon mono oxide

Expression for reaction of preparation of ketone from acid chloride



Reactants in preparation of ketone from acid chloride

- Acyl chloride
- Dialkyl cadmium

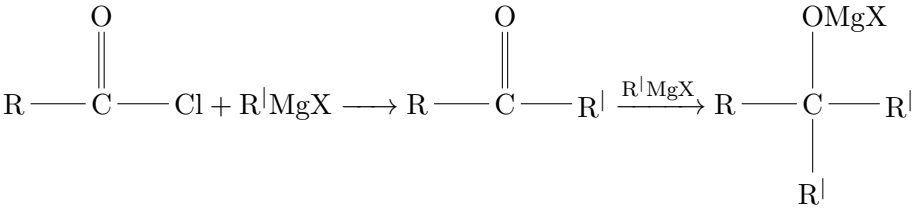
Products in preparation of ketone from acid chloride

- Ketone
- Cadmium alkyl chloride

Cause of not using grignard reagent in preparation of ketone from acid chloride

- Reduces to alcohol

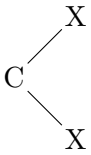
To prepare ketone from acyl chloride the chlorine atom is to be replaced with an alkyl unit. Grignard reagent even after replacing the alkyl unit yields alcohol by acting on the ketonic compound produced by itself.



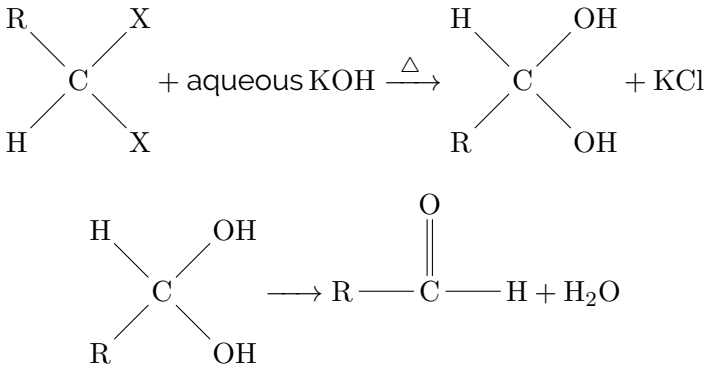
Preparation of aldehydes and ketones from geminal dihalide

Structure of geminal dihalide compounds

Two halogen atoms are bounded with single carbon atom



Expression for reaction of preparation of aldehyde from geminal dihalide



Intermediate compound in reaction of preparation of aldehyde from geminal dihalide

- Geminal Diol

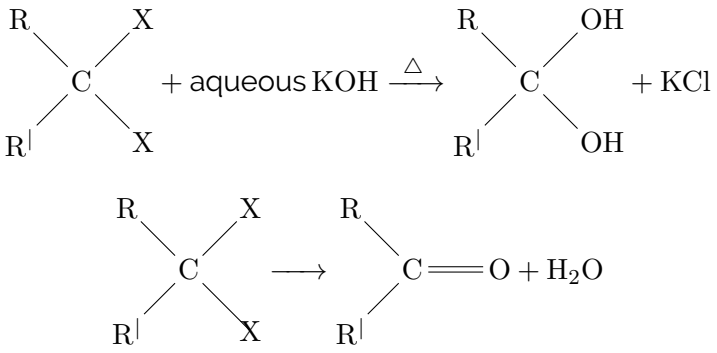
Reactants in reaction of preparation of aldehyde from geminal dihalide

- Geminal dihaloalkane
- Aqeous Potassium Hydroxide

Products in reaction of preparation of aldehyde from geminal dihalide

- Aldehyde
- Potassium Chloride
- Water

Expression for reaction of preparation of ketone from geminal dihalide



Reactants in reaction of preparation of ketone from geminal dihalide

- Geminal dihaloalkane
- Aqueous potassium Hydroxide

Intermediate compounds in preparation of ketone from geminal dihalide

Geminal diol

Products for reaction of preparation of ketone from geminal dihalide

- Ketone
- Potassium chloride
- Water

Preparation of aldehydes and ketones from alcohols

List of methods for the preparation of aldehydes and ketones from alcohol

- Oxidation
- Catalytic dehydrogentaion

Preparation of aldehyde and ketones from alkynes

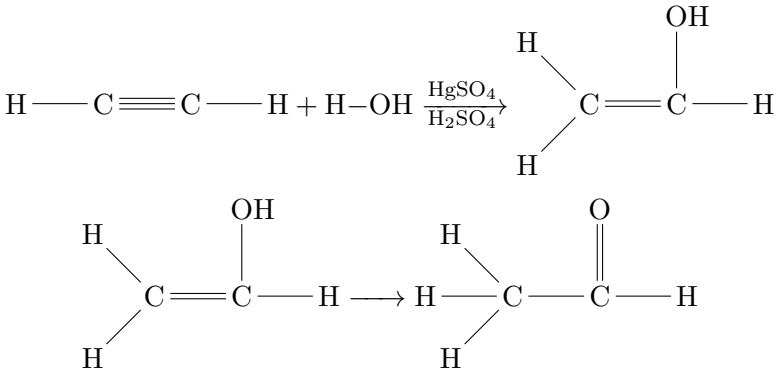
Term for reaction of preparation of aldehydes and ketones from alkynes

- Kucheorv reaction

Limitation of preparation of aldehydes from alkynes

Can only prepare acetaldehyde

Expression for reaction of preparation of acetaldehyde from alkynes



Reactants in reaction for preparation of acetaldehyde from alkynes

- Acetyne
- Water

Condition for preparation of aldehyde and ketones from alkynes

- Presence of mercuric sulphate
- Presence of Sulphuric acid

Percentage amount of mercuric sulphate present at preparation of aldehydes and ketone from alkynes

1 percentage

Range of percentage of amount of sulphuric acid present at preparation of aldehydes and ketones from alkynes

42 - 49 percentage

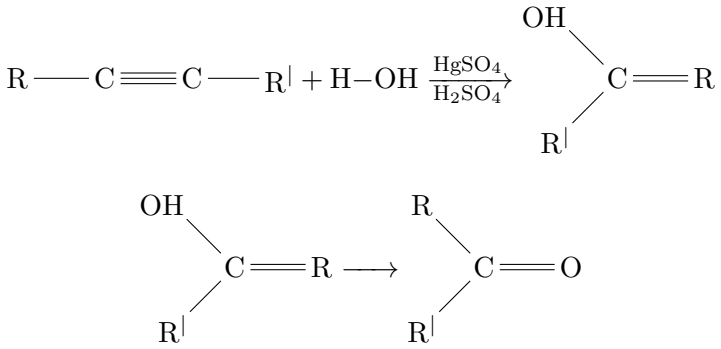
Products in reaction for preparation of acetaldehyde from alkynes

- Acetaldehyde

Function of Mercuric sulphate in reaction of preparation of aldehydes and ketones from alkynes

- Enhance activity of sulphuric acid

Expression for reaction of preparation of ketones from alkynes



Reactants in reaction of preparation of ketones from alkynes

- Alkyne other than ethyne
- Water

Intermediate compound in reaction of preparation of aldehyde and ketone from alkynes

Enol

Products in reaction of preparation of ketones from alkynes

Ketone

Oxidation

List of reagents capable of oxidizing alcohols into aldehydes and ketones

- Acidified potassium permanganate
- Acidified potassium dichromate
- Pyridinium chloro chromate

Molecular formula for potassium permanganate

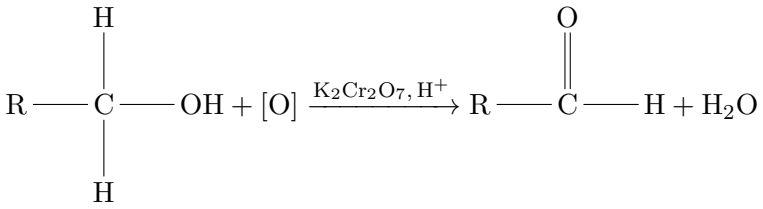
$$\mathrm{KMnO_4}$$

Molecular formula for potassium dichromate

$$\mathrm{K_2Cr_2O_7}$$

Acidified potassium dichromate

Reaction for the preparation of aldehyde from oxidation of alcohol using potassium dichromate as oxidizing agent



Reactants for the preparation of aldehyde from oxidation of alcohol using potassium dichromate as oxidizing agent

- Primary alcohol
- Nascent oxygen

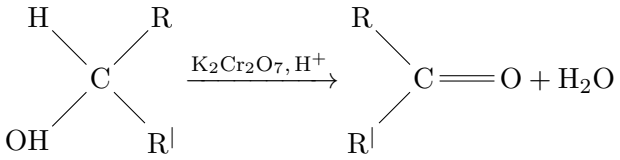
Products for the preparation of aldehyde from oxidation of alcohol using potassium dichromate as oxidizing agent

- Aldehyde
- Water

Condition for the preparation of aldehyde from oxidation of alcohol using potassium dichromate as oxidizing agent

- Acidic environment
- Controlled Reaction Temperature

Reaction for the preparation of ketone from oxidation of alcohol using potassium dichromate as oxidizing agent



Reactants for the preparation of ketone from oxidation of alcohol using potassium dichromate as oxidizing agent

- Secondary alcohol
- Nascent Oxygen

Products for the preparation of ketone from oxidation of alcohol using potassium dichromate as oxidizing agent

- Ketone
- Water

Condition for the preparation of ketone from oxidation of alcohol using potassium dichromate as oxidizing agent

- Acidic environment

Reason for control of reaction temperature at the preparation of aldehyde from oxidation of alcohol using potassium dichromate as oxidizing agent

- Oxidation to carboxylic acid

Exp: Oxidizing agents like potassium dichromate in acidic environment at so powerful that they oxidize alcohols to the level of carboxylic acid. To retain the product at the level of aldehyde , reaction in controlled temperature is carried.

Pyridinium chloro chromate

Molecular formula of pyridine

$$C_5H_5N$$

Reactants in formation of pyridinium chlorochromate

- Pyridine
- Chromium Trioxide
- Hydro chloric acid

Condition for preparation of pyridinium chlorochromate

- Presence of dichloromethane

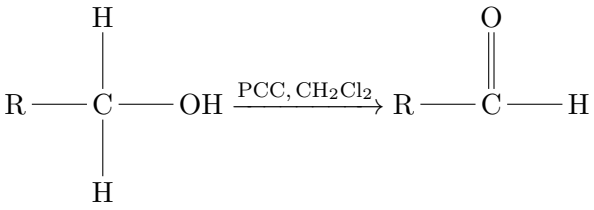
Molecular formula of pyridinium chloromchromate

$$C_5H_5NH^+CrO_3Cl$$

Abbreviation of pyridinium chlorochromate

PCC

Reaction for preparation of aldehyde from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent



Reactants for preparation of aldehyde from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

- Primary alcohol

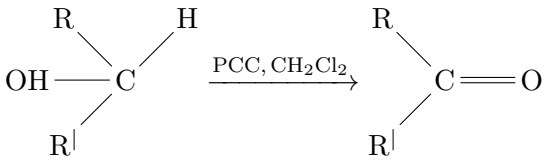
Products for preparation of aldehyde from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

- Aldehyde

Condition for preparation of aldehyde from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

- Presence of dichloromethane

Reaction for preparation of ketone from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent



Reactants for preparation of ketone from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

- Secondary alcohol

Products for preparation of ketone from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

- Ketone

Condition for preparation of aldehyde from the oxidation of alcohol by using pyridinium chlrochromate as oxidizing agent

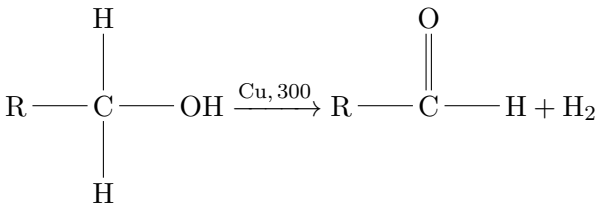
- Presence of dichloromethane

Catalytic dehydrogenation

State of alcohol in catalytic dehydrogenation of alcohol in preparation of aldehydes and ketones

Vapour

Chemical reaction for preparation of aldehyde from catalytic dehydrogentation of alcohol



Reactant in preparation of aldehyde from catalytic dehydrogentation of alcohol

- Primary alcohol

Products in preparation of aldehyde from catalytic dehydrogentation of alcohol

- Hydrogen
- Aldehyde

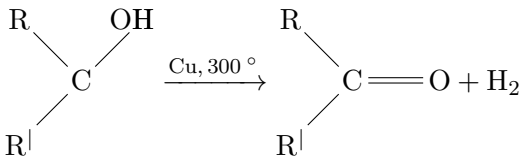
Condition in preparation of aldehyde from catalytic dehydrogentation of alcohol

Presence of reduced copper

Temperature in preparation of aldehyde from catalytic dehydrogentation of alcohol

$$300^\circ$$

Chemical reaction for preparation of ketone from catalytic dehydrogentation of alcohol



Reactant in preparation of ketone from catalytic dehydrogentation of alcohol

- Secondary alcohol

Products in preparation of ketone from catalytic dehydrogentation of alcohol

- Hydrogen
- Ketone

Condition in preparation of ketone from catalytic dehydrogentation of alcohol

Presence of reduced copper

Temperature in preparation of ketone from catalytic dehydrogentation of alcohol

300°