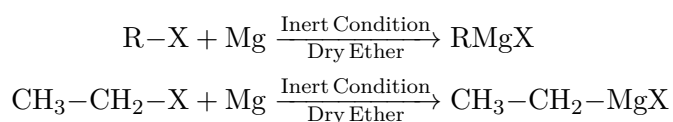

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Reaction with *Mg* metal

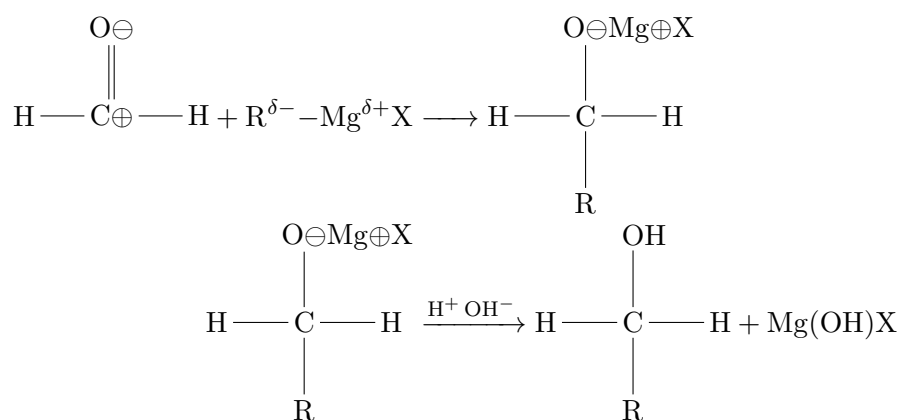
- **Grignard reagent** can be prepared by reacting *magnesium metal* with **haloalkane**.



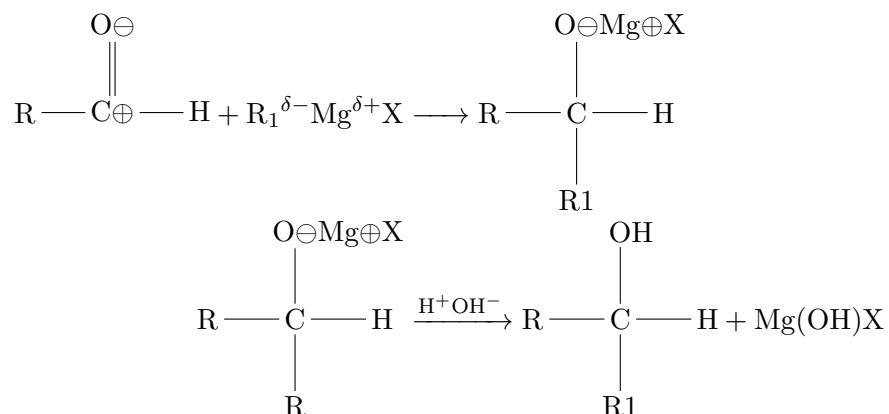
Applications of Grignard Reagent

Reaction with Carbonyl Compounds

- Reaction with **formaldehyde**
 - **Formaldehyde** reaction with **Grignard reagent** always yields 1° alcohol on **hydrolysis**.

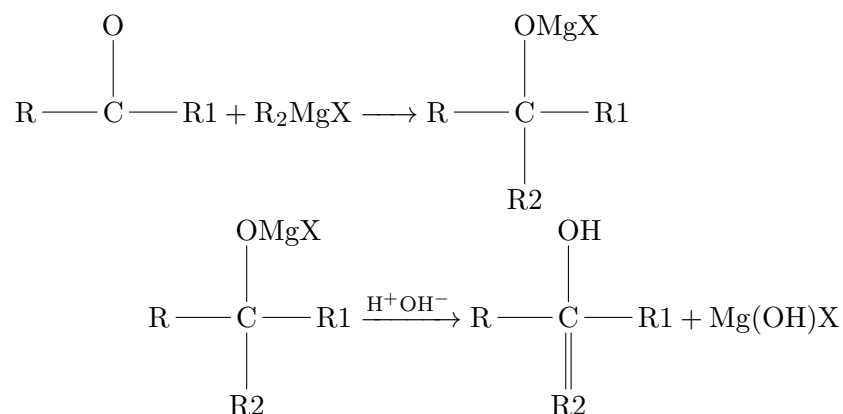


- **Aldehydes** other than *formaldehyde* always yield **secondary** alcohol on **hydrolysis**



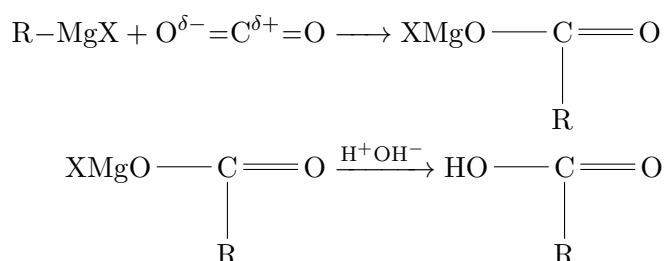
- Reaction with **Ketones**

- Reaction with **ketones** always yields **tertiary alcohol** on hydrolysis.



- Reaction with **Carbon Dioxide**

- Reaction of *Grignard reagent* with **Carbon dioxide** yields carboxylic acid on **hydrolysis**.



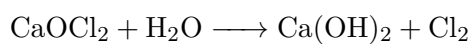
Preparation of chloroform

Reagents

- **Chloroform** can be prepared by:
 - **Acetone** or **Ethanol**
 - **Bleaching Powder**

Role of bleaching powder in preparation

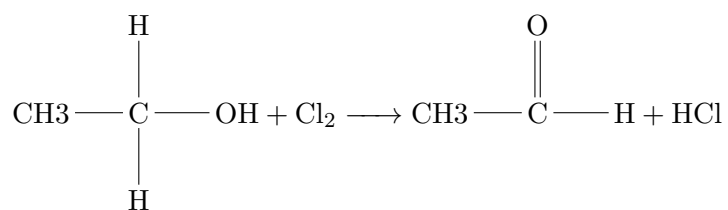
- **Bleaching Powder** treated with *water* is taken in *preparation* .



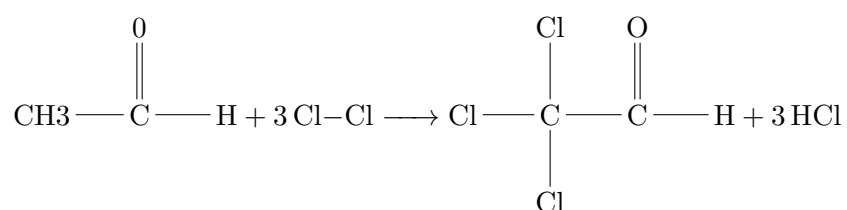
- acts as:
 1. **hydrolysing** agent.
- acts as:
 1. **chlorinating** agent.
 2. **oxidising** agent.

Reaction with Ethanol

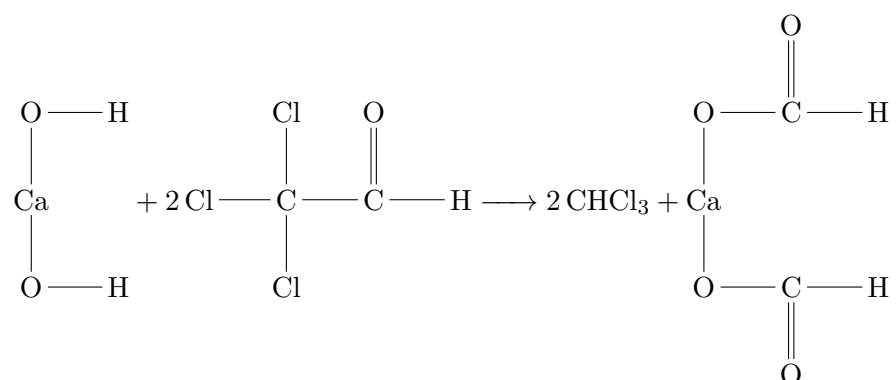
1. **Oxidisation** of Ethanol into **acetaldehyde** :



2. **Chlorination** of **acetaldehyde** to form **trichloroacetaldehyde**

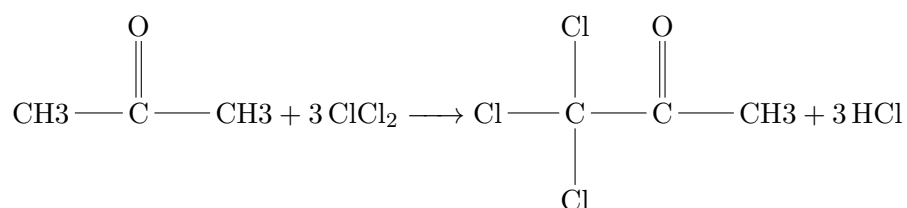


3. Hydrolysis of trichloroacetaldehyde

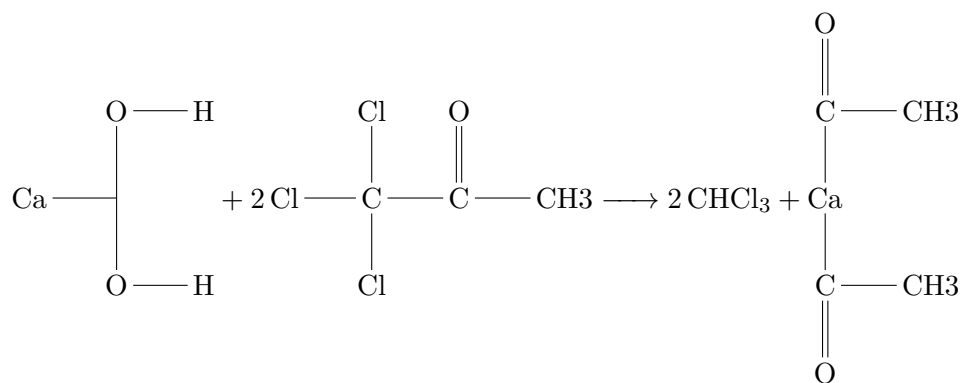


Reaction with propanone

1. Chlorination of acetone to trichloroacetone



2. Hydrolysis of trichloroacetone to chloroform



Laboratory Preparation

1. Paste of bleaching powder is dissolved in water .

- Amount of bleaching powder: 100gm .
- Amount of water: 200ml .

-
2. The *mixture* of **bleaching powder** is taken in
 - **round bottom flask** .
 3. *25ml* of **acetone** or **propanone** are added.
 4. The **R.B.** flask is fitted with **condenser** .
 5. The **condenser** is fitted with **reciever** .
 6. **Chloroform** is formed.
 7. **Chloroform** is *distilled*.

Purification of Chloroform

1. The chloroform contains **acidic impurities** .
2. **Chloroform** is treated with **dil. NaOH** .
3. **Aqueous** layer is rejected by **separating funnel** .
4. **Chloroform** is washed with water.
5. **Water** removes salt by **dissolution** .
6. **Chloroform** is treated with **anh.** .
7. **Chloroform** is distilled.
8. The boiling point of **chloroform** is 61° .
9. **Chloroform** obtained is:
 - **pure**
 - **dry**

Physical Properties

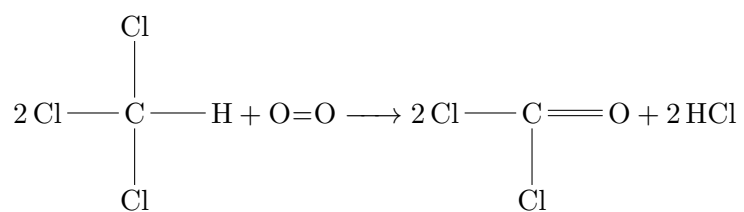
- **Chloroform** is **sweet** .
- **Boiling point:** 61° .
- **Melting point:** -63° .
- **Chloroform** dissolves **organic substances**.

-
- **Chloroform** is **heavier** than water.
 - **Vapour of chloroform** induces **unconsciousness**.
 - **Chloroform** is used as **anaesthetic** .

Chemical Properties

Phosgene

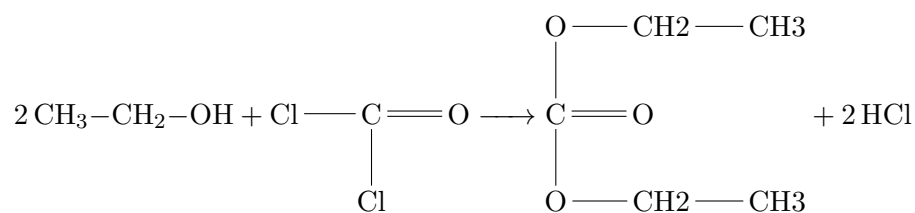
- **Reaction of chloroform** with **oxygen** yields **carbonyl chloride** .
- **Carbonyl chloride** is also called **phosgene** .
- This reaction occurs in the **presence** of *sunlight* .



- **Phosgene** is highly **poisonous** .
- *Intake* of phosgene attacks the **C.N.S.**
- This can result in *immediate* **death** .

Precautions of storage of phosgene

- Phosgene is **stored** in:
 - **dark brown** bottle.
 - **dark brown** bottle *reflects* sunlight.
- Phosgene is **filled** till **stopper**.
 - This leaves **no air** inside the bottle.
- Small amount of **ethanol** is added in the **bottle** .
 - **Ethanol** converts **phosgene** to **diethyl carbonate** .
 - **Diethyl carbonate** is non poisonous. **Diethyl carbonate** is **volatile** .

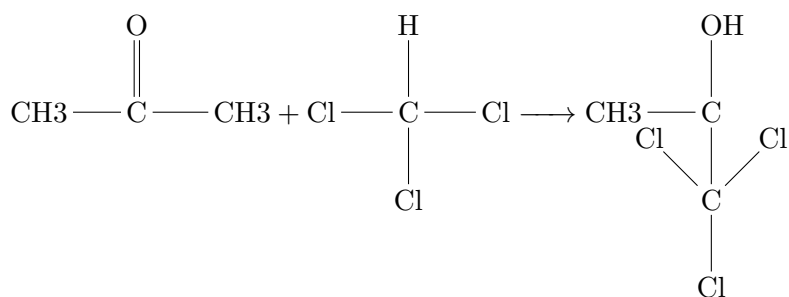


Test of purity of chloroform

- *Impure* chloroform contains **phosgene** .
- **Pure** chloroform doesnot
 - give *white ppt.* on reaction with
- **Impure** chloroform containing **phosgene**
 - gives *white ppt.* on reaction with

Reaction with acetone

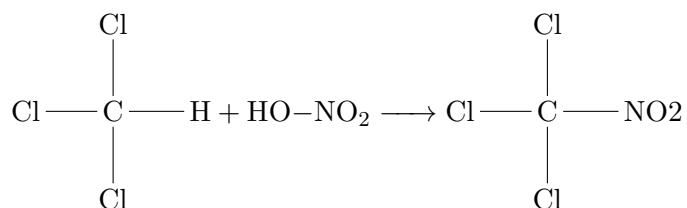
- **Reaction** of **acetone** with **chloroform** yields:
 - **Chlorotene**
 - **Chlorotene** is a sleep inducing **drug** .
 - **Chlorotene** is a **hypnotic** drug.



Reaction with Nitric Acid

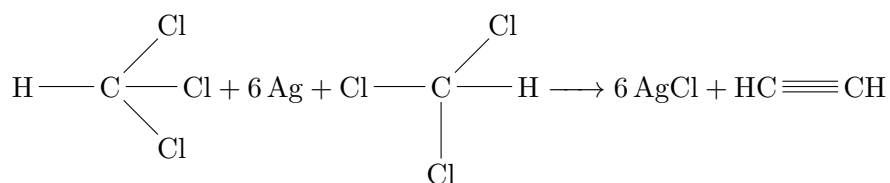
- **Reaction** of *chloroform* with **Nitric Acid** yields **chloropicrin** .

-
- The another name for **chloropicrin** is **war gas** .
 - The another name for **chloropicrin** is **tear gas** .
 - The another name for **chloropicrin** is **trichloromethane** .
 - **Chloropicrin** is used as *insecticide* .



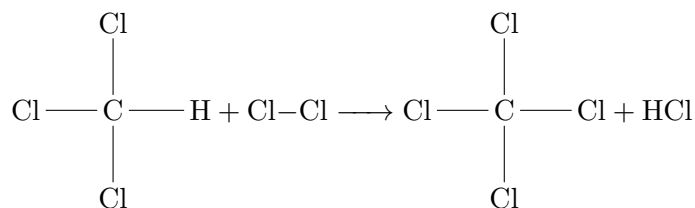
Reaction with silver powder

- **Reaction** of *chloroform* with *silver powder* yields **silver chloride** .



Reaction with chlorine

- **Reaction** of *chloroform* with **chlorine** yields **carbon tetrachloride** .

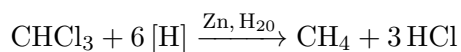


Reduction

Reduction with $\text{Zn}, \text{H}_2\text{O}$

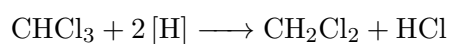
- produces **nascent hydrogen** .

-
- **Nascent hydrogen** replaces all **chlorine** to form **methane** .



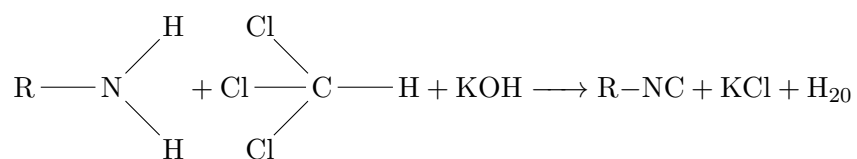
Reduction with Zn, HCl

- produces **nascent** hydrogen.
- **Nascent hydrogen** partially replaces **chlorine** to form



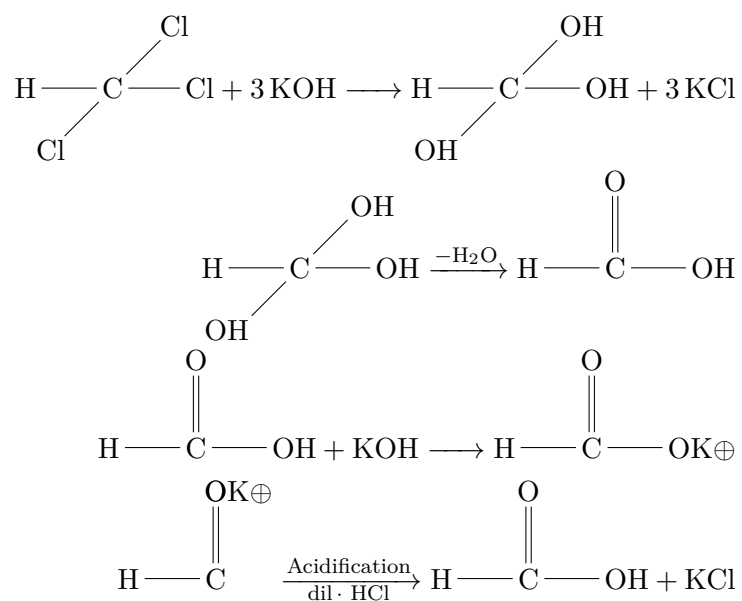
Reaction with primary amine

- **Chloroform** on reacting only with
 - primary amine
 - gives **alkyl isocyanide**
 - * **Alkyl isocyanide** is also called **carbylamine** .
 - * **Carbylamine** has a **pungent smell** .
 - * The smell is *analogous* to **rotten onion** .



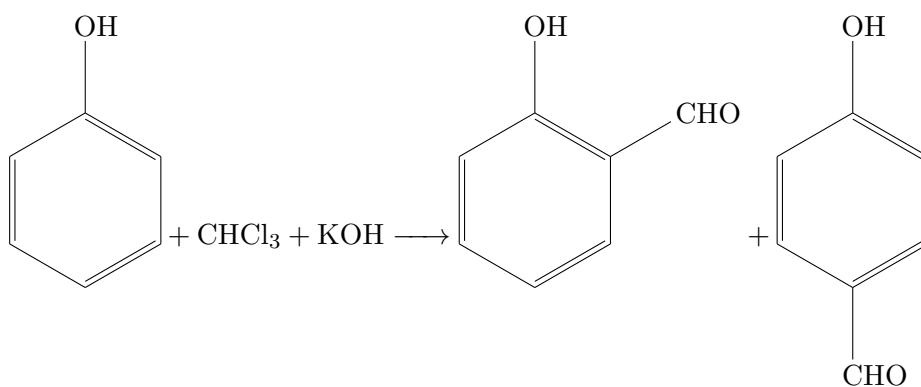
Reaction with aqueous KOH or NaOH

- **Reaction** of aqueous or NaOH **yields** *methanoic acid* .



Reaction of Chloroform with Phenol

- **Chloroform** on reacting with **phenol** gives **salicylaldehyde** as **major product**.
- The other name for this reaction is **Reimer -Tiemann reaction**



Uses of Chloroform

- **Chloroform** is used :
 - as **solvent**.
 - to prepare **chloretene** and **chloropicrin**

-
- in test of **primary amine**

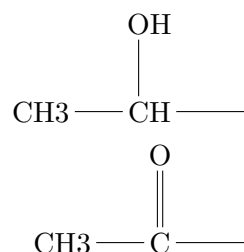
Iodoform

The molecular formula for iodoform is .

- Iodoform has almost similar chemical properties to chloroform.

Iodoform test

For iodoform test the molecules must have one among the two structures.



The term [?] in the box can be either or .

Nature of iodoform

When the molecules satisfying the above structural units are:

- treated with
 - aqueous alkali
 - excess

The product is an

- yellow coloured
- crystalline
- solid

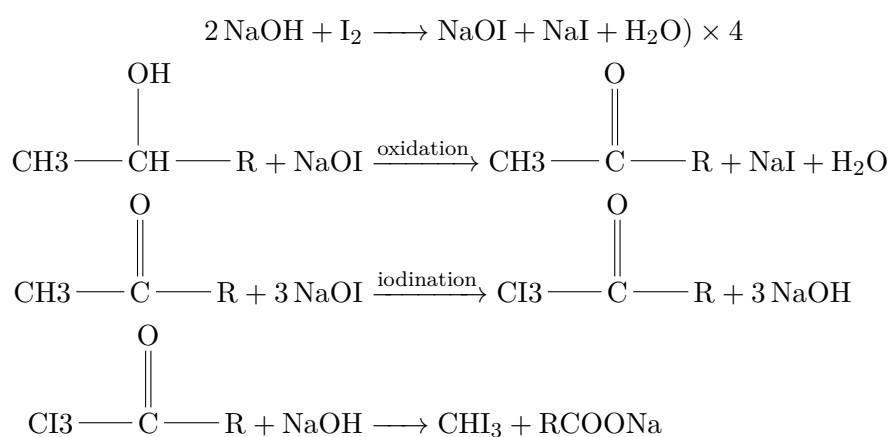
The nature of smell of such product is called hospital smell. The product obtained is iodoform.

Uses of iodoform

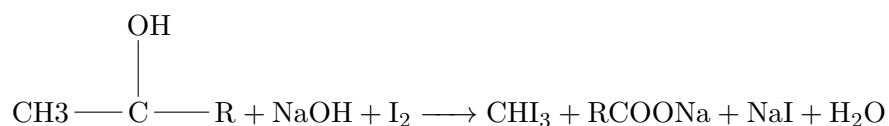
Iodoform is use in:

- antiseptic
 - This use of idoform comes form it's property to release iodine.

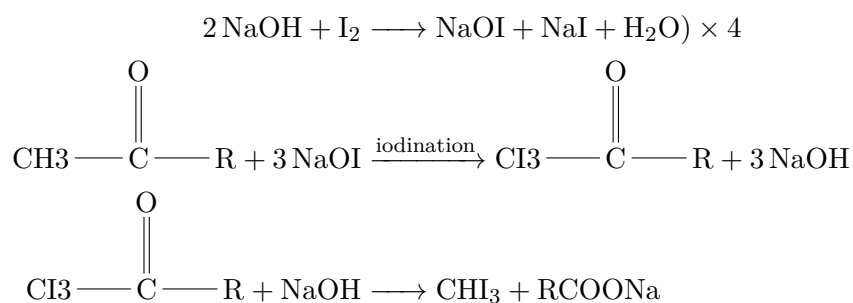
Alcohols



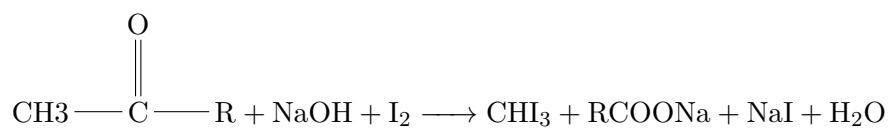
The final reaction can be expressed as:



Aldehydes and Ketones



The final reaction can be expressed as:



Special Cases for alcohol

- Only one primary alcohol can give iodoform test.
 - Methanol
- Tertiary alcohol donot give iodoform test.
- Secondary alcohol only give iodoform test if:
 - the alcohol has an structure of 2-ol

Special cases for carbonyl compounds

- The only aldehyde that gives iodoform test is:
 - ethanal
- Ketone only give positive iodoform test if there structure is 2-one