



Cannizzaro Reaction

The Cannizzaro reaction is when a non-enolizable aldehyde reacts with itself in a strong base, such as sodium hydroxide (NaOH), to form a carboxylic acid and an alcohol. A non-enolizable aldehyde is one that has no alpha hydrogens available for the aldehyde to form an enol. This reaction is a redox reaction in which two molecules of an aldehyde are reacted to produce a primary alcohol and a carboxylic acid using a hydroxide base.

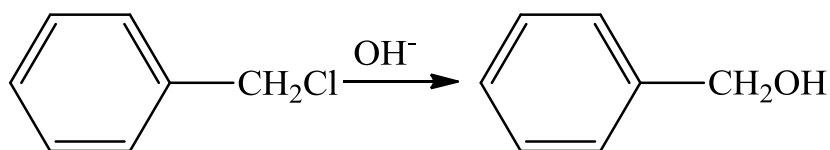
Both alcohols and organic acids are well known for their biological actions.

- 1- Antibacterial properties.
- 2- Preservatives for food.
- 3- pharmaceutical local application as antiseptics.

Benzyl alcohol has some local anesthetic properties, it is useful as antipruritic and is the reason for its inclusion in some dental remedies and injectibles in pharmaceutical preparations intended for local application, benzyl alcohol has been used up to 10 % in ointments as antipruritic and to prevent secondary infections.

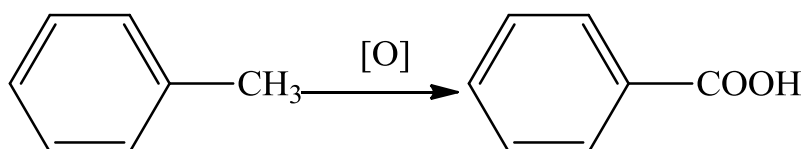
In injectibles, it is included in many painful IM injectibles, both as a preservative and as a local anesthetic.

Benzyl alcohol can be prepared by the hydrolysis of benzyl chloride with sodium hydroxide.

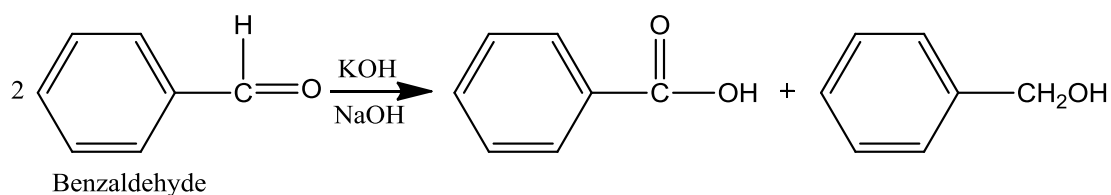


On the other hand, benzoic acid is used as a food preservative as a free acid, or in the form of sodium salt, also used externally in form of lotions, ointments, mouth washes, etc.

Benzoic can be prepared by the oxidation of toluene using oxidizing agent.



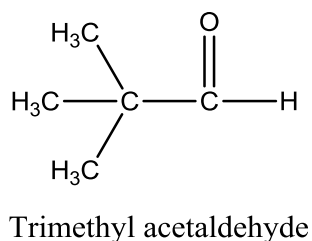
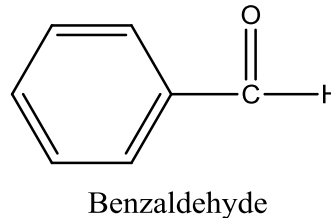
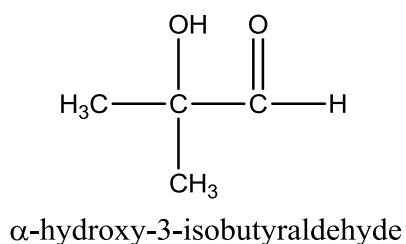
However, both benzoic acid and benzyl alcohol can be prepared in laboratory by cannizaro reaction by the action of sodium or potassium hydroxide on benzaldehyde.



Aim of experiment

Synthesis of benzoic acid and benzyl alcohol.

Examples for some compounds to interact by cannizaro reaction:



Properties of benzyl alcohol

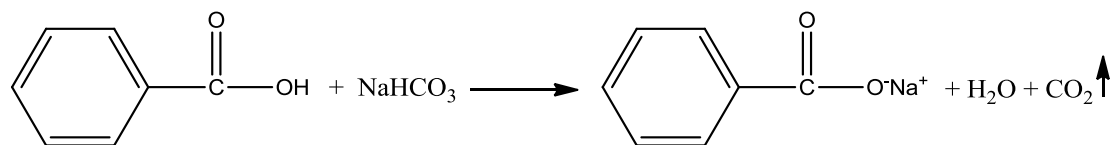
- 1- Colorless to very fine yellow (due to oxidation) oily liquid.
- 2- Immiscible with water, miscible with organic solvents like ether.
- 3- Boiling point is 204-207 °C.

Properties of benzoic acid

- 1- White crystalline plates or needles.



- 2- Sparingly soluble in water, soluble in hot boiled water.
- 3- Volatile with steam (so can be purified by Steam distillation).
- 4- Reacts with sod. bicarbonate to give CO₂ gas.



- 5- Melting point is 121-123 °C.