

Medical chemistry

Experiment 10 :

Identification of alcohols

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INTRODUCTION

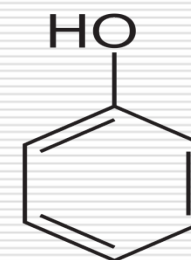
Alcohol



methanol



ethanol



phenol

Chemical Structure

- The functional group in both alcohol and phenol is the hydroxyl group (OH).
 - In alcohol, the(OH)group is directly attached to an alkyl group R-OH , while in phenol it is attached to an aryl group Ar-OH.
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Physical State

- The first compounds of alcohols (such as methyl alcohol and ethyl alcohol) are liquids.
- Phenol is a crystalline solid with a hospital odor (because it is an aromatic compound).

Solubility

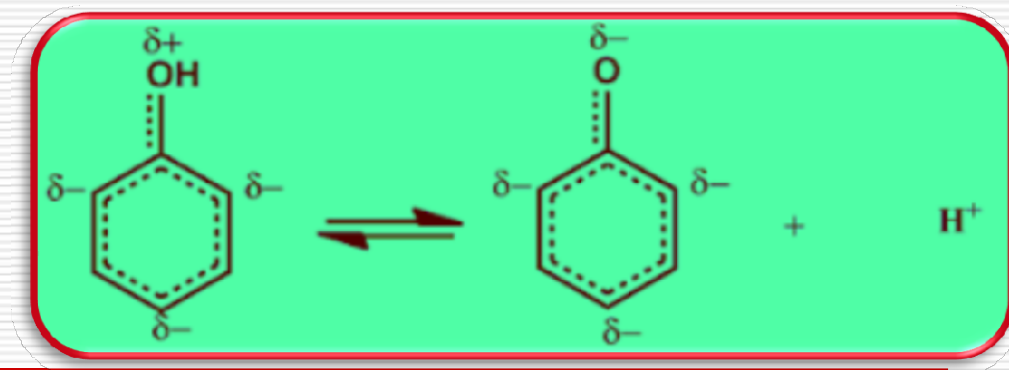
- Because of the ability of alcohols to form hydrogen bonds with water molecules, alcohols with low molecular weight dissolve in any quantity in water.
 - Phenols have low solubility in water because their carbon structure contains at least six carbon atoms. The solubility of phenols increases with the increase of the hydroxyl groups on the ring.
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Boiling Point

- Phenols have high boiling points due to their ability to form hydrogen bonds between their molecules and compared to alcohols of similar molecular weight.

Acidity

- Phenols are more acidic than alcohols because:
Positive resonance helps ionize phenol into positive hydrogen ions and negative phenoxide ions



Difference between ethanol, methanol and phenol in the laboratory

1- litmus test

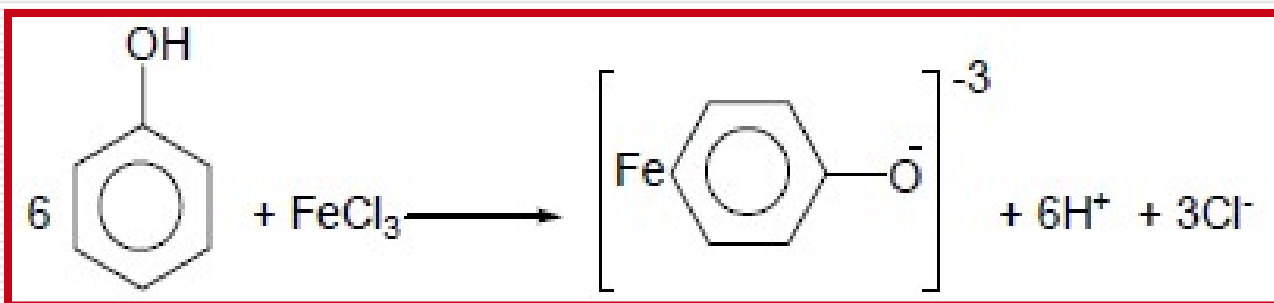
Put a drop of the phenol and alcohols (methanol, ethanol) solution on the litmus paper.

- Phenol turns blue litmus paper red, so it's acidic. (pH = 4)
 - Alcohols (methanol, ethanol) do not show any change on litmus paper, they are neutral. (pH = 7)
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2- Interaction with ferric chloride FeCl_3

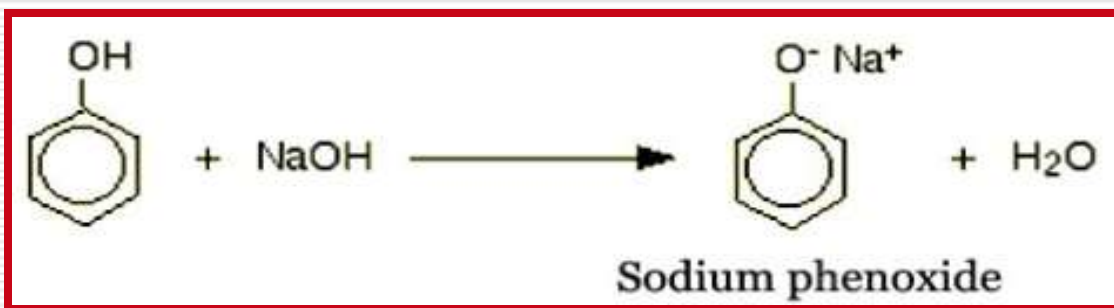
One of the most important reagents that characterize phenols in general is the ferric chloride reagent

- The reaction of FeCl_3 with phenol gives a violet color when complexes are formed with iron.
- When FeCl_3 is added to alcohols (methanol, ethanol) it does not react and gives uncolored solutions.



3- Reaction with sodium hydroxide NaOH

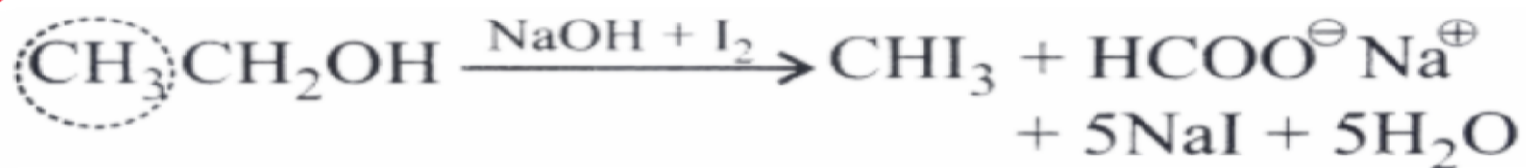
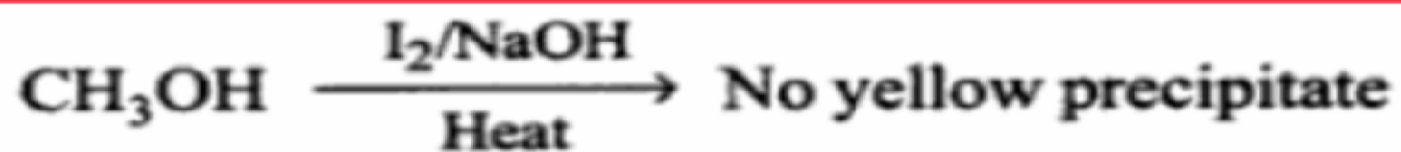
- Alcohols (methanol, ethanol) do not interact with sodium hydroxide, as they are neutral solutions, and their acidity is similar to that of water.
- Phenol reacts with sodium hydroxide to give sodium phenoxide (a white precipitate that is removed by shaking and returned by adding more NaOH).

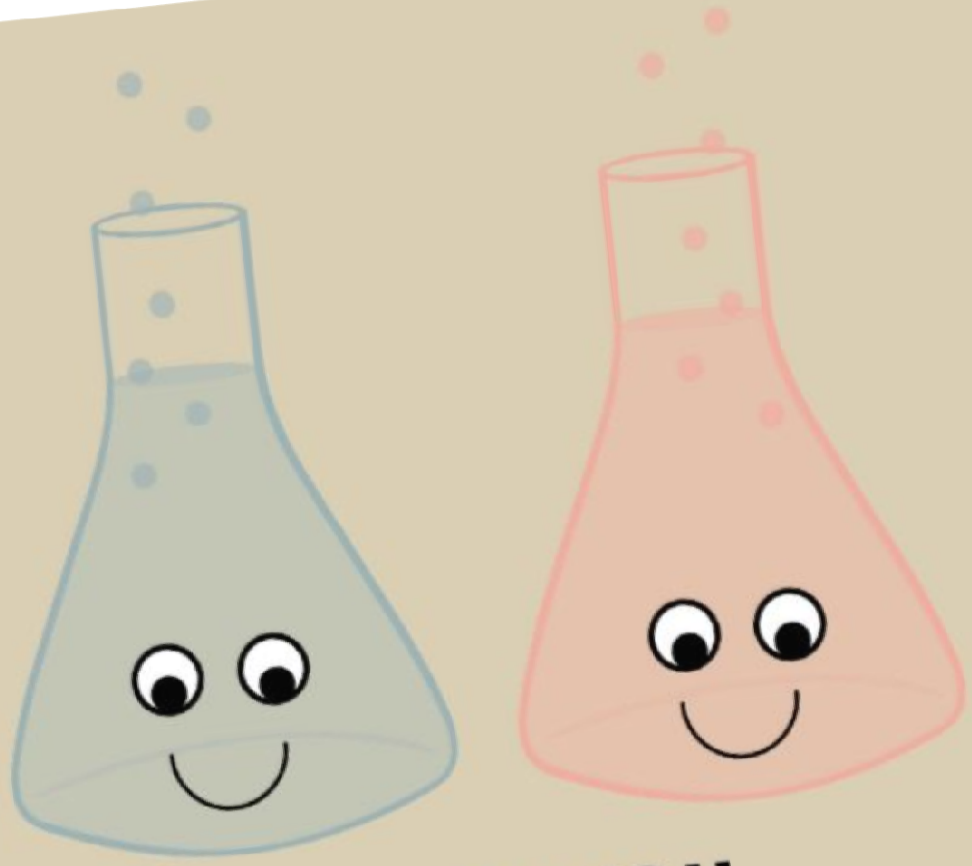


3- Iodoform test

- In a test tube, put 1 ml of alcohol + drops of iodine solution + 1 ml of NaOH 10%, with shaking well then put the product in a hot water bath for 5 minutes.
- No reaction occurs in the case of phenol.
- yellow or yellowish-white precipitate of iodoform CHI_3 is **formed only** in the case of **ethanol**.
- yellow or yellowish-white precipitate does **not form** in the case of **methanol**.







THANK YOU