

Daffodil International University

Lab Manual

Subject: Inorganic Pharmacy-II Practical

Subject Code: BPH-121P

Department of Pharmacy

Daffodil International University

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Date:

Experiment No.: 01

Experiment Name: Conversion of water insoluble benzoic acid to water soluble sodium benzoate.

Principle:

Water is polar molecule. It dissolved only polar solid. In pharmaceuticals, Polarity increment may be required during several operations like liquid dosage form preparation. Increment is done by addition of polar salt or base with various non -polar substance. Increase the solubility of the solution with water.

Benzoic acid helps prevent infection caused by bacteria. Benzoic acid is a topical medicine used to treat skin irritation and inflammation caused by burns, insect bites, fungal infections, or eczema .The salt and esters of benzoic acid are known as benzoates.

Reaction:

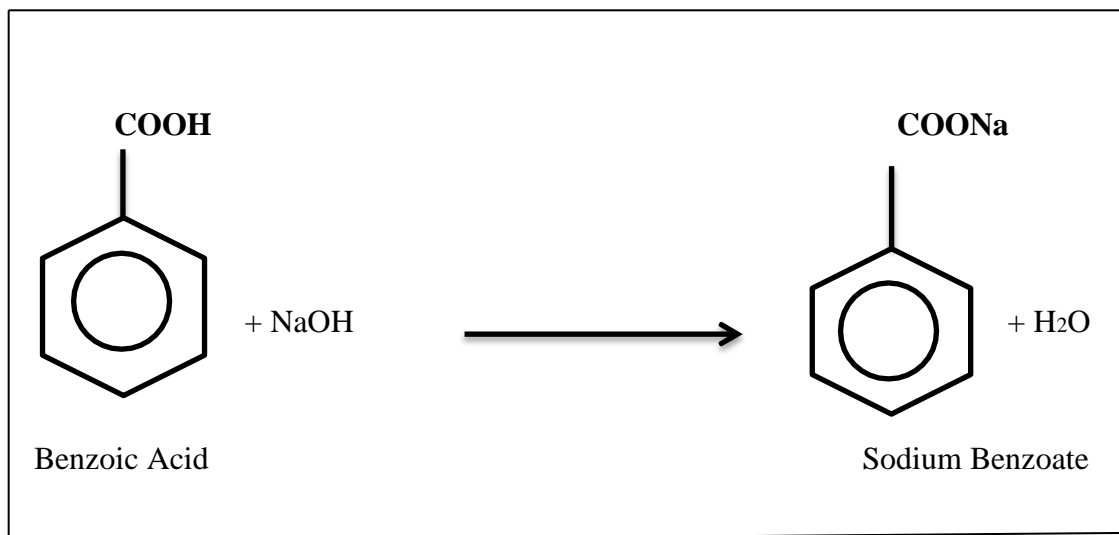


Figure 1: Benzoic acid with reacted sodium hydroxide and given product of sodium benzoate.

Required reagent for the experiment:

- Benzoic acid
- Sodium hydroxide
- Distilled water

Required apparatus for the experiment:

- Test tube
- Dropper
- Watch glass

Procedure:

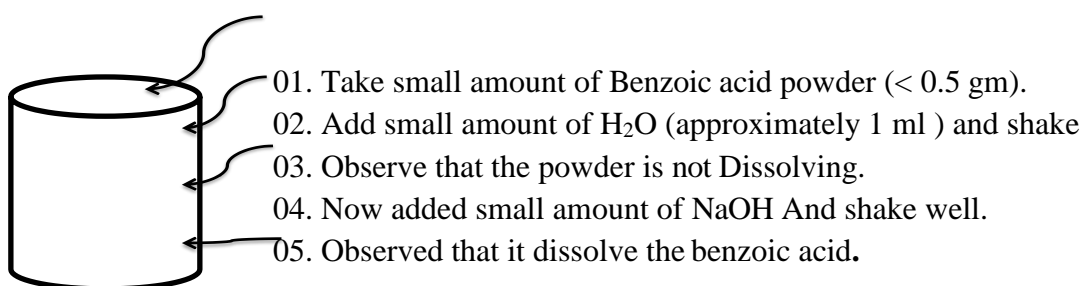


Figure 2: All substance mixed in the test tube

Result:

Water soluble sodium benzoate was observed.

Comment:

Benzoic acid was insoluble in water. It was added with sodium hydroxide. It's gave sodium benzoate which was soluble in water.

Precaution:

- Have to wear laboratory apron, hand gloves, mask & goggles.
- Have to wear shoes during the experiment.
- Have to be very careful during the experiment.

Date:

Experiment No.: 02

Experiment Name: Conversion of water insoluble Salicylic acid into water Sodium Salicylate.

Principle:

Water is polar molecule. It dissolved only polar solid. In pharmaceuticals, Polarity increment may be required during several operations like liquid dosage form preparation. Increment is done by addition of polar salt or base with various non-polar substance. Increase the solubility of the solution with water.

Salicylic acid topical is the used in the treatment of acne, dandruff, seborrhea, or psoriasis, and to remove warts. Naturally cucumber, broccoli, cauliflower, corn, radish, sweet potato and fennel contain Salicylates.

Reaction:

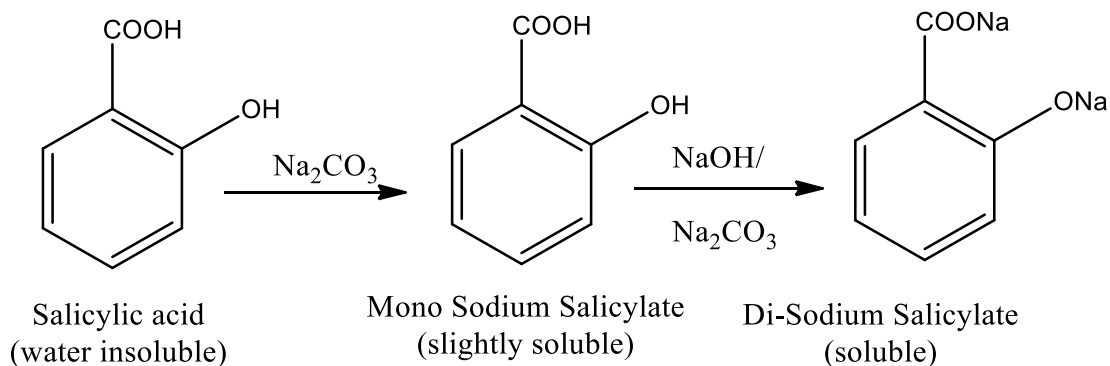


Fig. 2.1: Reaction between Salicylic acid and Sodium Carbonate.

Reagent:

- Salicylic acid
- Sodium carbonate
- Distilled water

Apparatus:

- 01. Test tube
- 02. Dropper

Procedure:

01. Take small amount of salicylic acid powder (< 0.5 gm).
02. Add small amount of H_2O (approximately 1 ml) and shake
03. Observe that the powder is not Dissolving.
04. Now added small amount of $NaCO_3$ and shake well.
05. Observed that it dissolves the Salicylic acid.

Observation:

Salicylic acid completely dissolved in the water due to the formation of Di-sodium Salicylate acid.

Result:

Salicylic acid insoluble in the water but di-sodium salicylate soluble in the water

Comment:

Salicylic acid turned into di-sodium salicylate which was soluble in water

Precaution:

- Have to wear laboratory apron, hand gloves, mask, shoes & goggles.
- Have to be very careful during the experiment.
- Wash apparatus with clean water.

Date:

Experiment No.: 03

Experiment Name: Qualitative test for known supplied salt sample of Fe^{2+}

Principle:

Each salt has two types of ions or radicals. One is cation from basic part & another is anion which comes from acidic part. The basic part is positively charged & the acidic part is negatively charged. When suitable reagent is added into the aqueous solution of a salt, the ions being precipitated and showed their own characteristics

Reactions of Fe^{2+} solution:

1. Stock solⁿ + NH_3 [NH_4Cl + NH_4OH -----> white $\text{Fe}(\text{OH})_2$
2. Solution + NaOH -----> white ppt. of $\text{Fe}(\text{OH})_2$ -----> Any acid soluble.
3. Solution + $\text{K}_4[\text{Fe}(\text{CN})_6]$ -----> white ppt. of $\text{K}_2\text{Fe}[\text{Fe}(\text{CN})_6]$.
4. Solution + NH_4CNS -----> Black ppt. of FeS -----> Soluble in acid.

Reagents:

- Stock solution
- Sodium hydroxide (NaOH)
- Potassium Ferro cyanide $\text{K}_4[\text{Fe}(\text{CN})_6]$
- Ammonium thiocyanate (NH_4CNS)

Apparatus:

- Test tubes
- Dropper
- Measuring Cylinder
- Burner

Procedure:

At first prepare stock solution, then mix different reagents and used in different amount with the sample to be confirmed about the presence of Fe^{2+} .

Observation No.	Test procedure	Observation	Result
01	Stock sol ⁿ + NH_3 [NH_4Cl + NH_4OH]	Dark blue $\text{Fe}(\text{OH})_3$ gelatinous	Fe^{2+} present
02	Stock sol ⁿ + NaOH	White greenish ppt. of $\text{Fe}(\text{OH})_2$	Fe^{2+} Present
03	Stock sol ⁿ + $\text{K}_4[\text{Fe}(\text{CN})_6]$	Light blue ppt. $\text{K}_2\text{Fe}[\text{Fe}(\text{CN})_6]$.	Fe^{2+} Present
04	Stock sol ⁿ + (NH_4CNS)	No change	Fe^{2+} Present

Result:

Fe^{2+} present

Comment:

Dark blue, white greenish, light blue, no change precipitate confirmed the presence of Fe^{2+}

Precaution:

- ❖ Need to wear apron, hand gloves, mask and goggles to protect eyes in the laboratory.
- ❖ Have to careful during experiment.
- ❖ Hands must be washed before leaving the lab.

Date:

Experiment No.: 04

Name of the Experiment: Qualitative test for known supplied salt sample of Fe^{3+} .

Principle:

Each salt has two types of ions or radicals. One is cation which comes from the basic part & another comes from the acidic part. The basic part is positively charged & the acidic part is negatively charged. When suitable reagent is added into the aqueous solution of a salt, the ions being precipitated and showed their own characteristics

Reaction of Fe^{3+} solution:

1. Stock solution + NH_3 [NH_4Cl + NH_4OH] \rightarrow Brown $\text{Fe}(\text{OH})_3$ gelatinous ppt. + acid soluble.
2. Stock solution + NaOH \rightarrow Brown ppt. of $\text{Fe}(\text{OH})_3$ \rightarrow Any acid soluble.
3. Stock solution + $\text{K}_4[\text{Fe}(\text{CN}_6)]$ \rightarrow Dark blue.
4. Stock solution + NH_4CNS \rightarrow Black ppt. of FeS \rightarrow Soluble in acid.

Reagents:

- Stock solution.
- Ammonia (NH_3).
- Sodium hydroxide (NaOH).
- Potassium ferro cyanide $\text{K}_4[\text{Fe}(\text{CN}_6)]$.
- Ammonium thiocyanate (NH_4CNS).

Apparatus:

- Test Tube.
- Dropper.
- Measuring Cylinder.
- Burner.
- Glass rod.

Procedure:

At first prepare stock solution then mix different reagents and used in different amount with the sample to be confirmed about the presence of Fe^{3+} .

Observation No.	Test procedure	Observation	Result
01.	Stock solution + NH_3 [NH_4Cl + NH_4OH]	1. Brown $\text{Fe}(\text{OH})_3$ gelatinous ppt. + acid soluble.	Fe^{3+} present
02.	Stock solution + NaOH	Brown ppt. of $\text{Fe}(\text{OH})_3$	Fe^{3+} present
03.	Stock solution + $\text{K}_4[\text{Fe}(\text{CN})_6]$	Dark blue	Fe^{3+} present
04.	Stock solution + NH_4CNS	Black ppt. of FeS	Fe^{3+} present

Result: Fe^{3+} present.

Comment:

Brown gelatinous ppt, Brown ppt, dark blue and black color precipitate confirmed presence of Fe^{3+}

Precaution:

- ❖ Wear lab apron properly.
- ❖ Wear hand gloves.
- ❖ Take all the reagents carefully.

Date:

Experiment No: 05

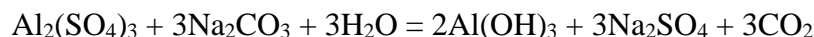
Experiment Name: Preparation of Aluminum Hydroxide $\text{Al}(\text{OH})_3$ gel

Principle:

Aluminum is a naturally occurring mineral. Aluminum Hydroxide is an antacid. Antacids are the oldest effective medications for heartburn. Most commercially available antacids are combinations of aluminum and magnesium hydroxide. Some effervescent antacids contain sodium bicarbonate. This medication is used to treat the symptoms of too much stomach acid such as stomach upset, heartburn and acid indigestion. Aluminum Hydroxide works quickly to lower the acid. Liquid antacids usually work faster than tablets or capsules.

Aluminum Hydroxide $\text{Al}(\text{OH})_3$ is a suspension, 100 mg of which contain the equivalent of 3.6-4.4 gm of Aluminum Oxide (Al_2O_3) in the form of Aluminum Hydroxide & Hydrate Oxide. Sodium Carbonate (Na_2CO_3) reacts with potash alum and produce water insoluble viscous Aluminum Hydroxide gel.

Reaction:



Required reagents for the experiment:

- Sodium Carbonate (Na_2CO_3)
- Hot water
- Potash alum [$\text{KAl}(\text{SO}_4)_2$]

Required apparatus for the experiment:

- Beaker
- Glass Rod
- Filter paper
- Pipette
- Funnel

Procedure:

1. We measured 0.5 gm Na_2CO_3 & 1.5 gm Potash alum in two separate beakers.
2. Then we added 25 ml hot water at each beaker.

3. Potash alum solution was also added to the hot solution of Na_2CO_3 . A white precipitation of $\text{Al}(\text{OH})_3$ is formed.
4. Then we filtered the precipitated aluminum hydroxide to find aluminum hydroxide gel.

Result:

$\text{Al}(\text{OH})_3$ formed

Comment:

The white colored $\text{Al}(\text{OH})_3$ gel was formed

Precaution:

- Have to wear laboratory apron, hand gloves, mask & goggles.
- Have to wear shoes during the experiment.
- Have to be very careful during the experiment.
- Have to take all reagents carefully.

Date:

Experiment No. : 06

Experiment Name: Qualities analysis of known supplied salt sample of Al^{3+}

Principle:

Each salt has two types of ions or radicals. One is cation which comes from basic part & another is anion which comes from the acidic part. The basic part is positively charged & the acidic part is negatively charged. When suitable reagent is added into the aqueous solution of a salt .The ions being precipitated show their own characteristics

Required Reagents for the experiment:

1. Stock Solution
2. Sodium Hydroxide (NaOH)
3. Ammonium Hydroxide (NH_4OH)
4. Ammonium Chloride (NH_4Cl)
5. Al_2Cl_3

Required apparatus for the experiment:

- Test tubes
- Dropper
- Measuring Cylinder
- Burner
- Test tube holder
- Glass rod

Procedure:

At first prepare stock solution, then mix different reagents and used in different amount with the sample to be confirmed about the presence of Al^{3+}

Observation No.	Test procedure	Observation	Result
01	Stock sol ⁿ +NaOH +Heat	White/brown ppt	Al ³⁺ present
02	Stock sol ⁿ +NH ₄ OH +NH ₄ Cl	White gel of Al(OH) ₂ formed	Al ³⁺ present

Result:

Al³⁺ is present

Comment:

After adding NaOH the white color ppt confirmed the presence of Al³⁺ in the supplied sample.

Precaution:

- Have to be very careful during the experiment.
- Have to wear laboratory apron, hand gloves, mask & goggles.
- Have to wear shoes during the experiment.