

# EXPERIMENT: 09

AIM:

## ***TO PERFORM ASSAY OF SODIUM BENZOATE (NON-AQUEOUS ACID BASE TITRATION) AND STANDARDIZATION OF TITRANT***

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## **REQUIREMENTS**

### **A. Glassware & Instruments**

1. Conical flask
2. Burette
3. Pipette

### **B. Chemicals & Reagents**

1. Sodium benzoate
2. HCl
3. Acetic acid
4. Potassium acid phthalate

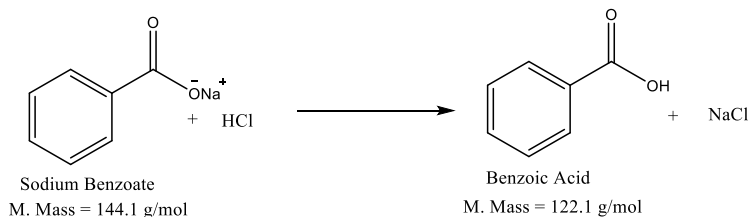
## **THEORY**

Sodium benzoate ( $C_7H_5NaO_2$ , M. Wt. = 144.1) is a white, crystalline or granular powder or flakes. It is mildly hygroscopic, easily soluble in water, and alcohol-soluble to a limited degree. When dried, the powder contains at least 99 percent sodium benzoate.

The antibacterial and antifungal activities of sodium benzoate. Concentrations of up to 0.5 percent are utilised as a preservative in medicinal formulations, especially oral preparations. Sodium benzoate is a common component of cough medicines.

Sodium benzoate is an organic sodium salt formed by the substitution of a sodium ion for the proton in the carboxy group of benzoic acid. It functions as an antimicrobial food preservative, an allergy to drugs, an algal metabolite, a human xenobiotic metabolite, and a plant metabolite. It includes a benzoate.

It is a salt produced from a weak acid and a strong base, hence its solution is alkaline; these salts are measured using a solution of N/2 hydrochloric acid in acid-base titrations.



## PRINCIPLE

The aqueous solution of sodium benzoate, which is a salt produced from a weak acid and a strong base, is alkaline. In an acid-base titration, thus, solutions containing sodium benzoate are evaluated using a standard N/2 hydrochloric acid solution.

## PROCEDURE

- Rinse the burette with distilled water and titrant (HCl).
- Fill the burette level with N/2 HCl (adjust it).
- Pour 10 ml of unknown sodium benzoate solution (about 3 g) into a clean conical flask.
- Combine 25 mL of dry ice with 15 mL of ether.
- Include six drops of bromphenol blue.
- Begin titration by adding HCl drop by drop while shaking the aqueous and ethereal layers until the aqueous layer retains a light green colour (end point).
- Separate the lower layer, wash the ethereal layer with 10 ml of water, and add the washings and an additional 10 ml of solvent ether to the separated aqueous layer.

*To perform assay of sodium benzoate (non-aqueous acid base titration) and....*

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- Complete the titration with N/2 hydrochloric acid while continuously shaking.
- Record the amount of HCl used.
- Each ml of N/2 hydrochloric acid equals 0.07205 grammes of  $C_7H_5NaO_2$ .
- Weigh precisely 0.25 grammes of sodium benzoate, dissolve it in 20 ml of anhydrous glacial acetic acid, heating to 50 degrees Celsius if necessary, and cool. As an indicator, titrate with 0.1 M perchloric acid using 0.05 ml of 1-naphtholbenzein solution. Perform an empty titration.

### **For the Estimation of Sodium Benzoate**

#### **Preparation of 0.1N solution of $HClO_4$ and its standardization**

- Dissolve 8.5 ml of 72%  $HClO_4$  in approximately 900 ml glacial acetic acid while stirring continuously.
- Add approximately 30 ml of acetic anhydride and fill the remaining volume (1000 ml) with glacial acetic acid. Store the mixture for 24 hours.
- The acetic anhydride has absorbed all of the water from  $HClO_4$  and glacial acetic acid, rendering the solution nearly anhydrous.
- Before adding acetic anhydride,  $HClO_4$  must be diluted with glacial acetic acid since the reaction between  $HClO_4$  and acetic anhydride is explosive.

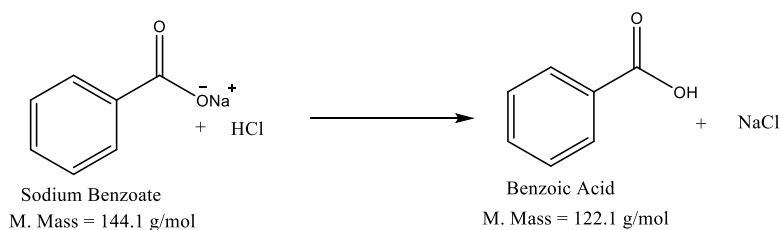
#### **Standardization of $HClO_4$**

- To 500 mg of potassium acid phthalate, add 25 ml of glacial acetic acid and a few drops of crystal violet dissolved in

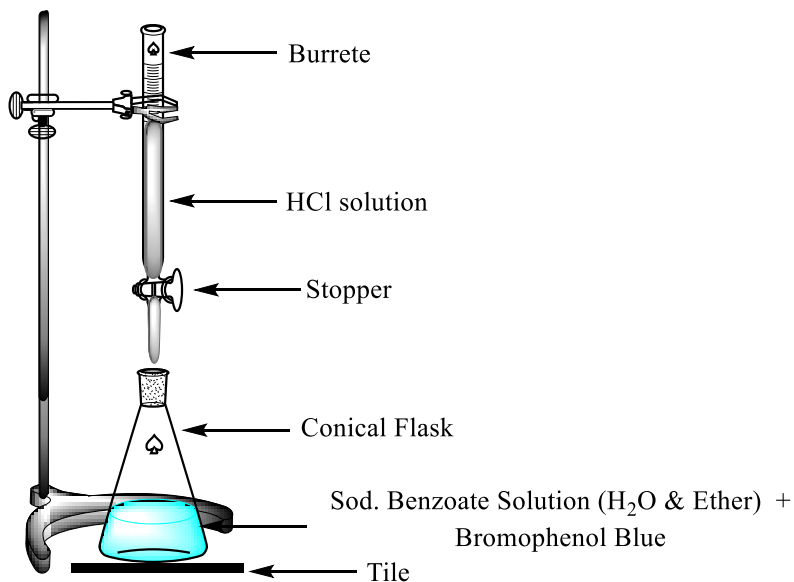
glacial acetic acid at a concentration of 5 percent by weight as an indicator.

- The titration of this solution with 0.1 HClO<sub>4</sub>.
- The colour varies between blue and blue-green.

## REACTION



## DIAGRAM



## **APPLICATIONS**

1. Sodium benzoate, with the E number E211, is a preservative. It is most commonly found in acidic foods like salad dressings (acetic acid in vinegar), carbonated beverages (carbonic acid), jams and fruit juices (citric acid), pickles (acetic acid), condiments, and yoghurt toppings, etc.
2. Sodium benzoate is a flavouring agent and antibacterial preservative.
3. The synthesis of sodium benzoate involves the combination of benzoic acid with sodium hydroxide.
4. Due to its capacity to bind amino acids, sodium benzoate is utilised as a therapy for urea cycle diseases.
5. Together with phenylbutyrate, sodium benzoate is used to treat hyperammonemia.

## **RESULT**

The percentage purity of the given sample of sodium benzoate is .....