Organic Pharmaceutical Chemistry
Third Stage First Semester
Lab No: 4

Benzoic Acid Assay by Titration

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Introduction

- Discover the ins and outs of benzoic acid assay by titration, a widely used technique for determining the concentration of benzoic acid in a sample.
- Learn about its importance in various industries such as food, pharmaceutical, and cosmetic.
- EQ. Wt : 122
- Benzoic acid, a white crystalline powder, is known for its antimicrobial and antifungal properties.
- Let's delve into its applications in various realms of the medical and pharmaceutical fields.

Applications of Benzoic Acid in Medicine

Antifungal Properties

Benzoic acid's potent antifungal properties make it a valuable component in topical treatments for fungal infections.

Antimicrobial Properties

Its antimicrobial properties also find usage in oral care products, aiding in the prevention of oral bacteria and related issues.

Synthesis of Pharmaceutical Compounds

Benzoic acid serves as a key ingredient in the synthesis of various pharmaceutical compounds due to its chemical reactivity.

Applications of Benzoic Acid in Pharmacy

1

Preservative

Benzoic acid acts as a preservative in drugs and cosmetics, prolonging their shelf life and maintaining their efficacy.

2

Solubility Enhancement

Pharmacy formulations often utilize benzoic acid to enhance the solubility of poorly soluble drugs, ensuring optimal absorption.

3

Flavoring Agent

In liquid medications, benzoic acid may serve as a flavoring agent, masking unpleasant tastes and increasing patient compliance.

Importance of Benzoic Acid Titration

Benzoic acid titration with sodium hydroxide is a fundamental technique used to determine precise amounts of acid or base in a given solution.

This titration method plays a vital role in quality control processes, ensuring accurate formulations in various industries such as pharmaceuticals and food production.

Scientists rely on benzoic acid titration to investigate reaction mechanisms, study equilibrium constants, and develop new chemical compounds.

Sample Preparation

Sample Dissolution

Dissolve benzoic acid crystals in an appropriate solvent to obtain a homogeneous solution for analysis.

pH Adjustment

Ensure the solution is at the required pH level for accurate titration by using a pH meter or pH indicator.

Clarification

Remove any impurities or particulate matter through filtration to obtain a clear solution.

Sources of Error

1

Instrument Calibration

Ensure proper calibration of measuring instruments to minimize errors in volume and concentration measurements.

2

Environmental Factors

Be aware of temperature and humidity fluctuations that might affect the accuracy and reproducibility of the assay.

3

Human Error

Pay close attention to details, such as accurately recording volumes or misreading the endpoint, to avoid human-induced errors.

Theoretical Background

1

The Titration Process 📈

Titration is a chemical analysis technique that involves the gradual addition of one reagent to another until a reaction is complete. It enables the determination of a component's concentration.

2

Benzoic Acid & Sodium Hydroxide 🧪

Benzoic acid is a colorless crystalline solid with various applications, while sodium hydroxide is a strong base commonly used in titrations. Discover the intriguing reaction between these compounds.

3

Formula & Calculations 🔢

Explore the stoichiometry and equations involved in calculating the amount of benzoic acid in a solution using the volume and concentration of sodium hydroxide.

Calculation of Benzoic Acid Content

1

Mole Ratio

Use the balanced chemical equation to determine the mole ratio between the titrant and the analyte.

2

Titrant Volume

Calculate the volume of titrant solution required to reach the endpoint and neutralize the benzoic acid in the sample.

3

Concentration Calculation

Determine the concentration of the benzoic acid in the original sample using the volume of titrant and the molar concentration of the titrant solution.

Procedure

- Dissolve about 500 mg of Benzoic Acid, accurately weighed, in 25 mL of diluted alcohol (ethanol)

  Then take 10 ml of the solution and add 2 drops of phenolphthalein as an indicator

  Titrate with 0.1 N sodium hydroxide. Titrate until you get a pink color.

Calculations

- When the base neutralizes the acid (at the endpoint), the number of equivalents of acid = the number of equivalents of base , therefore :-
- (N1 * V1) base = (N2 * V2) acid
- N1 :the normality of NaOH solution
- V1 :the volume of NaOH solution used (descending from burette)
- N2 :the normality of benzoic acid solution (to be calculated)
- V2 : volume of benzoic acid solution used (10 ml in our experiment)
- From the normality of benzoic acid, we calculate the weight of benzoic acid in 10 ml of solution.


Thank
You