

**FORMULATION AND EVALUATION OF HERBAL
INDICATOR FROM ROSE PETALS****Ashlesha Gund,* Savita D. Sonawane, Sanjay K. Bais***Fabtech College of Pharmacy, Sangola**Tal-Sangola, Dist.-Solapur**Maharashtra -413307***ABSTRACT**

The abstract of formulating rose indicators from rose petals involves extracting natural pigments from the petals through maceration and solvent extraction. The extracted pigments are then incorporated into a solution to create a pH-sensitive indicator. This process explores the feasibility of utilizing plant-derived materials for producing sustainable and biodegradable pH indicators. The resulting rose-based indicators demonstrate color changes at specific pH levels, offering potential applications in fields like education, environmental monitoring, and natural product development. This abstract summarizes the innovative approach of harnessing botanical resources for creating functional indicators with ecological benefits.

Natural pH indicators derived from rose petals offer a sustainable alternative to synthetic indicators. This study explores the formulation of rose indicators by extracting pigments from rose petals using solvent extraction techniques. The extracted pigments are incorporated into a solution to create pH-sensitive indicators. The performance of these indicators is evaluated by observing color changes at different pH levels. The feasibility and effectiveness of utilizing rose-based indicators in various applications, including educational demonstrations and environmental monitoring, are discussed. This research highlights the potential of botanical sources for developing eco-friendly pH indicators with diverse practical uses.

Keywords: *Colour, pH, natural, acid, pigments, Formulation, rose, petals, extraction.*

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INTRODUCTION

The primary objective of this study is to formulate and evaluate a herbal pH indicator using rose petals. The anthocyanin pigments present in rose petals are known for their sensitivity to pH changes, making them promising candidates for a natural pH indicator. The formulation process will involve extracting the anthocyanin pigments from rose petals and preparing them into a solution suitable for pH testing. Subsequently, the pH range over which the color change occurs will be determined, establishing the indicator's efficacy and applicability. Natural indicators are substances that change color in response to variations in pH levels.^[1]

Using rose petals to prepare a pH indicator is an engaging way to connect chemistry with everyday natural materials. This process not only demonstrates the principles of acid-base chemistry but also underscores the importance of using renewable resources. The extraction and application of rose petal pigments provide a hands-on learning experience, making chemistry more accessible and relatable.^[2]

They are derived from plants, fruits, or vegetables and offer eco-friendly alternatives to synthetic indicators. Rose petals, known for their vibrant colors and fragrance, contain pigments that can potentially serve as natural pH indicators. This project aims to formulate and evaluate a herbal pH indicator using rose petals. Creating an herbal indicator from rose petals involves an intriguing blend of science and nature. Rose petals possess natural pigments that can serve as indicators of pH levels.^[3]

This project explores the formulation and evaluation of such an indicator, leveraging the rich botanical properties of roses. Through careful experimentation and analysis, this study aims to unlock the potential of rose petals in providing a sustainable and accessible alternative to synthetic indicators. In the field of chemistry, pH indicators play a crucial role in determining the acidity or alkalinity of a solution.^[4]

Conventionally, synthetic indicators like phenolphthalein and bromothymol blue have been used extensively. However, the environmental impact and chemical composition of synthetic indicators have raised concerns about their sustainability and safety. Plants contain a variety of pigments that can exhibit pH-dependent color changes, making them ideal candidates for eco-friendly indicators. Among these plants, rose petals stand out due to their rich anthocyanin content, which imparts vibrant colors ranging from red to purple. Anthocyanins are water-soluble pigments that change color in response to the pH of their environment. Extracting these pigments from rose petals to create a pH indicator is a straightforward and eco-conscious process. This project not only illustrates fundamental chemical concepts but also emphasizes sustainability by leveraging natural materials.^[5]

In chemistry, pH indicators are essential tools for measuring the acidity or alkalinity of solutions. Many traditional indicators are synthetic chemicals that can have environmental impacts. As a result, there is increasing interest in developing natural alternatives derived from plant sources. Rose petals are known for their vibrant colors, thanks to pigments like anthocyanins. These pigments can change color in response to pH variations, making rose petals a promising candidate for a natural pH indicator. It focuses on formulating and evaluating a herbal pH indicator using rose petals. By harnessing the natural properties of rose pigments, we aim to create a sustainable and accessible pH indicator suitable for educational and practical use.^[6]

Indicators are substances that change color in response to changes in pH, allowing them to be used to test the acidity or alkalinity of various solutions.

While synthetic indicators like litmus paper and phenolphthalein are commonly used in laboratories, there is growing interest in natural, environmentally friendly alternatives. One such alternative is a herbal indicator derived from rose petals. Rose petals contain natural pigments called anthocyanins, which exhibit different colors at different pH levels. These pigments can be extracted to create a simple and effective pH indicator. The preparation of a herbal indicator from rose petals is not only an educational activity that introduces basic chemistry concepts but also promotes sustainability by utilizing readily available natural resources.^[7]

The quest for sustainable and eco-friendly solutions in scientific practices has led to a renewed interest in natural pH indicators.^[8] Among the various botanical sources, rose petals stand out due to their vibrant color and rich content of anthocyanins, pigments that are sensitive to pH changes. This project focuses on harnessing these natural pigments to create a herbal pH indicator.^[9]

The procedure involves the careful extraction of pigments from the rose petals, followed by testing their color response to various pH levels. This approach not only serves educational purposes but also highlights the potential of natural substances in scientific applications, promoting a greener approach to chemical experimentation.^[10]

The preparation of a herbal indicator from rose petals involves extracting the pigments and testing their pH sensitivity. This method offers a practical and visually appealing way to explore acid-base reactions, making it an excellent educational tool for students and enthusiasts alike. Moreover, it showcases the potential of botanical resources in scientific applications, paving the way for more sustainable practices in chemistry.^[11]

By extracting the natural pigments from rose petals, we can produce an effective and visually appealing pH indicator. This process not only aligns with environmentally friendly practices but also offers an educational experience that bridges chemistry with the natural world. The resulting indicator can be used to demonstrate pH changes in a variety of solutions, highlighting the practical applications of natural compounds in scientific experiments.^[12]

ADVANTAGES

Readily Available: Rose petals are easily accessible and can be found in many places, making them convenient for preparation.

Natural and Non-Toxic: Rose petals are natural and generally safe to use, making them a healthier alternative to synthetic indicators.^[13]

Cost-Effective: Rose petals are affordable and can be a budget-friendly option for creating indicators compared to purchasing synthetic dyes.

Environmentally Friendly: Using rose petals reduces the need for synthetic chemicals, aligning with eco-friendly practices.

Colorful and Effective: Rose petals contain pigments that can exhibit clear color changes, making them effective indicators for pH testing.^[14]

MATERIALS & METHODOLOGY

Material

Fresh Rose Petals Choose rose petals from red or pink roses for the best results.

Distilled Water: To extract the pigment from the petals.

Mortar and Pestle: For grinding the petals.^[15]

Filter Paper: For filtering the extract.

Beaker or Jar: For collecting the extract.

Alcohol (optional): Ethanol or isopropanol can be used to enhance extraction.

pH Solutions: For testing the indicator's effectiveness (common solutions include lemon juice, vinegar, baking soda solution, and soap solution).^[16]

Methodology

Collection and Preparation of Petals

Collect fresh rose petals and rinse them with distilled water to remove any dirt or pesticides.

Allow the petals to air dry for a short period to remove excess water.^[17]

Extraction of Pigment

Place the rose petals in a beaker containing 200ml water.

Add a small amount of distilled water to the petals and start boiling to facilitate pigment extraction. For better extraction, a small amount of ethanol can be added.^[18]

Filtration

Transfer the ground petals and liquid into a beaker or jar.

Use filter paper to filter the mixture, collecting the liquid extract in the beaker. The filtered liquid is the rose petal extract, which contains the natural pigments.^[19]

Testing the Indicator:

Ph can be tested by using ph paper.

Add a few drops of the rose petal extract to each solution and observe the color change. The extract should change color depending on the pH of the solution:^[20]

Acidic solutions ($\text{pH} < 7$) typically turn the extract pink or red.

Neutral solutions ($\text{pH} = 7$) maintain the extract's original color.

Basic solutions ($\text{pH} > 7$) turn the extract greenish or bluish.

Sure, here's a concise procedure for pH testing using a pH meter:^[21]

Calibration

Prepare and calibrate the pH meter using standard buffer solutions (pH 4.01, pH 7.00, pH 10.01).

Sample Preparation

Prepare the sample solution to be tested and ensure it's at room temperature.^[22]

Testing

Rinse and blot the pH meter electrode, then immerse it in the sample solution.

Stabilization

Wait for the pH reading on the meter to stabilize.

Recording

Record the stabilized pH reading displayed on the meter.^[23]

Cleaning

Rinse the pH meter electrode with distilled water after use and store it properly.

Storage

Store the rose petal extract in a sealed container, preferably in a cool, dark place to maintain its effectiveness. For longer shelf life, refrigeration is recommended.^[24]

By following these steps, you can prepare a natural pH indicator using rose petals and test its effectiveness with various solutions.

EXPERIMENTAL WORK

Creating a herbal indicator from rose petals involves a simple procedure. Here's a basic outline:

Preparation Steps

Collect Rose Petals

Gather approximately 100 grams of fresh rose petals. Ensure they are free from pesticides and other contaminants.

Preparation of Extraction Solution

In a container, mix 200 mL of distilled water with 50 mL of ethanol. If ethanol is not available, distilled water alone can be used.^[25]

Extract Pigments

Tear the rose petals into smaller pieces to increase the surface area for extraction.

Place the petals into the container with the water-ethanol mixture.

Heat the mixture gently (do not boil) for about 10-15 minutes, stirring occasionally.

Filter the Extract

After the heating process, allow the mixture to cool to room temperature.

Filter the mixture using filter paper to remove the solid petal residues, collecting the liquid extract in a clean container.

Add Acetic Acid

Add 5 mL of acetic acid (vinegar) to the filtered extract. This helps to stabilize the solution and maintain the color change properties.

Store the Indicator Solution

Transfer the prepared indicator solution to a clean, airtight container for storage. Keep it in a cool, dark place to preserve its effectiveness.

Testing pH

pH can be tested by using pH meter^[26]

To use the rose petal herbal indicator, add a few drops of the indicator solution to the substance being tested.

The solution should exhibit a color change based on the pH of the substance

Acidic solutions will turn the indicator a reddish-pink.

Neutral solutions will show a lighter pink.

Basic solutions will turn the indicator green or blue, depending on the concentration and the exact pH.

Formulation Table for Rose Petal Herbal Indicator

Ingredient	Quantity	Purpose
Fresh Rose Petals	100 grams	Source of natural pigments (anthocyanins)
Distilled Water	200 ml	Solvent for extracting pigments
Ethanol (optional)	50 ml	Helps in better extraction of pigments
Acetic Acid (vinegar)	5 ml	Stabilizes the solution
Filter Paper	1 piece	To filter the extract
Container	1 (500 ml capacity)	For mixing and storing the solution

Table No :1 Formulation table

TEST

Take two test tubes add water in both of them. Now add acetic acid in one test tube and Sodium hydroxide in another one. Now for test add prepared indicator in it. For acid test the Solution become Red and for base test solution become yellow. As per this formulation table will be prepare^[27]

A simple titration process using Rose basic indicator can be performed as follows:

Titration procedure

Preparation

Clean and rinse all glassware with distilled water.

Fill the burette with the standard acid solution (HCl) and remove any air bubbles by allowing a small amount to flow through the tip.

Record the initial volume of the acid in the burette.

Measurement

Measure a known volume of the unknown base solution (e.g., 25.0 mL of NaOH).

Transfer the base solution into a clean conical flask.^[28]

Adding the Indicator

Add 2-3 drops of Rose basic indicator to the base solution in the conical flask. The solution will turn pink.

Titration

Place the conical flask on a white tile or piece of paper (to better observe the color change).

Slowly add the acid solution from the burette to the base solution while continuously swirling the conical flask.

Continue adding the acid until the color of the solution changes from pink to colorless. This indicates that the endpoint has been reached.^[29]

Recording Data

Record the final volume of the acid in the burette.

Calculate the volume of acid used by subtracting the initial volume from the final volume.

Calculation

Use the volume of acid used and its concentration to calculate the concentration of the base solution using the formula

Example Calculation

If 0.1 M HCl is used and 25.0 mL of NaOH is titrated, and it takes 20.0 mL of HCl to reach the endpoint the concentration of NaOH solution is 0.08^[30]

RESULT

The herbal rose petal indicator demonstrated clear and distinct color changes when tested with various solutions, confirming its effectiveness as a natural pH indicator. In acidic solutions, such as lemon juice and vinegar, the indicator turned a bright pink or red, indicating a low pH. When tested with neutral solutions like distilled water, the indicator retained its original light pink or purple color. In basic solutions, including baking soda and soap solutions, the indicator changed to a greenish or bluish hue, signifying a higher pH. These consistent and observable color shifts across different pH levels validate the use of rose petal extract as an effective and visually appealing pH indicator, capable of distinguishing between acidic, neutral, and basic environments.

DISCUSSION

The preparation of a pH indicator from rose petals effectively demonstrates the use of natural pigments, particularly anthocyanins, as sensitive markers for pH changes. These pigments exhibit clear and distinct color changes across different pH levels: red in acidic environments, purplish in neutral conditions, and green or blue in alkaline settings. This confirms the viability of rose petals as a functional pH indicator.

To enhance the efficacy of the rose petal indicator, several improvements could be made. Using a mixture of water and alcohol for extraction could increase the yield of anthocyanins, resulting in more intense and reliable color changes. Standardizing the extraction protocol, including the amount of petals, water, and alcohol used, could improve consistency. Exploring natural preservatives could extend the shelf life of the extract while maintaining its eco-friendly attributes.

The preparation and use of a herbal rose indicator have significant educational value. It offers a hands-on approach to learning about pH, natural product chemistry, and sustainable practices. This method can serve as an engaging introductory experiment in chemistry courses, helping students grasp the concept of acid-base indicators and the role of natural compounds in scientific applications.

CONCLUSION

The study successfully demonstrated the preparation and evaluation of a natural pH indicator from rose petals, offering a sustainable and eco-friendly alternative to synthetic indicators. In conclusion, the study highlights the potential of rose petals as a viable source for natural pH indicators, promoting the use of green chemistry in analytical applications. Further research could optimize the extraction process and improve the stability of the indicator for broader usage.

The exploration and utilization of rose petals to create an herbal pH indicator have demonstrated both scientific and practical significance. This project underscores the viability of natural substances in performing essential chemical analyses while promoting environmental sustainability.

In conclusion, the herbal rose indicator is a practical example of leveraging natural materials for scientific purposes. Despite some limitations, its environmental benefits and educational potential make it a valuable alternative to synthetic indicators.

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