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### STUDY OF ETHANOLIC EXTRACT ON DIFFERENT SPECIES OF PLUMERIA – AS HERBAL INDICATOR.

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#### ABSTRACT

An indicator is a halochromic chemical compound added in small amounts to a solution so the pH of the solution can be determined visually.<sup>[1]</sup> Hence a pH indicator is a chemical detector for hydronium ions or hydrogen ions in the Arrhenius model.<sup>[2][3]</sup> As most naturally occurring organic compounds are weak protolyte, carboxylic acid and amines pH indicator find many applications in biology and analysis. The term pH stands for potential hydrogen and is the measurement of how many hydrogen ions symbolized by H<sup>+</sup> are in solution. The more ions, the more acidic. A high number of hydroxide ions, symbolize by OH<sup>-</sup> characterizes basic or alkaline substances. *Plumeria* (also known as *Frangipani*) is a genus of flowering plants in the family *Apocynaceae*. Most species are deciduous shrubs or small trees. A single *Plumeria* tree can produce around 50-60 flowers and grows to a height of 35 feet. In traditional system of medicine of India *Plumeria* species are widely used as purgative, remedy for diarrhea, cure of itch, bronchitis, cough, asthma, fever, piles, dysentery, blood disorder and tumors.<sup>[4]</sup>

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## INTRODUCTION

An indicator is a halochromic chemical compound added in small amounts to a solution so the pH of the solution can be determined visually. *Plumeria* is a genus of flowering plants in the family *Apocynaceae*. Most species are deciduous shrubs or small trees. The species *rubra* and *acutifolia* variously indigenous to Mexico, Central America, and the Caribbean and as far south as Brazil and north as Florida, but are grown as cosmopolitan ornamentals in warm regions like some parts of India. Common name for plants in the genus vary widely according to region, variety, and whim, but *Frangipani* or variations on that theme are the most common. *Plumeria* is also used as common name, especially in horticulture circles.

The flowers of the *Frangipani* come in gorgeous White, Red and Rose-Pink colour brushed with bronze. *Frangipani* flowers are scented during nights and are often used in bouquets. *Frangipani* flowers have wonderful tropical essence. The *Frangipani* flower is propeller-shaped with a delicate yellow center melting into creamy-white outer petals. The umbel like clusters of *Frangipani* flowers at the end of terminal branches open over several weeks and each day, the ground is carpeted with fresh *Frangipani* flowers which are gathered for preparing the concert. *Frangipani* is deciduous and sensitive to cold. *Frangipani* is known to possess a poisonous, milky sap. *Plumeria* is one of the best 'no maintenance' plants in the world. *Plumerias'* fragrance lures sphinx moths to pollinate the flowers.

## Special features

Anti-inflammatory and antioxidant activity- ethanolic extract of flowers of *Plumeria rubra* showed significant antioxidant and anti-inflammatory activity and phytochemical analysis indicate that *plumeria rubra* was rich in flavonoid and phenol contents. <sup>[5]</sup>

Antiviral activity- *plumeria rubra* containing fulvoplumerin act as inhibitors of human immunodeficiency virus type 1 (HIV) reversal transcriptase. <sup>[6]</sup>

## Taxonomical features <sup>[7]</sup>

<b>KINGDOM</b>	<b>Plantae</b>
DIVISION	Magnoliophyta
CLASS	Magnoliopsida
ORDER	Gentianales
FAMILY	Apocynaceae
GENUS	<i>Plumeria</i>
SPECIES	<i>Rubra</i>

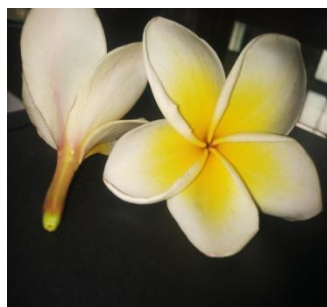
## MATERIALS AND METHODS

### Cultivation and collection of plant material

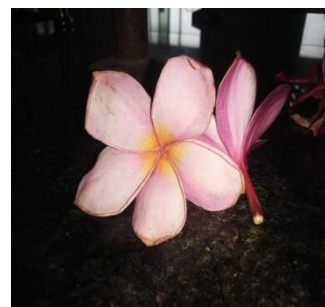
The plants *Plumeria rubra* of different species were collected during the flowering period of August to December from the Botanical garden of Ideal College of Pharmacy and Research of Thane dist. of Maharashtra state of India.



**Red *Frangipani***



**Yellow *Frangipani***



**Rose-pink *Frangipani***

## MATERIALS AND METHODS

### Plant Materials-

Fresh Flowers of *Plumeria* of different colors were collected from the Botanical garden of campus of *Ideal College of Pharmacy and Research, Bhal, Kalyan* and authenticated by Prof. Anil Avhad, Associate Proffesor in Botany, R J College, and Mumbai.

### Experimental work-

Reagents of Analytical grade like Hydrocholric acid (HCl), sodium hydroxide (NaOH), Glacial acetic acid (CH<sub>3</sub>COOH), n-butanol, distilled water and phenolphthalein were procured from Ideal College of Pharmacy and Research, bhal, kalyan. Reagents and Volumetric solutions were prepared as per Indian Pharmacopoeia (I.P.2018).

### Preparation of Extract

- 1) Red *Frangipani*: Fresh petals of yellow *Frangipani* were collected, washed and dried. They were then weighed and kept for maceration for 24 hrs in 30ml of ethanol.
- 2) Yellow *Frangipani*: Fresh petals of red *Frangipani* were collected, washed and dried. They were then weighed and kept for maceration for 24 hrs in 30ml of ethanol.
- 3) Rose-pink *Frangipani*: Fresh petals of Rose-pink *Frangipani* were collected, washed and dried. They were then weighed and kept for maceration for 24 hrs in 30ml of ethanol.

### Procedure

#### Part A:

The calibration of burettes pipettes and other instruments and the standardization of acids and bases were done according to the standard procedure of IP 2018. The petals of the Red *Frangipani*, Yellow *Frangipani* and Rose-pink *Frangipani* flowers were collected. Washed with distilled water separately followed by, Cutting into small pieces and kept for maceration in 30 ml of ethanol for 24 hrs in a closed conical flask and covered with aluminum foil away from sunlight.



Fig (a): Maceration process:

#### Part B:

After maceration the ethanolic extract were filtered. 10 ml of titrant (HCl) with 3 drops of indicator prepared from the flower yellow *Frangipani*, red *Frangipani* and rose pink *Frangipani* was titrated against NaOH. The readings of the various indicators are mentioned below in the table. The results for screening of the strong acid and strong base i.e. HCl and NaOH respectively are shown below.

#### Titration process:

The phenolphthalein was taken as a standard indicator and the titration was performed using flower extract.

#### Standard phenolphthalein indicator



Fig (b)

Before titration.

after titration.

**Table (a): Titration of HCl against NaOH using Phenolphthalein (3 drops) Endpoint: Sharp color changes from Colorless to pink.**

Sr. No.	Volume of acid (ml)	Burette reading		Mean value of titrant
		Initial	Final	
1	10	0	10.2	10.3
2	10	0	10.5	
3	10	0	10.3	



**Before titration**



**after titration**

**Fig (c): Red Frangipani**

**Table (b): Titration of HCl against NaOH using ethanolic *Plumeria* extracts indicator (5 to 6 drops) Endpoint: Sharp color changes from Colorless to pink.**

Sr. No.	Volume of acid (ml)	Burette reading		Mean value of titrant
		Initial	Final	
1	10	0	11.2	11.0
2	10	0	11.0	
3	10	0	10.9	

**Flower B:**



**Before titration**



**after titration**

**Fig (d): Yellow Frangipani**

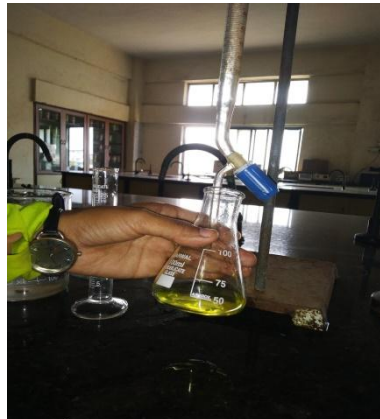
**Table (c): Titration of HCl against NaOH using ethanolic *Plumeria* extracts indicator (5 to 6 drops) Endpoint: Sharp colour changes from pale red to pale yellow.**

Sr. No.	Volume of acid (ml)	Burette reading		Mean value of titrant
		Initial	Final	
1	10	0	11.6	11.3
2	10	0	11.0	
3	10	0	11.4	

#### Flower C:



Before titration



after titration

**Fig (e): Rose-pink *Frangipani*.**

**Table (d): Titration of HCl against NaOH using ethanolic *Plumeria* extracts indicator (5 to 6 drops) Endpoint: Sharp colour changes from colorless to lemon yellow.**

Sr. No.	Volume of acid (ml)	Burette reading		Mean value of titrant
		Initial	Final	
1	10	0	12.0	11.8
2	10	0	11.9	
3	10	0	11.7	

#### Observation

Being colourless white *Frangipani* flower shows a sharp end point. The red and rose-pink flower shows colour change at certain volume of titrimetric analysis.

#### CONCLUSION

For all the type of titrations equivalence point obtained by ethanolic extract of White *Frangipani*, Red *Frangipani* and Rose-pink *Frangipani* either exactly coincided or closed with equivalence point obtained by the std phenolphthalein indicator. The ethanolic extracts used shows the usefulness of the ethanol used for the acid-base titrations. The results obtained justifies that instead of synthetic indicator herbal indicator can be used. The herbal indicator can be used as it signifies its cost effective, easy to prepare, it can also be freshly prepared just before the use, it gives accurate results, nontoxic as well. The proposed indicators of *Frangipani* flowers can be used as a substitute for phenolphthalein indicator.

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