

A Study on Acid-Base Indicator Characteristics of Hydro-Alcoholic Extract of *Jasminum officinale* and *Ixora coccinea* Flowers

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ABSTRACT

Today synthetic indicators are used to show sharp color change at intervals of pH in acid base type of titrations. Many more synthetic indicators are used in acid base titration, but they are slightly expensive and are unavailable, so attempt has been made to establish the indicator activity of flower pigments to replace synthetic indicators as they have certain disadvantage like their chemical synthesis, chemical hazards, high cost, availability problems and environmental pollution. The present work highlights the use of the hydro alcoholic extract of the flowers of few common plants as an acid-base indicator in acid-base titrations. This natural indicator is easily available as well as easy to extract and gives sharp intense color change at the equivalence point as compared to phenolphthalein and methyl orange. As these flower extracts have simple, cost-effective, environment friendly extraction procedure and excellent performance with sharp and intense color change in end points during the acid base titrations, it would be possible to replace the synthetic indicators being used in conventional laboratories with natural flower indicators.

Keywords: pH indicators, Flower pigments, Neutralization indicators, Phenolphthalein substitutes, Titrations

INTRODUCTION

Jasminum officinale, also called as the common jasmine, is a species of flowering plant belonging to the family Oleaceae can grow up to height 15-30 ft. It is a vigorous, twining, bright, deciduous climber with sharply pointed pinnate leaves and produces the large flush of clusters of starry, pure white colour flowers in summer season, which are the source of its heady scent [1,2]. The oil extracted from *Jasminum officinale* is used in aromatherapy. Jasmine absolute is also known as the 'King of Oils' and its heavy, having sweet scent is loved by most people. The flowers release their perfume at dusk, so that the flowers are picked at night and a tiny amount of oil is removed by using solvent extraction method [3,4]. It is very expensive oil therefore used in low concentrations. As an herbal medicine, it is used in the treatment of dermatology as either an antiseptic or anti-inflammatory agent [5]. It is cultivated in the northern Iran, Afghanistan, Pakistan, Himalayas, India, Nepal and western China. The species is also cultivated in many places like in Spain, France, Italy, Portugal, Romania and West Indies [6]. It is the National flower of Pakistan.

Ixora coccinea also called as jungle geranium, is a species belonging to the family Rubiaceae. It is a dense, multi-branched evergreen shrub, commonly grows up to 4-6 ft

(1.2-1.8 m) in height. The glossy and leathery leaves are about 4 in (10 cm) long, with entire margins and are carried in opposite pairs or whorled on the stems. Small tubular shape, flowers in dense rounded clusters 2-5 in (5.1-12.7 cm) and are found in a wide range of colors across are produced throughout the year. The flowers, leaves, roots, and the stem are used to treat various diseases in the Indian traditional system of medicine [7]. The fruits, when get fully ripe, are used as a dietary supplement. There are about 400 species spread from Africa to Southern Asia. They differ in their leaf size, plant height, flower size and flower color, etc. It is a common flowering shrub well cultivated in Southern India [8,9].

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MATERIALS AND METHODS

Plant materials

Fresh flowers of *Jasminum officinale* (sample C) and *Ixora coccinea* (sample D) was collected from campus of Ideal College of Pharmacy & Research, India in the month of March.

Reagents and glassware's

The study was well performed by using analytical grade reagents as per standard were made available from ideal college of pharmacy and the whole experimental work was

performed by using the clean and same set of glassware's. The reagents and volumetric solutions were prepared as per Indian pharmacopeia.

Preparation of flower extract

Cleaned fresh flower petals of each plant, first crushed in mortar then transferred into conical flask and added enough 90% ethanol to produce 50% concentration of extract, followed by maceration method of extraction for 48 h. Each extract was then preserved in well closed container and stored away from direct sun light (**Figure 1**).

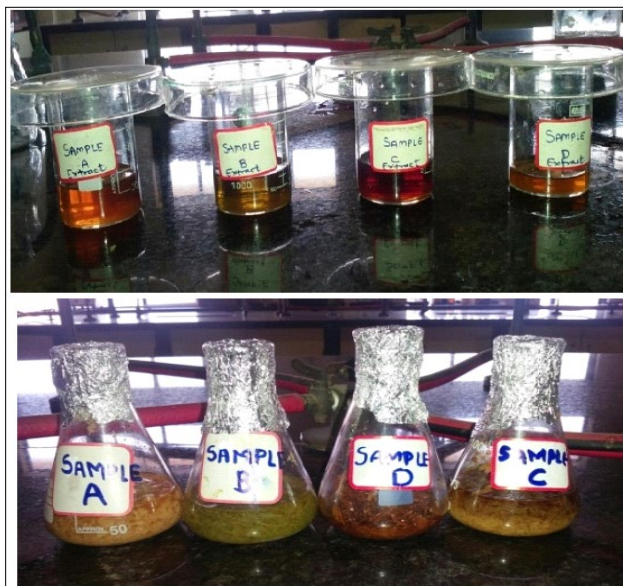


Figure 1. Cleaned fresh flower petal extracts.

Methods

The experiment was performed by using the same set of glass wares for titration of each flower extract. Titrant of 10 ml with 2 to 3 drops of standard indicator (Phenolphthalein) was titrated against 1 molar acid-base. The results were depicted in the experiment was carried by using the same set of glass wares for titrations of each flower extracts.

The equimolar (1 M) titrations were performed using 10 ml of titrant with 2 ml of indicator (aqueous). All the parameters for each experiment are given in table format. A set of three experiments, each for acid base titrations were carried out. The mean calculations for each titration were calculated from results obtained (**Figure 2**).

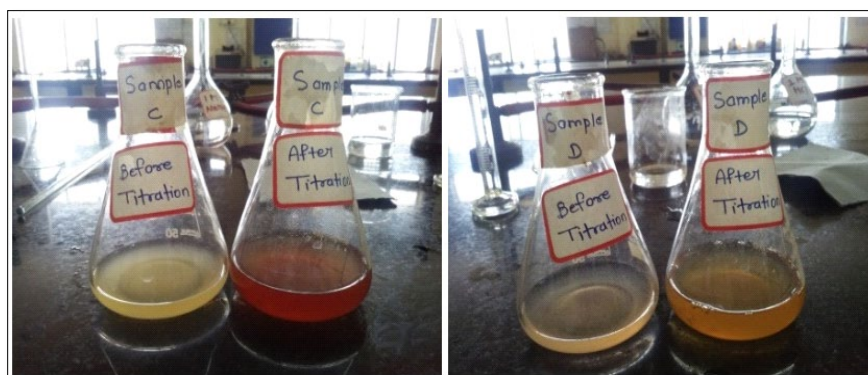


Figure 2. Titrated extracts of each flower.

RESULTS AND DISCUSSION

The study proved that the equivalence point of acid-base titrations using the all different flower extract either coincided or almost closer to that of using standard

phenolphthalein indicator. The each of flower extract indicator gave sharp color change at the equivalence point during titration. It was also observed that the all extract acted reversibly and gave sharp color change in both directions (Tables 1-4).

Table 1. Indicating color change in acidic medium and after neutralization.

Samples	Color of flower	Color of ethanolic extract of flower	Color in acidic medium	Color during neutralization
<i>Jasminum officinale</i>	White	Dark red	Turbid white	Dark red
<i>Ixora coccinea</i>	Red	Orange red	Light red	Clear dark yellow

Table 2. *Jasminum officinale* extract titration reading.

Color change: Turbid white to dark red			
S. no.	Initial volume (ml)	Final volume (ml)	Mean (ml)
1	0	10	10.06
2	0	10.2	
3	0	10	

Table 3. *Ixora coccinea* extract titration reading.

Color change: Light red to clear dark yellow			
S. no.	Initial volume (ml)	Final volume (ml)	Mean (ml)
1	0	10.3	10.20
2	0	10.1	
3	0	10.2	

Table 4. Standard phenolphthalein indicator titration reading.

Color change: Colorless to light pink color			
S. no.	Initial volume (ml)	Final volume (ml)	Mean (ml)
1	0	10	9.93
2	0	9.9	
3	0	9.9	

Conclusion

The study revealed that the hydro alcoholic extract of each flowers of *Jasminum officinale* and *Ixora coccinea* can be used as a substitute to the synthetic indicators due to its advantages like easy preparation, effective performance and ability to produce accuracy and precision in results as per followed by green chemistry [10-13].

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