



Study of *Sesbania grandiflora* as Natural, Economical and Effective alternative to Synthetic Indicator

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Accepted on: 26-10-2016; Finalized on: 30-11-2016.

ABSTRACT

Natural alternatives to synthetic chemicals are the demand of contemporary chemistry regarding environmental pollution crisis. There is need to develop green indicator as effective alternative for synthetic indicator used in laboratory. In the present, work Acid-Base titration has been performed by using natural indicators: *Sesbania grandiflora* (L.) pors extract. Two acids (Hydrochloric acid and Acetic acid) and two bases (Sodium Hydroxide and Ammonium Hydroxide) were selected for Acid-Base titration. 0.1N, 0.5N, 1N strength of these acids and bases were prepared. The end point obtained by flower extract coincides with the end point obtained by standard indicator. Finally it may conclude that *Sesbania grandiflora* flower extract as an indicator is more economical and having the same accuracy of result as that given by synthetic indicator.

Keywords: *Sesbania grandiflora*, Indicator, Titration, Natural Indicator, Acid, Base.

INTRODUCTION

Sesbania grandiflora is commonly known as Hadaga. An indigenous medicinal plant in India, known as "Sesbania" and "agathi" in ayurvedic system of medicine which belongs to family *Leguminosae*. It is soft wooded tall slender tree that reaches 6.9 m in height, 20-25 cm width. Leaves 5-30 cm long; leaflets 16-30 pairs, linear-oblong. Pods 50 cm long or 15-20 pale coloured seeds. 10 cm long with showy, fleshy, white, crimson, red or pink petals. It is cultivated in India, Australia, Indonesia, Malaysia, and Myanmar, Philippine.¹In India it is found at West Bengal, Assam, Karnataka, and North-Eastern. It is cultivated as Ornamental plant, grows wild in hedges and shady forests.²

Plant drug profile

Plant name-*Sesbania grandiflora*

Synonym- Agathigrandiflora.

English - Agatisesban, Swamp pea

Ayurvedic- Agasti, Agastya, Kanali, Munidruma, Pavitra, Shuklapushpa, Vakrapushpa, Vaka.

Sesbania grandiflora is used asulcer, dyspepsia, diarrhea, gastralgianyctalopia and cephalgia, fever, anaemia and emaciation. It also used as astriengent, tonic, anthelmintic, febrifuge, diuretic, nyctalopia, anxiolytic, tonic and antipyretics.³

The flowers of *Sesbania grandiflora* were reported to content total phenols, flavonoids.⁴ Flavonoids are colour compound that can be isolated from various parts of plants like flower, fruit and are pH sensitive. Hence it has been hypothesized that the flower extract could be used

as an Indicator for different types of Acid-Base titration.^{5,6}

Present study is designed to identify the usage of floral extract as Green Indicator instead of Chemical Indicator for Acid-Base titration.

MATERIALS AND METHODS

Analytical grade reagents were made available from Shree Santikrupa Shikshan Sanstha's College of Pharmacy (D. Pharm), Ghogaon.

Reagents and volumetric solutions were prepared as per standard books.^{7,8}

Sesbania grandiflora flowers were collected from plants growing in the surrounding of the Karad, District Satara, and Maharashtra. The plant was identified and authenticated by an expert Priyanka A. Ingale, Scientist 'B' Botanical Survey of India, Western regional centre, Pune. The specimen was deposited as (Voucher no.BSI/WRC/IDEN.CER/2016/196) in Botanical survey of India Pune.

Collected flowers of *Sesbania grandiflora* were cut into small pieces were kept at room temperature. The petals were dried and ground to fine powder with mechanical blender.

The 50gm of powder of flower were extracted with methanolic, hydro alcoholic acid. After pressing marc the filtrate was collected and used in various titrations.

The experiment was performed by using same set of glasswares for all types of titrations. As the same aliquots were used for both titrations i.e. titrations by using

standard indicators and flower extract the reagent were not calibrated.

The equimolar titrations were performed using 10ml titrant with three drops of indicator. All the parameter for experiment are given in table no. 1. A set of five experiments was performed and mean and standard deviation were calculated from results.^{9,10}

RESULT AND DISCUSSION

The flower extract was screened for its use as an acid – base titrations and the results of this screening compared with the result obtained by standard indicators like

methyl red. For strong acid v/s strong base (HCl and NaOH) Strong acid v/s weak base (HCl and NH₄OH) Weak acid v/s strong base (Oxalic Acid and NaOH acid) and Weak acid v/s Weak base (Oxalic and NH₄OH) titrations respectively. The results of these titrations are given in table no. 2. The floral extract of *Sesbania grandiflora* was found to have coloring matter flavonoids and these are pH sensitive. It could be due to this flavonoid the sharp end points appear in the above mentioned titrimetric analysis for all titration, the equivalence point obtained by flower extract matched with the equivalence points obtained by standard indicators.

Table1: Parameters used for experiment and the results of screening.

Titrant	Titrate	Indicator Colour Change	
		Standard	Flower Extract
HCl	NaOH	Yellow to red	Green to colour less
HCl	NH ₄ OH	Yellow to red	Green to colour less
CH ₃ COOH	NaOH	Yellow to red	Green to colour less
CH ₃ COOH	NH ₄ OH	Yellow to red	Green to colour less

Table 2: Experiment Screening of *Sesbania grandiflora* flowers

Titration	Strength	Indicator	Mean \pm S.D
HCl Vs NaOH	0.1N	Methyl red	13.76 \pm 0.20
		Flower Extract	13.76 \pm 0.20
	0.5N	Methyl red	12.26 \pm 0.11
		Flower Extract	11.86 \pm 0.11
	1N	Flower Extract	11.86 \pm 0.11
		Methyl red	12.5 \pm 0.10
HCl Vs NH ₄ OH	0.1N	Methyl red	10.03 \pm 0.05
		Flower Extract	9.76 \pm 0.05
	0.5N	Methyl red	12.00 \pm 0.10
		Flower Extract	11.36 \pm 0.05
	1N	Methyl red	12.56 \pm 0.11
		Flower Extract	11.06 \pm 0.05
CH ₃ COOH VS NaOH	0.1N	Methyl red	9.66 \pm 0.1
		Flower Extract	10.33 \pm 0.05
	0.5N	Methyl red	8.33 \pm 0.11
		Flower Extract	8.16 \pm 0.05
	1N	Methyl red	9.43 \pm 0.15
		Flower Extract	11.03 \pm 0.05
CH ₃ COOH VS NH ₄ OH	0.1N	Methyl red	10.63 \pm 0.05
		Flower Extract	10.5 \pm 0.00
	0.5N	Methyl red	12.83 \pm 0.05
		Flower Extract	11.86 \pm 0.05
	1N	Methyl red	13.23 \pm 0.05
		Flower Extract	10.46 \pm 0.05

CONCLUSION

Sesbania grandiflora flower extract alone can serve the purpose of indicator in acid-base type of titration, where generally mixed indicators are employed. Finally it is concluded that *Sesbania grandiflora* flower extract as an indicator is more economical and having the same accuracy of result as that given by synthetic indicator.

Acknowledgement: The authors are thankful to Mr. Shashikant Patil, President, and Mr. PrasunJohari, Secretary of Shree, Santkrupa Shree Santkrupa Shikshan Sanstha's, for providing necessary facilities to carry on research work.

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Source of Support: Nil, Conflict of Interest: None.

