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# Use of *Celosia argentea* Linn aqueous Flower Extract as a Natural Indicator in Acid Base Titration

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**Abstract:** *Celosia argentea* L is a species of the genus *Celosia*, belonging to the family Amaranthaceae. The present work highlights the use of *Celosia argentea* L aqueous flower extract as an acid base indicator in acid base titrations. The equivalence points obtained by the flower extract coincident with the equivalence points obtained by standard indicators expect in weak acid Vs Weak base This natural indicator was found to be a very useful, economical, simple and accurate for the said titration.

Keywords: Celosia argentea, Acid base indicator, Natural indicator.

## Introduction

*Celosia argentea* L (Amaranthaceae) grows as a weed during rainy season throughout India and other tropical regions of the world such as Sri Lanka, South Asia, Africa and America. It is also used traditionally for the treatment of jaundice, gonorrhea, wounds and fever. The leaves are used for the treatment of inflammations, fever and itching. The seeds are bitter, useful in blood diseases, mouth sores<sup>1</sup>. Based on ethno botanical practice the plant was investigated for anti inflammatory<sup>2</sup>. Anti-pyretic<sup>3</sup>, Anti diabetic<sup>4</sup>, Anti bacterial and Diuretic properties<sup>5</sup>, Laxative, antioxidant, Antiviral and antibacterial activity<sup>6</sup>. Hepatoprotective effect of *celosian* was investigated by using liver injury models<sup>7</sup>. *Celosia argentea* is used in the traditional medicine for sores, ulcers, and skin ruptions<sup>8</sup>. Flavonoids have also been found to inhibit a wide range of enzymes involved in oxidation systems such as 5-lipoxygenase, cyclooxygenase, mono oxygenase, or xanthine oxidase<sup>9</sup>. As flavonoids, anthocyanins are present in flowers of *Celosia argentea* are pH sensitive<sup>10</sup>; it was hypothesized that the flower extract could be utilized as an indicator for different types of acid base titrations. Hence the

flavonoids were extracted, and identified for their potential use as an acid base indicator in various acid base titrations.

### **Material and Method**

Analytical grade reagents were made available by Nanded Pharmacy college, Nanded. Reagents and volumetric solutions were prepared as per standard books<sup>11, 12</sup>.*Celosia argentea* L flowers were collected from plants growing in the garden of Nanded Pharmacy college, Nanded and authenticated from Prof. P.B Deshmukh, Department of Botany, Science college, Nanded. The flowers were collected. The fresh petals were separated and directly put into beaker with 200ml of distilled water and kept for overnight. On second day the extract is filtered and directly used for the study. The experimental work was carried out by using the same set of glassware's for all type of titrations. As the same aliquots were used for both titrations i.e. titration by using standard indicators and aqueous flower extract, the reagent were not calibrated. The equimolar titrations were performed using 20 ml of titrant with three drops of indicator. All the parameters for experiment are given in Table 1. A set of five experiments was carried out and mean and standard deviation were calculated from results<sup>11</sup>.

#### **Result and Discussion**

The aqueous flower extract was screened for its use as an acid base indicator in acid base titrations, and the results of this screening compared with the results obtained by standard indicators methyl red; for strong acid Vs strong base (HCl and NaOH), Strong acid Vs weak base (HCl and NH<sub>4</sub>OH), weak acid Vs strong base (Oxalic acid and NaOH), and weak acid Vs weak base (Oxalic acid and NH<sub>4</sub>OH) titrations respectively<sup>13</sup>. All these parameters are shown in Table 1. For all titrations the equivalence points obtained by the aqueous flower extract matched with the equivalence points obtained by standard indicators except in weak acid Vs Weak base. The results of screening were listed in Table 2.

*Celosia argentea* L aqueous flower extract alone can serve the purpose of indicator acid titration. Another benefit of this titration is that it gives colorless end point at the equivalence point. If we add more amount of titrant (acid) it gives pink colored solution.

The results obtained in all the types of acid base titrations lead us to conclude that it was due to the presence of flavonoids, sharp color changes occurred at the end point of the titrations. Lastly we can say that it is always beneficial to use Celosia argentea L aqueous flower extract as an indicator in all types of acid base titrations because of its economy, simplicity and availability.

#### Table 1: Parameters Used For Analysis and the Comparison of Color Change.

Titrant	Titrate	Indicator Color Change			
		Standard	Aqueous Flower Extract		
		(pH Range)	(pH Range)		
HCl	NaOH	Yellow to Red	Green to Colorless		
		(8.8-3.7)	(8.9-4.16)		
HCl	NH <sub>4</sub> OH	Pink to Colorless	Green to Colorless		
		(8.1-3.5)	(8.2-4.50)		
Oxalic acid	NaOH	Pink to Colorless	Green to Colorless		
		(9.2-4.5)	(9.1-5.22)		
Oxalic acid	NH <sub>4</sub> OH	Blue-Green to Orange	Green to Colorless		
		(7.9-4.5)	(8.1-5.12)		

HCl: Hydrochloric acid, NaOH: Sodium Hydroxide, NH<sub>4</sub>OH: Ammonium Hydroxide.

Sr. No.	Titration (Titrate Vs Titrate)	Strength in Mole (%)	Indicator	Reading with S. D. (±)
01	HCl Vs NaOH	100	Methyl Red	$8.45 \pm 0.05$
		100	Flower Extract	$8.45 \pm 0.07$
		50	Methyl Red	$8.65 \pm 0.05$
		30	Flower Extract	8.45±0.03
		25	Methyl Red	8.60±0.10
		23	Flower Extract	$8.70 \pm 0.05$
02		100	Methyl Red	$5.47 \pm 0.05$
	_	100	Flower Extract	$5.45 \pm 0.08$
	<b>МИ ОН Ve ИС</b> І	50	Methyl Red	$5.55 \pm 0.05$
		50	Flower Extract	$5.45 \pm 0.05$
		25 -	Methyl Red	$5.55 \pm 0.03$
			Flower Extract	$5.60 \pm 0.04$
03 (	_	100 -	Methyl Red	11.20±0.10
		100	Flower Extract	11.00±0.10
	Ovalic acid Vs NaOH	50 -	Methyl Red	12.00±0.05
		50	Flower Extract	11.70±0.05
		25	Methyl Red	11.50±0.06
		25	Flower Extract	11.50±0.06
04	Oxalic acid Vs NH₄OH	100	Methyl Red	None
		100	Flower Extract	None
		50	Methyl Red	None
		50	Flower Extract	None
		25	Methyl Red	None
		23	Flower Extract	None

Table 2	2: 5	Screening	Results	of	various	titrations
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HCl: Hydrochloric acid, NaOH: Sodium Hydroxide, NH₄OH: Ammonium Hydroxide, S. D.: Standard Deviation

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