

Dioscorea bulbifera L. fruit extract use as a natural indicator in acid base titration

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Abstract— In present scenario natural indicator are more efficiently prepared as it has several advantages over synthetic indicator. *Dioscorea bulbifera* Linn is a species of the genus *Dioscorea*, belonging to family *Dioscoreaceae*. In present research work natural indicator of *Dioscorea bulbifera* fruit extract were prepared and it is used as an indicator in various acid base indicator. The equivalence point obtained by the fruit extract compared with the equivalence point obtained by the standard indicators.

Index Terms— *Dioscorea bulbifera*, Acid base indicator, Natural Indicator

I. INTRODUCTION

The plant species used for this study is *Dioscorea bulbifera* also called Gonth, Kolkand, Varaheekand belonging to the family *Dioscoreaceae*. The native of this plant especially in India except in the dry north-western regions. About 50 species are found in India. The tuber is used by the tribal population of central India as a food particularly in Madhya Pradesh, Chattisgarh, Jharkhand and Orissa [1]. The fruits are in capsular form. It is also called as Air Potato. It has been used as a folk remedy to treat conjunctivitis, diarrhoea and dysentery, among other ailments [2]. The term titrimetric analysis refer to quantitative chemical analysis carried out by determining the volume of solution of accurately known concentration which is required to react quantitatively with a measured volume of a solution of the substance to be determined [3].

II. MATERIAL AND METHODS

All the apparatus and instruments required for the present research work were calibrated [4]. Analytical grade reagents were available by Dadasaheb Balpande college of Pharmacy, Besa Nagpur. Reagents and volumetric solutions were prepared as per the standard books [5, 6]. The fruits of *Dioscorea bulbifera* were collected from the Nagpur region in the year 2014. The plant was identified and authenticated at Department of Botany, R.T.M. Nagpur University, Nagpur and authentication number was 9886.

[1] Solvent Extraction:

The fresh fruits were cleaned by distilled water and cut into small pieces and macerated for two hours in 25ml of 90% ethanol. The extract was preserved in tight closed container and stored away from direct sun light. The experiment was carried by using the same set of glassware's for all types of titrations that is titrations by using standard indicators and fruit extract. The reagents were not calibrated. The equimolar titrations were performed using 10 ml of titrant with three

drops of indicator [7]. All the parameters for experiment are given in Table 1.

Table 1: Analyzed Parameters and Comparison of Colours Change

Titrate	Titrant	Indicator Color Change		Readings with S.D.(+/-)	
		Standard (PH range)	Fruit Extract (PH range)		
HCl	NaOH	Red to Yellow (3.2-8.4)	Slightly yellow to faint pink	Methyl red	18.3+/- 0.13
				Fruit extract	18.1+/- 0.14
HCl	NH ₄ OH	Colourless to Pink (5.3-8.2)	Pink to Colourless	Phenolphthalein	12.3+/- 0.14
				Fruit extract	12.4+/- 0.16
CH ₃ COOH	NaOH	Colourless to Pink (4.7-9.2)	Faint yellow to pink	Methyl red	22.3+/- 0.18
				Fruit extract	22.6+/- 0.19
Oxalic acid	NH ₄ OH	Orange to Blue-green (4.3-7.8)	Yellow to colourless	Mixed indicator	10.3+/- 0.21
				Fruit extract	10.4+/- 0.23

(HCL- Hydrochloric acid, NaOH- Sodium Hydroxide, NH₄OH- Ammonium Hydroxide)

III. RESULTS AND DISCUSSION

The prepared fruit extract was screened for its use as an acid base indicator in various acid base titrations, and result of screening compared the result obtained by standard indicators methyl red, phenolphthalein and mixed indicator (methyl orange: bromocresol green (0.1-0.2) 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 NH₄OH) titrations respectively.

All the parameters are shown in Table 1. For all titrations the equivalence points obtained by the fruit extract matched with the equivalence points obtained by standard indicators.

IV. CONCLUSION

It is concluded from the data, the results obtained in all types of acid base titrations lead us to conclude that it was due to the presence of flavonoids and anthocyanins sharp color changes occurs at the end point of the titrations. At last we can say that it is always beneficial to use *Dioscorea bulbifera* fruit extract as an indicator in all types of acid base titrations because of its cost effectiveness, simplicity and availability.

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