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MURRAYA KOENIGII FRUIT EXTRACT - HERBAL ALTERNATIVE TO SYNTHETIC ACID BASE INDICATORS

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ABSTRACT

Indicators used in neutralization titration show well marked changes of colour in certain intervals of pH. Most of these indicators are organic dyes and are of synthetic origin. Today synthetic indicators are the choice of acid-base titrations. But due to environmental pollution, availability and cost, the search for natural compounds as an acid-base indicator was started. The present vocation highlights the exploit of Murraya Koenigii fully ripened fruit extract as a pH indicator in strong acid-strong base, strong acid weak base, weak acid strong base and weak acid-weak base titrations. This natural indicator is easy to prepare. The results showed that the fruit extract of Murraya Koenigii indicator is colourless in acidic solution, while greenish yellow in basic solution. The comparison indicators used in this research were methyl red, methyl orange, phenol red and phenolphthalein. Promising results were obtained when it was compared against standard synthetic indicators. Volumetric titrations between acid and base shows sharp colour change at the equivalence point. The equivalence points obtained match with the equivalence points obtained by standard indicators. Therefore this natural indicator is found to be a very useful, economical, simple, accurate and eco-friendly for acid base titration.

KEYWORDS: Fruit Extract, Murraya Koenigii, Natural indicator, Acid base indicator, Equivalence point.

INTRODUCTION

Murraya Koenigii, a small tree, growing 3–4 m tall, with a trunk up to 12 inch diameter is a deciduous valuable plant for its characteristic aroma and medicinal value, originally from India. It is known by several names such as *karepaku*, *narasingha bishahari*, and *mitha neem*, curry tree.[1] The Curry fruit grows on the evergreen curry tree and called as curry berries. The tree is botanically known as Murraya Koenigii and belongs to the *Rutaceae*, or citrus, family. Though not as commonly consumed, Curry berries are also edible and contain a large amount of vitamin C and anthocyanins as well as the minerals calcium, phosphorus, magnesium, and iron.[2,3] Curry berries are also being studied for their potential use as a natural treatment for diabetes. Curry berries can be eaten fresh as a snacking fruit. They can also be squeezed for their juice. Most commonly they are used to make a nutritional juice or tonic used in Ayurvedic medicine.[4] Though the seeds are toxic, they do contain an antibacterial and antifungal essential oil that is used in perfumery. Most commonly it is the leaves of the curry tree that are used.[5,6]

Apart from the uses of Curry plant and Curry berries mentioned above, in this study it was aimed to make Curry berries extract as neutralization indicator for strong acid-strong base and other three acid base titrations with the comparison against standard indicators viz. methyl orange, methyl red, phenol red and phenolphthalein. The pulps of the fully ripened fruits, black with a very shining surface are pH sensitive and give different colors in acidic condition (colourless) and basic condition (greenish yellow) might be due to anthocyanin content. Therefore it has been hypothesized that the fruit extract could be utilized as an indicator for strong acid strong base[7] and other three acid base titrations.

MATERIALS AND METHODS

Materials

Analytical grade reagents of MERCK Ltd. namely Hydrochloric acid (HCl), Acetic acid (CH_3COOH), Sodium hydroxide (NaOH), Ammonium hydroxide (NH_4OH), Phenolphthalein, Methyl red, phenol red and Methyl orange were procured from the R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science College Washim (M.S.). Reagents and volumetric solutions were prepared as per Indian Pharmacopoeia. For production of acid base indicator from Murraya Koenigii, the fresh Murraya Koenigii fruits were collected from my home garden in the month of January 2019 and authenticated at Department of Botany, R. A. College -Washim (M.S.) and by botanical Software.

Preparation of acid base indicator solution

Fully ripened black-violet berries of Murraya

Koenigii (150 g) were washed with distilled water and crushed in a mortar with a pestle and then transferred its pulp into a beaker where seeds were rejected and thrown away. Next, a crushed black pulp was soaked with 120 mL ethyl alcohol for about 20 hours. The extract was filtered by Mussolini cloth, while the residue was re-extracted again using 30 ml of ethyl alcohol for 20 hrs. The resulting solution is filtered through cellulose double filter paler and fairly wine red coloured solution obtained was used as an indicator. Its pH rang is (10.5-11.1) 10.5 at and below which it is colourless and 11.0 at and above which it is greenish yellow. The extract was stored in tightly closed dark bottle and kept away from the source of heat and direct sun light.

Experimental

At room temperature the titrations of Strong acid-Strong base (HCl versus NaOH) Strong acid-Weak base (HCl versus NH_4OH), Weak acid Strong base (CH_3COOH versus NaOH) and Weak acid-Weak base (CH_3COOH versus NH_4OH) both of equal concentrations i.e. 0.25 M, 0.50 M and 1.0 M was carried by using the same set of glassware for all titrations. As the same aliquots were used for all titrations i.e. titrations by using standard indicators phenolphthalein, methyl red, methyl orange and indicator under study, the reagents were not calibrated. The equimolar titrations were performed using 10 ml of titrant with 5 to 6 drops of indicator. The trials were repeated 3 times to check the precision. The end points of the titrations using the indicator under study were reached when colour changed from colourless to greenish yellow. The color changes for the indicators are listed in the Tables 1. The results of screening for strong acid-strong base and weak acid-weak base are recorded as Mean Value of Titrations (mL) ± SD in Table 2.

When weak base was titrated with the weak acid, the acid was constantly stirred on a magnetic stirrer for better results. For titrations involving a weak acid-weak base our indicator was added in excess (1.5 mL).

Table 1: Colour changes for the Indicators during Acid - Base Titrations.

Titrant	Titrate	Indicator	Colour at end point	Ph range
HCl	NaOH	Phenolphthalein	Colorless To Pink	8.00 – 10.00
		Methyl Red	Pink To Yellow	4.2 – 6.2
		Methyl Orange	Orange To Yellow	3.0 – 6.3
		Phenol Red	Yellow To Red	6.8 – 8.2
		Murraya Koenigii Fruit's Extract	Colourless To Greenish Yellow	10.5 – 11.1
HCl	NH_4OH	Phenolphthalein	Colorless To Pink	8.00 – 10.00
		Methyl Red	Pink To Yellow	4.2 – 6.2
		Methyl Orange	Orange To Yellow	3.0 – 6.3
		Phenol Red	Yellow To Red	6.8 – 8.2
		Murraya Koenigii Fruit's Extract	Colourless To Greenish Yellow	10.5 – 11.1
CH_3COOH	NaOH	Phenolphthalein	Colorless To Pink	8.00 – 10.00
		Methyl Red	Pink To Yellow	4.2 – 6.2
		Methyl Orange	Orange To Yellow	3.0 – 6.3
		Phenol Red	Yellow To Red	6.8 – 8.2
		Murraya Koenigii Fruit's Extract	Colourless To Greenish Yellow	10.5 – 11.1
CH_3COOH	NH_4OH	Phenolphthalein	-	8.00 – 10.00
		Methyl Red	Pink To Yellow	4.2 – 6.2
		Methyl Orange	Orange To Yellow	3.0 – 6.3
		Phenol Red	-	6.8 – 8.2
		Murraya Koenigii Fruit's Extract	-	10.5 – 11.1

Table 2: Experimental screening of 'Murraya Koenigii fruit extract' as acid base indicator.

S.N.	Titrations	Strength	Indicators	Mean t-Value of Titrations ± SD
1	HCl Vs NaOH	0.25 M	Phenolphthalein	10.18 ± 0.057
			Methyl Red	10.19 ± 0.060
			Methyl Orange	10.15 ± 0.055
			Phenol Red	10.10 ± 0.091
			Murraya Koenigii Fruit's Extract	10.09 ± 0.049
		0.50 M	Phenolphthalein	10.18 ± 0.072
			Methyl Red	10.17 ± 0.063
			Methyl Orange	10.19 ± 0.060
			Phenol Red	10.20 ± 0.063
			Murraya Koenigii Fruit's Extract	10.16 ± 0.045

		1.00 M	Phenolphthalein	10.16 ± 0.066
			Methyl Red	10.19 ± 0.060
			Methyl Orange	10.18 ± 0.063
			Phenol Red	10.11 ± 0.063
			Murraya Koenigii Fruit's Extract	10.17 ± 0.039
2	HCl Vs CH_3COOH	0.25 M	Phenolphthalein	09.98 ± 0.057
			Methyl Red	09.99 ± 0.060
			Methyl Orange	09.95 ± 0.055
			Phenol Red	09.96 ± 0.091
			Murraya Koenigii Fruit's Extract	10.19 ± 0.029
		0.50 M	Phenolphthalein	09.91 ± 0.072
			Methyl Red	09.89 ± 0.063
			Methyl Orange	09.94 ± 0.060
			Phenol Red	09.92 ± 0.063
			Murraya Koenigii Fruit's Extract	10.06 ± 0.035
		1.00 M	Phenolphthalein	09.91 ± 0.066
			Methyl Red	09.97 ± 0.060
			Methyl Orange	09.98 ± 0.063
			Phenol Red	09.97 ± 0.063
			Murraya Koenigii Fruit's Extract	10.19 ± 0.049

S.N.	Titrations	Strength	Indicators	Mean t-Value of Titrations ± SD
3	CH_3COOH Vs NaOH	0.25 M	Phenolphthalein	10.38 ± 0.057
			Methyl Red	10.39 ± 0.060
			Methyl Orange	10.35 ± 0.055
			Phenol Red	10.40 ± 0.091
			Murraya Koenigii Fruit's Extract	10.49 ± 0.049
		0.50 M	Phenolphthalein	10.38 ± 0.072
			Methyl Red	10.57 ± 0.063
			Methyl Orange	10.59 ± 0.060
			Phenol Red	10.67 ± 0.063
			Murraya Koenigii Fruit's Extract	10.66 ± 0.065
		1.00 M	Phenolphthalein	10.56 ± 0.066
			Methyl Red	10.49 ± 0.060
			Methyl Orange	10.38 ± 0.063
			Phenol Red	10.27 ± 0.063
			Murraya Koenigii Fruit's Extract	10.47 ± 0.059
2	CH_3COOH Vs NH_4OH	0.25 M	Phenolphthalein	-
			Methyl Red	11.17 ± 0.066
			Methyl Orange	11.7 ± 0.087
			Phenol Red	-
			Murraya Koenigii Fruit's Extract	-
		0.50 M	Phenolphthalein	-
			Methyl Red	11.33 ± 0.077
			Methyl Orange	11.43 ± 0.045
			Phenol Red	-
			Murraya Koenigii Fruit's Extract	-
		1.00 M	Phenolphthalein	-
			Methyl Red	11.44 ± 0.065
			Methyl Orange	11.54 ± 0.087
			Phenol Red	-
			Murraya Koenigii Fruit's Extract	-

RESULTS AND DISCUSSION

The ethanolic solution of proposed indicator Murraya Koenigii fruit's extract was screened for its use as an acid-base indicator and the results were compared with that obtained using phenolphthalein, methyl red and methyl orange for strong acid-strong base (HCl and NaOH) and also other three types of acid-base titrations. The equivalence point of the titrations using Murraya Koenigii fruit's extract is almost close or coincides with that of phenolphthalein, methyl red and methyl orange

for strong acid– strong base, strong acid-weak base, weak acid-strong base titration but not in the titration of weak acid-weak base titration as shown in Table 2.

Acid base titrations were carried out to ensure that the proposed colour of standard indicators like phenolphthalein, methyl red and methyl orange etc. reappears in titrations even after reaching the end point, but this is not happen in the case of this Murraya Koenigii fruit's extract indicator. Therefore, use of alcoholic solution of this indicator could be effectively employed as a substitute to the strong acid-strong base, strong acid weak base and weak acid strong base indicators. In other words usefulness of this indicator in acid- base titrations was found to be more significant over standard indicator as it gives sharp colour change and very slight standard deviation.

CONCLUSIONS

It can be concluded that, the Murraya Koenigii fruit's extract showed different colour changes in acid and base solutions and its titration equivalent points (end-points) matched with standard indicator. Hence it is plausible to suggest Murraya Koenigii fruit's extract as alternative source to existing standard acid base indicators due to its advantages like economical, eco friendly, simple preparation, reversible sharp color change, effective performance and ability to produce accuracy and precision in results for strong acid-strong base, strong acid-weak base and weak acid-strong base titrations. However it is ineffective as indicator in case of weak acid weak base titrations.

REFERENCES

1. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A Hand Book of Medicinal plants, 1st ed. India: Agrobios India, 2003.
2. Anand T, Kalaiselvan A, Gokulakrishnan K. Wound healing activity of Murraya Koenigii in Male Albino Rats. International Journal of current research, 2011; 3(2): 425-427.
3. Kumar VS, Sharma A, Tiwari R, Kumar S. Murraya Koenigii: A review. J of Med and Aroma Plant Sci., 1999; 21: 1139-1144.
4. Harish K Handral, Anup Pandith and Shruthi SD, A review on Murraya Koenigii: Multipotential Medicinal plant, Asian Journal of Pharmaceutical and Clinical Research, 2012; September 4: 5.
5. Kawaljeet Kaur, Arvind Kumar Gupta, Sayeed Ahmad, Perwez Alam. Pharmacognostic studies on bark of Murraya Koenigii Spreng. International Journal of Research in Pharmaceutical and Biomedical Science, 2011; 2–4.
6. Harish K Handral, Prashanth Kumar Jha, Shruthi SD, Pharmacognostic and phytochemical studies on the leaves of Murraya Koenigii L. Spreng. Pharmacophore, 2010; 1(3): 231-238.
7. R.F.Pagariya, Murraya Koenigii fruit extract as herbal substitute for hazardous internal indicators in volumetric analysis, Journal of Emerging Technologies and Innovative Research (JETIR), 2019; 6(4): 290-292.