British Journal of Pharmaceutical Research
9(1): 1-4, 2016, Article no.BJPR.20556
ISSN: 2231-2919, NLM ID: 101631759

SCIENCEDOMAIN *international*
www.sciencedomain.org

Study of Acid-base Indicator Property of Ethanolic Extract of *Nerium indicum* Flower

Khalid Da'u Khalid[1*], Mustapha Balarabe Idris[1], Naziru Alhassan Muhammad[1] and Ahmad Bala[1]

[1]Department of Chemistry, Jodhpur National University, Narnadi, Jhanwar Road, Boranada, Rajasthan, India.

Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJPR/2016/20556
Editor(s):
(1) Nawal Kishore Dubey, Centre for advanced studies in Botany, Banaras Hindu University, India.
Reviewers:
(1) Daniel A. Abugri, Tuskegee University, USA.
(2) Anonymous, HNB Garhwal central University Campus, India.
(3) Tulay Aşkin Çelik, Adnan Menderes University, Turkey.
(4) Anthony Cemaluk C. Egbuonu, Michael Okpara University of Agriculture Umudike, Nigeria.
Complete Peer review History: http://sciencedomain.org/review-history/11933

Original Research Article

Received 31st July 2015
Accepted 1st October 2015
Published 20th October 2015

ABSTRACT

A study has been done to investigate the indicator property of ethanolic extract of *Nerium indicum.* The commonly used synthetics indicators cause environmental pollution and pose hazardous effects in human body. Natural pigments in plants are highly coloured substance and may change with pH variation. The equivalence points of the titrations using flower extract is almost close or coincide with that of phenolphthalein (synthetic indicator). Therefore, use of ethanolic extract of *Nerium indicum* as an indicator for acid-base titration could be effectively employed as a substitute to the synthetic acid-base indicators.

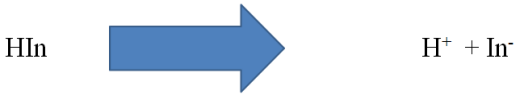
Keywords: Equivalence point; ethanol; indicator; Nerium indicum; pH and titration.

1. INTRODUCTION

In spite of the numerous instrumental techniques currently available for the chemical analyses of various samples, conventional methods of analysis such as gravimetry and titrimetry are still relevant. The end point in traditional titrimetry is usually indicated by some substances added into

**Corresponding author: Email: khalid126dkhalid@yahoo.com;*

the analyte solution, which change colour immediately after the equivalence point has been attained [1]. The substances that change colour when the acidity of the solution changes are known as acid-base indicators [2]. Acidimetry and alkalimetry include the titration of free bases with a standard acid and the titration of free acids with a standard base respectively. The reactions involve the combination of hydrogen and hydroxyl ions to form water [3]. This can only be identified by the use of colourant called indicator. A pH indicator is a halochromic chemical compound that is added in small amounts to a solution so that the pH (acidity or alkalinity) of the solution can be determined easily [4]. For simplicity, we represent a general indicator by the formula HIn for acidic indicators and InOH for basic indicator. The ionization of acidic indicator in a solution is represented by the equilibrium [5].



Commercial indicators are expensive and some of them have toxic effects on users and can also cause environmental pollution [6]. For these reasons there has been an increasing interest in searching for alternative sources indicators from natural origins, these alternatives would be cheaper, more available, simple to extract, less toxic to users and environmentally friendly [4]. Almost any flowers such as blue, purple or red in colour contain a class of organic pigment called anthocyanins that change colour with pH [7]. Several authors have reported on the effectiveness of indicators extracted from natural sources in acid base-titration. Some of these were *Dianthus plumarius* and *Antirrhium majus [8], Nerium odoratum* [9], *Ipomoea biloba* [10], *Jacaranda acutifolia* flower [11], pride of barbados [12], *Morus alba linn* fruit [6].

Nerium indicum belongs to the family Apocynaceace; the plant is commonly known as “Kaner” [13]. It is widely distributed in Mediterranean region and subtropical Asia but is native of Indian subcontinent and cultivated elsewhere [14]. In Northern regions it may be grown as an indoor or patio plant; oleander has flexible branches with green, smooth bark eventually turning to dark-grey [14].

2. MATERIALS AND METHODS

All reagents and chemicals used in this study were of analytical grade.

2.1 Flower Collection and Identification

The flower *Nerium indicum* was collected from the plants grown at college compound of Jodhpur National University, India and authenticated by a botanist; Dean Faculty of Science Dr. N. L. Vyas. The flower was then kept in laboratory.

2.2 Extraction of *Nerium indicum* Flower

Any extract from either plant leaves or flowers that have a pH different from neutral and can change colour in acidic and basic medium can be used as indicator. The collected flowers were cleaned with distilled water, cut into small pieces and 5.0g was weighed using analytical weighing balance. It is then soaked into 30 mL of 90% ethanol and allowed to stand for 48hrs for complete extraction of colourant present. pH of the extract was determined to be slightly acid in the range of 6-6.5.

2.3 Titrations

0.1 ml of the extract was added as an indicator for each titration type: Strong acid-strong base (HCl versus NaOH), strong acid-weak base (HCl versus $NaHCO_3$), weak acid-strong base (CH_3COOH versus NaOH) and weak acid-weak base (CH_3COOH versus $NaHCO_3$) of 1M, 2M and 3M respectively. The trials were repeated 3 times to check the precision. The titrations were again performed using phenolphthalein indicator as standard and the results obtained were compared with the results of titrations using the flower extract indicator. The end points of the titrations using the extract were reached when colour changed from yellow to light pink. The results for titrations were shown in the Table 1.

3. RESULTS AND DISCUSSION

The extract from *Nerium indicum* flower was tested for its use as an acid-base indicator and the results was compared with that obtained using phenolphthalein for strong acid-strong base (HCl and NaOH), strong acid-weak base (HCl and $NaHCO_3$), weak acid-strong base (CH_3COOH and NaOH) and weak acid-weak base (CH_3COOH and $NaHCO_3$) titrations. The equivalence point of the titrations using flower extract is almost close or coincides with that of phenolphthalein for all the titrations as shown in Table 1.

The result obtained in the presence study is in cognomen with those in related literature using

Table 1. Parametric result screening of acid base titration

Titrant/Titrand	Indicator	Mean value of titration ±SD
	Phenolphthalein	
1M HCl / NaOH		9.67±0.06
2M HCl / NaOH		9.60±0.15
3M HCl / NaOH		10.10±0.02
1M HCl / $NaHCO_3$		9.77±0.01
2M HCl / $NaHCO_3$		10.20±0.07
3M HCl / $NaHCO_3$		9.86±0.14
1M CH3COOH / NaOH		10.03±0.06
2M CH3COOH / NaOH		10.10±0.04
3M CH3COOH / NaOH		9.53±0.05
1M CH3COOH / $NaHCO_3$		10.03±0.12
2M CH3COOH / $NaHCO_3$		10.10±0.16
3M CH3COOH / $NaHCO_3$		10.20±0.12
	***Neriun indicum* (extract)**	
1M HCl / NaOH		9.83±0.06
2M HCl / NaOH		9.45±0.11
3M HCl / NaOH		10.40±0.13
1M HCl / $NaHCO_3$		10.03±0.12
2M HCl / $NaHCO_3$		10.10±0.21
3M HCl / $NaHCO_3$		9.97±0.13
1M CH3COOH / NaOH		10.0±0.06
2M CH3COOH / NaOH		9.70±0.05
3M CH3COOH / NaOH		9.50±0.05
1M CH3COOH / $NaHCO_3$		10.70±0.04
2M CH3COOH / $NaHCO_3$		9.90±0.12
3M CH3COOH / $NaHCO_3$		10.70±0.11

different plant extract [7,10], however there was slight difference in the result as compared with the one obtained in [15]. This show usefulness of flower extracts as an indicator in acid- base titration and its use in weak acid-strong base was found to be more significant over standard indicator as it gives sharp colour change.

4. CONCLUSION

The results obtained in all the types of acid-base titrations in the present study revealed that the *Nerium indicum* extract could effectively be used as acid-base indicator (and subsequently substitute phenolphthalein synthetic) indicator owing to the factors like wild availability of the flower, simple preparation, and good performance, precise and accurate results.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

The authors wishes to acknowledge Dr. N. L. Vyas and Dr. Kamlesh Gautam; faculty of applied science, Jodhpur National University India, for their immense contribution toward the completion of this research work.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Izonfuo WAL, Fekarurhobo GK, Obomanu FG, Daworiye LT. Acid-base indicator properties of Dyes from local Plants I: Dyes from *Basella alba*. (Indian spinach) and *Hibiscus sabdariffa* (Zobo). J. Appl. Sci. Environ. Mgt. 2006;10(1):5-8.
2. Pimpodkar NV, Shikalgar S, Shinde N, Bhise S, Surve B. *Rhoeo syathacea* and *Allamanda cathartic* extract as a natural indicator in Acidimetry-Alkalimetry. Asian. J. Pharm. Ana. 2014;4(2):82-84.

3. Abugri1 DA, Apea OB, Pritchett G. Investigation of a simple and cheap source of a natural indicator for acid-base titration: Effects of system conditions on natural indicators. Green Sustainable Chem. 2012; 2:117-122.
4. Eze SO, Ogbuefi RA. Analytical potentials of dye extracts from *Aspilia africana* (Oramejula) flowers. Asian J. Nat. Appl. Sci. 2014;3(1):54-60.
5. Pimpodkar NV, Surve BS, Bhise SH. Use of *Argyreia cuneata* flower extract as a natural indicator in acid base titration. J. Curr. Pharma. Res. 2014;4(2):1124-1127.
6. Pathade SK, Patil SB, Konda-war N, Magdum CS. Morus alba fruit-herbal alternative to synthetic acid base indicators. Int. J. Chem. Tech. Res. 2009; 3(1):549-551.
7. Bhise SH, Shinde NG, Surve BS, Pimpodkar NV, Shikalgar SS. *Acalypha wilkesiana* as natural pH indicator . Int. J. Nat. Prod. Res. 2014;4(1):33-35.
8. Jaspreet S, Kanika A, Parminder N, Geeta D. Herbal indicators as an upcoming trend in titrimetric analysis. Int. J. Pharma. 2011; 2(4):177-179.
9. Vaibhav GN, Vishal BK, Prashant DN, Ganpatrao NM, Suresh TS, Ashish SS. Study of *Nerium odoratum* as natural, economical and effective alternative to synthetic indicator and litmus paper. Intl. J. Pharm. Chem. Sci. 2014;3(2):440.
10. Abbas SK. Study of acid-base indicator property of flowers of *Ipomoea biloba*. Int. Curr. Pharm. J. 2012;1(12):420-422.
11. Eze SO, Ogbuefi RA. Analytical potentials of dye extracts from *Aspilia africana* (Oramejula) flowers. Asian J. Nat. Appl. Sci. 2014;3(1):54-60.
12. Gupta P, Jain P, Jain PK. Dahalia flower sap a natural resource as indicator in Acidimetry and alkalimetry. Int. J. Pharm. Tech. 2013;4(4):5038-5045.
13. Patrakar R, Gond N, Jadge D. Flower extract of *Jacaranda acutifolia* used as a natural indicator in acid base titration. Int. J. Pharmtech Res. 2012;2(3):1954-1957.
14. Nwosu FO, Adekola FA, Ihedioha KC. Simple titrimetric colour indicators from some natural flower petals. Centre Point (science edition). 2004;12(1):74-89.
15. Saini P, Kannapan N, Kumar P, Diwan A, Antil V, Sharma S, Singh S. CNS activity of *Nerium indicum* flower part. Res. J. Pharm. Bio. Chem. Sci. 2010;1(3):546 -550.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/11933