

## SYNTHESIS OF NATURAL INDICATOR AND PH INDICATOR PAPER WITH SPATHODEA FLOWER EXTRACT

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**Abstract :** In present work we have synthesized natural indicator from Spathodea flower ethanol extract. In laboratory titrimetric experiments it has been compared with regular synthesized indicators. Our natural indicator showed comparable results for acid base titrations with distinct colour change. Spathodea flower extract showed different colors in acidic and basic medium at  $\lambda_{\max}$  530nm and 400nm. Its applicability was checked for milk and lime juice. Study was extended with preparation pH indicator paper with pink and blue colour change in acidic and basic media. Finally it concludes that the prepared indicator is natural, economical and effective alternative for synthetic indicator.

**Key words:** Natural indicator, spathodia flower, litmus paper, acid base titration

**Introduction:** A good indicator is a weak acid or weak base that is slightly soluble in water. The indicator used in the acid-base titrations generally is commercial indicators. Commercial indicators are relatively expensive and have a toxic effect on the user and can also cause environmental pollution. In addition, the commercial indicator has weaknesses such as lack of availability problems. (Abbas S. K., 2012) For this reason, it has been a lot of research to find an alternative to substitute the commercial indicators with natural indicators derived from the natural products. These alternatives will be cheaper, more available, easier to be extracted, less toxic to the user and environmental friendly (Tukiran, Wardana A. P. 2018).

Indicators are dyes or pigments that can be isolated from a variety of sources, including plants, fungi, and algae. Almost any flower which is red, blue, or purple in color contains a class of organic pigments called anthocyanins that change color with pH. The use of natural dyes as acid-base indicators was first reported in 1664 by Sir Robert Boyle in his collection of assays "*Experimental History of Colours*" (Chavan H. et al. 2017). Indicators are pigments or dyes that can be isolated from a variety of sources, including plants, fungi, and algae (Pimpodkar N. V. et al. 2014, Pimpodkar N. V. et al. 2014). Virtually any flower that is red, blue, or purple in

colour contains a class of organic pigments known as anthocyanin that can change colour with pH (Bhise S. H. et al. 2014). Some naturally coloured substances change colours when the acidity or alkalinity of their environment changes, for example, grape juice, brown tea, and some flower pigments. These substances are called acid/base indicators (Ikoku C. et al. 1984). Indicators change colour at a particular stage of chemical reaction (Stanley I. R. et al. 2015).

Some scientists have successfully tried to invent the herbal indicators such as methanolic extract of the flowers of *Tagetes erecta* (Elumalai A. et al. 2012), petal extract of *Rosa hybrid cv. Menu Pearl* and *cv. Cri Cri* (Bisht S. et al. 2012), fresh flowers of *Dianthus plumarius* and *Antirrhinum majus* (Sidana J. et al. 2011), *Morus alba* (Pathade K. S. et al. 2009), waakye leaves (Abugri D. A. et al. 2012), Methanolic extract of *Rosa indica* (Bhagat V. C. et al. 2008), Methanolic fruit extract of *Punica granatum*, *Hibiscus rosasinensis* (Agrawal S. et al. 2011), *Napoleon vogelii* (Gupta P. et al. 2012), *Nerium odoratum* (Nikam V. G. et al. 2014).

In present study, we used *Spathodea* flower ethanolic extract as natural and effective indicator for acid-base titration. Also developed pH strips for mobile use an effective and economical choice to litmus paper. The *Spathodea* plant has use as only ornamental plant in garden and at roadside.

### **Experimental:**

**Preparation of Indicator :** The petals of *spathodia* flower were collected and air dried. Then these petals were crushed and grinded powder was dissolved in ethanol. The extract was stirred for few minutes and filtered with Whatman filter paper No. 1 the extract was diluted with ethanol and the indicator is ready to use.

**Preparation of pH paper indicator:** The extract was not only developed and used as indicator but also generated pH indicator strip. Whatman filter paper No 1. And 41 were soaked in concentrated extract in ethanol for 24hr. and tested for the developing the strip as pH indicator alternative to litmus paper. We got the better result it was better exercised for various applications. In acidic medium it showed light orange color while in basic medium it showed blue color to strip.

### **Result discussion**

**Color change at various PH:** The color change has invented for pH range from 1 to 12. The color change has different wavelength values mainly acidic range it showed  $\lambda_{max}$  530  $\pm$  5nm while basic pH range showed  $\lambda_{max}$  values 400  $\pm$  5nm. In

spectrum has been taken with UV – VIS spectrophotometer. The spectrum of acidic and basic pH solution is the color change can observed with naked eye only, which may reveals indicator sensitivity towards pH

**Titration:** The developed indicator tested for all three types of acid base titration viz. strong acid Vs (Verses) strong base (  $\text{HCl}$  Vs  $\text{NaOH}$  ), weak acid vs strong base ( $\text{CH}_3\text{COOH}$  Vs  $\text{NaOH}$ ), And strong acid Vs weak base ( $\text{HCl}$  Vs  $\text{NH}_4\text{OH}$ ). The sharp end point was observed for all types.

**Application of pH paper:** The application for titration was used in regular manner in laboratory along, with this our developed the pH paper strip was used for various application and confirmed. (1)milk and (2) lime juice.

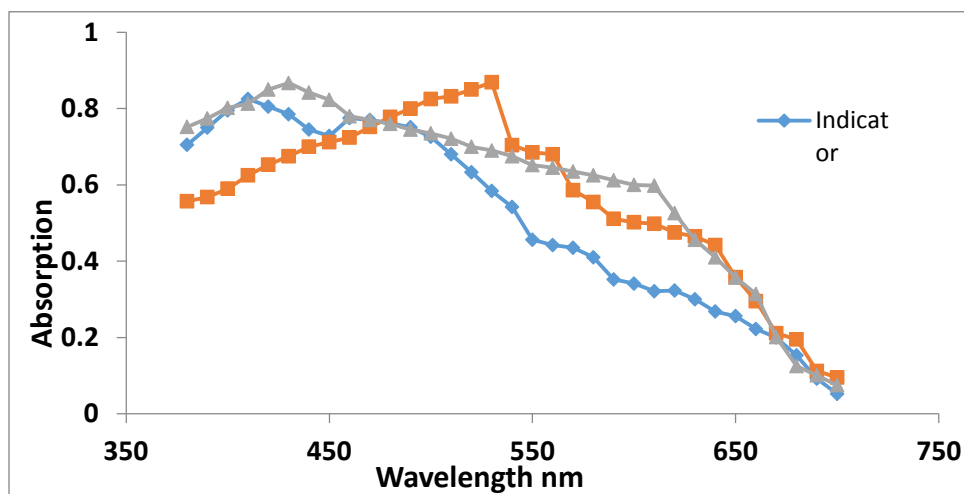


Fig. 1 Absorbance of indicator at various wavelengths

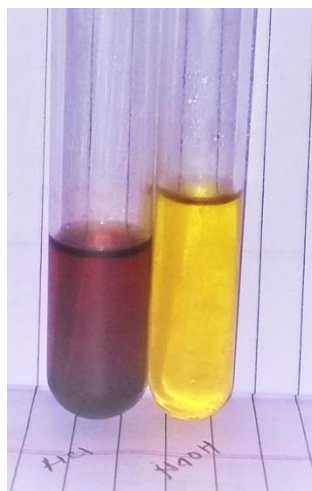


Fig. 2.Indicator colour change in HCl and NaOH

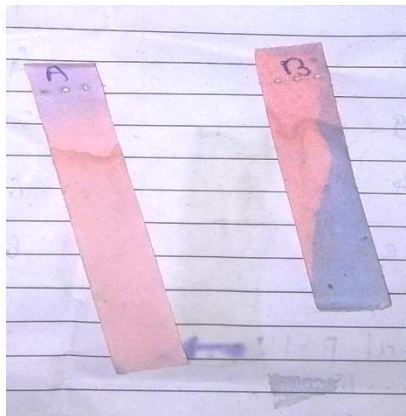


Fig. 3 Litmus paper in acid and base media

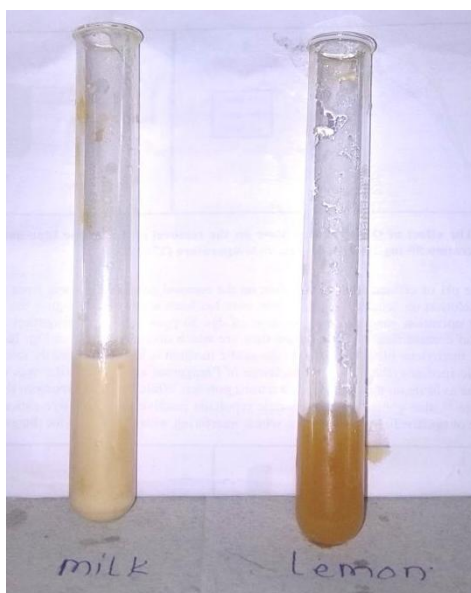


Fig. 4 Real samples like milk, lime juice by addition of indicator

**Conclusion:** In the present study spathodia alcoholic extract was used as natural indicator for acid base titration and pH indicator strip as base alternative for litmus paper. The preparation of indicator and pH strip is very easy and students friendly which can easily applied to collage laboratory. The color change in acidic and basic condition for extract and strip is pink and blue having about  $\lambda_{\max}$ - 530 nm and  $\lambda_{\max}$ - 400 nm respectively the pH strip can use for various applications as primary determination. Finally it may be concluded that the prepared indicator is green natural economical and better alternative to synthetic indicator and litmus paper.

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