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A NATURAL INDICATOR FROM RHIZOMES OF CURCUMA LONGA (TURMERIC)

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ABSTRACT

The present study was designed to evaluate the extracted solution from Rhizomes of curcuma longa (Turmeric) as a titration Indicator. A comparative study of curcuma longa a natural indicator with synthetic indicator ie.Phenophthalein, methyl orange were carried out to determine the accuracy of curcuma longa as an Acid-Base indicator .the results indicated curcuma longa can be used acid base titration, becausesimilar results were obtained by phenolphthalein and methyl orange. The used of curcuma longa is easy availability, inertness, easy of preparation and cost effectiveness as compared to synthetic indicator. Curcuma longa extracted solution can be used to differentiate solution and it showed different colors each pH range from.

KEYWORDS- *Curcumalonga, Indicator, Phenolphthalein, Methyl orange.*

INTRODUCTION

Indicator solution is a substance that has a different color an acid, alkaline and neutral. As a result the solution can be used to distinguish acid, alkaline, and neutral.[Sarita Kadam, AdhikraoYadav,Vijay Raje, KarishmaWaghmare,2013].

Indicators can be classified into two main classes according to their source.

1. Synthetic indicators- it includes all the synthetically prepared acid base indicators.

2. Natural indicators- It includes natural flowers, fruits and other plant parts as acid-base indicator. [Pokharna Gaurav ,Jain Naveen Kumar, Nalwaya Narendra, Chatap V.K.,2010].

commercial indicators are expensive and some of have toxic effects on users and can also can be environmental pollution for these reasons there has been an increasing interest in searching for alternatives sources of indicators from Natural indicators .these alternatives would be cheaper ,more available, simple to extract, less toxic to users and environmentally friendly.[Daniel A.Abugri, Ohene

B.Apea,Gregory Pritchett,2012] Curcuma longa (Turmeric)and several other spices of the curcuma genus grow wild in the Indian Ayurveda system of herbal medicine ,turmeric known as strengthening and warming to the whole body.[DebijitBhowmik,Chiranjib,K.P.SampathKumar,Mar gretChandira,B.Jayakar,2009] the main constituent of turmeric is curcumin. Curcumin a polyphenol that gives turmeric its color. The other constituent present are volatile oils including turmerone, atlantone and zingiberone, sugars, proteins and resins.[Harshal Pawar, Mugdha karde, Nilesh Mundle,, Pravin Jadhav, kavitaMehra,2014]

Curcumin is pH indicator in acidic solution (pH < 7.4) it turns yellow, whereas in basic (pH >8.6) solution it turns bright red. [Nitesh Kumar, Sunil Kumar Sakhya, 2012].

Due to presence of curcumin as an active constituent and the volatile oils turmeric is widely used as a medicine for the treatrment of many ailments.it is vastly used as an anti-inflammatory agent.[Harshal Pawar, Mugdha karde, Nilesh Mundle,, Pravin Jadhav, kavita Mehra,2014] the rhizomes extract had been studied for its anticancer activity.[Singh G., Sharma S., Choudhary N., Yadav S.,2012] it is natural antiseptic and antibacterial agent,useful in distinfecting cuts and burns, natural liver detoxifier, prevent and slow the progression of Alzheimer disease by removing amyloid plague buildup in the brain .[DebijitBhowmik,Chiranjib,K.P.SampathKumar,Mar gretChandira,B.Jayakar,2009] it is antioxidant ,antiviral, immunosuppressive activity in-vitro and in animals.[7]

Table no.1 Phramacongnostical details Turmeric.[S.B.Gokhale, Dr. C.K.Kokate,2005].

Sr.no.	Heading	Features
1.	Synonyms	Halad,curcuma
2.	Biological source	Curcuma longa
3.	Parts used	Rhizomes
4.	Family	Zingiberaceae
5.	Color	Yellowish orange
6.	Odour	Characteristics
7.	Taste	Slightly bitter
8.	Size	2-5 cm in length, 1-2 cm in thickness
9.	Shape	Round, ovate or oblong, cylindrical and short Branched.
10.	Extra features	Rootsscars and imparts yellow color to fingers during handling and shows presence of fibers.

Fig.no.1 Turmeric plant

MATERIALS AND METHODS

1. Collection of Rhizomes –

The rhizomes of curcuma longa (Turmeric) were collected from local area of Tarhadi (Maharashtra) and then rhizomes were washed with water to remove the dust.

2. Apparatus and chemicals-

Burette, mortar pestle, Ammonia, Acetic acid, hydrochloric acid, sodium hydroxide, methyl orange, and phenolphthalein of analytical grad were used.

3. Preparation of Reagents-

0.1 M each of Ammonium hydroxide, acetic acid,hydrochloric acid, sodium hydroxide and methyl orange, and phenolphthalein solution were prepared as per Indian Pharmacopoeia (IP 1996).[Indian Pharmacopoeia-1996].

4. Preparation of Turmeric extract-

5 gm. of rhizomes of curcuma longa were cut into small pieces and triturated in mortarpestle by adding 10 ml of water and cool it then filter the extract solution and used as indicator.

Fig.no.2 Turmeric Extract (Curcuma longa)

5. Experimental procedure-

The extract solution of curcuma longa was filled in a petridish and then properly sized strips of what man filter paper were dipped in it for 6-7 hours and finally dried at 25-35^{0}C. Then these papers were dipped in acid solution (0.1 M HCl) and in basic solution (0.1 M NaOH) and color changed were observed .paper showed in yellow color in acidic solution and brownish red color in basic solution.

The calibration of apparatus like burette, pipettes and other required instruments and standardization of acid and bases were done as per procedures given in Indian pharmacopoeia 1996.

10 ml of titrant with 2 drops of indicator curcuma longa was titrated against titrants and the color changes for the indicator is listed table no.2The results of screening for strong acid-strong base (HCl-NaOH),strong acid-weak base(HCl-NH_4OH),weak acid-weak base(CH_3COOH-NH_4OH),weak acid – strong base(CH_3COOH-NaOH) are listed in table no. 3 and 4 .Each titration is carried out ten times by using 0.1 M strength of acid and alkali then results were recorded as per method.

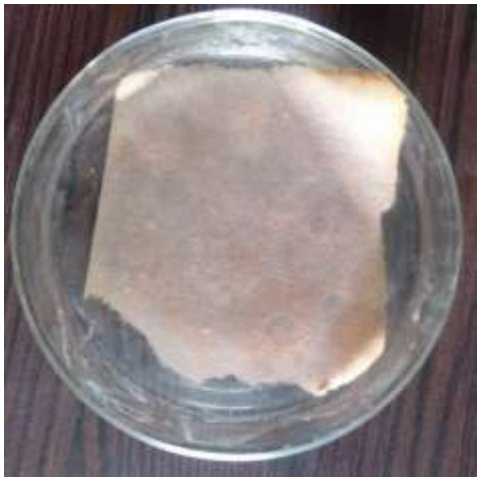

Fig. no. 3 Brownish color in Basic solution

Fig. no. 4 yellow color in Acidic solution

RESULTS AND DISCUSSION

By using strong acid, strong base,weak acid, weak base in differentcombinations and along with synthetic and natural indicator result can be concluded in terms of difference in volume consumed of a particular acid or base in given set of combination.

In case of strong acid and strong base, volume consumed with phenolphthalein and curcuma longa are almost similar, differing only 0.5 ml and pH at end point point was same both cases 7-8.since difference in volume is not significant and pH at the end point is alsosame, so we can say that Curcuma longa can be used in place of phenolphthalein.

In case of weak acid and strong base, volume consumed with phenolphthalein and curcuma longa are almost similar , differing only by 0.3 ml but pH at end point was differ in 0.3 almost same .So we can say that Curcuma longa can be used in place of phenolphthalein.

In case of strong acid and weak base, volume consumed with methyl orangeand curcuma longa are nearly similar, differing only 1.7 ml and pH at end point point was same both cases7-7.1.since difference in volume is not significant and pH at the end point is also same, so we can say that Curcuma longa can be used in place of Methyl orange.

In case of weak acid and weak base, volume consumed with methyl orange and curcuma longa are almost similar, differing only 1.8ml and pH at end point point was same both cases 7-7.3.since difference in volume is not significant and pH at the end point is also same, so we can say that Curcuma longa can be used in place of Methyl orange.

Table no. 2 Curcuma longa (Turmeric)

Titrant	Indicator	Color (at initial point)	Titrate	Color (at end point)
HCl	Curcuma longa	yellow	NaOH	Brownish red
CH_3COOH	Curcuma longa	yellow	NaOH	Brownish red
HCl	Curcuma longa	yellow	NH_4OH	Brownish red
CH_3COOH	Curcuma longa	yellow	NH_4OH	Brownish red

Table no.3 volume of titrate with standard indicator.

Chemicals		volume of titrate required for equivalent point with titrant(10 ml) with indicator	
Titrant (0.1M)	Titrate(0.1M)	Standard Indicator	Curcuma longa
HCl	NaOH	7.5 ± 0.02 (ph.Ind.)	8.0 ±0.2
CH_3COOH	NaOH	9.7 ± 0.02 (ph.Ind.)	10.2 ±0.02
HCl	NH_4OH	19.3 ±0.48 (M.O.Ind.)	2 1 ±0.03
CH_3COOH	NH_4OH	19.6 ±0.3 (M.O.Ind.)	21.4 ± 0.04

Ph.Ind. -Phenophthaleinindicator; M.O.Ind. - Methyl orange indicator

Table no .4 pH of the solution at End point of titration.

Solution	pH
HCl andNaOHwith ph.Ind.	7.4
HCl and NaOH withC.L.Ind.	7.9
CH_3COOH and NaOHph.Ind.	8.2
CH_3COOH and NaOH C.L.Ind	8.5
HCl andNH_4OH with M.O.Ind.	7.0
HCl and NH_4OH with C.L..Ind.	7.1
CH_3COOH andNH_4OHwithM.O.Ind	7.024
CH_3COOH and NH_4OH withC.L.Ind	7.32

Ph. Ind. -Phenolphthalein indicator; M.O.Ind. - Methyl orange indicator C.L. Ind. - Curcuma longa indicator

Fig no.5 Acid –Base titration with Synthetic indicator

Fig no.6 Acid-Base titration with Curcuma longa extract

CONCLUSION

Natural indicators are the results of ever increasing demand of mankind towards better alternatives, which not only reduces cost but also healthful to the user and on the all results obtained by natural indicator is similar to that of available synthetic indicator.

Extract obtained from rhizomes of curcuma longa can be used as acid base indicator in titration of strong acid with strong base with similar results as obtained by phenolphthalein .the rationale behind using curcuma extract in preference to phenolphthalein is easy availability, inertness, low cost, and ease of preparation.

Conflict of Interest- None.

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