

DETERMINATION OF STABILITY OF VITAMIN C PRESENT IN DIFFERENT COMMERCIAL FRUIT JUICES

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ABSTRACT

The objective of this study is to determine the stability of vitamin c present in different marketed juices. Different marketed juices (Minute maid-Pulpy orange, Minute maid- pulpy orange, Mogu mogu- Strawberry, Freshzo lemon drink) were purchased from the market and stored at refrigerator condition. For determination of ascorbic acid present in all juices colorimetry and iodometry were performed. We have done the study for 7 days. This study reveals that the degradation of ascorbic acid is high in mosambi juice when compared to that of other juices. Strawberry juice is less degraded compared to all other

juices because it contains more amount of jelly and less concentration of sugar. We cannot store any marketed products more than 7 days because they are held in plastic containers. Iodometry and colorimetry were performed for this study. Here the results of colorimetry were very sensitive compared to iodometry. Iodometry was preferable because it is economical.

KEYWORDS: Minute maid, ascorbic acid, iodimetry, colorimetry, refrigerator, storage, stability and degradation.

INTRODUCTION

Vitamin C, also known as L-ascorbic acid ((5R)-5-[(1S)-1,2-dihydroxyethyl]-3,4-dihydroxy-2,5-dihydrofuran-2-one), is a water-soluble vitamin that is naturally present in some foods, added to others, and available as a dietary supplement. Humans, unlike most animals, are unable to synthesize vitamin C endogenously, so it is an essential dietary component. Vitamin C is required for the biosynthesis of collagen, L-carnitine, and certain neurotransmitters; vitamin C is also involved in protein metabolism. Collagen is an essential component of connective tissue, which plays a vital role in wound healing. Vitamin C is also

an important physiological antioxidant and has been shown to regenerate other antioxidants within the body, including alpha-tocopherol (vitamin E). Fruits and vegetables are the best sources of vitamin C. Citrus fruits, tomatoes and tomato juice, and potatoes are major contributors of vitamin C to the American diet. Other good food sources include red and green peppers, kiwifruit, broccoli, strawberries, Brussels sprouts, and cantaloupe. Although vitamin C is not naturally present in grains, it is added to some fortified breakfast cereals. The vitamin C content of food may be reduced by prolonged storage and by cooking because ascorbic acid is water soluble and is destroyed by heat. pH, light, humidity, other components, storage conditions, container also alter stability of ascorbic acid. According to literature review stability of ascorbic acid present in juices was determined by using methods like iodometry, colorimetry, UV-Visible spectroscopy and chromatography.

Structure.

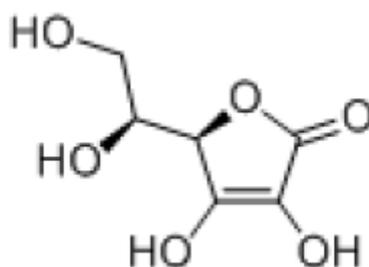


Fig 1: Structure of Vitamin.C.

METHODOLOGY

IODOMETRIC TITRATION

Preparation of 0.05M iodine solution

Weigh 1.75g of iodine in a solution of 4.5g of potassium iodide in 50 ml water and add 3 drops of hydrochloric acid (HCl) and makeup to 250ml water in volumetric flask.

Preparation of starch solution

Titrate 1g of starch with 5ml of water and stir continuously to 100ml of boiling water containing 10mg of mercuric iodide.

Preparation of 10% Hydrochloric acid (HCl)

Measure 10ml concentrated HCl and dilute with 100ml distilled water.

Preparation of 1M sodium hydroxide

Dissolve 10.5g of NaOH in sufficient carbondioxide free water to produce 250ml.

STANDARDIZATION OF 0.05 M IODINE SOLUTION

Weigh 0.07g of arsenic trioxide, previously dried at 105°C for 1hour and dissolve in 10ml of 1M sodium hydroxide by warming if necessary. Dilute with 20ml of water. add 0.1ml of methylene orange solution and add drop wise dilute HCl until the yellow colour is change to pink. Add 1g of sodium carbonate. dilute with 25ml water and add 3ml of starch solution. Titrate with iodine solution until a permanent blue colour is produced.

Procedure

Measure 25ml of juice sample in a conical flask and titrate with iodine solution. Colour that persists longer than 20seconds.

COLORIMETRY**Preparation of 0.1N oxalic acid**

Weigh 1.26g of oxalic acid and dilute with 200ml distilled water.

Preparation of acetate buffer at pH 4.2

Weigh 0.068g of sodium acetate and add 3.85g of ammonium acetate in 250ml of distilled water and add 12.5ml of glacial acetic acid solution.

Preparation of 0.01% methylene blue

Weigh 1g of methylene blue and dilute with 100ml distilled water.

Preparation of sample

Different samples were purchased from market.

1. Minute maid- Mosambi
2. Minute maid- pulpy orange
3. Mogu Mogu - strawberry juice drink.
4. Freshzo lemon drink.

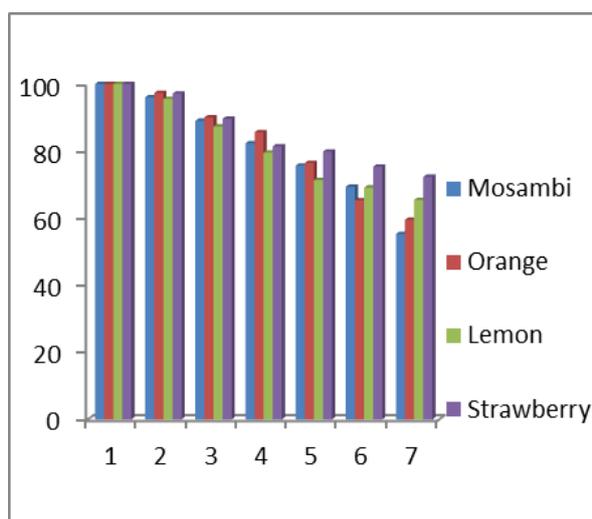
PROCEDURE

Measure 20ml of oxalic acid and add 0.2ml of 0.01% of methylene blue and add 1ml of acetate buffer of pH 4.2 and add 1ml of sample solution and measure the absorbance at 540nm.

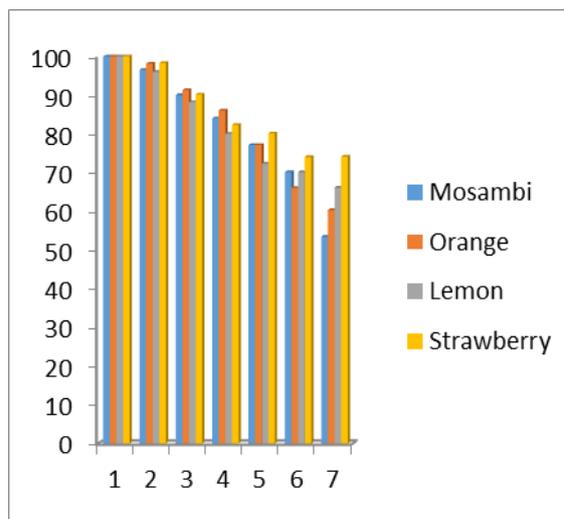
RESULTS

Assay of Ascorbic Acid

Day	Mosambi		Orange		Lemon		Strawberry	
	Iodometry	Colorimetry	Iodometry	Colorimetry	Iodometry	Colorimetry	Iodometry	Colorimetry
1	100	100	100	100	100	100	100	100
2	96	96.5	97.3	98.1	95.5	96	97.1	98.3
3	89	90	90	91.3	87.3	88.2	89.6	90.1
4	82.3	84	85.6	86	79.5	80	81.4	82.3
5	75.6	77.1	76.4	77.1	71.3	72.3	79.8	80.1
6	69.3	70.1	65.3	66	69.1	70.1	75.3	74
7	55.2	53.4	59.5	60.3	65.4	66.1	72.3	74.1



IODOMETRY ASSAY



COLORIMETRY ASSAY

DISCUSSION

We have done the study for 7 days.

Mosambi: Degradation of ascorbic acid was more in mosmbi juice because of high concentration. More degradation with microbial growth observed on 7th day under refrigerator conditions.

Orange: Degradation of ascorbic acid is not degraded more as compared to that of mosambi because the concentration is low as compared to mosambi. More degradation with microbial growth observed on 7th day under refrigerator conditions.

Freshzo: Degradation of ascorbic acid was slow in freshzo lemon juice. More degradation with microbial growth observed on 7th under refrigerator conditions.

Strawberry: Degradation of ascorbic acid was very slow in fresh lemon juice as compared to the fresh. More degradation with microbial growth observed on 7th under refrigerator conditions.

CONCLUSION

Because of higher concentration of ascorbic acid and presence of sugars degradation was more in mosambi juice and orange juice respectively. Under refrigerator conditions degradation occurs slowly because of low temperature but degradation ascorbic acid was occurred due the exposure of humidity. Water catalyses chemical reactions as oxidation, hydrolysis and reduction reaction and promotes the microbial growth. In Fresh lemon juice and strawberry juice degradation was slow because of less concentration and absence of sugar content in lemon juice. But ascorbic acid was affected by humidity and temperature leads to degradation.

Hence we can conclude that lemon juice and strawberry were degraded very slowly when compared to other juices because of the presence of less concentration of sugars. When comparing results of colorimetry and iodometry sensitivity was more for colorimetry, but the results of colorimetry and iodometry are near to each other. Hence we can tell that iodometry method is economic and easy method for estimation of ascorbic acid present in lemon juices.

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