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Determine the Ascorbic Acid Content in Selected Fruits by Using Iodine Solution in Redox Titration Method and Application of Ascorbic Acid

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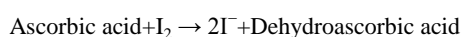
ABSTRACT

Ascorbic acid was present in some selected fruits like apple, banana, guava, kiwifruit, mango, orange and papaya. All fresh fruits were perches from a market and pulp was separate from peel. Determine ascorbic acid content in selected fruits by using iodine solution in redox titration method. This method was straight forward than the other alternative methods were used. Ascorbic acid content was highest in mango 51.19 mg/100 g and lowest in guava 10.41 mg/100 g among the different fruits tested. Application of ascorbic acid is in pharmaceutical industry, food industry, cosmetic industry and various technological processes.

Keywords: Ascorbic acid, Content, Selected fruits, Iodine solution, Redox titration

INTRODUCTION

Ascorbic acid is important vitamin than other vitamins are present in fruits and vegetables. It is the major water soluble antioxidant and an essential needed by the human body. The determine ascorbic acid content in selected fruits by using iodine solution in redox titration method. The presence of iodine the ascorbic acid is oxidized to dehydroascorbic acid due to the iodine is reduced to iodide ions.



The excess iodine is reacts with starch as indicator to give blue-black colour due to starch-iodine complex at the endpoint of titration. Ascorbic acid is a water soluble vitamin and naturally present in some foods [1]. Humans are unable to synthesize ascorbic acid endogenously and it is consumed as essential dietary component [2]. Ascorbic acid is one kind of physiological antioxidant [3] and also regenerates other antioxidants within the body, including alpha-tocopherol (vitamin E) [4].

Ascorbic acid is required in many reactions involved in body processes, including collagen and some synthesis [5]. Ascorbic acid is essential for the scurvy prevention, healthy skin, gums and blood vessels. It functions as an antioxidant. It is also reduced the risk of arteriosclerosis, cardiovascular diseases and some forms of cancer [6-9]. Fruit juices and vegetables are beneficial for health effects. Ascorbic acid is natural antioxidant for major clinical conditions including cardiovascular diseases and cancer [10-12].

MATERIALS AND METHODS

Samples for the study were purchased in local market. All samples were thoroughly cleaned using deionized water to remove adhering contaminants. The samples were analyzed on the same day of purchase to prevent any changes.

Preparation of solutions

Iodine solution

0.005 mol/L: Accurately 2 g weight of potassium iodide and 1.5 g of iodine than few ml of distilled water take in 100 ml beaker. It is stirring for few minutes until dissolved iodine. This solution transfer in 1 liter volumetric flask than add distilled water up to 1 L mark on it.

Starch indicator solution

0.5% of 0.25 g starch and 50 ml boiling water in a 100 ml conical flask. It is stirring well and cool before use.

Sample preparation

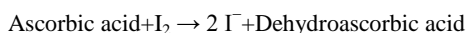
100 g of each fruit pulp and 50 ml of distilled water blended in a food processor. After blending, strain the pulp through cheesecloth. It is wash with 10 ml distilled water. Make the sample solution diluted with distilled water up to 100 ml in a volumetric flask.

Titration method

Pipetting 20 ml of sample solution and 150 ml of distilled water than 1 ml of starch as indicator take into a 250 ml conical flask. Titrate the sample solution with burette reagent as iodine solution. The endpoint of the titration is to give blue-black colour due to starch-iodine complex. Repeat the titration until constant reading obtained.

Calculations

1. Determine the reacting moles of iodine.
2. Determine the reacting moles of ascorbic acid.



3. Determine the concentration of ascorbic acid in mol/L from extracted sample solution.
4. Determine the concentration of ascorbic acid in mg/100 g or mg/100 ml from sample solution.

RESULTS AND DISCUSSION

Ascorbic acid is essential nutrient for life of human. The main source of ascorbic acid is content in fresh fruits and vegetables. Low levels of ascorbic acid can result in a condition called scurvy. Scurvy may cause symptoms such as rash, muscle weakness, joint pain, tiredness or tooth loss. Ascorbic acid plays an important role in the body. It is needed to maintain the health of skin, cartilage, teeth, bone and blood vessels. It is also used to protect body's cells from damage. It is known as an antioxidant.

The ascorbic acid content of the selected fruits was determined by redox titrimetric analysis and results are summarized in Table 1. Ascorbic acid content was highest in mango 51.19 mg/100 g and lowest in guava 10.41 mg/100 g among the different fruits tested. The variation between the above results with those of other investigators for many of the fruit samples analyzed may be explain on the basis of factors that affects ascorbic acid levels in fruits. Climatic factors as light and temperature and chemical composition of horticultural crops [13]. Ascorbic acid content of a fruit is also determined by the level of nitrogen fertilizer used in growing the plant.

Table 1: Ascorbic acid content in selected fruits

S. No.	Name of fruit	Ascorbic acid (mg/100 g)
1	Apple	11.51
2	Banana	18.9
3	Guava	10.41
4	Kiwifruit	16.9
5	Mango	51.19
6	Orange	50.3
7	Papaya	44

Application

Application of ascorbic acid is depend on its chemical properties. Most of production used in pharmaceutical industry. Some people are used for depression, thinking problems, physical and mental stress. Ascorbic acid helps the heart and blood vessels. It is used for hardening of the arteries, heart attack, stroke, high blood pressure and high cholesterol. It is also used for glaucoma, preventing cataracts, dental cavities, heat stroke, asthma, diabetes, collagen disorders, back pain and some cancer. Some are used as an additive to food, improve product quality and stability. It is also protects colour, aroma and nutrient content in fruits and vegetables. It is one kind of nutrient in the food industry. Actually its applications are extend to as an effective ingredient in cosmetic products. It protects skin tissues and cells against ultra-violet radiation, pollutants and other environmental hazards.

Ascorbic acid used as technological functions for food additive: as retardation of oxidative rancidity for fats and oils, curing agent in meat processing, improvement of quality for bread baking, protection of processed fruits and vegetables against enzymatic browning and increased clarity of wine and beer.

CONCLUSION

Ascorbic acid plays very important role in the maintenance of the body system, hence it is imperative to analyze the ascorbic acid levels of some common fruits to compare their various concentrations. In this work, selected fruits contain appreciable amount of ascorbic acid. The variation was due to climatic factor as light and temperature and effects of chemical composition of crops as well as also variation due to level of nitrogen used in growing the plant of fruits.

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