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Identify the Presence of Oxalate Ions in Guava and Sapota Fruits at Various Stages

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Abstract:- The oxalate content of guava and sapota fruits at various stages of ripening were initiate out by permanganometric method. Oxalate rich foods are usually constrained to some degree, particularly in patients with high urinary oxalate level. Guava and sapota fruit have the peak percentage of vitamin C among citrus fruits. It may also contains oxalate amount of which varies with ripening of the fruit. Throughout ripening of guava and sapota fruit; the oxalate content improves progressively and the fully ripe fruit has the extreme oxalate content. Oxalate form an insoluble complex with calcium in the urine, or hyper-oxaluria, is even supplementary vital to stone formation than high levels of calcium or hypercalcicuria. Unwarranted intake of food and drink containing oxalate leads to calcium oxalate stone. Also, excessive intake of vitamin C which metabolized to oxalate may lead to hyper calcicuria and an increase in stone formation. Pain medications can be prescribed for symptom relief. Surgical techniques have also been developed to remove kidney stones.

Keywords:- *Permanganometric method, hyper-oxaluria, hypercalcicuria, vitamin C etc.*

I. INTRODUCTION

Oxalate (IUPAC ethandionate) is the dianion with the formula C2O4 2- also written as (COO)2- 2. either name is often used for derivation, such as salts of oxalic acid for example, sodium oxalate 2((Na)+2C2O4 2- or esters. For example, Dimethyl oxalate ((CH3)2C2O4 also forms coordination compounds where it is abbreviated as ox. Many metal ions from insoluble precipitates with oxalate, a prominent example calcium oxalate, the primary constituents of most common kind of kidney stones. Guava, a native of Central America was introduced to India in the 17th century and lea became naturalised in the state of, Bihar. It is a small profusely branched tree, bearing solitary white flowers. The fruits are intermediate sized globoze with whitish greenish skins. The capsules in a berry with a pulpy edible meso. The guava plant is extremely hardy and can tolerate prolonged dry and drought periods, but not frost. It requires 60.80 inches of rain full. It is capable of upward in poor alkaline or poorly drained soils with pH ranging from 4.5 to 7.5. The plant is propagated by stem and stem cutting. It is a more successful method of cultivation. The plant yields fruits twice a year. The important varieties are Allahabad Safeda, Chiffidas, Lucknow 49, Hafsi, Harijha, Habshie etc. Sapota in a large and decidedly ornamental evergreen tree that can reach a night of 15 to 45 metre. It is mainly propagated by grafting. Which ensures the new plant has the same choolaeteristic as the parent, especially its fruit, as it doesnot raise true to seed. It is also considerably faster than growing trees by seed, producing fruit in 3 to 5 years, growns from seed needs seven years of growth. In florida, the fruit is zaarrested from May to July with some cultivars available all years.

Guava is a common sweet fruit initiate in India and many other places around the world. Guavas are plants in the Myrtle family (Myrtaceae) genus Psidium (meaning “pomegranate” in Latin), which contains about 100 species of tropical shrub. On ripening it turns yellow in color. Rich in vitamin C, this fruit is a rich source of oxalate ion whose content varies during the different stages of maturement. L Guavas have a definite and typical fragrance, like to lemon rind but less in strength.

II. OBJECTIVES OF THE STUDY

- To learning the oxalate content in Guava fruit and Sapota fruit.
- To comparability the oxalate content of different days ripened Guava and Sapota fruit.

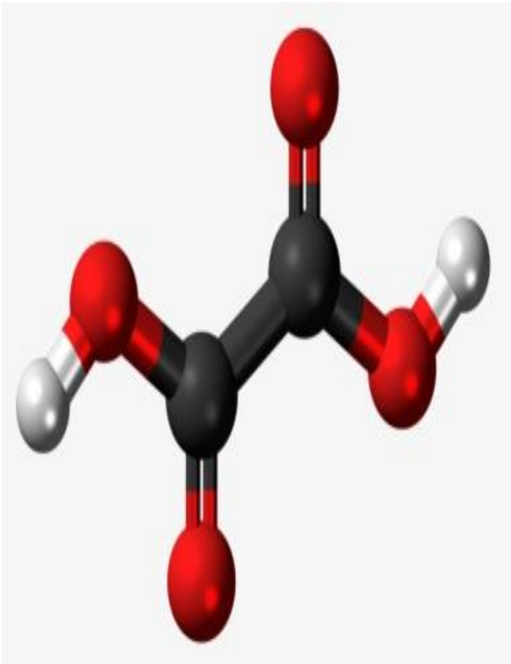

Fig. 1: Oxalate Ion

III. MATERIALS AND METHODS

A. Chemicals required
Dilute H2SO4, N/20 KMnO4 Solution.

B. Apparatus Required
100 ml measuring flask, pestle and motor beaker. Filtration flask, funnel, burette, pipette, filter paper.

Fig. 2: Apparatus used for Procedure

C. Materials Required
Pulp of guava and sapota fruits at various stage of ripening, 0.005N KMnO4 and dil. H2SO4.

Fig. 3: Guava Fruit

Fig. 4: Sapota Fruit

IV. METHODOLOGY

- **Procedure**
The initial step is to standardised KMnO4. In order to stadardise the N/20 KMnO4 solution we prepare 0.05N oxalic acid.

- **Preparation of standard oxalic acid:**
Yield the Weight accurately about 1.2g of oxalic acid and style up into 200ml standard flask using distilled water.

- **Standardisation of KMnO4**
(Standard oxalic acid x KMnO4)
Wedge up with the burette by potassium permanganate solution after washing and rinsing the burette. Pipette out 20 ml of standard oxalic acid solution in to a clean conical flask. Add an equal volume of dilute sulphuric acid and heat the mixture at 60°C. Titratition is done against potassium permanganate solution. The end point is noted the arrival of permanent pale pink colour. So Replication the titration to get concordant value and calculate the normality of potassium permanganate solution.

- **Standardisation of Free oxalate ion present in the given fruit pulps**
Oxalate ions are haul out from the fruit by boiling pulp with dil. H2SO4. The oxalate ion are estimated volumetric by titrating the solution with standard Kmno4 solution. Evaluatet 50.0 gm of fresh guava and crush is to a fine pulp using pestle motor. Assignment the crushed pulp to a beaker and add about 50 ml dil. H2SO4 to it. Boil the content for about 10 min. Unruffled and riddle the content up to 100 ml measuring flask make the volume up to 100 ml by adding distilled water. Pipette out 10ml of this solution into the other 100ml standard measuring flask. Revenue in to a titration flask and add 20 ml of dil H2SO4 acid to it. Heat the mixture to about 60°C and titrate it against N/20 KMnO4 solution taken in a burette. The end point in experiment is noted as of permanent pale pink colour. Reiteration the upstairs same experiment with 50.0 gm of 1, 2, 3 and 4 days old guava fruit. Note the reading of titration.

- **Chemical Equation**
  - Molecular Equation
  $2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 2H_2O + 4[O]$

  $HOOC - COOH.2H_2O + [O] \rightarrow 2CO_2 + 2H_2O \times 5$

  $2KMnO_4 + 3H_2SO_4 + 5HOOC\text{-}COOH.2H_2O \rightarrow K_2SO_4 + 2MnSO_4 + 18H_2O + 10CO_2$

  - Ionic Equation
  $MnO_4^- + 16H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O \times 2$

  $C_2O_4^{2-} \rightarrow 2CO_2 + 2e^- \times 5$

  $2MnO_4^- + 16H^+ + 5C_2O_4^{2-} \rightarrow 2Mn^{2+} + 8H_2O + 10CO_2$

- **Calculation**
  - Calculation of strength of oxalic acid
    Equivalent weight of oxalic acid = 63

    Normality of Oxalic Acid = Weight / liter Equivalent weight

    = 0.7×5 63 Normality of Oxalic acid

    = 0.06 N

  - Calculation of strength of KMnO4
    Volume of oxalic acid V1 = 20 ml

    Strength of oxalic acid N1 = 0.061N

    Volume of KMnO4 V2 = 23

    Normality of KMnO4 N2 = ?

    V1N1= V2 N2

    N2 = V1N1/V2 = 20 x 0.061 / 23

    Normality of KMnO4 (N2) = 0.053N

  - Calculation of amount of oxalate ions in guava fruit
    Weight of guava fruit taken each time = 50 g

    Volume of guava extract taken for each titration = 20 ml

Types of Fruit	Burette Reading		Volume of KMnO4	Concordant Value (Ml)
	Initial Reading	Final Reading		
Fresh fruit	0	5.5	5.5	5.5
	0	5.5	5.5	
One day old	0	7.2	7.2	7.2
	0	7.2	7.2	
Two days old	0	8.2	8.2	8.2
	0	8.2	8.2	
Three days old	0	9.0	9.0	9.0
	0	9.0	9.0	
Four days old	0	9.7	9.7	9.7
	0	9.7	9.7	
Five days old	0	10.2	10.2	10.2
	0	10.2	10.2	

Table 1: Volumetric titration for guava fruit

Normality of the KMnO4 solution used for titration=0.053 N

- For Fresh guava fruit
  Volume of KMnO4 Solution V1 = 5.5 ml

  Normality of KMnO4 solution N1 = 0.053 N

  Volume of guava fruit extract V2 = 20 ml Normality of the oxalate ions in the guava extract N2 =?

  V1N1 = V2N2

  N2 = V1N1/V2 N2

  = 5.5 x 0.053/20

  = 0.014575 N

  Amount of oxalate ions in 1000g fresh guava extract

  = N oxalate x 44 x 100/1000 x 1000/50 g/litre

  = 0.03084 x 44 x 2 = 1.2826 g/litre

- Calculation of amount of oxalate ions in Sapota fruits
  Weight of Sapota fruit taken each time = 50 g

  Volume of Sapota extract taken for each titration = 10 ml

Types of Fruit	Burette Reading		Volume of KMnO4	Concordant Value (Ml)
	Initial Reading	**Final Reading**		
Fresh fruit	0	9.5	9.5	9.5
	0	9.5	9.5	
One day old	0	10.0	10.0	10.0
	0	10.0	10.0	
Two days old	0	11.2	11.2	11.2
	0	11.2	11.2	
Three days old	0	11.8	11.8	11.8
	0	11.8	11.8	
Four days old	0	12.5	12.5	12.5
	0	12.5	12.5	
Five days old	0	13.2	13.2	13.2
	0	13.2	13.2	

Table 2: Volumetric titration for Sapota fruit Normalit

Normality of the KMnO4 solution used for titration

= 46 N

- For Fresh sapota fruit
  Volume of KMnO4 Solution V1 = 9.5 ml

  Normality of KMnO4 solution N1 = 0.053 N

  Volume of sapota fruit extract V2 = 20 ml

  Normality of the oxalate ions in the sapota extract N2 =?

  V1N1 = V2N2

  N2 = V1N1/V2 N2

  = 9.5 x 0.053/20

  = 0.025175 N

  Equivalent weight of oxalate ion = 44

  Amount of oxalate ions in 1000g fresh sapota extract

  = N oxalate x 44 x 100/1000 x 1000/50 g/litre

  = 0.025175 x 44 x 2 g/ litre

  = 2.2154 g/litre

V. RESULT AND DISCUSSION

The oxalate content of guava and sapota fruits at varoius stages of ripening were found out by permanganometric method. Their results are specified as

Sample	Weight of oxalate ion in 50g of guava fruits (g/litre)
Fresh guava	1.2826
First day guava	1.6790
Second day guava	1.9122
Third day guava	2.0988
Fourth day guava	2.2620
Fifth day guava	2.3786

Table 3: Amount of oxalate ions in 1000g fresh guava extract

Sample	Weight of oxalate ion in 50g of guava fruits (g/litre)
Fresh Sapota	2.2154
First day Sapota	2.332
Second day Sapota	2.6118
Third day Sapota	2.7518
Fourth day Sapota	2.915
Fifth day Sapota	3.0782

Table 4: Amount of oxalate ions in 1000g fresh Sapota extract

From the above table it was initiate that the amount of oxalate content varies with ripening of fruits. Among the five days of guava and sapota fruits, fresh fruits had minimum oxalate content. As days went on during ripening the oxalate content increased progressive and had the maximum oxalate content in the fully ripe fruit. Oxalate ions are extracted from the fruit by boiling pulp with dilute H2SO4.

Oxalate is a carboxylic acid, primarily found in plants and animals. It is not an indispensable molecule and is excreted form our body, unmovable. Our body either produces oxalate on its own or converts other molecules like vitamin C to oxalate. Peripheral sources like food also contribute to the accumulation of oxalate in our body. The oxalate contemporary in the body is evacuated in the form of urine as waste. Too plentiful of oxalate in our urine results in a medical condition called hyperoxaluria, commonly discussed to as kidney stones. Diet is looked upon as a precautionary portion in addition to medication to treat kidney stones.

VI. CONCLUSION

This project positioned upon guesstimating the amount of oxalate present in the sapota and guava fruits during ripening. The oxalate content was on the surge in both the fruits and the days passed on, that is as the ripening proceeded. It ought be noted that the increase in oxalate content was mere in sapota than in Guava. presence of oxalate in injurious to health. Oxalate rich foods are usually delimited to some degree, predominantly in patients with high urinary oxalate level. Guava and sapota fruit have the highest percentage of vitamin C among citrus fruits. It also contains oxalate expanse of which varies with ripening of the fruit. During ripening of guava and sapota fruit; the oxalate content growths progressively and the fully ripe fruit has the maximum oxalate content. Oxalate form an insoluble complex with calcium in the urine, or hyper-oxaluria, is even more important to stone establishment than high levels of calcium or hypercalcicuria. Unnecessary intake of food and drink containing oxalate leads to calcium oxalate stone. Also, disproportionate intake of vitamin C which metabolized to oxalate may lead to hyper calcicuria and an intensification in stone formation. Pain.

Medications can be prearranged for symptom relief. Surgical techniques have also been technologically advanced to remove kidney stones. Rather than having to undergo treatment, it is best to avoid kidney stone in the first place. Circumvent calcium rich foods and drink more water. Water services to flush away that form stones in the kidneys.

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