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Estimation and comparison of Oxalate ion content in Tomato (red & green) and Brinjal

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ABSTRACT

This paper describes method for estimation of oxalate ion content in tomato and brinjal. Crushed pulp of a fruit or a vegetable is its most useful source to estimate any content in it. The oxalate ion content in a fruit or a vegetable can also be determined by performing a specific procedure on this pulp .The strength of oxalate ion content is determined through the experiment and it is the clear indictor of the amount of oxalate ion content present in that fruit or vegetable. Oxalic acid has various harmful as well as useful effects on our body .The estimation of oxalate ion content hence can be further used for studying the direct effects of that specific fruit or vegetable on our human body.

Keywords: Amount, estimation, experiment, procedure, strength.

I. INTRODUCTION

The tomato is the edible, often red, fruit of the plant Solanum lycopersicum, commonly known as a tomato plant. The plant belongs to the nightshade family, which is called Solanaceae. The species originated in Central and South America. The Nahuatl (Aztec language) word tomatl gave rise to the Spanish word "tomate", from which the English word tomato originates.

Eggplant (Solanum melongena), or aubergine, is a species of nightshade, grown for its edible fruit. Eggplant is the common name in North America, Australia and New Zealand, but British English uses the French word aubergine. It is known in South Asia and South Africa as brinjal. Oxalate (IUPAC: ethanedioate) is the dianion with the formula $C_2O_4^{2-}$. Either name is often used for derivatives, such as salts of oxalic acid, for example sodium oxalate $Na_2C_2O_4$, or dimethyl oxalate ($(CH_3)_2C_2O_4$). Oxalate also forms coordination compounds where it is sometimes abbreviated as ox.

The oxalate ion content in tomato (ripened and fresh) and brinjal will be calculated, determined and compared in the experiment performed by us.

II. CONCEPT

Oxalate ion is present in a variety of fruits and vegetables. The content of oxalate ion present in a specific fruit or a vegetable can be determined by a carrying out experiment on the crushed pulp of that fruit or vegetable. The experiment gives the strength of oxalate ion content which can be directly related to the amount of oxalate ion present in that specific fruit or vegetable.

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II. THEORY

Oxalate ions are extracted from the fruit or vegetable by boiling pulp with dil. H_2SO_4. Then the oxalate ions are estimated volumetrically by titrating the dilution with standard $KMnO_4$ solution.

III.DETAILS OF PROCEDURE

1. Weigh 50 g of fresh (green) tomato pulp and crush it to a fine pulp using pestle and mortar.
2. Transfer the crushed pulp to a beaker and add about 50 ml dil. H_2SO_4 to it. Boil the content for 2 minutes.
3. Cool and filter the contents in a 100 ml measuring flask.
4. Make the volume up to 100 ml by adding distilled water.
5. Take 20 ml of solution from the measuring flask into a titration flask add 20 ml of dil. H_2SO_4 to it.
6. Heat the mixture to about 60^o C and titrate it against N/10 $KMnO_4$ solution taken in a burette. The end point is appearance of permanent light pink colour.
7. Repeat the above procedure for ripened (red) tomato as well as brinjal.

IV. OBSERVATIONS AND NUMERICAL FIGURES

Weight of fruit or vegetable taken each time = 50g

Vol. of pulp extract taken in each titration = 20 ml

Normality of $KMnO_4$ solution = 1/10

Table given below shows the volume of $KMnO_4$ solution used for brinjal and the two types of tomatoes.

VEGETABLE TYPE	VOL. OF KMNO4 SOLUTION USED (ml)
TOMATO (GREEN AND FRESH)	23.3
TOMATO (RED AND RIPENED)	27.6
BRINJAL	13.3

Strength of oxalate in fresh (green tomato) = 5.126 g/litre

Strength of oxalate in ripened (red tomato) = 6.072 g/litre

Strength of oxalate in brinjal = 2.926 g/litre

V. CONCLUSION

From our observations, we can conclude that the oxalate ion content is much more in tomato (ripened or fresh) than in brinjal. We also saw that oxalate ion content in ripened (red) tomato is more than in fresh (green) tomato. Hence we can also conclude that oxalate ion content in tomato increases with ripening.

Advantage :- This technique of estimation of oxalate ion content can be utilized to determine the oxalate ion content in any desired fruit or vegetable as per an individual's need.

Limitation :- The technique finds its use only for the determination of oxalate ion content and no other contents present in a fruit or vegetable can be determined by it.

Applications :- The estimation of oxalate ion content can help in research in many other fields such as various harmful effects of oxalte on our body and its relation with kidney disorders.

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