SUDAN UNIVERSITY OF SCIENCE
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Determination of vitamin C in different natural juices

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الآية

قال تعالى:

﴿ اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ * خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ * اقْرَأْ وَرَبُّكَ الْأَكْرَمُ * الَّذِي عَلَّمَ بِالْقَلَمِ * عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ ﴾

صدق الله العظيم

سورة العلق الآية "1-5"

Dedication

To our parents,

Prathers,

Colleagues

Acknowledgments

All praise is raised to Allah , the merciful and the biggest helper, who gave us the strength and determination to complete this work .

Many sincere thanks to our supervisor Dr: Mohamed ElMukhtar for helpful discussion and valuable advice .

And many thanks to every person who contributed directly or indirectly in this work.

Abstract

Three samples of Sudanese natural juices were analysed to determined the concentration of vitamin C in each of them by using redox-titration. The samples were baobab, hibiscus and aerdab .

The results showed that the concentration of vitamin C was higher in the Baobab than hibiscus juice and then Aerdab juice.

The concentrations of vitamin C were found to be $1.5 \times 10^{-3} M$(5.26418g/l-264.18ppm) , 1.44x10^{-3}m(0.2536g/l- 253.6ppm) and 6.75x10^{-4}M (0.118881g/L- 118.8881ppm).in baobab, hibiscus and aerdab, respectively .

Drinking natural juices is strongly recommended because they contain a high level of vitamin C which helps much metabolic processes in the body that enable the continuation of life .taking much vitamin C is equally harmful to health as taking than needed.

ملخص البحث

تم اختبار ثلاثة عينات من العصائر الطبيعية البلدية لمعرفة تركيز فايتمين سي في كل عصير وأيهما أكثر تركيزاً من الأخر عن طريق معايرة اكسدة واختزال والعينات هي عصير التبلدي و الكركدي والعرديب.

أوضحت النتائج ان تركيز فايتمين سي في عصير التبلدي هو الأكثر مقارنة بعصير الكركدي والعرديب ثم يأتي تركيز عصير الكركدي وأقلاهم تركيزاً عصير العرديب.

بعد إجراء الحسابات على كل من الثلاثة عينات تم إيجاد تركيز فايتمين سي في عصير التبلدي يساوي $5 \times 10^{-3} M(0.26418g/l{-}264.18ppm)$ ، وتركيز عصير الكركدي يساوي $1.44x10^{-3}M(0.2536g/\ l{-}\ 253.6ppm)$ أما تركيز عصير العرديب $6.75x10^{-4}M\ (0.118881g/L{-}\ 118.8881ppm)$.

يجب الإكثار من تناول العصائر الطبيعية البلدية لاحتوائها المركز على فايتمين سي الذي يساعد الجسم في الكثير من العمليات التي تمكن من استمرار الحياة .

الإكثار من تناول فايتمين سي يسبب مشاكل وكذلك قلته إذا يجب معرفة ما يناسب تناوله يومياً وتقسيم الكميات على حسب الأعمار.

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Chapter one

Chapter one

1.1 introduction

Vitamin C or L ascorbic acid or simply ascerbate (the anion of ascorbic acid) is an essential nutrient for humans and certain other animal species .Vitamin C describes several vitamers that have vitamin C activity in animals including ascorbic acide and its salts , and some onidized forms of the molecule like dehydro ascorbic acid.

Ascorbate and ascorbic acid are both naturally present in the body when either of these is introduced into cells , since the forms interconvert according to PH.

Vitamin C is cofactor in at least eight enzymatic reactions including several collagen synthesis reactions that , when dysfunction al , cause the most severe symptoms of scurvy . in animals these reactions are especially important in wound- healing and in preventing bleeding from capillaries . Ascorbate may also act as an antioxidant protecting against oxidative stress.

Ascorbate (the anion of ascorbic acid) is required for arrange of essential metabolic reactions in all animals and plants . it is make internally by almost all organisms the main exceptions are most bats , all guinea pigs , capybaras , and the haplorrhini cone of the two major primates suborders , consisting of tarsiers , monkeys, and humans and other apes . A scorbate is also not synthesized by some species of birds and fish . all species that do not synthesize ascorbate require it in the diet deficiency in this vitamin causes the disease scurvy in humans.

Ascorbic acid is also widely used as a forod additive , to prevent oxidation (Richard A.Harvey 2008)

Ascorbic acid is weak sugar acid structurally related to glucose . in biological systems . ascorbic acid can be found only at low P^{H} , but in neutral solutions above P^{Hs} is predominantly found in the ionized form.

Vitamin C:

Is water soluble vitamin that is naturally present in some foods added t o others , and a available as a dietary unable supplement. Humans unlike most animals are unable to synthesize vitamin C endogenously so it is an essential dietary component .

1-2 **Literature review**

1.2.1 Definition of vitamin

An organic substance that occurs in foods in small amounts and is necessary for normal metabolic functioning of the body.

- Vita means life
- Amin mean protein

May be water soluble or fat soluble.

Do not contribute directly to the structure of the body in or do they supply energy.

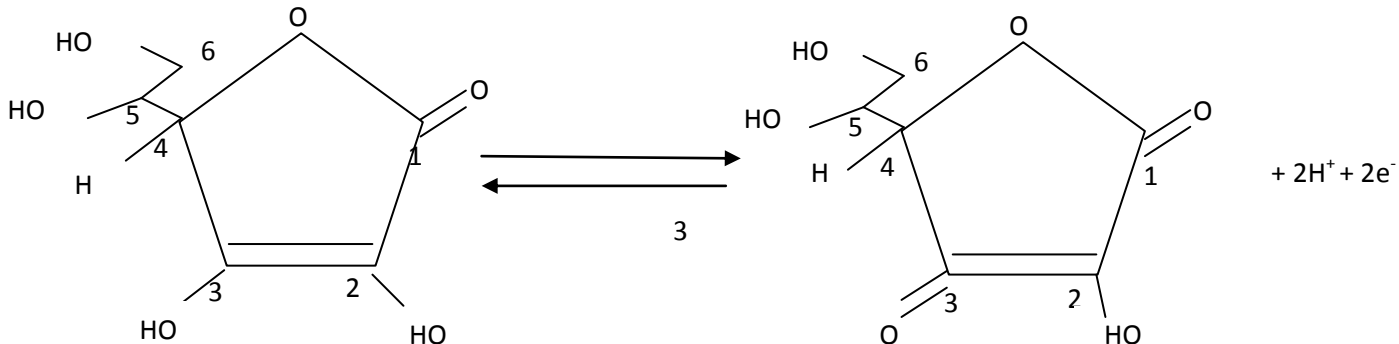
They regulate metabolism by releasing energy from fats and carbohydrates.

They are involved in amino acid metabolism and also assist in forming blood , bones and tissues.

Vitamins C is water – soluble vitamin . it is needed for normal growth and development. Left over amounts of the vitamins leave the body through the urine .

That means you need an ongoining supply of such vitamins in your diet (warsaw-1911)

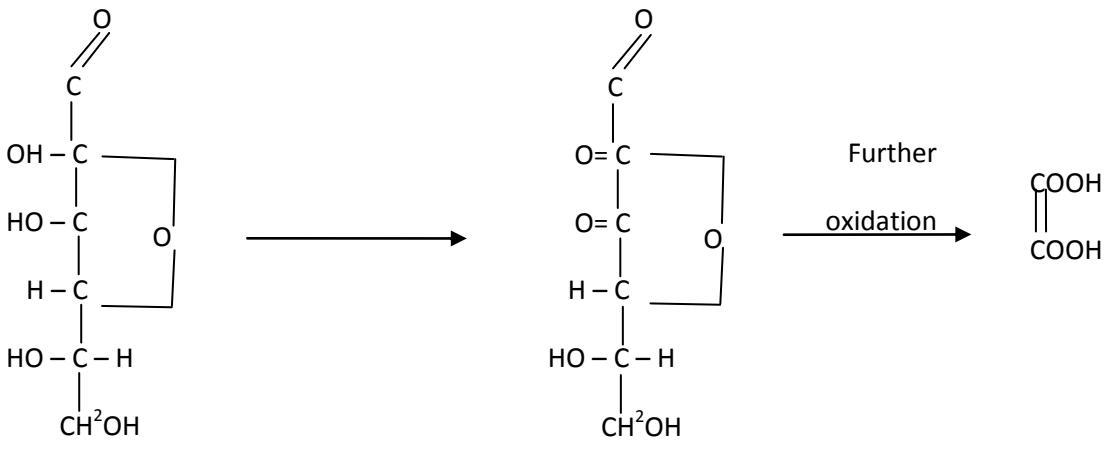
1.2.2 structure



Ascorbic acid
(reduced form)

Ascorbic acid
(oxidized form)

- Vitamins C is the strong reducing agent ,oxidize rapidly in to a sorbate by the oxygen or metallic ions such as " Cu" and doesn't contain free hydroxyls group but from as internal ester (lactone).
- Hybridization in the first three carbon in ascorbic acid is Sp^2 and " OH" carbon "2" is very acidic.
- Vitamins "C" just constant in acidic medium and reduced medium but effected by heat , alkalines , light and oxidizing agent , it can be form salt with basics .
- Animal tissues contains 90% L. a ascorbic acid and 10% dehydro L – ascorbic acid. Both forms are active.
- further oxidation gives inactive form called L diketo gulonic acid ---oxalic acid. (Oraby 2012)



Dehydro - **L- Ascorbic acid** **Oxalic acid**

1.2.1 Iupac name

2.oxo-L threo – hexono – 1,4 lactone 2,3 endediol .

1.3 physical properties:

a) appearance :

white , odorless , crystalline solid with sharp acidic taste (0.Neil, M.J2006).

b) molecular weight : 176.13

c) crystal form:

monoclinic , usually plates , sometimes needles.

d) melting point: 190-192e(from Brag Bank)

E) Boiling point: 553c - 1,027fn.

F) Density: 1.65glcm (from ILo- icsc)

G) solubility :FIRST STAGE : e TO .1660(pH4n)

H) Solubility:1(g) dissolve in 3ml water , 30 ml 95% ethanol , 50 ml absolute ethanol , 100ml glycerol or 20 ml propylene glycerol.(from ILO – ICSC)

Insoluble in ether chloroform, benzene , petroleum ether , oils , fats and fats solevents.

I) Infra red :

The maximum absorbance at wave length 245nm acidic medium but in neutral medium at 265nm.

1.2.4 chemical properties

A) ascorbic acid is acidic because it contains two enol- group (C-OH).

B) vitamin C is the most labile vitamin in food i.e easy to be destroyed . much of it is activity is lost through oxidation during preparation , cooking and storage (oraby 2012)

1.2.5 Function

Vitamin C is needed for the growth and repair of tissues in all parts of your body , it is used to:

a) Heal wounds .
b) Repair and maintain cartilage . bones and teeth .
c) Formation of collagen protein: ascorbic , acid is essential for the conversion of the pro collagen(immature collagen)into collagen pro collagen is a protein containing protein and lysine. Hydroxylase enzymes and by vitamin C as coenzyme , this converts pr collagen in to collagen.

- Collagen is essential for synthesis f connective tissue , bone cartilage
and teeth (Oraby 2005)

Procollagen "contains proline and lysine "	Lysyl hydxoxylase or prolyl hydroxyise ⟶ Vitamin "C"	Collagen " contains hydroxyl prolline and hydoxyliysine

D) A absorption and mobilization of iron:

Ascorbic acid is a potent reducing agent keeping iron in ferrous state:

Fe^{+++}" ferric ions "	Vitamin C →	Fe^{++}ferous lons →	Fe++"absorbtion distribution, and storage"

E)ascorbic acid act as coenzyme for many hydroxylase enzymes in the pathway of :

- Bile acids synthesis : by 7hydrxylase.
- osteocalcin synthesis: osteocalcin is calcium binding protein present in bones.
- Carnitine synthesis : carnitine is substance formed in the muscle . it stimulates fatty acid oxidation in mitochondria .
- Epinephrine synthesis: by hydroxylase required for conversion of tyrosine into epinephrine.

Procarnitine + - oH	hydroxylase → vitamin	carnitine

F) antioxidant action:

Vitamin C act as antioxidant and protect tissues from toxic effect of some oxidants that may lead to cancer . antioxidant are nutrients that block some of damage caused by free radicals ,free radicals are made when your body breaks down food or when you are exposed to tobacco (smoke or radiation.(oraby 2005)

G- Help regulated the immune system and relive pain cased by tired muscles and stimulating white blood cells in the body.

1-2-6 food source

All fruits and vegetables contain some amount of vitamin "c" (David Zieve 2011).

1-2-6-1 Fruits sources

the highest source of vitamin “c” include:

A. Cantaloup.
B. Citrus frits and juice .such as orange ,grapefruit and lemons.
C. Mango.
D. Papaya.
E. Pine apple.
F. Watermelon.
G. Guava.
H. Strawberry.

1-2-6-2 vegetables sources :

The highest source of vitamin “c”:

A- Green and red peppers.
B- Spinach.
C- Sweet and white potatoes.
D- Tomatoes and tomatoes juice
E- Squash.
F- Lettuce.

1-2-7 side effect:

Serious side effect from too much vitamin “c” is very rare. Because the body cannot store the vitamin. However, amounts greater than 2000 mglday are not recommended .doses these high can lead to stomach upset and diarrhea. Large doses of vitamin “c” supp lamentation are not recommend during pregnancy ,they can lead to vitamin “c” deficiency in the baby after delivery . excessive vitamin “c” produces hyperoxaluria (

increased oxalate in urine) and may lead to stone formation (Levine m,1995)

Too little vitamin “c” can lead to signs and symptoms of deficiency including:

a) Anemia.
b) Bleeding gums.
c) Decrease ability to fight infection.
d) Dry skin and hair.
e) Nosebleeds.
f) Swollen and painful joints.
g) Weakened tooth.

1.2.8 Intakes of vitamin "C":

1-2-8-1 for infants:

1-6 months: 40 mg /day

7-12 month: 50 mg / day

1-2- 8-2 for children:

1-3 years : 15 mg/day.

4-8 years:25 mg/day.

9-13 years :45 mg/day.

1-2-8-3 for adolescent

Girls: 14-18 years: 65mg/day.

Boys: 14-18 years: 75mg/day.

- Pregnant teen: 80mg/ day.
- Breast feeding teens :115mg/ day.

1-2-8-4: For adultness:

- Men :age 19and older :90mg/ day.
- Women :age 19 and older 75mg/ day.
- Pregnant women : 85mg/ day.
- Breast feeding women :120 mg/ day

Smokers or those are around second hand at any age should increase their daily amount vitamins "c" an additional 35 mg/ day (schollhorn HE 2007).

1-2-9 Role in mammals:

In humans vitamin "c " is essential to a healthy diet as well as being a highly effective antioxidant ,acting to lessen oxidative stress ; a substrate for ascorbate peroxidase in plants CAPX is plant specific enzyme and an enzyme cofactor for the biosynthesis of many important biochemicals. vitamin "c' acts as an electron donor for important enzymes (Meister 1994).

1-2-10 Role in plants:

Ascorbic acid is associated with chloroplasts and apparently plays a role in ameliorating the oxidative stress of photo synthesis . in addition it has number of other roles in cell division and protein modification . Plant appear to be able to make a scorbate by at least one other biochemicals.

In animals although precise details remain unknown (wheeler GL.1998)

1-2-11 Metabolism:

1-2-11-1 Absorption and bioavailability:

Transport of vitamin C is a saturable and dose dependent process that occurs by active transport At the intestine and cells AA is oxidized to DHAA, which is more quickly transported across the cell membrane . once inside the tissue or intestinal epithelium, the vitamin is reduced back to AA . the degree of intestinal absorption decreases as intake of AA increases .in takes of 1 to 1.5 grams results in 50% absorption but at intakes over 12 grmas , only 16% of the vitamin is absorbed. In contrast, an intake of less than 20 mg , has a 98% absorption rate. Absorption of vitamin C is greater when several individual doses of vitamin C , in quantities less than one gram, are taken throughout the day rather than one megadose . eight to ninety – five percent of the vitamin C found in food is absorbed furthermore, the bioavailability of synthetic and nutral forms of the vitamin differ very little despite the claims made by manufacturers vitamin C absorption can be impaired by anumber of factors.Asingle large dose saturates the enzyme kinetics for vitamin C, Leading to excess AA in the intestinal lumen,which causes numerous gastrointestinal problems . Pectin and zinc also inhibit AA absorption but this mechanism is not well understood . Ahigh iron concentration in the gastronintestinal tract may cause oxidative dest – ruction and in turn impair uptake (leuin,M1986).

1-2-11-2 Transport:

Active transport is the main mechanism of vitamin C distribution within the body . simple diffution may occur in the mouth and stomach but accounts for only avery small percentage of uptake . sodium – independent transport systems shuttle vitamin C across the basolateral membrane of the intestinal cells. In the plasma absorbed ascorbic and

dehydroascorbate . (DHAA) can either be transported freely or be bound to albumin . A scorbate can also more in to body cells and tissues . As previously mentioned DHAA is the primary form of vitamin C that crosses cellular membranes . The adrenal and pituitary glands, red blood cells, lymphocytes, and neutrophils all receive vitamin C in the form of DHAA (Rose R C . 1988).

1-2-11-3 Storage:

Vitamin C is stored throughout body tissues and blood. Ascorbic acid content of blood components, fluid and tissue varies widely on an individual basis.

Tissue concentration exceed those found in the plasma by three to ten times. Energy driven transport pumps are responsible for the higher tissue concentrations of vitamin C versus the plasma . Both tissue and plasma levels of vitamin C are correlated to intake up to 90 mg/day . The tolal body pool of vitamin C has been estimated using radio labeled isotopes , to a maximum of 20 mg/kg body weight. This corresponds to plasma AA concentration of 57mol/L. The saliva and plasma have the lowest AA content .vitamin C content cardiac tissue between 28 and 85 ml/loog wet weight while that in skeletal muscle is approximately 17 ml/l00g wet weight. Other tissues with intermediate levels of vitamin C include the kidneys, brain, liver, lungs, and thyroid. The water soluble properties of vitamin C prevent it from being stored in the adipose tissue of the body (Bethesda 2009)

1.2.11.4 Excretion:

The average half – life AA is believed to be between 16 and 20days. Its half – life is inversely related to intake. The water – soluble properties of vitamin C lead to urinary excretion of the vitamin. Metabolites of vitamin

C including dehydroascorbate (DHAA) oxalic acid 2 – 0 - methyl a scorbate and 2-ketoascorbitol are also excreted from the body via the urinary system. The kidneys play a major or role in vitamin C excretioa and retention . DHAA and AA can be reabsorbed by the kidney tubules as long as body pool levels within the body that are 1500mg ,or less will result in no vrinary ewxcretion of vitamin C. as levels increase above 1500mg the reabsorption efficiency of the kidneys decreases. Thus body pool levels from 1500 to 3000 mg related to tissue saturation of the vitamin. Plasma a scorbate levels between 0.8 and 1.4 mg/dl are considered the renal threshold. Above these levels vitamin C will be excreted rather than reabsorbed by the kidneys (Bucci, LR1998).

1-2-12 Benefits of vitamin C

Vitamin C prevents from:

1. Scurvy, colds , heart disease and some cohronic disease.
2. Quick , aging , strake , cholesterol increase
3. Rheumatism , cancer , Asthma
4. Toxin Removal, virsal , allergies
5. Gallblasdder disease, Gallstones (Carr AC 1999)

1-2-13 Bio synthesis:

Ascorbic acid is found in plants and animals where it is produced from glucose. Animals must either produced it or digest it , otherwise alack of vitamin C may cause scurvy, Which may eventually lead to death. Reptiles and older orders of birds make ascorbic acid in their kidneys. Recent orders of birds and most mammals make ascorbic acid in their

liver where the enzyme L-gulono lactone oxidase is required to convert glucose to ascorbic acid Humans, other higher primates, guinea pigs and most bats require dietary L-gulonolactone oxidase because the enzyme catalysing the last step in the biosynthesis is highy mutated and non-functional , therefore, unable to make ascorbic acid . Synthesis and signalling properties are still under investigation (Wheeler GL, 1998).

1-2-14 Industrial preparation:

Ascorbic acid is prepared in industry from glucose in amethod based on the historical Reichstein process. In the first of five – step process , glucose is catalytically hydrogenated to sorbitol , which is then oxidized by the microorganism Acetobacter suboxydans to sorbose. Only one of the six hydroxy groups is oxidized by this enzymatic reaction. From this point , tow routes are a vailble. Treatment of the product with acetone in the presence of an acid catalyst converts four of the remaining hydroxyl group to acetals . The unprotected hydroxyl group is oxidized to the carboxylic acid by reaction with the catalytic oxidant TEMPO" regener by sodium hypochlorite – bleaching solution ". Historically, industrial preparation via the Reichstein process used potassium permanganate as the bleaching solution . Acid catalyzed hydrolysis of this product performs the dual function of removing the two acetal groups and ring – closing lactonization . this step yields ascorbic acid each of the five steps has a yield larger than 90%.

Amore biotechnological process, first developed in china in the 1960, but further developed in the 1990, by passes the use of acetone – protection groups . A second genetically modified microbe species , such as mutant Erwinia – among others, oxidizes sorbose into 2-ketogluconic acid (2-KGA), which can then undergo ring – closing lactonization via

dehydation . This method is used in the predominant process used by the ascorbic industry in china, which supplies 80% of worlds ascorbic acid .American and Chinese researchers are competing to engineer a mutant that can carry out a one – pot fermentation directly form glucose to 2-KGA by passing both the need for a second fermentation and the need to reduce glucose to sorbitol.

There exists a D-ascorbic acid , which does not occur in nature but can be synthesized artificially . It has identical antioxidant properties to L-ascorbic acid yet has far less vitamin C activity(although not quite zero) . This fact is taken as evidence that the antioxidant properties of ascorbic and are only small part of its effective vitamin activity . To be specific , L-asorbate is known to participate in many specific enzyme reactions that require the correct enantiomer (L-sascorbate and not D-ascorbate). L-Ascorbic acid has specific rotation of $[\propto]_D^{20} = +23°$(Richstein 1934).

1.2.15: toxicity:

While it is uncommon to take in too much vitamin C, it is still possible. Vitamin C toxicity is usually caused by taking too many supplements it usually not caused by getting too mach vitamin C from food vitamin C toxicity can cause:

- Diarrhea.
- Nausea.
- Stomach cramps.

Vitamin C toxicity is usually not serious and is treated by stopping vitamin C supplements . However vitamin C toxicity can be serious for some people.

For people with condition called hemochromatosis , vitamin C toxicity may be serious . Hemochromatosis causes the body to store too much iron . High doses of vitamin C could worsen iron overloud and causes damage to body tissues . it is important to stay within . recommended dosage range and take to health care provider before starting vitamin supplements doing so can help prevent vitamin C toxicity.(Anon 1984)

1.3 Objectives :

The objective of the study are :

1. To determine the amount of vitamin C in three commercial natural juices (tamarind – Adansonia- hibiscus) using Redox titration.
2. To compare the amount of vitamin C determined and to that stated on the label for each juice sample.

Chapter two

Chapter two

2.0 Materials and Methods

2.1 Equipment Needed

1. burette.

2. 100 ml volumetric flask and 1L volumetric flask .

3. 20 ml pipette .

4. 250 conical flask.

5. 10 ml and 100 ml measuring cylinders.

6. 100 ml beakers.

2.2 Solutions Needed:

1. potassium iodate solution.

2. potassium iodide solution.

3. starch indicator solution.

4. dilute hydrochloric acid (1mol L^{-1})

5. EDTA.

6. Trichloro acetic acid (TAA).

7. Acetic acid.

2.2.1 Standardization of potassium iodate (0.002mol L^{-1})

1(g) f potassium iodate was dried for several hours or overnight at 100c . Allowed to cool and accurately was weighed about 0.43.(g) of potassium lodate and was dissolved in I L of distilled water in volumetric flask.

2.2.2 preparation of starch indicator (0.5%)

0.25(g) of soluble starch was added it to 50 ml of near boiling water in 100ml conical flask . solution was stired to dissolved and cooled before using.

2.2.3 Standardization of potassium Iodide (0.6mol L^{-1})

10(g) f solid KI was dissolved in about50 ml of distilled water in 100 ml volumetric flask and diluted to 100ml with distilled water.

2.3 Samples preparation

Vitamin C was dissolves in water so we were added trichovacetic acid " TCA" and EDTA made at decreasing oxidation of ascorbic acid and this by precipitation all metals and ions which make as helping agent in the oxidation process and from there side precipitation of protein , there for the solution be clear , then added acetic acid that prevent lose of vitamin.

2.4 Method of titration

20 ml of the sample solution was pipetted in to 250 ml conical flask and added about 150ml of distilled water. 5ml of 0.6 mol L^{-1} potassium iodide was added also 5ml of hydrochloric acid and 1ml of starch indicator solution were added.

The sample was titrated with the (0.002 mol L^{-1}) potassium iodate solution . the end point of the titration is the trace of dark blue - black colour due to the starch iodine complex .

The titration was repeated with further aliquots of sample solution until we obtained concordant results .

Chapter three

Chapter three

3.o Results and discussion:

3.1 Result:

$IO_3^- + 6H^+ + 5e^- \rightarrow \frac{1}{2}I_2 + 3H_2O$

- the iodate ion are reduced to form iodine
- $2I \rightarrow I_2 + ze^-$

While the rodide ions are oxidized to form iodine.

- Combining these half equation demonstrates the reaction between iodate acid and iodide:

  $IO_3^- + 5I^- + 6H^+ \rightarrow 3I_2 + 3H_2O$

It is iodine formed by this reaction that oxidizes the ascorbic acid to dehydro ascorbic acid as the iodine is reduced to iodide ions:

Ascorbic acid $+ I_2 \rightarrow 2I +$ dehydro ascorbic acid

Due to this reaction the iodine formed is immediately reduced to iodide as long as there is any ascorbic acid present . once all the ascorbic acid has been oxidized the excess iodine is free to react with the starch indicator forming the blue – black starch- lodine Complex this is the end point of the titration .

Result of titration tamarindus inddica juice:

Trail No	Initial Volume	Final Volume	Consumer Volume
1	31.00	33.50	2.50
2	33.50	35.80	2.30
3	35.80	38.00	2.20

Result of titration Hibiscus sabdaritta juice:

Trail No	Initial Volume	Final Volume	Consumer Volume
1	16.60	21.50	4.90
2	21.50	26.30	4.80
3	26.30	3.00	4.70

Result of titration Adansonia juice:

Trail No	Initial Volume	Final Volume	Consumer Volume
1	0.00	5.60	5.60
2	5.60	11.10	5.50
3	11.10	16.60	5.50

Calculation of titration Adansomia Juice :

1) mole of lodate = $\frac{m \times v}{1000} \Rightarrow \frac{0.002 \times 5.50}{1000} \Rightarrow 1.1 \times 10^{-5} mole$

2) 2 mole $I0_3^- \rightarrow 1.1 \times 10^{-5}$

$6mol\ I_2 \rightarrow X$

$$X = \frac{1.1 \times 10^{-5} \times 6}{2} = 3 \times 10^{-5} mole$$

$\therefore mole\ of\ iodine\ = 3 \times 10^{-5} mole$

3) mole of ascorbic acid = mole of Iodine = $3 \times 10^{-5} mole$

4) morality of ascorbic acid = $\frac{n \times 1000}{V} \Rightarrow \frac{3 \times 10^{-5} \times 1000}{20} = 1.5 \times 10^{-5} M.$

5) concentration by $g/L \Rightarrow M \times M.wt$

$\therefore 1.5 \times 10^{-3} \times 176.12 = 0.26418 g/L$

6) concentration by ppm $\Rightarrow g/L \times 1000$

$= 0.26418 \times 1000 = 264.18 ppm$

3-2 Discussion:

The purpose of this study are to determine and compare amount of vitamin C ascorbic acid in three natural juices , therefore we found larger amount of vitamin C in adansonia juice then in Hibiscus sabdarintta " roselle" juice and the third is tamarind inddica juice.

So we need drink all of this natural juices that improve the body and help to survives the person as good health, always we focus at adansonia juice because it is the major.

3.3 conclusion:

From above experiment there was found to be the concentration of vitamin C in A dansonia juice

$=1.5 \times 10^{-3} M, 0.26418. \frac{g}{L}, 264.18\ ppm. ether\ in\ Hibiscus$

Sabdaritta juice = $1.44 \times 10^{-3} M; 0.2536 g/L; 253.6 ppm.$

and in tamarindus inddica = $6.75 \times 10^{-4}; 0.11888\ g/L\ ; 118.888 ppm$

3.4 Recommendation :

We recommended non take too much vitamin C when vitamin is water soluble this means that your body eliminates what it does not use through your urine , and therefore , the excess is not stored .

Because your body cannot store vitamin C it is nearly impossible for you to over dose on it . and it is not likely to harm your liver or other organs the toler able upper limit of vitamin C has been set at 2.000mg per day , notes Medline plus , and this is largely because high doses can cause diarrhea or other types digestive upset.

Also not too little vitamin C because is water soluble ,this also mean that you need to continually supply your body with more to avoid becoming deficient . many people may have amild deficiency of this vitamin , and some of the symptoms include a compromised immune system . bleeding gums nosebleeds, unintentional weight gain. rough skin, swollen joints and dry hair . if you became severely deficient in vitamin C you may develop a condition known as scurvy , though this is rare in the developed world.

If you chose to take vitamin C supplements , discuss this with your doctor before doing so as it may interact with certain conditions and medications . because vitamin C enhances your body's ability to absorb iron , you should not a supplement if you have hemochromatosis , and help with kidney problems should discuss their use of vitamin C with their health care provider as well . also be aware that vitamin C hase a diuretic effect , and it is therefore essential that you drink enough water while taking it to prevent dehydrastion if you experience any side effects from vitamin C or suspect a problem with the functioning of your liver ,seek medical attention.

We recommend also when testing a scarbate levels. In the body use dichlorophenolindophenol (redox indicator) by simple test, to measure the levels of vitamin C in the urine and in serum or blood plasma however these reflect recent dietary intake rather than the level of vitamin C in body stores . Reverse phase high performance liquid chromatography is used for determining the storage level of vitamin C within lymphocytes and tissue . it has been observed that while serum or blood plasma level follow the circadian rhythm or short term dietary changes , those within tissues themselves are more stable and give a better view of the availability of acerbate within the organism. However very few hospital laboratories are adequately equipped and trained to carry out such detailed analyses , and require samples to be analyzed in specialized laboratories.

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