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ERASMUS+ (KA2) 2016/2017

FOOD AND SUSTAINABILITY

THRIVE

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Ljubljana, 17th October – 21st October 2016



HANDOUT 1: Tuesday, 18th October 2016

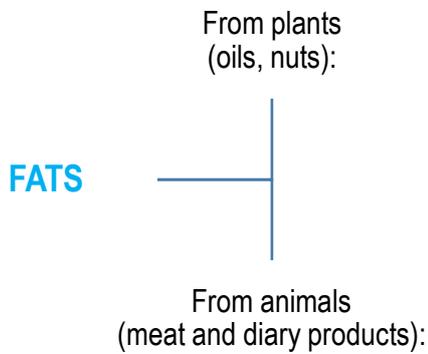
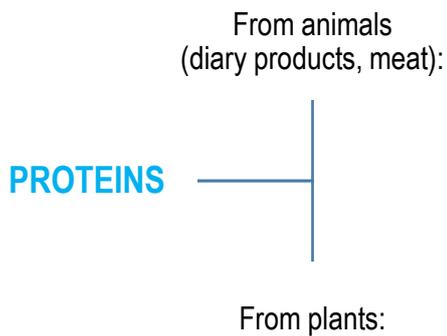
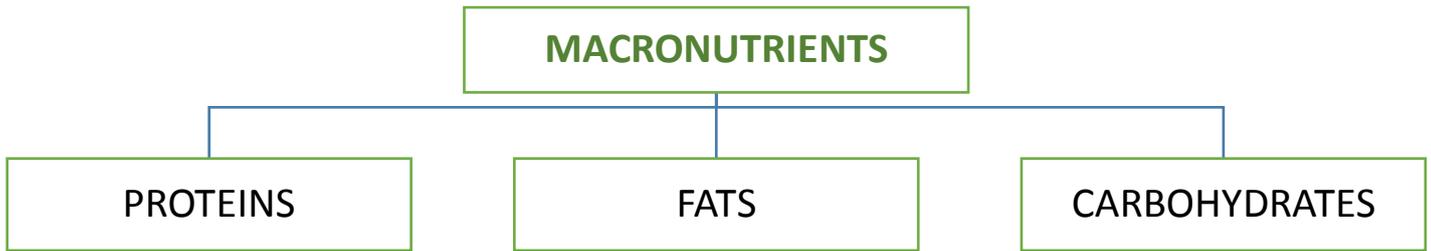
Project topic introduction: **FOOD AND SUSTAINABILITY THRIVE**

K.W.L. Chart

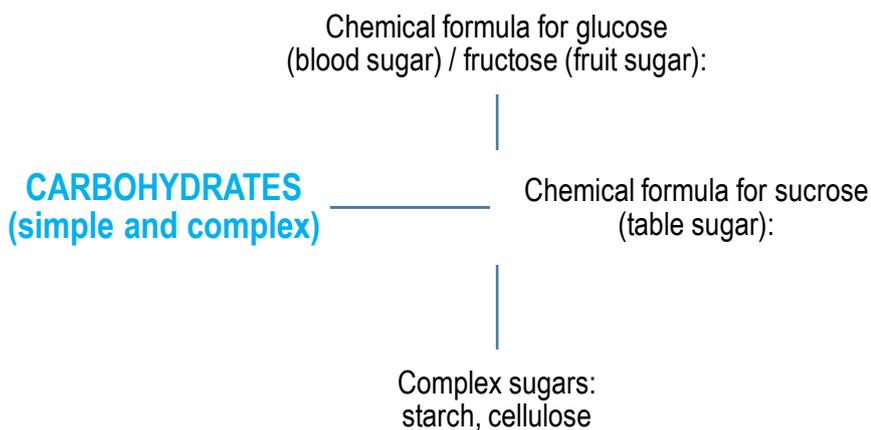
Topic: _____

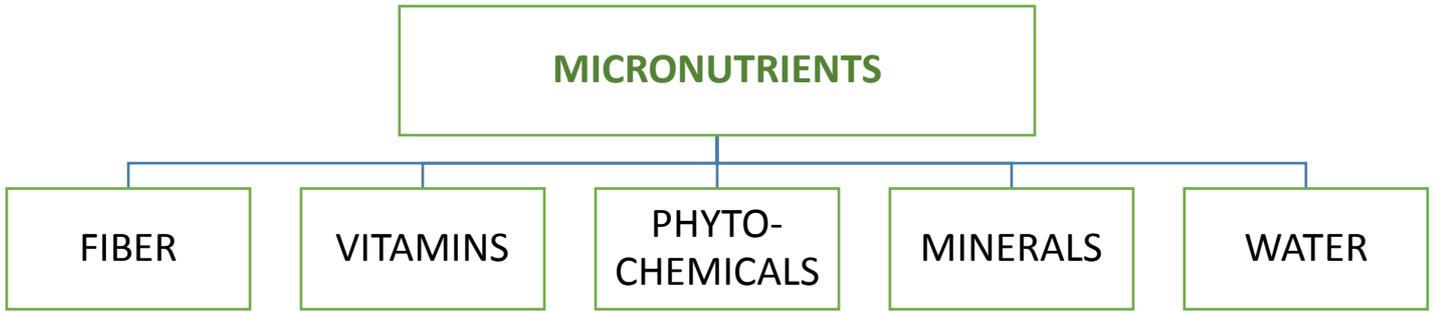
K What I Already Know	W What I Want to Know	L What I Have Learned

FOOD VOCABULARY



S





Water soluble:



Non-water soluble:



GROUP WORK

Work in groups of 6. In each group there should be 3 Slovene students and 3 Dutch students.

Discuss the following topics and take notes.

a) Traditional country dishes. What traditional Dutch and Slovene dishes do you know? Choose 6 of them and write down their names. Then describe one of the well known Dutch & Slovenian dessert.

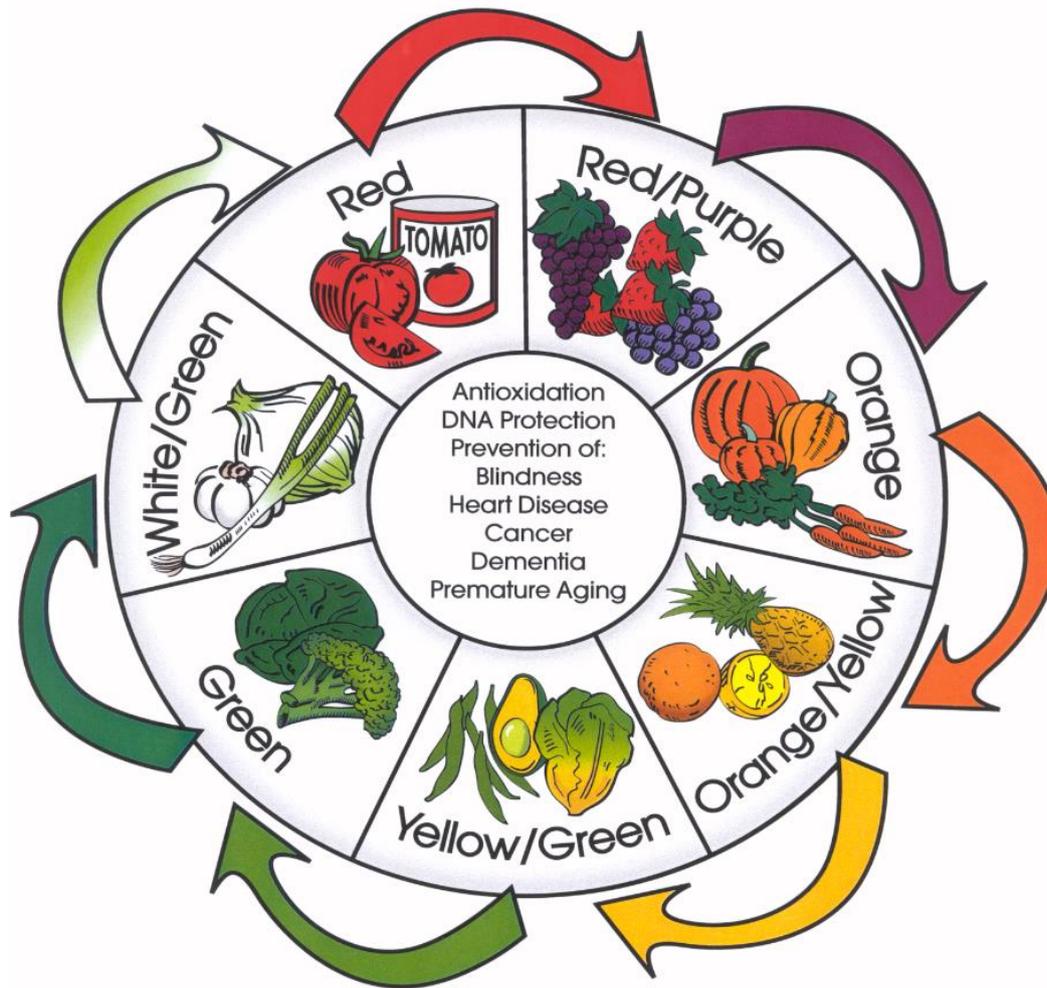
b) What advice would you give on a healthy / balanced diet?

c) Think of some disadvantages of eating fast food.

d) In your opinion, what is *sustainable* food?

THE COLOURS OF HEALTH

Phytochemicals (plant chemicals) protect not only plants but also people. Scientists highlight a range of health benefits that phytochemicals offer. They protect us from cancer, aging, heart disease, bad eyesight etc.



Each colour offers a different health benefit. Eat all of the colours to get all benefits!

No individual colour does it all!

Just as colours give the rainbow its life, so do phytochemicals give us a chance for a healthy life.

- Name some varieties of **blue / purple** fruits.



- What benefits do **blue / purple** fruits offer?

- Name some varieties of **green** fruits.



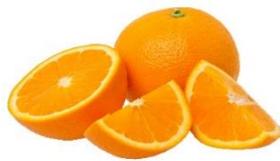
- What benefits do **green** fruits offer?

- Name some varieties of **white / brown** fruits.



- What benefits do **white / brown** fruits offer?

- Name some varieties of **yellow / orange** fruits.



- What benefits do **yellow / orange** fruits offer?

- Name some varieties of **red** fruits.



- What benefits do **red** fruits offer?

Labels

Explanations



ekološki



Abbreviations

Explanations

FAO	
GMO	
WHO	

Tasting paper

The characteristics of varieties of apples: Idared, Jonagold, Elstar, Gala, Golden Delicious

sweet _____ sour

very aromatic _____ flavourless

very juicy _____ dried

firm _____ floury

Assessment of internal quality

bad (1) _____ excellent(5)

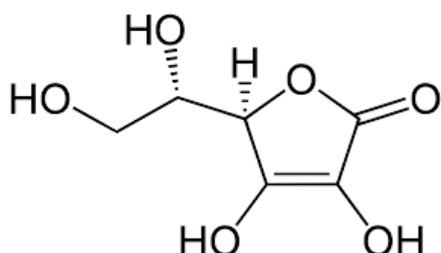
Appearance of apple

bad (1) _____ excellent (5)

HANDOUT 3: Tuesday, 18th October 2016Project topic: **LAB WORK INTRODUCTION**

Vitamin C (Ascorbic acid)

Which fruit contains most vitamin C?



Vitamin C (ascorbic acid) is an antioxidant that is essential for human nutrition. Vitamin C deficiency can lead to a disease called **scurvy**, which is characterized by abnormalities in the bones and teeth. Many fruits and vegetables contain vitamin C.

Fruits have varying levels of vitamin C. In some fruits, the amount of vitamin C varies between different varieties of the same species. The vitamin C content of many fruits is higher when it is slightly unripe, and declines as the fruit becomes ripe. Vitamin C content also decreases with storage.

Tincture of iodine is brownish-red in colour. When vitamin C is added, it becomes colourless. This reaction can be used to test for the presence of vitamin C and to give some idea of the amount that can be found in a given substance.

Problem:

Which fruit has the most vitamin C (ascorbic acid)?

Materials:

- Fruit or juices of a lemon, an apple, a grapefruit, a kiwifruit, a pineapple, a pear, and an orange
- Tincture of iodine
- 100 mg vitamin C pills
- Medicine droppers
- 500 ml water container
- Set 8 of 100 ml of clear beakers

Safety:

*Tincture of iodine is poisonous and therefore should not be ingested. If iodine gets into eyes, immediately flush with plenty of water. Continue for at least ten minutes and call for medical help. In case of skin contact, wash off with soap and water. Remove any contaminated clothing. If the skin reddens or appears damaged, call for medical aid. **Do not consume any of the juices and /or fruits connected with this project!***

Procedure:

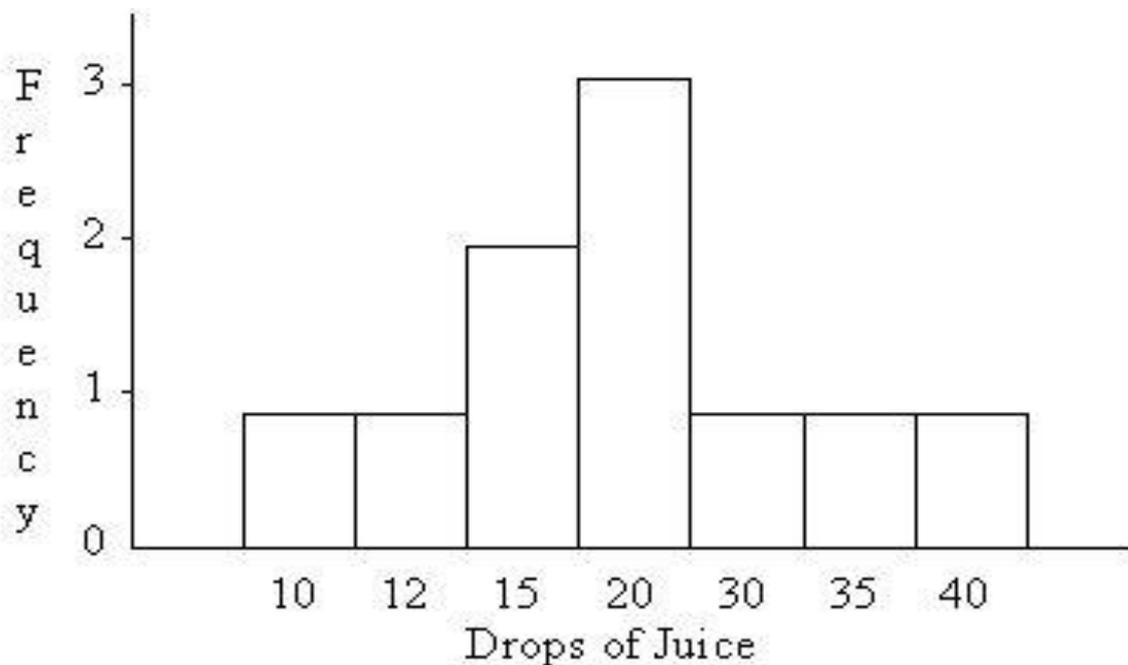
1. Prepare an iodine solution by mixing a bottle of tincture of iodine in about 500 ml of water. Place equal amounts of the iodine solution in beakers.
2. Using a spoon, crush a vitamin C tablet and then dissolve it in water (this will be the control).
3. Place equal amounts of various fruit juices in beakers.
4. Using the medicine dropper first add the vitamin C control solution drop by drop to a cup of iodine and record the results. Do not dip the medicine dropper into the iodine.
5. Next, add a juice using a different medicine dropper, drop by drop, to a fresh cup of iodine. Swirl the cup after each drop is added.
6. Count the number of drops you add until a colour change is seen.
7. Record the number of drops needed to change the iodine from its brownish-red colour to a clear or almost clear colour.
8. Repeat the procedure using each of the juices.
9. Arrange data in numerical order, from the lowest to the highest vitamin C content in a table similar to the one shown below.
10. Test each juice three times and calculate the average number of drops required to change the colour.

Name of Juice	Number of Drops
Control	
Lemon	
Apple	
Grapefruit	
Kiwifruit	
Pineapple	
Pear	
Orange	

11. Using the data in the table plot a bar graph of Vitamin C Amount (I₂ drops/Juice) along the Y-axis verses the names of the juices tested along the X-axis.
12. The data in the table might be further organized as a *frequency distribution*. The frequency with which each measurement occurs is noted in the table below, this way the original raw data can be treated graphically.
See example below:

Drops per juice	Tally	Frequency
40	I	1
35	I	1
30	I	1
20	III	3
15	II	2
12	I	1
10	I	1

13. Plot a statistical histogram graph similar to the graph shown.

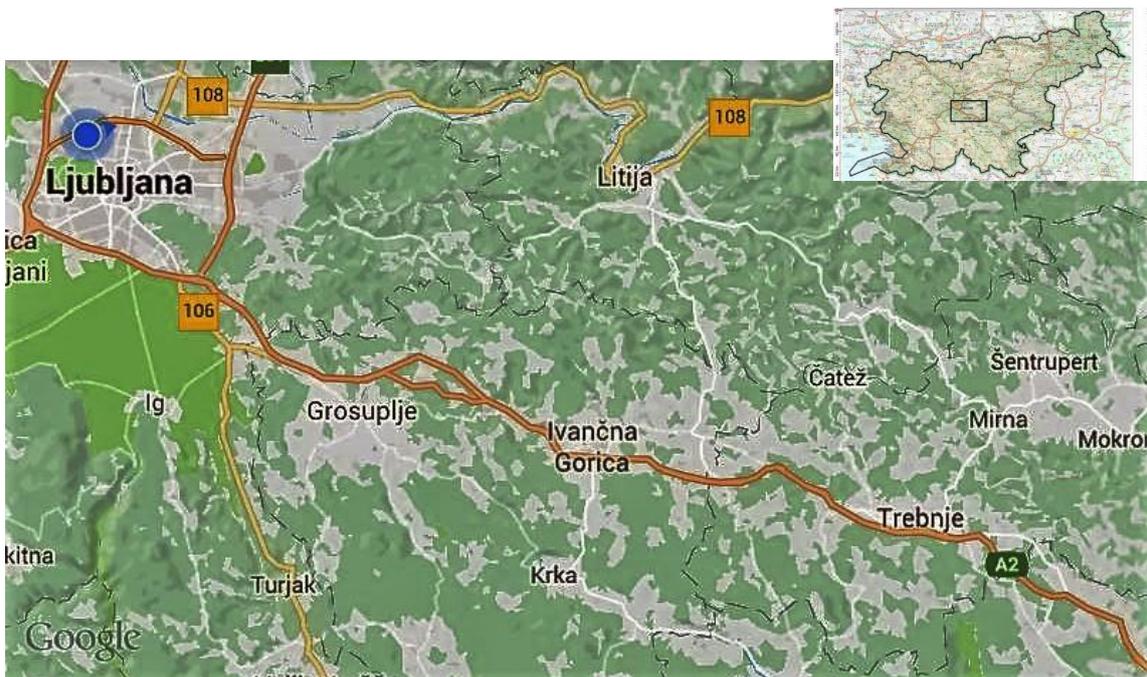


HANDOUT 4: Wednesday, 19th October 2016

Field work: FRUIT PROCESSING PLANT DANA

Dana is a Slovenian beverage manufacturer with more than sixty years of tradition. The company is focused on high quality, safety, and reliability of products, which is achieved by considering and complying with all legal regulations. They express their operational excellence and respect of the environment with a positive attitude and with environmentally friendly products. They adapt to trends, explore new technological solutions, and introduce new flavors and packaging. Their brands market: natural mineral water, juices, nectars, fruit beverages, non-carbonated refreshing beverages, ice teas, syrups, and alcohol program.

1. Draw the way from Ljubljana to the Dana factory on the map below.



Juice preparation

2. What is the geographical origin of fruit used for the process of juice preparation?

3. Describe the process of juice preparation.

4. What do we have to do with crushed juice to get clear juice?

5. How do we get concentrated fruit juice?

6. What is the difference between fruit nectar and fruit syrup?

Dana's production of semi-finished products

Flavour is at the centre of our sensory perception of the world. For decades now, Dana has been gaining knowledge and broadening the experience that has brought the company closer to understanding the secrets of flavour. By successfully combining experience, knowledge and technology (of different methods), they have managed to create a wide range of rich flavours that meets the demands of the international market.

7. Fruit bases are one of the most common flavour additives used in beverages. Which properties of fruit provide the beverage?

Syrups for automatic dispensers and ready-made drinks, and syrups for energy drinks

8. In the production of finished goods, syrups are used for dilution purposes in production of drinks and for vending machines. What are they based on?

Herbal extracts

9. Extract is a preparation that comes from maceration and distillation of various herbs. These extracts preserve the vital components that the body receives from herbs. Consequently, herbs are often added to _____

10. Go to <http://www.dana.si/en>. In the JUICES AND NECTARS section find [DANA apple nectar, 1.5 L, slim](#). What is the amount of fruit that is contained in it? _____

11. Which flavor of juice did you like the most?☺

HANDOUT 5: Wednesday, 19th October 2016

Field work: ORGANIC FARM REPOVŽ

Today you will learn about organic farming while visiting the Repovž organic farm that has a long and rich tradition. Answer the questions below.

1. What is organic farming?

2. What are the benefits of organic farming?

3. Are there any disadvantages of organic farming?

4. Define environmental and geographical characteristics of the Repovž farm location.

5. Describe:

- The structure by diversity and quantity of production. What products are they most famous for?

- The structure of the working processes (types of mechanization) on the Repovž organic farm.

6. What was the most interesting thing you saw/experienced on the organic farm today? 😊

7. What is your vision and strategy of further development of organic farms?

8. Study the map of this region.



Organic farm REPOVŽ introduces itself ...

A healthy nutrition is not just a fashion fad; it is becoming a way of life. On our farm we produce fruit, cereals, vegetables and herbs. We offer our products under the brand name Biodar. Our ecological farming dates back to 1999 with the start of production of organically grown apples Topaz. We produce apple vinegar, 100% natural apple juice, segments of apples, apple purée and other products. Of course you can also buy fresh organic apples. In our fields we grow an ancient type of wheat – spelt and buckwheat. Thus, we offer home-produced flour, groats, grits and other products. In our restaurant we serve with fresh spelt bread, but we can satisfy your sweet tooth with organic spelt biscuits. If you want natural and organic food from our vegetable garden on your table, come and visit us.

Guest house Repovž: With hundred years of tradition, the greatness of simplicity and richness of the countryside, intertwined with organic agriculture we create authentic flavours which will satisfy even the most demanding palate. We try to produce majority of ingredients in our garden and offer a complete culinary trip for the most demanding gourmand or we can satisfy fast and simply a hungry traveller who has no time to enjoy the natural beauty that surrounds you. Wine tasting knowledge and love of wine lead us to make your soul smile. You must try the vintage wines from our own vineyards or from any other wine grower from Slovenia.

Relaxation: Have you ever spent a few days in the country? Not yet. You have missed a lot. It is a perfect place to get away from big city life and traffic jam. It is the right place for those people who want to enjoy the smell of cut grass, vineyards, orchards, meadows, hills and fields. Stop and try to feel the nature. Stop and listen to the pulse of the countryside. Unknowingly you will meet new friends and begin to appreciate the entire process, the lives, and livelihoods focused on bringing regional speciality to your plate. In autumn we are in our orchards and vineyards harvesting this year's crop of apples and grapes. Would you like to join us? Meet the locals and enjoy our hospitality. You will have a great experience. You can sleep in single or double rooms or in the apartment in the vineyard cottage. In the morning it is always a pleasure to wake up with a cock-a-doodle-doo or warbling of birds. What else could be more relaxing?

Wine growing: Our Vineyard Cottage, located on the sunny side in the middle of vineyards, is the right place for people who want to spend their free time in nature. A real eye-catcher is a look at the wine-growing hills. The wind that caresses the leaves and fruit, vines, and the sun, which warms with its rays, creates a special song that goes deep into the heart and soul. This is a place where you can invite your friends and acquaintances. We organize wine tasting of local wine, picnics and other forms of entertainment. Of course, you should try our red wine from Dolenjska; cviček. The new trend is going towards the award winning red wine Blaufränkich. Explore the dry white wines (Chardonnay, Sauvignon, Pinot Blanc and Pinot Gris) or the delightful dessert, sweet Reisling.

HANDOUT 6: Wednesday, 19th October 2016

Project topic: **LAB WORK VIDEO**

<https://www.youtube.com/watch?v=Za3EQpHKif0>

DETERMINATION OF VITAMIN C CONCENTRATION BY TITRATION

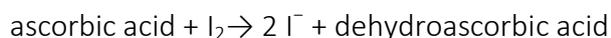
(Redox Titration Using Iodine Solution)

Safety

Lab coats, safety glasses and enclosed footwear must be worn at all times in the laboratory.

Introduction

This method determines the vitamin C concentration in a solution by a redox titration using iodine. Vitamin C, more properly called ascorbic acid, is an essential antioxidant needed by the human body (see additional notes). As the iodine is added during the titration, the ascorbic acid is oxidised to dehydroascorbic acid, while the iodine is reduced to iodide ions.



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 oxidised, the excess iodine is free to react with the starch indicator, forming the blue-black starch-iodine complex. This is the endpoint of the titration.

The method is suitable for the use with vitamin C tablets, fresh or packaged fruit juices and solid fruits and vegetables.

NB: This method is more straight forward than the alternative method using potassium iodate, but as the potassium iodate solution is more stable than the iodine as a primary standard, the alternative method is more reliable.

Equipment Needed

burette and stand
100 mL or 200 mL volumetric flask
20 mL pipette
10 mL and 100 mL measuring cylinders
250 mL conical flasks
juicer

Solutions Needed

Iodine solution: (0.005 mol L⁻¹).

Weigh 2 g of potassium iodide into a 100 mL beaker. Weigh 1.3 g of iodine and add it into the same beaker. Add a few mL of distilled water and swirl for a few minutes until iodine is dissolved. Transfer iodine solution to a 1 L volumetric flask, making sure to rinse all traces of solution into the volumetric flask using distilled water. Make the solution up to the 1 L mark with distilled water.

Starch indicator solution: (0.5%).

Weigh 0.25 g of soluble starch and add it to 50 mL of near boiling water in a 100 mL conical flask. Stir to dissolve and cool before using.

Sample Preparation

For vitamin C tablets: Dissolve a single tablet in 200 mL of distilled water (in a volumetric flask if possible).

For fresh fruit juice: Strain the juice through cheesecloth to remove seeds and pulp which may block pipettes.

For packaged fruit juice: This may also need to be strained through cheesecloth if it contains a lot of pulp or seeds.

For fruits: Cut a 100 g sample into small pieces and grind in a mortar and pestle. Add 10 mL portions of distilled water several times while grinding the sample, each time decanting off the liquid extract into a 100 mL volumetric flask. Finally, strain the ground fruit/vegetable pulp through cheesecloth, rinsing the pulp with a few 10 mL portions of water and collecting all filtrate and washings in the volumetric flask. Make the extracted solution up to 100 mL with distilled water.

Alternatively the 100 g sample of fruit or vegetable may be blended in a juicer together with about 50 mL of distilled water. After blending, strain the pulp through cheesecloth, washing it with a few 10 mL portions of distilled water, and make the extracted solution up to 100 mL in a volumetric flask.

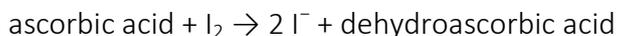
Method

Titration

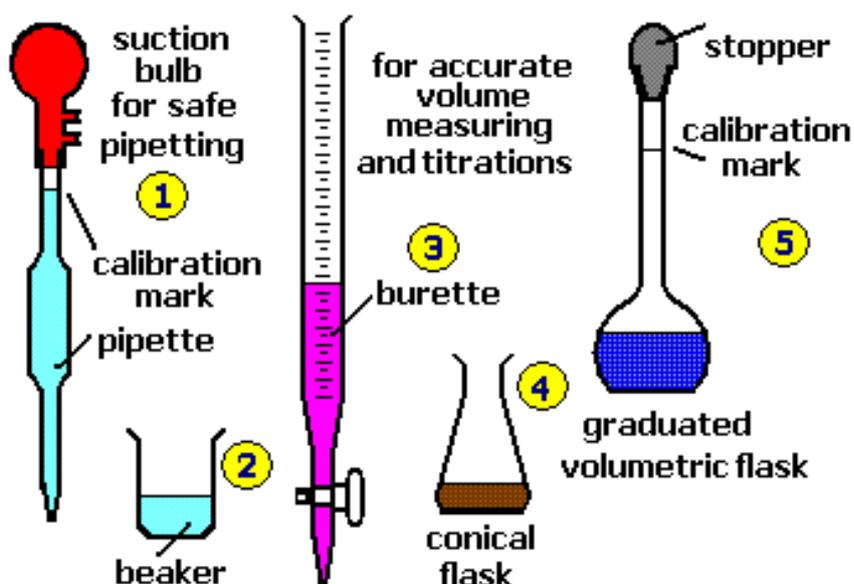
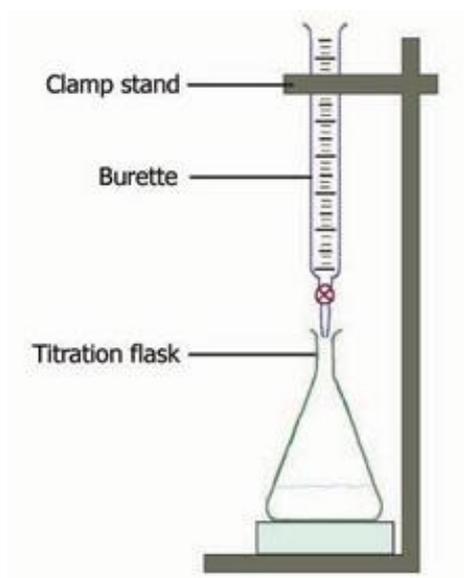
1. Pipette a 20 mL aliquot of the sample solution into a 250 mL conical flask and add about 150 mL of distilled water and 1 mL of starch indicator solution.
2. Titrate the sample with 0.005 mol L⁻¹ iodine solution. The endpoint of the titration is identified as the first permanent trace of a dark blue-black colour due to the starch-iodine complex.
3. Repeat the titration with further aliquots of sample solution until you obtain concordant results (titres agreeing within 0.1 mL).

1. Calculate the average volume of iodine solution used from your concordant titres.
2. Calculate the moles of iodine reacting.
3. Using the equation of the titration (below) determine the number of moles of ascorbic acid reacting.

Calculations



4. Calculate the concentration in mol L^{-1} of ascorbic acid in the solution obtained from fruit/vegetable/juice. Also, calculate the concentration, in $\text{mg}/100\text{mL}$ or $\text{mg}/100\text{g}$ of ascorbic acid, in the sample of fruit/vegetable/juice.



Additional Notes

1. Iodine stains both skin and clothing so proper care is advised. If staining does occur, alcohol may remove skin stains and cleaners are available for fabric stains.
2. Vitamin C, or ascorbic acid, is a water soluble antioxidant that plays a vital role in protecting the body from infection and disease. It is not synthesised by the human body and therefore must be acquired from dietary sources – primarily fruits and vegetables. The chemical structure and antioxidant (reducing) action of ascorbic acid are illustrated in the redox half equation below.
3. The concentration of the prepared iodine solution can be more accurately determined by titration with a standard solution of ascorbic acid or a standard solution of potassium thiosulfate using a starch indicator. This should be done if possible as iodine solutions can be unstable.
4. The average titre volume should ideally be in the range of 10 – 30 mL. If the titre required for a 20 mL aliquot of sample solution is well outside this range then a larger or smaller aliquot volume should be chosen. If the volume of the titre is too low, dilute the standard. If the titre volume is too high, dilute the sample.
5. Ascorbic acid is susceptible to oxidation by atmospheric oxygen over time. For this reason, the samples should be prepared immediately before the titrations. However, if the samples have to be prepared several hours earlier, oxidation can be minimised by the addition of a small amount of oxalic acid (eg 1 g oxalic acid per 100 mL of sample solution).
6. Identification of the endpoint in this titration is significantly affected by the colouration of the sample solution used. If the solutions are colourless or are pale in colour, there is no problem identifying or strongly coloured juices there can be a problem with the endpoint and it is advised to carry out a “rough” titration in order to become familiar with any distinct colour change which occurs at the endpoint (it may just be a darkening of the colour) This will also help by establishing an approximate volume of iodate solution required. For colourless or pale solutions, there is no problem identifying the endpoint. For strongly coloured juices there can be a problem with the endpoint and it is advised to carry out a “rough” titration in order to become familiar with any distinct colour change which occurs at the endpoint (it may just be a darkening of the colour) This will also help by establishing an approximate volume of iodate solution required.
7. The above method may be used to carry out a number of interesting investigations regarding the concentration of vitamin C in various foods and drinks:
 - Vitamin C content of different types of fruits juices.
 - Vitamin C content of different types/brands of vitamin tablets.
 - Vitamin C content of tablets or food/drink in the presence and absence of added oxalic acid or metal ions over various periods of time.
 - Vitamin C content of food/drink before and after subjection to cooking conditions.
 - Vitamin C content of fruit at different stages.

HANDOUT 7: Thursday, 20th October 2016

Field work: THE EXPERIMENTAL ORCHARD IN BRDO PRI LUKOVICI

The Experimental Orchard in Brdo pri Lukovici

The experimental orchard in Brdo pri Lukovici covers 16.8 ha, of which 14.9 ha is **apple plantations**. It is intended for performing expert work in the field of fruit growing and protection of plants against diseases and pests, basic and applied research and testing new technological measures in fruit growing. The collection, which in terms of the number of collected varieties of fruit plants is the largest in Slovenia, is intended for performing tests as part of the expert work in fruit growing and represents a valuable collection of genetic material in the field of fruit science. The orchard occasionally also serves as a venue for various meetings of fruit experts; everybody finds the experience of our fruit experts very valuable, since they are striving to adhere to environmentally-friendly integrated and organic fruit production.

1. How many sorts of fruit do they grow in the Experimental Orchard Brdo pri Lukovici?

2. How many varieties of apples are there?

Planting an apple tree

A symbol of a friendship between Dutch and Slovenian students

In many cultures the apple tree symbolically represents the "tree of life" or the "tree of eternity", therefore apple tree planting is a symbol of life and eternity. Now in the time of global climate changes, we should focus on environmental care and protection more than ever. Trees play an important role in maintaining balance in nature and every new tree represents a new hope, a new opportunity and a small but important step towards a brighter future. So today, by planting an apple tree, we are going to make an important gesture in expressing our concern and at the same time making our own practical contribution.

3. In your opinion, what could every individual do to help save the environment?

HANDOUT 8: Thursday, 20th October 2016

Field work: **ORGANIC FARM KOS**



The organic farm Kos produces food without the addition of artificial substances in fertilizers. They use direct marketing to customers who get products from "first hand". They use modern, nature-friendly production methods. Their products are certified as "Eco".

Answer the following questions.

1. Who controls their products?

2. What kind of organic products is this farm known for?

HANDOUT 9: Thursday, 20th October 2016

Field work: **AGRICULTURAL INSTITUTE OF SLOVENIA**

About the institute

The Agricultural Institute of Slovenia is the leading research institute in the field of agriculture in Slovenia. It comprehensively deals with the issues of modern agriculture and is expanding its activities into the fields of environmental protection and ecology. It employs 187 workers, of which 89 are researchers.



The Agricultural Institute of Slovenia is a public research institute that performs fundamental, applied and development research and specialist tasks in agriculture, publishes the results of scientific research work as well as professional and supervision work, performs tasks based on authorizations and accreditations and checks the quality of agricultural products and products used in agriculture. The Institute also engages in the training of producers, education of young persons and consultation for various users in agriculture.

Areas of activity:

- crop science and olericulture with seed science,
- genetics, breeding, preservation selection and gene banks in agriculture,
- animal production (cattle production, pig production, apiculture),
- **fruit science, viticulture and winemaking,**
- plant and environment protection,
- supervision of fertility and quality of agricultural land,
- ecology of the agricultural space,
- soil utilisation and protection,
- analyses of soil, mineral and organic fertilisers, animal feed, honey, remains of pesticides, plant protection products, wine, must and spirit drinks,
- agricultural engineering and energetics and
- Economics of agriculture.

The majority of research and professional work is done at the laboratories and in experimental fields and plantations:

- **Experimental Station for Fruit Growing - Brdo pri Lukovici,**
- Infrastructure Centre Jablje,
- Trials Centre for Potato Moste pri Komendi,
- Selection-experimental station for bees at Senično pri Golniku in
- Collection-experimental blueberries plantation at the Drenovi grič.

After it was reorganised in 2013, the Department of Fruit Growing and Viticulture was renamed **the Department of Fruit Growing, Viticulture and Oenology**. Besides business premises and laboratories at the head office of the Institute in Ljubljana, they also have 16.79 ha **experimental orchard for fruit growing in Brdo pri Lukovici** and 2.51 ha experimental plantation of blueberries in Drenov grič. In accordance with the requirements of Slovenian fruit growers, winegrowers and winemakers, their activities are divided into research, expert and market activities.

The majority of their work is performed as part of expert tasks and international and Slovenian projects. An important part of the department is also **the production of quality fruit** (apples, pears, small fruits) according to the guidelines for integrated and organic production. With their research and expert work, they contribute towards the quality and competitiveness of the production of Slovenian fruit, grapes and wine.



HANDOUT 10: Friday, 21st October 2016

Creative workshops: FRUIT CREATIONS

Take a picture of your fruit creation and describe it. Also, describe all varieties of fruit and ingredients that could be used to create your fruit creation.

BE CREATIVE!!!

Example
of a fruit creation:
Banana Dolph



Example
of a fruit creation:
Apple Butterfly



Example
of a fruit creation:
Apple Pig Pal



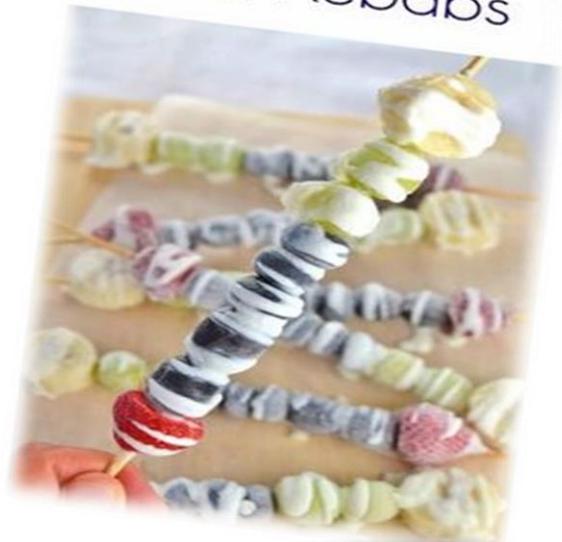
Example
of a fruit creation:
Banana Caterpillars



More examples of fruit creations



Fruit & Chocolate
LADYBUGS



HANDOUT 11: Friday, 21st October 2016

Creative workshops: GLASS CONTAINER DESIGNES

Design your very own unique glass container. Take a picture of it and upload it to the project facebook site.

HANDOUT 12: Friday, 21st October 2016

Creative workshops: FRUIT PROVERBS / IDIOMS

Make a list of English/Slovene/Dutch proverbs or idioms connected with fruit. Take a picture of your final list and upload it to the project facebook site.

LITERATURE

<http://www.education.com/science-fair/article/vitamin-c-in-fruit-juice/>

www.outreach.canterbury.ac.nz/chemistry/documents/vitaminc_iodine.pdf

<https://www.pinterest.com/explore/fruit-creations/>

<http://www.dana.si/en>

www.schoolnutritionandfitness.com/

<http://www.gostilna-repovz.si/>

pri-kmetu.si/kmetija.php?kmetija=137

<http://www.kis.si/en/>