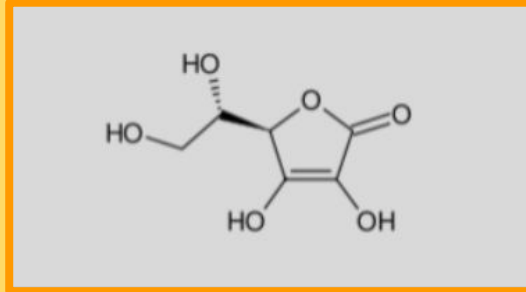


PRESENCE OF VITAMIN C IN FOODS AND ITS VARIATIONS WITH TIME AND TEMPERATURE



Cofinanciado por
la Unión Europea



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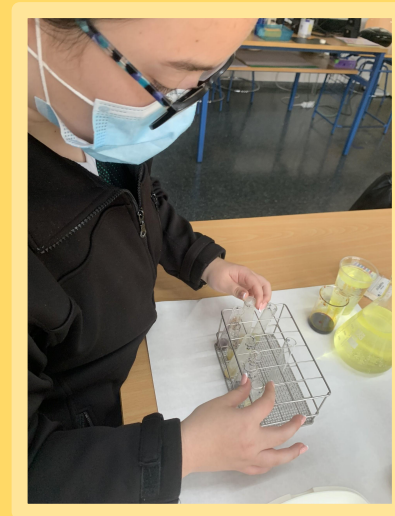
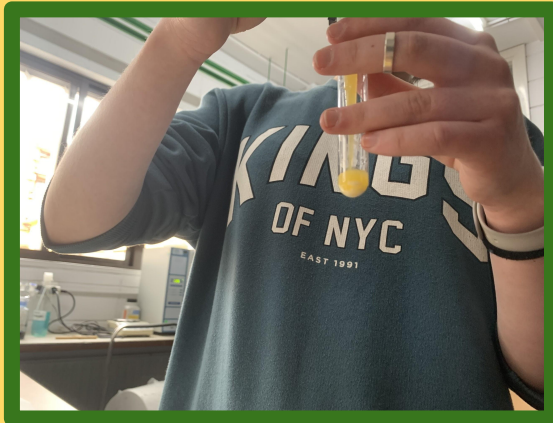
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INTRODUCTION

The ascorbic acid, usually called 'vitamin C', is a water-soluble vitamin, with a consistency similar to a yellowish dust. It is an essential nutrient for every living being, which is created internally by themselves, by human beings and some other species.

First and foremost, this project is based on the quantity of vitamin C (ascorbic acid) that is found in various foodstuffs; and how the content of vitamin C varies with time and temperature.



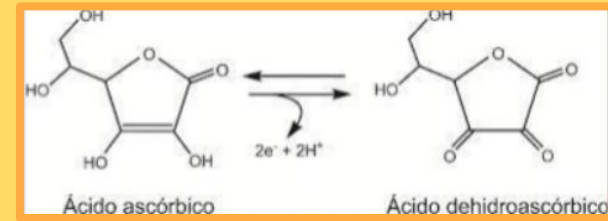
OBJECTIVES

The targets of this project are the following:

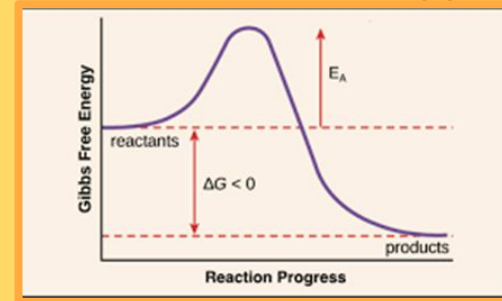
- To estimate the quantity of ascorbic acid contained within the juice of different citrus fruits, in this case: orange, lemon, kiwi juice.
- To study whether there is a variation in the content of ascorbic acid in relation with time and temperature.
- To know the value of pH of the aliments analysed.
- To become aware of the importance of knowing the composition of the consumed foods in order to achieve a balanced and healthy diet.
- To value mathematical knowledge as a basic tool in the scientific method.



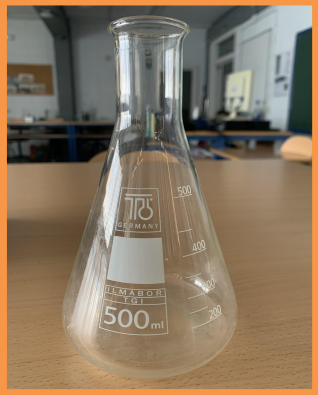
THEORETICAL FRAMEWORK



- REDOX reaction — constant happened - chemical reaction.
 - Oxidation of a substance whilst another is reduced.
 - Lost of vitamin C — oxidation of the molecules of vitamin ($C_6H_8O_6$)
- Activation energy — minimum Energy required for the reaction to happen.
- Ascorbic acid — natural antioxidant.
 - Ability to reduce iodine to iodide.
- Iodine:
 - Blue compound with starch \neq not with to iodide.
- Reduction of iodine in betadine
 - When a solution of vitamin C with starch is added to betadine, the iodine of betadine is reduced by vitamin C. It will not change to blue until all vitamin C is reduced.

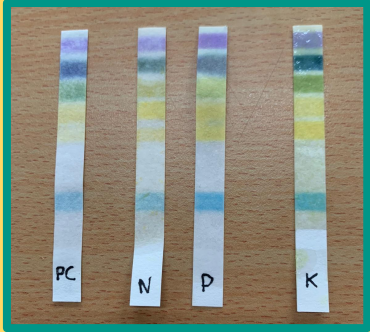


MATERIALS AND METHODS



Erlenmeyer flask

pH strips



Test tubes

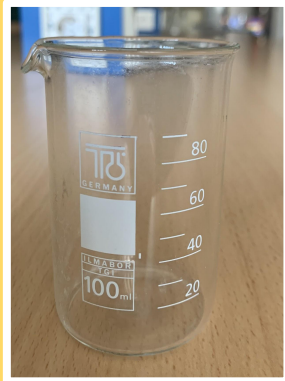
Pipette



Betadine



Micropipette



Beaker



Racks

Alcohol lighter





WORKING HYPOTHESIS

The ascorbic acid is an organic instable molecule towards heat sources, in contact with oxygen or light, so it decomposes by making DEHYDROASCORBIC ACID. Knowing this data, our hypotheses are:

The content of ascorbic acid decreases in proportional relation with exposition time.

The content of ascorbic acid decreases at being heated, and is maintained when freezing.

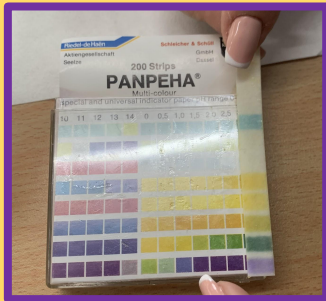
ASSIGNING OF MEANING TO VARIABLES

Different variables used:

-The time as an independent variable.

-Dependent variables as:

- Type of aliment
- Temperature
- pH



RESULTS

TESTING TUBES	N° DROPS OF BETADINE	mg VITAMIN C
STARCH	1	0
STARCH + TABLET SOLUTION	9	0.22
FROZEN STARCH + TABLET SOLUTION	11	0.18
ORANGE JUICE	11	0.18

RESULTS

TESTING TUBES	N° DROPS OF BETADINE	mg VITAMIN C
BOILED ORANGE JUICE	4	0.06
FROZEN ORANGE JUICE	5	0.4
TIME-EXPOSED ORANGE JUICE	4	0.25
ORANGE JUICE	4	0.5
KIWI JUICE	5	0.4

RESULTS

pH IN THE ALIMENTS STUDIED

-Orange pH 3.5

-Vitamin Tablet pH 4.5

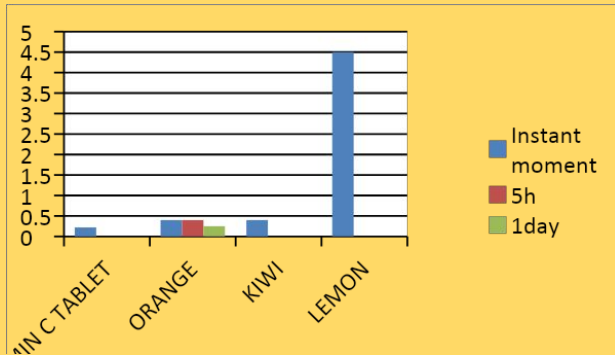
-Frozen vitamin Tablet pH 5

-Kiwi pH 4

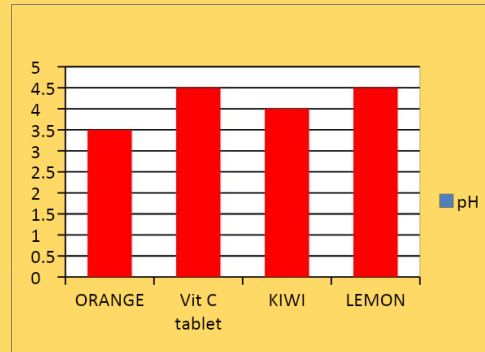
-Boiled orange juice 3.5

GRAPHICS

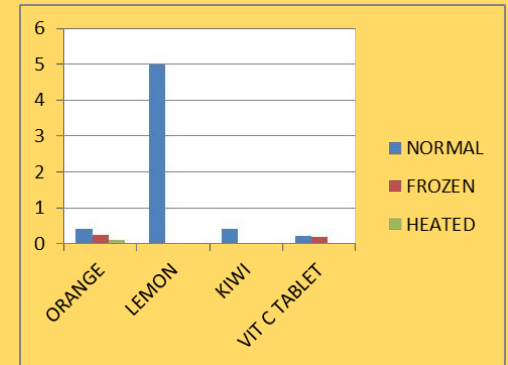
Vitamine- time



pH- aliments

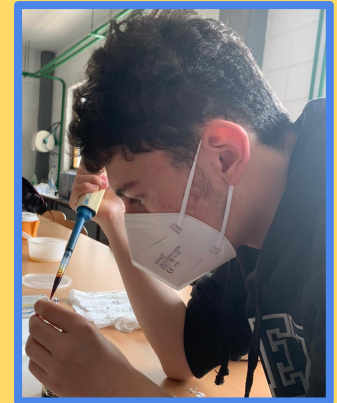
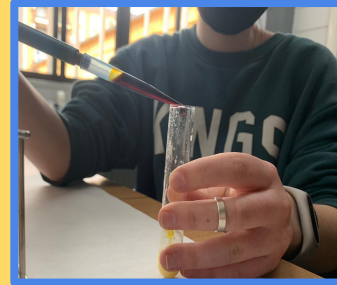


Vitamine C- temperature



DISCUSSION

- Thoughts and questions arised regarding vitamin C
- **Zhongwei Fang**
 - Decrease of vitamin C in high temperature
 - Maintenance of Vitamin C in low temperature
 - Changes of Vitamin C levels after a prolonged time
- Different failures and successes, not too much at all.
- Results keep sense and seem accurate.
- Having learnt the importance of repeating a project so as to get better results
- Precises results in regard to magnitudes studied.





DESIGN OF EXPERIMENTAL TOOLING

Permanent marker: used to mark test tubes

Water: used for cleaning and for making chemical solutions (vitamin pill).

Laboratory rack

Test tubes

Betadine

Fruit juices

Starch (cornstarch)

pH strips

Dropper

Lighter

1ª Sesión:

- 1st contact with the experiment
- Vitamin C pill solution
- Preparation of practice procedure

2ª Sesión:

- 1st experimentation.
- 1h to perform the experiment
- Use of the previous solution done as a guide of measurement of vitamin C
- Serving of juices and naming test tubes
- Measuring ascorbic acid with betadine and starch, and pH
- Collection and studying of data

3ª Sesión:

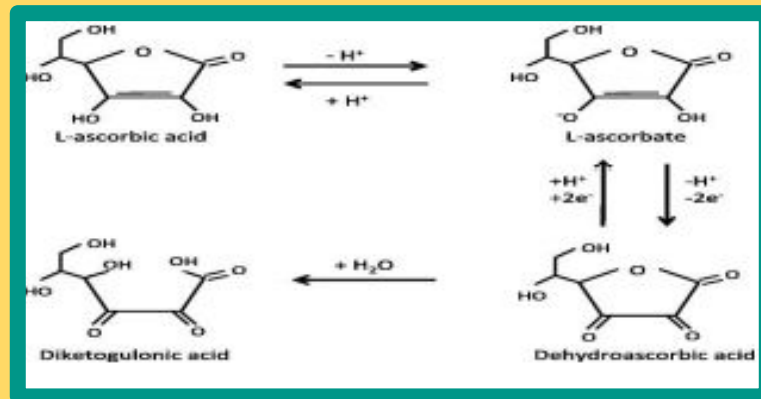
- Repetition of the experiment
- Changes of some few data

CONCLUSION

Ascorbic acid loses its quantities remarkably when heating it up.

Levels of pH were very similar among all fruits manipulated within fruits, and the vitamin C tablet + water solution.

When freezing the Vitamin C preparations, either in the control tablet or the orange juice, ascorbic acid concentrations keep virtually unalterable.



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