

# LOOKING FOR ANTIOXIDANT



bringing up students to a responsible diet

## GOALS

Oxidative stress, due to the very reactive molecules called “free radicals”, is connected to many pathologies: atherosclerosis, Alzheimer’s disease, some tumors, ... These pathologies are less common in those countries where a diet rich in antioxidant molecules takes place. The goal of this project consists in bringing up students to a responsible diet, that’s aimed at limiting the foregoing diseases.

## METHODS

INSTRUMENTS AND GLASSWARE: magnetic stirring plate; 100 mL and 400 mL beakers, 2 mL and 10 mL pipettes, wash bottle, spatula, glass rod, test tubes, paper roll.

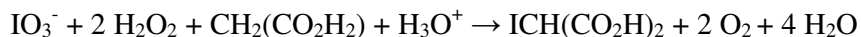
MATERIALS: 4 M H<sub>2</sub>O<sub>2</sub> aqueous solution (1) ; 0,20 M in KIO<sub>3</sub> and 0,077 M in H<sub>2</sub>SO<sub>4</sub> aqueous solution (2); 0,15 M in malonic acid and 0,20 M in MnSO<sub>4</sub> aqueous solution (3), distilled water. Food e.g. samples of wine, teas, infusions; samples of food aqueous extracts.

## PROCEDURE

In a 100 mL beaker containing a magnetic stirrer, pipette: 10 mL of solution (1), 10 mL of solution (B) and 10 mL of solution (C). Turn on the magnetic stirring. When the solution turns blue the second time, 1 mL of the food solution or suspension is added to the reaction. Since the amber colour is connected with a radicalic step and the blue colour with a non radicalic step, the longer the time interval between the second and the third blue the greater the antioxidant activity of a given food.

## DISCUSSION

The Briggs-Rauscher’s is a very complex reaction and many factors are still under investigation. This is the transformation that accounts for the oscillations:

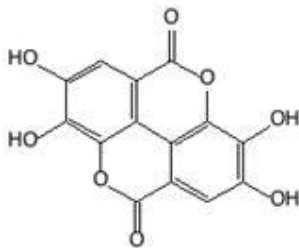


and it is accomplished through two component reactions the first of which can occur via two different processes: a radical process and a nonradical process.

It is not easy to describe the detailed mechanism in a few words, but as far as this work is concerned, it’s enough to know that when the **RADICAL** process maintains the concentration of the intermediate HOI greater than the concentration of the intermediate I<sup>-</sup>, the solution turns **amber**, when the **NONRADICAL** process takes place, [I<sup>-</sup>] is greater than [HOI] and the iodide ion combines with I<sub>2</sub> to form a **blue** complex with starch.

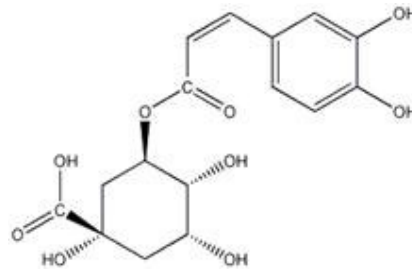
Here are two examples of food with one of their main antioxidant molecules:

## BLACKBERRY JAM

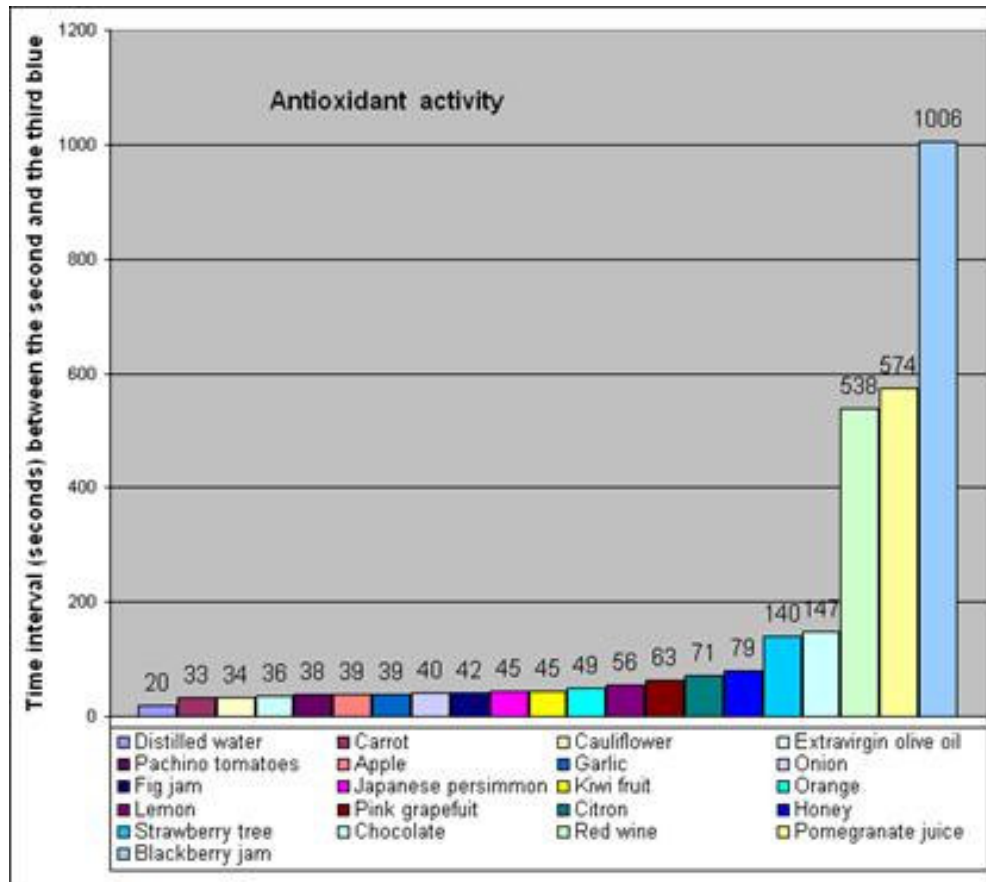


ELLAGIC ACID

# ESPRESSO COFFEE



CHLOROGENIC ACID



## RESULTS

The greatest antioxidant activity was shown by Espresso coffee that's not present in the table because the result outranges (6970 seconds!!!)

These values refer to a quantity of food that's about 0,02 g\* and so 0,02 g of blackberry jam, for instance, have an antioxidant activity 50 times greater than distilled water!