

INFLUENCE OF REFRIGERATION LENGTH AND OF SUGAR ADDITION ON ASCORBIC ACID CONTENT IN SOME NATURAL JUICES

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Abstract: Following some studies concerning the main factors influencing the concentration of vitamins within food raw materials, especially ascorbic acid, this work tries to evidence the influence of the refrigeration temperature and of the sucrose addition on content of this vitamin in three types of natural juice. The biological material was represented by orange, strawberry and kiwi natural juices, obtained from these fruits by means a crushing out process. For each type of juice there were made up samples without addition and samples with 5% and 10% sucrose addition. The ascorbic acid determination was carried out from fresh juice as well as from juice kept in refrigerator, at certain time intervals (24, 48, 96 și 168 hours). The storage of these juices under refrigeration conditions has determined percentage reductions of vit. C content of these ones. Thus, after 168 hours of storage, in the three types of analysed juices the highest loss of vitamin have been registered in samples without sucrose addition, and the least ones in samples with 10% addition. The comparison of vitamin C values in the three analysed juices, subjected 168 hours to refrigeration process, has evidenced that the highest loss of ascorbic acid have been in orange juice, and the least one in kiwi juice.

Keywords: vitamin C, sucrose, orange, strawberry, kiwi

INTRODUCTION

There are some factors which negatively influence the vitamins concentration in food raw materials, such as: high temperatures over certain values, the freezing, the presence of oxygen and of some chemical substances, certain pH values etc.

During food raw materials processing, the level of their vitamins can be negatively affected through some operations such as: manipulation-conservation after harvest of vegetable produce and of meat and aquatic produce, collecting-storage of milk, cutting- chopping end/or scalding, boiling of fruits and legumes, cereals grinding, the adding of chemical substances into legumes, fruits, meat (Adrian and Petit, 1970; Ferrando and Mainguy, 1970; Flanzky, 1970; Scriban, 1970; Ulrich and Delaporte, 1970; Banu et al., 2003).

As to vitamin C, its concentration can be reduced with various percentages, depending on type of processing of raw material containing this vitamin. Thus, three months potatoes storage leads to loss of 50%, the sterilization, but especially vegetables boiling lead to vitamin loss between 47% and 82%. The addition of bicarbonate, used to soften some legumes, contributes to diminish of vitamin C concentration (Banu et al., 2003).

The storage of legumes for an year at temperatures around -10° can lead to vitamin C loss of 80–90% (Selman, 1994).

The addition of anthocians, sugar and even starch seems to have a protecting action on vitamin C (Banu et al., 2003).

Retention of ascorbic acid is better in rapid drying at high temperatures than in slower drying at lower temperatures. Drying methods that expose the food to air result in losses of vitamin C due to oxidation. On the other hand, freeze drying, which is carried out in the absence of oxygen, does not cause loss of vitamin C (Ball, 2006).

According to Selman (1994), the inefficient blanching causes some loss of vitamin C by oxidation, as well as by leaching.

As to microwave heating, the ascorbic acid content is higher in vegetables cooked by microwave heating than by conventional methods (Hill, 1994).

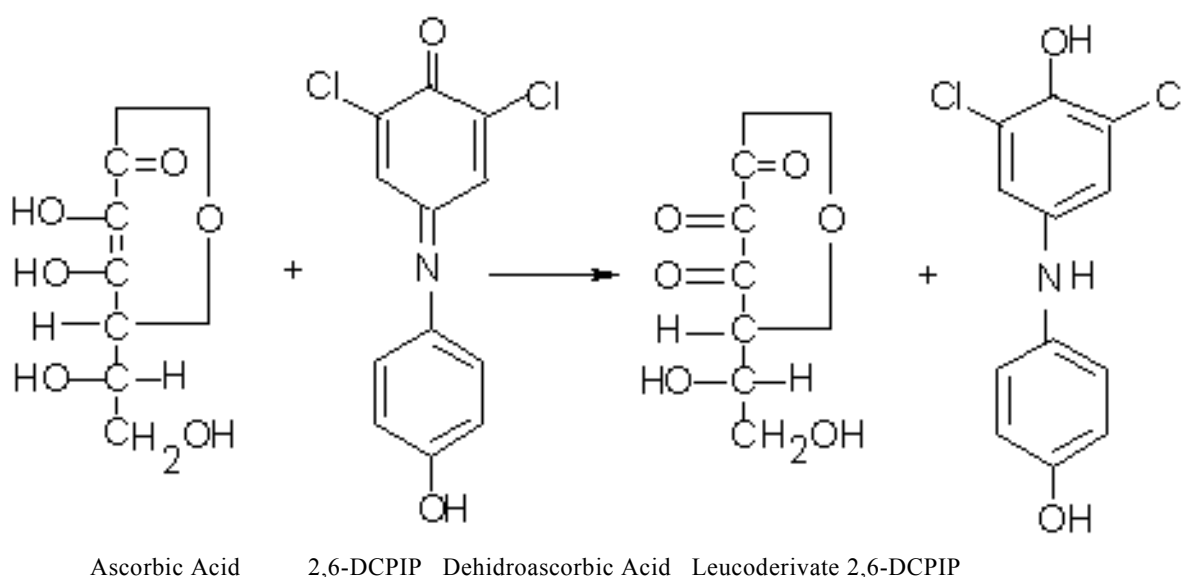
In this work it was studied the variation of vitamin C (ascorbic acid) concentration within three types of natural juices, without and with sucrose addition, stored at +2°C, certain time periods.

MATERIALS AND METHODS

The biological material was represented by natural juices of orange, strawberry and kiwi, obtained from these fruits by means a crushing out process. In order to limit the contact with air and the possibility of vitamin C oxydation, at once after obtaining the juices were rapidly poured into plastic bottles (300 ml capacity) tight closed, and introduced into refrigerator at +2° C.

For each type of juice there were make up samples without addition and samples with 5% and 10% sucrose.

The ascorbic acid determination was carried out from fresh juice as well as from juice kept in refrigerator, at certain time intervals (24, 48, 96 și 168 hours). The method was based on reduction of 2,6-Diclorphenolindophenol (2,6-DCPIP) to the leucoderivate of 2,6- DCPIP, by ascorbic acid (Artenie and Tănase, 1981):



RESULTS AND DISCUSSION

In the table 1 are rendered the values of ascorbic acid content in orange juice.

Table 1 The orange juice ascorbic acid content, with and without sugar addition, stored certain time periods in refrigerator (2° C)

Ascorbic Acid (mg %)			
Juice type Storage length	Sucrose free juice	Juice with 5 % sucrose	Juice with 10 % sucrose
*0 hours	59.752	59.752	59.752
24 hours	58.520	58.784	59.004
48 hours	56.056	56.241	56.454
96 hours	51.744	52.028	52.849
168 hours	37.576	39.295	42.482

* Blank sample

As seen, both in the sucrose free orange juice and in samples with sucrose addition, the vitamin C concentration has gradually decreased once with juice keeping in refrigerator. The highest differences between samples, which has begun to come into view after 96 hours, have appeared after 168 hours of storage. The greatest value was registered by juice with 10% sucrose (28,91% vitamin loss beside blank), and the least was registered by sucrose free juice (37,12% vitamin loss beside blank).

The table 2 reproduces the values of ascorbic acid content in strawberry juice.

Table 2 The strawberry juice ascorbic acid content, with and without sugar addition, stored certain time periods in refrigerator (2° C)

Ascorbic Acid (mg %)			
Juice type Storage length	Sucrose free juice	Juice with 5 % sucrose	Juice with 10 % sucrose
*0 hours	56.056	56.056	56.056
24 hours	52.976	53.167	53.486

Ascorbic Acid (mg %)			
Juice type	Sucrose free juice	Juice with 5 % sucrose	Juice with 10 % sucrose
Storage length			
48 hours	50.512	50.988	51.339
96 hours	48.048	48.113	48.543
168 hours	41.272	42.105	42.766

* Blank sample

Also in strawberry juice it can see reductions of vitamin C concentration, once with increase of the samples keeping length in refrigerator at +2° C. Less marked then in the case of orange juice, in strawberry juice, after 168 hours of storage, the vitamin C loss has been 26,38%, in sucrose free juice sample, and 23,71% in juice sample with 10% sucrose. Along the whole storage period, but in the last determination (after 168 hours) the vitamin C concentration values of the three analysed samples have been close.

In the table 3 are rendered the values of ascorbic acid content in kiwi juice.

As seen in the table, in kiwi juice, the vitamin C loss have been the least beside orange and strawberry juices. Thus, after 168 hours of storage at +2° C, in sucrose free juice sample the vitamin C concentration has reduced (beside blank) with 20%, and in juice sample with 10% sucrose has reduced with 16,25%.

Table 3 The kiwi juice ascorbic acid content, with and without sugar addition, stored certain time periods in refrigerator (2° C)

Ascorbic Acid (mg %)			
Juice type	Sucrose free juice	Juice with 5 % sucrose	Juice with 10 % sucrose
Storage length			
*0 hours	70.840	70.840	70.840
24 hours	68.992	68.998	69.166
48 hours	67.760	68.005	68.537
96 hours	65.296	66.108	67.214
168 hours	56.672	58.851	59.332

* Blank sample

CONCLUSIONS

The storage under refrigeration conditions (+2° C) of some natural orange, strawberry and kiwi juices, with and without sucrose addition certain time periods, has determined percentage reductions of vitamin C content in these juices.

After 168 hours of storage, in the three types of analysed juices the highest vitamin loss have registered in sucrose free juice samples, and the least ones in juice samples with 10% sucrose.

The comparison of vitamin C values in the three analysed juices, subjected 168 hours to refrigeration process, has evidenced that the highest loss of ascorbic acid have been in orange juice, and the least one in kiwi juice.

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