

THE DETERMINATION OF SOME PHYSICAL-CHEMICAL CHARACTERISTICS FOR ORANGE, GRAPEFRUIT AND TOMATO JUICES

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Abstract

Orange, grapefruit and tomato natural juices were obtained through the centrifugal method. Later, the extracts were subdued to some analyses in order to praise their main physical-chemical characteristics, obtaining compatible values with dates from the specialty literature.

Keywords: *natural juices, juices with pulp, extraction, oranges, tomatoes, grapefruit.*

Introduction

Vegetables and fruits are part of man's most important food categories being necessary for the maintenance of life and health. Especially they are a precious source of vitamins, mineral substances and other substances that are necessary for food completion (some proteins with indispensable amino-acids etc.).

Fruit juices are liquid, non-alcoholic products, with a different degree of clarity and viscosity, obtained through pressing or breaking up the fruits, with or without sugar or carbon dioxide addition.

The production of fruit and vegetable juices got a large development in the last years, so we can talk about a prosperous industry of juices, respectively about concentrated juices. (Banu, 1998; Hass, 1966).

At present, modern medicine recommends the use of different kinds of juices in the treatment and prophylaxis of cardiovascular diseases, in different stomachaches, affections of the duodenum, intestine sicknesses (gastritis, ulcer, enterocolitis), in liver and bladder illnesses, in different affections of the kidneys and in fatness. As a result, they are used as dietetic products as well as special elements for children and old people. (Guțulescu, 1977).

Also, based on their antioxidant capacity, established in some papers ("Total antioxidant capacities and polyphenols contents of some

fruit juices and beverages from Romanian market”, “Antioxidant capacities, polyphenols and ascorbic acid contents of some fruit juices and soft drinks”), it is recommended to use these juices as indicators for healthy nourishment as well as protection factors of the human body against oxidative destruction.

In the paper we have established the main physical-chemical characteristics (relative density, pH, turbidity, refraction index and sugar content) of the orange, grapefruit and tomato juices. Thus, some values for acidity and sugar content for orange and tomato juices are quote in papers and there are no dates regarding the turbidity of these juices (www.gemon.ro/vitaminaC.htm). Also, there aren't any dates of this kind regarding the grapefruit juice.

Experimental

The main methods of obtaining juices are:

- cold extraction which can be realized through the extraction of the juice using a press with spirals for fruits, extraction of the juice using an electric centrifuge and extraction of the juice through freezing;
- warm extraction which requires using of steam. (Tressler, 1971).

In order to obtain the juices we used an average sample of oranges – Greece importation, grapefruits – Oroblanco grapefruit citrus paradise sort and tomatoes from our country – Aurora sort, all of them belonging to the 2005 summer production. In the paper we have described the obtaining of the natural juices (with pulp) from the above mentioned fruits through the centrifugal method. For this type of extraction the free water is eliminated and especially that part that isn't hold back in cells and tissues. Therefore, the raw material fission is one of the main conditions in obtaining a good efficiency in juice using this method.

For the extraction a filterable centrifuge with vertical axle and perforate filterable reel in a conical shape was used (Bomann type). (Răşenescu, 1972).

The main physical-chemical characteristics of the juices have been established, thus: the relative density of the juices was picnometrically measured, the refraction index with ABBÉ refractometer, the sugar content with a Carlzeiss Jena portable refractometer, the pH through the potentiometric method using an “inoLab” pH-meter equipped with a SenTix81 combined glass electrode. The glass electrode was calibrated using

standard buffer solutions. The turbidity of the juices was measured with a TURB 355 IR/T turbidimeter produced by WTW, Germany.

Results and Discussions

Different quantities of grapefruits, oranges and tomatoes were subject to extraction, obtaining the following efficiency: 48.56% for grapefruits; 38.64% for oranges and 72.85% for tomatoes, values comparable with the values found in the specialty literature (Tressler, 1971). The physical characteristics of the tomato, orange and grapefruit juices were established organoleptically, all of them presenting the aspect of a diffuse liquid with pulp, the color and the odor of the juices being characteristic for each of them and the taste was flavored.

The main physical-chemical characteristics obtained values are presented in table 1.

Table 1. The values of the determined physical-chemical properties

Determined physical-chemical property	Oranges	Grapefruits	Tomatoes
Relative density (at 20°C)	1.033	1.030	1.010
pH (at 20 °C)	3.716	3.611	4.032
Turbidity (NTU)	3695	2554	1958
Refraction index (at 20°C)	1.347	1.344	1.339
Sugar content (%)	11.1	9.9	2.0

From table 1 it comes out that the biggest acidity is present within the grapefruit and orange juices, a predictable fact, having in view their content in vitamin C (www.gemon.ro/vitaminaC.htm). The refraction indexes of the three extracts are considerably close, while the turbidity of them is declining from the orange juice to the grapefruit and tomato one. The entire sugar content is much different at the orange and grapefruit juices in comparison with the tomato juice.

Dates from the specialty literature regarding some physical-chemical characteristics of orange, grapefruit and tomato juices are relatively terse. Thus, values for acidity and sugar content for orange and tomato juices are quote. Suitable values obtained by us were comparable with dates from literature (Gergen, 2004).

Fruits should constitute one of the most important foods for man. Their regular and copiously consumption maintains health and makes up for the losses in the humans' diet. Due to their beneficent qualities, from a food point of view (they guarantee a great percentage of vitamins and mineral substances from the necessary daily dose) and also from a medical point of view (treatment and prophylaxis of cardiovascular diseases, in different stomachaches, affections of the duodenum, intestine sicknesses, in liver and bladder illnesses, in different affections of the kidneys and in fatness) the consumption of the natural juices with pulp is recommended.

Conclusions

The main physical-chemical characteristics of the orange, grapefruit and tomato juices determination led to some results that are comparable with dates from specialty literature. All of these juices present a high turbidity – particularly the orange juice, while the sugar content is high at the orange juice, a little bit lower at the grapefruit one and far lower at the tomato juice. The results obtained completes the dates that already exist in the literature.

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