

EVALUATION OF SOLUBLE SOLIDS CONTENT AND PH OF ICE CREAM TREATED WITH GAMMA RADIATION

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ABSTRACT

The ice cream is considered an aerated suspension of fat and ice crystals in a concentrated sugar solution containing hydrocolloids, proteins and casein micelles. Only in Brazil, in the year 2010, it was produced 1120 million liter of ice cream and due to high demand by the consumers, this is considered the most important product of the dairy industry. The objective of this work is to evaluate the soluble solids content (SSC) and the hydrogenionic potential (pH) of vanilla ice cream conditioned in isothermal boxes irradiated with 3.0 and 5.0 kGy in the Multipurpose Irradiator of ⁶⁰Co located at IPEN – CNEN/SP. It can be concluded that the treatment of ice cream with gamma radiation didn't cause changes in the analyzed parameters.

1. INTRODUCTION

According Brasil (1999) the ice cream is considered an emulsion of fat and proteins, with or without the addition of other ingredients. From 2003 until 2010 the consumption of ice cream in Brazil grew by 63.07 %, increasing from 685 million liters in 2003 to 1,117 million liters in 2010 (*per capita* consumption of 5.77 liters / year). For the same period domestic production increased from 687 million liters to 1,120 million liters with a turnover of US\$ 1,939 million [2].

Ice cream is the most important dairy product consumed in the world and it is a good medium for a microbial growth due to its nutrient content, and long storage [3]. Irradiation treatment is an important technology to reduce microorganisms in food and can be easily used for frozen products [4]. The objective of this work is to evaluate the soluble solids content (SSC) and the hydrogenionic potential (pH) of vanilla ice cream.

2. MATERIAL AND METHODS

2.1. Sample

The samples of vanilla ice cream were purchased in the retail market of São Paulo city.

2.2. Irradiation

The samples of vanilla ice cream were irradiated using a Multipurpose ⁶⁰Co Irradiator at Institute of Nuclear Energy Research – IPEN/CNEN (São Paulo, Brazil). The applied doses

were 3.0 and 5.0 kGy with dose rate of 4.5 kGy h⁻¹. Amber 3042 Batch S 603 nm dosimeters were used for the measurement of radiation dose. After irradiation, the samples were immediately stored at -10 °C.

2.3. Soluble Solid Contents

Soluble Solid Contents (°Brix) was determined using an ABBE refractometer model Q-767b, according AOAC (1995) with correction of the soluble solid contents for the temperature.

2.4. pH measurement

The pH was determined using a Micronal[®] pHmeter model B474, according AOAC (1995).

3. RESULTS AND DISCUSSION

The analysis of pH didn't showed statistical difference among the control sample and irradiated with 3.0 kGy and 5.0 kGy (Table 1). The ice cream pH is normally about 6.3 [6], although depending on what is added to ice cream these values may vary between flavors, such as in ice cream made with kiwifruit that showed values between 3.5 and 3.8 [7] or papaya ice creams with values of 5.53 to 5.87 [8].

Table 1. pH values of vanilla ice cream treated with gamma radiation.

Samples	Control	3.0 kGy	5.0 kGy
pH	7.06 ^a	6.99 ^a	7.13 ^a
	7.07 ^a	6.99 ^a	7.10 ^a
	7.12 ^a	6.98 ^a	7.00 ^a

^a equal letters within columns or row don't differ significantly (p < 0.05).

The results of soluble solid contents (°Brix) did not differ statistically among the control sample and 3.0 and 5.0 kGy irradiated sample (Table 2). The mean of soluble solid contents were 39.50, 39.19 and 40.63 for control, 3.0 kGy and 5.0 kGy, respectively. This results concern with Aime et al. (2001) that presented similar results with those obtained in this work.

Table 2. Values of soluble solid contents of irradiated vanilla ice cream.

Samples	Control	3.0 kGy	5.0 kGy
°Brix	39.26 ^a	37.16 ^a	40.06 ^a
	41.26 ^a	39.26 ^a	41.16 ^a
	38.06 ^a	41.16 ^a	40.66 ^a

^a equal letters within columns or rows don't differ significantly (p < 0.05).

4. CONCLUSION

It can be concluded that irradiation did not affect the analyzed parameters in this research, although other physical and chemical studies should be conducted to better understand the gamma radiation effects on ice cream.

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