Acrylamide Mitigation in Bakery Products

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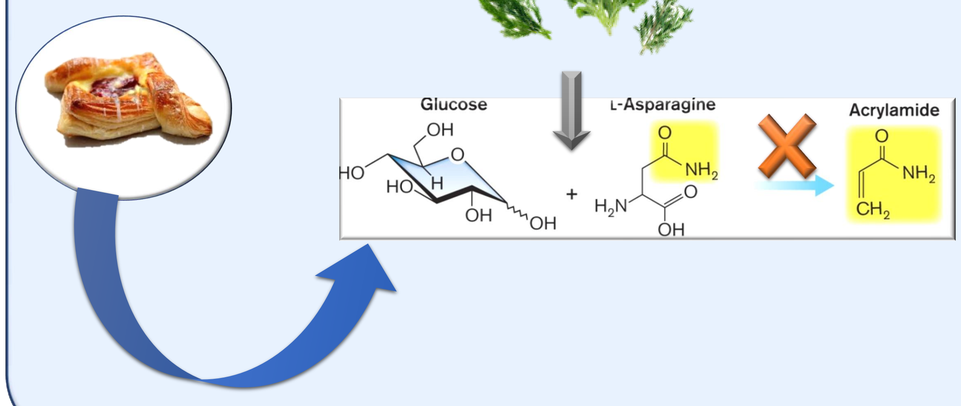
INTRODUCTION

Acrylamide is a carcinogenic substance for animals and to humans. The harmful effect of such compound was later confirmed, and recently the acrylamide was considered a neurotoxic and genotoxic substance[1]. This contaminant has been found in processed food result of Maillard reaction[2]. There are many studies regarding several mitigation strategies, however it is need to change the manufacturing processes[3].

OBJECTIVES

Given the acrylamide content in foods, strategies to counter the Maillard reaction have been studied and developed, but here are no industrial application studies in the area of baking. So, the present work focuses on the occurrence study and development of different reducing additives in bakery products.



MATERIALS AND METHODS

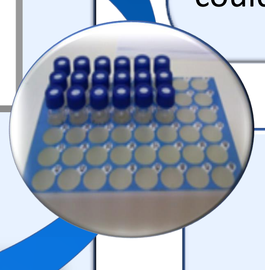
The methodology is described in figure 1. The acrylamide concentration was determined by UPLC-MS method, preceded by the "Method of extraction in solid phase".

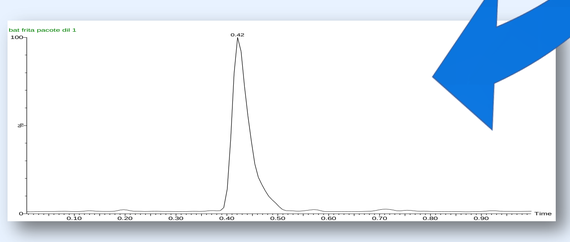
Sample + H_2O:HCOOH

Shake

Centrifuge
31000 rpm, 15 min

Solid Phase Extraction





RESULTS AND DISCUSSION

From figure 1, the ham and cheese rolling and "trouxa filó" had the highest amount of acrylamide, 3743 µg/kg and 3862 µg/kg, respectively. The results also showed that caramel cookies, butter cookies, Greek cookies and cocoa cookies do not exceed the EFSA indicative value (500 µg/kg)[1].

Pie samples (686-1084 µg/kg), god's bread (995 µg/kg), pastels (527-809 µg/kg) and muffins (676-1057µg/kg) contain high levels of acrylamide when compared to the values found in the literature for bakery products, 198 µg/kg[2].

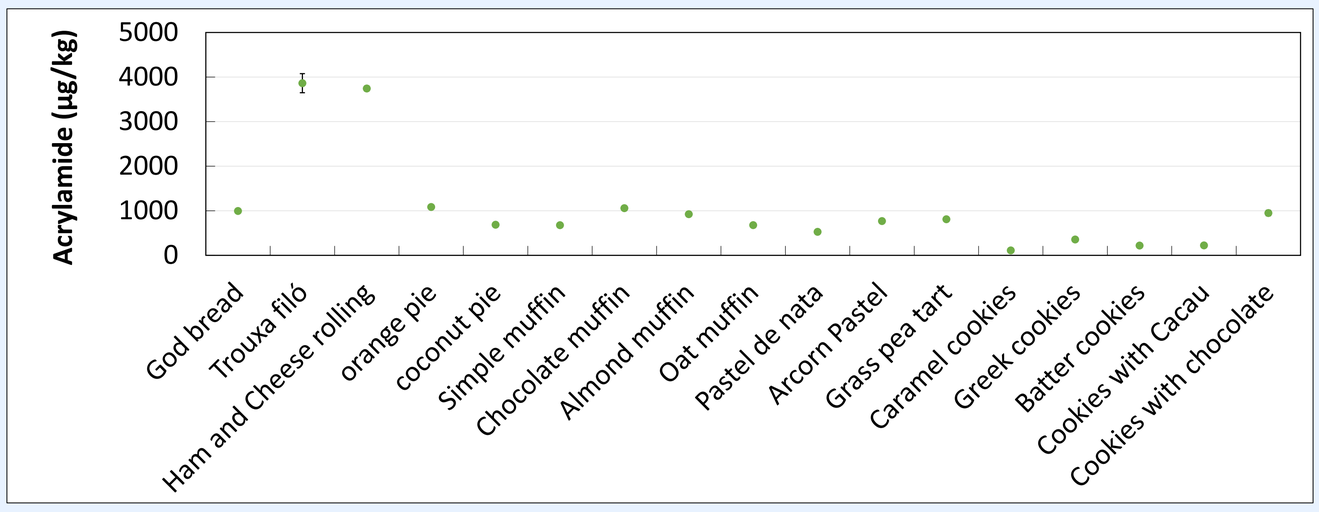


Figure 1. Acrylamide occurrence in bakery products

Given the obtained results, tests were carried out in order to reduce the concentration of acrylamide. A bakery product was prepared to which four different reducing agents (A, B, C and D) were individually added. The effect of each agent on acrylamide formation was evaluated.

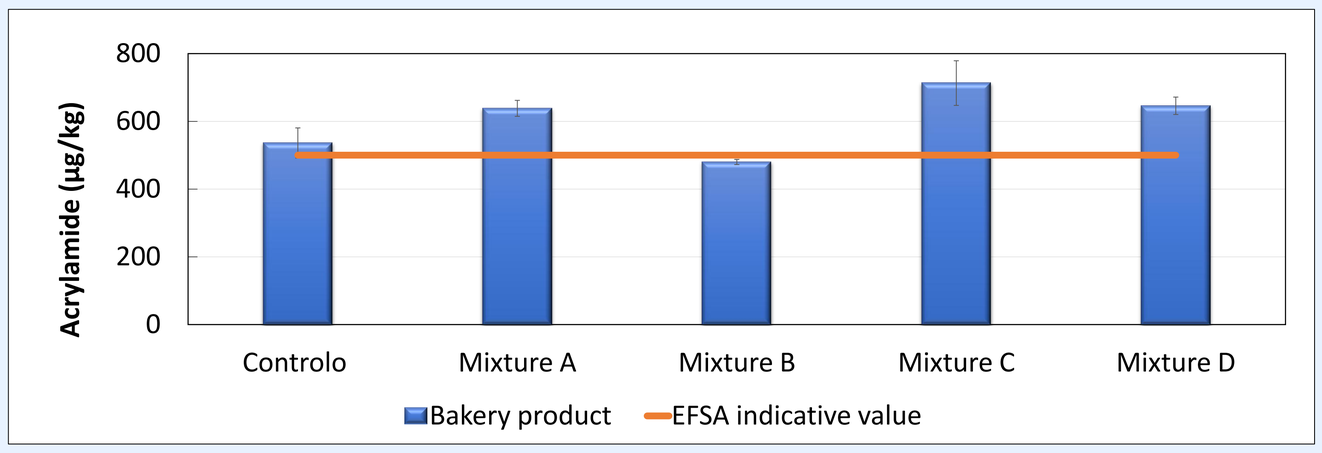


Figure 2. Acrylamide reduction

Results showed that mixture B obtained an acrylamide reduction of 16%. On the other hand, the remaining mixtures increased the production of the contaminant. These results could be related with nutritional composition of the reducing agents.

CONCLUSIONS

In this study was demostrated that the bakery group had achieved high values of acrylamide, highlighting "trouxa filó" and ham and cheese rolling.

However, further studies are necessary in order to achieve a higher percentage of reduction of acrylamide. Progress studies are ongoing with other reducing agents and flours.

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AKNOWLEDGMENTS

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