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Pharmacology & Chromatography & HPLC Congress 2018: Sugars determination by UPLC-MS/MS and relation with acrylamide formation in bread - Susana Jesus - National Institute of Health Doutor Ricardo Jorge

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Statement of the Problem: Acrylamide is a carcinogenic contaminant produced during food processing at high temperatures. This contaminant is a Maillard Reaction product that results from a reaction between asparagine and reducing sugars. Therefore, the determination of sugar profile is an important form to understand the formation of acrylamide in foods, such as bread, potatoes or coffee. In the particular case of bread, it is important to understand the effect of fermentation on the formation of acrylamide. Until now, several techniques have been developed to determine saccharides in food, GC-MS, HPLC-DAD, HPLC-FLD, HPLC-ELSD. However, these methods have disadvantages, such as low selectivity and some methods require derivatization. Therefore, the aim of the present work was to develop a method to analyze the mono and disaccharides by UPLC-MS/MS in flour and bread dough.

Methodology & Theoretical Orientation: Six flours (oat, rye, wheat flours) and four bread dough were selected. For the detection and quantification of sugars ultra-performance liquid chromatographic coupled to a mass detector (UPLC-MS/MS) was used. To identify sugars and optimize the parameters of the detector, direct injections of the sugars under study (sucrose, glucose, fructose, maltose, and mannose) was carried out. The following chromatographic conditions were then tested: mobile phase A with acetonitrile/water (10:90) with 0.1% ammonium hydroxide and mobile phase B with acetonitrile/water with 0.1% ammonium hydroxide. The method has a flow of 0.2 ml/min with a 32 minutes gradient: 0-30 min, 100-70% B; 30-30.1 min, 70-60% B; 30.1-31 min, 60-80% B; 31-32 min, 80-100% B.

Result: With this method, it was observed that there are no matrix interferences in the chromatogram (Figure 1), concluding that this method is suitable for sugar analysis in flour and bread dough.

Conclusion & Significance: We developed a simple and rapid method for simultaneous determination of sugars in flour and bread dough to understand the formation of acrylamide in bread

Recent Publications

1. Jesus S, Delgado I, Rego A, Brandão C, Santos R, Bordado J and Castanheira I (2018) Determination of Acrylamide in Portuguese Bread by UPLC-MS/MS: Metrological and Chemometric tools. Acta Imeko

2. Motta C, Delgado I, Matos A, Gonzales G, Torres D, Santos M, Chandra-Hioe M, Arcot J and Castanheira I (2017) Folates in quinoa (Chenopodium quinoa), amaranth (Amaranthus sp.) and buckwheat (Fagopyrum esculentum): Influence of cooking and malting. Journal of Food Composition and Analysis, 64:181–187.

3. Rego A, Mota C, Gueifão S, Ventura M, Delgado I, Lopes J, Matos A and Castanheira I (2018) Amino acid contents and toxically relevant arsenic of rice varieties consumed in Portugal. Measurement 113:189-195.

4. Mota C, Santos M, Mauro R, Samman N, Matos S, Torres D and Castanheira I (2016) Protein content and amino acids profile of pseudocereals. Journal of Food Chemistry 193:55-61.

5. Castanheira I, Saraiva M, Rego A and Ollilainen V (2016) EuroFIR guidelines for assessment of methods of analysis: GAMA. Journal of Food Chemistry 193:82-89.

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