

Cristina Soares  
Faculdade de Farmácia da  
Universidade do Porto -  
Bromatologia  
Porto (OPO), Portugal

Email:  
cristina.md.soares@gmail.com

## ACRYLAMIDE IN COFFEE BY GC/MS – COMPARISON BETWEEN MATRIX SOLID- PHASE DISPERSION AND LIQUID- LIQUID/SPE PROCEDURES FOR SAMPLE PREPARATION

Soares, Cristina\*; Alves, Rita C.; Amaral, Joana S; Casal, Susana;  
Oliveira, M. B. P. P.; *josefer@ff.up.pt*

In 2002, Swedish scientists reported the discovery of large amounts of acrylamide in starch-rich foods that had been cooked at high temperatures. Although the mechanism of acrylamide formation remains unclear, it is believed to arise as a by-product of the Maillard reaction through a mechanism involving asparagine and glucose. Acrylamide has been demonstrated to cause cancer in animals and it is thought that its presence in foods may be potentially harmful to people's health [1].

Several methods to determine AA in food have been developed mostly based on either GC-MS or LC-MS. Independently of the chromatographic technique adopted, the success of the method is very dependent on the extraction and clean-up steps but the most used procedures usually exhibit problems when dealing with coffee products preventing its correct quantification.

The present work describes the development and validation of a Matrix Solid Phase Dispersion (MSPD-GC/MS) procedure for the analysis of acrylamide in coffee samples. The matrix (0.5 g) was dispersed in C<sub>18</sub> (2 g) and packed into a SPE column prepared with 1 g of C<sub>18</sub> and 1 g of ISOLUTE Multi-Mode. Acrylamide was then extracted with water and the extract derivatized and injected in the GC-MS. The same samples were also prepared for GC-MS analysis using a liquid extraction approach (LE-GC/MS): 2 g of sample were extracted with hot water, and the polysaccharides and proteins were precipitated with ethanol and Carrez solutions, respectively. After centrifugation and filtration of the solutions, the extracts were evaporated to 3 ml and cleansed in SPE columns prepared with 3 g of ISOLUTE Multi-Mode and 1 g of C<sub>18</sub> [2].

The results obtained by using both methods were very similar. However, the MSPD-GC/MS method exhibits improved analytical features, namely the carrying out of the analysis in an easier and simpler manner, the reduced sample manipulation, solvent usage and disposal, and working time. It also eliminated emulsification problems related to the characteristic coffee foam, which makes it an advantageous alternative for the analysis of acrylamide in coffee samples.

[1] Dybing, E. et al., Food and Chemical Toxicology, 43:365- 410 (2005); [2] Soares, C. et al., Food Addit. Contam., 23:1276 (2006)