

## Acrylamide – new findings in foodstuffs

Acrylamide was not considered to be a great health risk prior to April 2002, however when the Swedish National Food Administration (NFA) presented the results of its studies on barbecued, deep-fried and oven-baked foodstuffs they found that the formation of acrylamide occurred at high temperatures and in products containing carbohydrates. These results had repercussions all over the world.

The official reaction from different countries is that this study does not expose a new food scandal. The general feeling is that the study has provided data on a phenomenon that has probably existed for thousands of years. However, it is regarded as an important discovery, so much so that further studies are planned in order to obtain a sound scientific basis for the effects observed. These studies include the testing and evaluation of cooked foods, the determination of the amount of acrylamide in relation to process parameters and more importantly, the health risk of eating foods containing acrylamide. There is also demand for a comparison of the results obtained using different analytical techniques. The current state of scientific knowledge is currently insufficient for action and no countries have as yet changed their dietary recommendations.

It has been suggested that comparable products contain acrylamide at different levels and also there does seem to be a correlation with the food production condition. It has been observed that vigorous heat stress, combined with any number of factors, increases the content of acrylamide. Therefore it is suggested that it may be possible to reduce the formation of acrylamide by alterations in processing technologies. Many manufacturers are considering

these changes with regard to the principle that the content of any hazardous compounds should always be minimised in foods. The food industry has undertaken this new task regardless of the outcome of future health and risk studies.

It is worth noting that there is no current limit for the concentration of acrylamide in foodstuffs. The World Health Organisation (WHO) has recommended a limit of 0.5 µg/l for drinking water. The EU Drinking Water Directive of 1998 specifies a limit of 0.1 µg/l. The laboratories of Eurofins



Denmark have confirmed the Swedish findings for acrylamide, ranging from below the limit of detection up to 4,000 µ/kg. The foodstuffs examined included potato chips, hard pastries, biscuits, crisp breads and breakfast cereals. This comparison illustrates the extent of the problem, although the consumption of water is much larger than the foodstuffs in question. Furthermore, the findings in unprocessed and boiled foods were well below the limit of detection.

Unlike the majority of food related scares, which in general are related to industrially manufactured products, the formation of acrylamide occurs domestically by frying, grilling or baking.

For many years, Eurofins Denmark has performed analyses for acrylamide in air and water samples. The method used is based on the bromination of acrylamide, with subsequent analysis by gas chromatography with electron capture detection (GC-ECD). This method is suitable for relatively pure samples (e.g. air and ground water), however it has been found unsuitable for more complex samples such as foodstuffs, which corresponds to the experiences of the Swedish NFA. The GC-ECD method requires further validation before it is considered reliable.

A more suitable method is Liquid Chromatography - tandem Mass Spectrometry (LC-MS-MS). This method is based on the liquid chromatographic separation of acrylamide from other components, and is followed by the analysis of separated components in a first mass spectrometer. A second mass spectrometer is used further to fragment components for a positive, fast and accurate identification of acrylamide. This technique can also be performed with a single mass spectrometer (LC-MS), rendering analysis considerably less expensive. However, the latter method cannot accurately confirm that a positive result is indeed acrylamide.

Eurofins Denmark has many years' experience in LC-MS-MS analysis and would suggest that this is the obvious choice for the determination of acrylamide in foods and other related products ●

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*Acrylamide is a well-known compound that is chemically manufactured in large amounts and used in synthesis of polyacrylamide. This polymer is frequently used as a flocculation agent in water treatment and as an insulating material. Acrylamide may therefore occur naturally in water and air, and is considered as a carcinogen. EU Scientific Committee on Food Opinion on new findings regarding the presence of Acrylamide in food (expressed on 3<sup>rd</sup> July 2002) : [http://europa.eu.int/comm/food/fs/sc/scf/out131\\_en.pdf](http://europa.eu.int/comm/food/fs/sc/scf/out131_en.pdf)*

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