

Factors Affecting the Content of Acrylamide during Deep-fat Frying

B. Matthäus¹, K. Vosmann¹, N. U. Haase²

¹ Institute for Lipid Research, Federal Center for Cereal, Potato and Lipid Research, Post Box 1705, D-48006 Münster, Germany, email: matthaus@uni-muenster.de

² Institute for Cereal, Potato and Starch Technology, Federal Center for Cereal, Potato and Lipid Research Schuetzenberg 12, D-32756 Detmold, Germany

In April 2002 the Swedish National Food Administration (NFA) reported about the finding of acrylamide in a number of baked, fried or deep-fat fried foods. This finding was of great importance, because acrylamide is classified as a probable human carcinogen. Further on a neurotoxic and reproductive effect is described

In the meantime different factors effecting the formation of acrylamide in food are known: low-molecular protein-components (e. g. amino acids (asparagine)), reducing sugars (fructose, glucose), a high temperature and a low availability of water.

This knowledge leads to the conclusion that especially processing and preparation of food as well as the used raw material has an important influence on the content of acrylamide. Particularly, potatoes are in the focus of interest, because in potato products high amounts of acrylamide were found.

The lecture describes different factors affecting the content of acrylamide in deep-fried potato products. In French fries the amount of acrylamide increases with increasing temperature and frying time, whereas a drastically increase of acrylamide takes place at temperatures higher than 175 °C. The increase of acrylamide with the time follows a linear function and an exponential increase is found with the temperature. The result is that the amount of acrylamide in the product increases faster with increasing temperatures at a constant frying time.

No significant influence of the sort of oil on the content of acrylamide, and also no significant influence by the use of silicone oil as antifoaming agent was found.

The variety of potatoes has a strong influence on the content of acrylamide of potato crisps and French fries. It is shown that a good correlation between the content of acrylamide and glucose in potatoes is given, but no correlation with the content of asparagine is found. Another factor which strongly influences the amount of acrylamide in the product is the storage temperature of potatoes. A decrease of the storage temperature from 8 °C to 4 °C leads to an increase of the amount of glucose in the raw material and therefore to an increase of the formation of acrylamide in the product. Further on the amount of acrylamide depends on the form of French fries. While coarse cut French fries results in low amounts of acrylamide in the product, in fine cut French fries higher contents are found.