A "Toolbox" for the Reduction of Acrylamide in Fried Potato Products Potato Crisps

Acrylamide

Acrylamide is a substance that is produced naturally in foods as a result of high-temperature cooking (e.g., baking, grilling, frying). Acrylamide can cause cancer in animals and experts believe it can probably cause cancer in humans. Although acrylamide has probably been part of our diet since man first started cooking, because of concerns over safety, world experts have recommended that we reduce the levels of acrylamide in foods.

Acrylamide has been found in a wide variety of foods, including those prepared industrially, in catering and at home. It is found in staple foods such as bread, potatoes as well as in some specialty products such as crisps, biscuits and coffee.

The CIAA Acrylamide Toolbox

Following the discovery of acrylamide in food, the food industry and other stakeholders, including regulators, took action to investigate how acrylamide is formed in foods and possible methods that can be employed to reduce levels of acrylamide in foods. The European Food and Drink Federation (CIAA) coordinated the efforts and pooled the results together to produce the Acrylamide Toolbox.

What does the Toolbox do?

- Details existing methods to reduce acrylamide in foods
- Allows users to assess and evaluate which reduction measures to use

This brochure is designed to help manufacturers of fried potato crisps. For more detailed advice contact the European Snacks Association (ESA) at esa@esa.org.uk

What can you do?

- Use this brochure to identify methods that you can use to reduce acrylamide levels
- Not all methods will apply to your manufacturing needs
- You will need to examine your production methods, recipes, product quality and national legislation in order to identify the most appropriate "tools".

Acrylamide in potato products

Methods of formation

- Acrylamide is formed via the reaction of asparagine and reducing sugars (both naturally occurring in potatoes)
- Acrylamide is formed at temperatures higher than 120 °C
- The amount of acrylamide formed depends on
  - Temperature
  - Cooking time
  - Amounts of asparagine and reducing sugars in the potato

Tools to try

- Control the levels of reducing sugars
- Control the temperature/time of cooking
- Aim for a lighter golden colour when cooking
- Control the final moisture content

Methods of Reduction Fried Potato Products Potato Crisps

The following “Tools” have been used successfully to reduce levels of acrylamide in Potato Crisps.
Manufacturers are advised to select those “Tools” that are most suitable to their type of product, process methods and product quality specification.
esa@esa.org.uk

Manufacturing Stage	Reduction Measures	Comments
Agronomical: sugar content of potatoes	Select potatoes cultivars with levels of reducing sugars as low as reasonably achievable taking into account regional and seasonal variability. Selection of potato suitability for the product type should be based on a colour assessment of a fried sample or the capability of other tools to control acrylamide.	Test incoming deliveries of potatoes for sugar levels, or fry test them (aim for a light golden colour). Avoid potatoes that give a dark product.
Agronomical: potato storage and transport	Store potatoes at > 6°C. Control storage conditions from farm to factory; in cold weather, protect potatoes from cold air. Avoid deliveries of potatoes that have been standing outside (unprotected) over night in freezing conditions.	Fry test potatoes that have been stored at low temperatures for long periods of time. If the product is dark, consider leaving the potatoes to warm up over a period of two weeks. Fry test regularly.
Processing: pre-treatment, Blanching	Wash potato slices in warm/hot water to remove excess sugars	Blanching has a negative effect on the quality of final product and therefore should only be considered as a final option
Processing: Frying control	Optimise time temperature and cooker settings to produce a crisp product with a golden yellow colour	Frying at lower temperatures for longer time will increase the fat content of the product Vacuum frying if available may be used to process high sugar potatoes. If using flash frying rapid cooling is recommended.
Final preparation	In line colour sorting to remove dark crisps	