

## 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 Biscuits, Crackers and Crispbreads. For detailed advice contact CAOBISCO (EU Association of Biscuit, Chocolate and Confectionery) at [caobisco@caobisco.be](mailto:caobisco@caobisco.be)

### 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”.

## A “Toolbox” for the Reduction of Acrylamide in Biscuits, Crackers & Crispbreads

### Acrylamide

Acrylamide is a substance that is produced naturally in foods as a result of high-temperature cooking, e.g., baking, grilling, or 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.



## Acrylamide in Biscuits, Crackers & Crispbreads

### Methods of formation

- Acrylamide is formed via the reaction of asparagine, which is naturally present in flour, and reducing sugars such as fructose and glucose .
- Acrylamide is formed at temperatures higher than 120 °C
- The amount of acrylamide formed depends on
  - Recipe
  - Baking time/temperature

### Tools to Try

- Replacement of ammonium bicarbonate with other raising agents
- If possible avoid using fructose
- Do not over bake

## Methods of Reduction for Biscuits, Crackers and Crispbread

The following “Tools” have been used successfully to reduce levels of acrylamide in some varieties of product. However owing to the vast range of different recipes, ingredients and processes used in traditional biscuit manufacture there is no simple way to reduce acrylamide formation. For example, fermented crispbread generally contains substantially less acrylamide than non-fermented crispbread, but each has its own distinctive characteristics. Manufacturers are advised to select those “Tools” that are most suitable to the type of product that they are producing and to contact the EU Association of Biscuit, Chocolate and Confectionery (CAOBISCO) for more detailed advice.

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Manufacturing Stage	Reduction Measures	Comments
Recipe	<p>When raising agents are used, for example in hard sweet biscuits, replacement of ammonium bicarbonate sometimes works. Alternatives are potassium carbonate with potassium tartrate or disodium diphosphate with sodium bicarbonate.</p>	<p>There may be an impact on loss of stack height, flavour or texture. If sodium salts are used as an alternative take care not to end up with excessive sodium in the finished product</p>
	<p>Fructose, when used in products like gingerbread, should be replaced with glucose. Only low fructose glucose syrups should be used</p>	<p>Carefully monitor the effect on finished product colour and flavour</p>
	<p>Wholemeal products are desirable from a nutritional and taste point of view, but if less wholemeal flour is used less acrylamide will be formed</p>	<p>Significantly lowering the wholemeal content will reduce the nutritional quality of the product.</p>
Processing: Baking Conditions	<p>Baking at a lower temperature for a longer time, but to the same final moisture content has been effective in lowering acrylamide in some products.</p>	<p>The product will inevitably have a less dark, less ‘baked’ colour. Take care not to underbake the product as this could lead to microbiological problems on storage.</p>