

A “Toolbox” for the Reduction of Acrylamide in Breakfast Cereals

Acrylamide

Acrylamide is a substance that is produced naturally in foods as a result of high-temperature cooking. (e.g., baking, grilling and 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 and 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 Breakfast Cereals. For detailed advice contact CEEREAL (the EU association of breakfast cereal manufacturers at julia.hauk@ceereal.eu)

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 breakfast cereals













Tools to Try

- Minimise reducing sugars in the cook phase.
- Do not over bake or over toast
- Maintain a uniform colour for the product
- Consider other inclusions e.g. nuts.

Methods of formation

- Acrylamide is formed via the reaction of asparagine, which is naturally present in all grains, and reducing sugars such as fructose and glucose.
- Acrylamide is formed at temperatures higher than 120°C. Formation accelerates rapidly as moisture falls below 5%.
- The amount of acrylamide formed depends on
 - Recipe
 - Process
 - Toasting conditions

Methods of Reduction for breakfast cereals The vast range of different recipes, grains, ingredients and processes used in breakfast cereal manufacture means there is no single, simple way to reduce acrylamide formation. For example, wheat based cereals generally contain more than rice or maize based cereals but each grain has its own distinctive nutritional and eating characteristics. Manufacturers are advised to select those “Tools” that are most suitable to the type of product that they are producing and to contact CEEREAL, the EU association for manufacturers of breakfast cereal for more advice (julia.hauk@ceereal.eu).

Manufacturing Stage	Reduction Measures	Comments
Recipe	 Minimise the use of reducing sugars in the pressure cook phase for batch process cereals.	 In general an excess of reducing sugar at this stage creates too dark a cereal.
	 Consider inclusions with the cereal. If baked pieces resembling biscuits are present study the toolkit for biscuits.	 A few mueslis containing baked pieces made with ammonium bicarbonate have been found in some countries.
	 High roasted almonds contain more acrylamide than low roast almonds.	 Low roast almonds have good appearance but inherently less flavour.
Processing: Baking Conditions	 Baking / toasting at a lower temperature but to the same final moisture content has been effective in lowering acrylamide in some products.	 Take care not to under bake the product as this could lead to staling on storage. Capacity may be reduced if one cannot compensate for the lower temperature by other means.
	 Manage the toasting for uniform colour; darker pieces are likely to contain most acrylamide.	 Manufacturers normally seek to avoid “two toning”. Acrylamide adds another reason to do so.