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Acrylamide 101: practical steps your food business can take

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Acrylamide has been a hot topic in the food industry for some time. The substance is a chemical which forms when starchy foods such as potatoes, bread or cereals are baked, fried or roasted at above 120°C. Acrylamide isn't an additive but a naturally occurring substance that has undoubtedly been consumed for many generations. However in 2015, the European Food Safety Authority (EFSA) published animal studies that found that the substance increases the risk of developing cancer.

Since then, it has been best practice for food producers to seek to reduce acrylamide levels in their food. Best practice 'benchmark' levels were set out. But since April this year new EU legislation has been in place which tightens controls on the chemical for all food business operators – from multinational food production giants to independent restaurants – by formally setting out these benchmark principles and requirements underpinning them.

The new regulation means it is now legally mandatory for all producers to use mitigation measures based on the 'ALARA' principle, which means acrylamide levels must be "as low as reasonably achievable".

The good news for smaller food producers is that these measures are dependent on size and practicality for each business, so small and medium operations should not suffer undue commercial pressures. But all food producers now have a legal responsibility to be aware that the chemical is a food safety hazard, generally understand how it forms in the food they produce, and to keep records of their acrylamide sampling processes and results.

Although acrylamide can't be eliminated entirely, there are ways to adjust cooking methods to reduce the amount in the bread, crisps and biscuits that reach the market.

Low-acrylamide cuisine

What practical measures can businesses take when preparing food? Techniques vary depending on the food but some general principles can be adopted for many recipes.

A crucial step is to ensure that high-starch foods aren't burnt, overcooked or heated at very hot temperatures – ideally lower than 120°C. Aim for a product with a pale colour: the lighter the colour of chips, biscuits or bread, the lower their acrylamide content will be. As acrylamide needs protein, sugar and heat to form, reducing sugar content where possible through blanching, rinsing or diluting sugary ingredients will reduce the amount of the chemical that forms.

The legislation applies to all food businesses in the European Union.





When frying potatoes, the Food Standards Agency recommends using fryers with computerised timers and ensuring they are set to the standard time and temperature settings. The European Potato Processors Association's guide to producing 'good fries' suggests the maximum temperature for frying potatoes should be 175°C, and just 160°C when pre-frying. Oil and fat should also be changed regularly and not reheated, and all potatoes should be checked for bruises. Bruised potatoes have a higher sugar content, so these should be discarded.

As well as altering cooking methods, there are also chemical techniques which can stop acrylamide from forming. Research has found that, if potatoes are dipped in the food additive E509 before frying then acrylamide formation can be inhibited by up to 95%. Renaissance BioScience manufactures an acrylamide-reducing yeast called Acrylow while DSM has developed the enzyme PreventASE, which can be added to a recipe to reduce acrylamide levels by up to 90%. These methods don't appear to affect the taste, texture or appearance of food, and although they are still new, they may hold strong potential for making food compliant without having to make significant changes to the cooking process.

Incorporating as many of these measures as possible into food preparation will be key to ensuring that businesses are compliant with the legislation.

The legal angle: what are the consequences?

For now tracking and regulating acrylamide levels will be mainly the responsibility of individual food business operators. The regulation says that, if benchmark levels of acrylamide are exceeded, then businesses must review and adjust their processes. While local authorities will provide enforcement officials, the colossal cost of externally regulating every affected business means they are extremely unlikely to undertake routine examinations.

There are no specified penalties set for exceeding benchmark levels, but adhering to them is now a clear regulatory requirement for food businesses rather than just best practice. Businesses who fail to adequately record their testing and mitigation processes will also be breaching the regulation. In the UK, the Food Standards Agency has extremely high standards for record-keeping, and have suggested that they may consider businesses who do not record their acrylamide levels and processes adequately to be at greater risk of not adhering to other food hygiene and safety requirements.

Plus, the Food Standards Agency has been surveying acrylamide levels in food products since 2007, and legislation keeps evolving in line with developing scientific understanding. It is likely to become much stricter if the link to cancer in humans is definitely established.

In the meantime, the European Commission plans to review the legislation every three years, and is likely to gradually lower the benchmark level. It is also possible that rather than a benchmark level, it will change to a more stringent Maximum Residue Level (MRL). If MRLs become law in the future then exceeding them could mean companies are in breach of Food Safety Requirements.

To remain compliant now and to prepare for any stricter legal obligations in the future, food producers need a strategy for recording and analysing acrylamide levels in their products. Incorporating the food preparation techniques above and keeping thorough records of their acrylamide testing will ensure that businesses are adhering to the new regulations.