



Acrylamide in foodstuffs

Frying and baking with consequences

Acrylamide was detected in foodstuffs for the first time in 2002. Acrylamide is formed as a by-product of the Maillard reaction in carbohydrate-rich foods such as French fries, chips, crunchy cereal and crispbread during baking, roasting, grilling, frying and broiling. A high content of the amino acid asparagine is needed here as a reaction partner in order to form large amounts of acrylamide. Acrylamide formation begins at temperatures of over 120 °C and increases sharply at 170–180 °C. Because acrylamide has proven carcinogenic in animal tests and is genotoxic, its intake quantities should be kept «as low as reasonably achievable» (ALARA principle).

After a comprehensive evaluation, the European Food Safety Authority (EFSA) in 2015 published a scientific appraisal of acrylamide in foodstuffs^{1,2}; it confirms the earlier assessment that acrylamide in food increases the risk of cancer for all age groups. As a consequence of the EFSA's assessment, the EU commission specified regulatory measures to reduce acrylamide levels in foodstuffs³: EU regulation 2017/2158 to establish minimization measures and benchmarks for reducing acrylamide levels in foodstuffs³. Switzerland included the EU acrylamide benchmarks (see Table 1) with the Stretto 3 revision package as of 1 July 2020 in the contaminant directive (VHK)⁴.

Foodstuff	Benchmark [µg/kg]
• French fries (ready to eat)	500
• Potato chips from fresh potatoes or potato dough	750
• Potato-based crackers	
• Other products from potato dough	
Bread	
• Wheat-based bread	50
• Bread except wheat-based bread	100
Breakfast cereals (except porridge)	
• Bran products and whole grain cereals, puffed grains	300
• Wheat and rye-based products ⁽¹⁾	300
• Products based on corn, oat, spelt, barley and rice ⁽¹⁾	150
• Biscuits and waffles	350
• Crackers, except potato-based crackers	400
• Crispbread	350
• Gingerbread	800
• Products similar to biscuits, waffles, crackers, crispbread and gingerbread	300

Foodstuff	Benchmark [µg/kg]
• Roasted coffee	400
• Coffee extract	850
Coffee substitutes	
• Coffee substitutes made exclusively of grain	500
• Coffee substitutes made of a mixture of grain and chicory ⁽²⁾	4000
• Coffee substitutes made of chicory	
• Supplementary cereal food and other supplementary food for babies and young children (except biscuits and rusks)	40
• Biscuits and rusks for babies and young children	150

⁽¹⁾ The grain with the largest content determines the category.

⁽²⁾ The relative proportion of ingredients must be taken into account for the benchmark.

Table 1: Acrylamide benchmarks⁵



As per the annex to the BLV information letter dated 2020/5, a distinction is made between three business categories as regards minimization measures and obligations (see Table 2).

Business category	Examples of businesses	Measures	Monitoring and recording of measures
1 Foodstuffs producers* who neither operate as retailers nor purely supply the local retail trade directly	Medium-sized to large foodstuffs producers who sell throughout Switzerland or an entire region	Measures as per Annex I of EU regulation 2017/2158	Recording of measures to minimize acrylamide content Examination of foods to verify compliance with benchmarks
2 Foodstuffs producers* who operate as retailers or purely supply the local retail trade directly, under a trademark or as franchisee	Businesses such as restaurants and bakeries belonging to a chain	Measures as per Annex II Parts A and B of EU regulation 2017/2158	Recording of measures to minimize acrylamide content Examination of foods to verify compliance with benchmarks
3 Foodstuffs producers* who operate as retailers or purely supply the local retail trade directly	Retailers who supply foodstuffs directly to consumers, or establishments which purely supply the local retail trade directly	Measures as per Annex II Parts A and B of EU regulation 2017/2158	Evidence of application of measures to minimize acrylamide content must be presentable No analysis of products necessary

(*) Businesses producing the foodstuffs listed in Annex 11 VHK

Table 2: Obligations and minimization measures

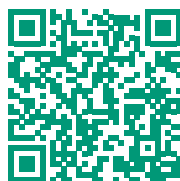
In the framework of the HACCP concept, foodstuffs manufacturers are required to deal systematically with the problems posed by endangered products. It may well be possible to achieve significant reductions in acrylamide content through adaptations of baking/frying technology as well as treatment and/or selection of raw materials. For meaningful risk assessment and planning of measures, however, the effective bandwidth of product-specific acrylamide content must first be known or analytically determined. The LC-MS/MS method used by Labor Veritas AG meets the performance criteria required in EU regulation 2017/2158.

Literature, sources

- ¹ EFSA: Scientific opinion on acrylamide in food, Panel on Contaminants in the Food Chain (CONTAM), EFSA Journal 2015;13(6):4104
- ² EFSA: Acrylamide in food – EFSA explains risk assessment, 04.06.2015
- ³ Commission regulation (EU) 2017/2158 of 20 November 2017 for establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food
- ⁴ Verordnung über den Höchstgehalt für Kontaminanten (VHK, SR 817.022.15), Art. 5a und 5b, Anhang 11
- ⁵ BLV: Informationsschreiben 2020/5 – Massnahmen zur Senkung des Acrylamidgehalts in Lebensmitteln, 13.07.2020



Contact persons



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