

15 Years of Minimising Acrylamide in Foodstuffs

Signal Values · Indicative Values · Benchmark Levels



Food Chemistry
Institute of
the Association
of the German
Confectionery Industry

Institute Director:
Prof. Dr.
Reinhard Matissek

Adamsstraße 52 - 54
51063 Köln

phone
+49 221 62 30 61
fax
+49 221 61 04 77
web
www.lci-koeln.de

It is meanwhile a good 15 years ago that a Swedish research group chanced upon the by now comprehensively researched substance acrylamide to discover it was a process contaminant, i.e. a contaminant that is created within the course of manufacturing foodstuffs. At the time, in 2002, research was focused on finding a marker for the job-related acrylamide contamination of blue-collar workers.

This involved comparing the blue-collar workers with a control group of white-collar employees. However, after acrylamide was also detected in the blood of the supposedly uncontaminated comparison group, another cause for the detected background contamination with acrylamide was looked for – and found. The contamination arose from heated-up foodstuffs!

Acrylamide may be formed during the manufacture of foodstuffs, especially arising from the free amino acid asparagine and certain reducing sugars (glucose and fructose). In this case heating up the foodstuffs

may lead to the so-called Maillard reaction taking place in them and hence to the formation of acrylamide.

From a toxicological point of view, the intake of high acrylamide levels is definitely to be seen as a relevant issue. Animal experiments have proven that acrylamide has carcinogenic and mutagenic properties. Hence the International Agency of Research on Cancer (IARC) places it in category 2A, i.e. as a probably carcinogenic substance for humans. The metabolism of acrylamide also produces glycidamide, the latter likewise being toxicologically relevant. Hence acrylamide is deemed to be the forerunner of a previously unknown and completely new group of toxicological significant substances, the so-called “foodborne toxicants”.

National indicative values

Germany's federal and state governments formed a cooperation with the German food industry as early as in 2002 – the same year in which the first acrylamide

findings in foodstuffs were published – and conceived a dynamic minimisation concept on the basis of so-called “signal values”. This national minimisation strategy was also termed the “Signalwertkonzept” (Signal Value Concept). Based on the acrylamide content data gathered by the food safety authorities, the German Federal Office for Consumer Protection and Food Safety (BVL) calculated and published annual signal values for the respective product groups on a yearly basis. This dynamic approach to the national “Signal Value Concept” was very successful in reducing acrylamide levels in Germany in the years thereafter, including the product groups shortbread, breakfast cereals excluding muesli, roasted coffee, potato crisps, biscuits for infants, bakery wares for diabetics, and speculoos.

So far eight signal value calculations have been conducted in the years from 2002 to 2010. The results of these calculations for selected foodstuffs are shown in figure 1. As a result of these signal value calculations, a significant reduction of these signal values was observable in almost all product groups.

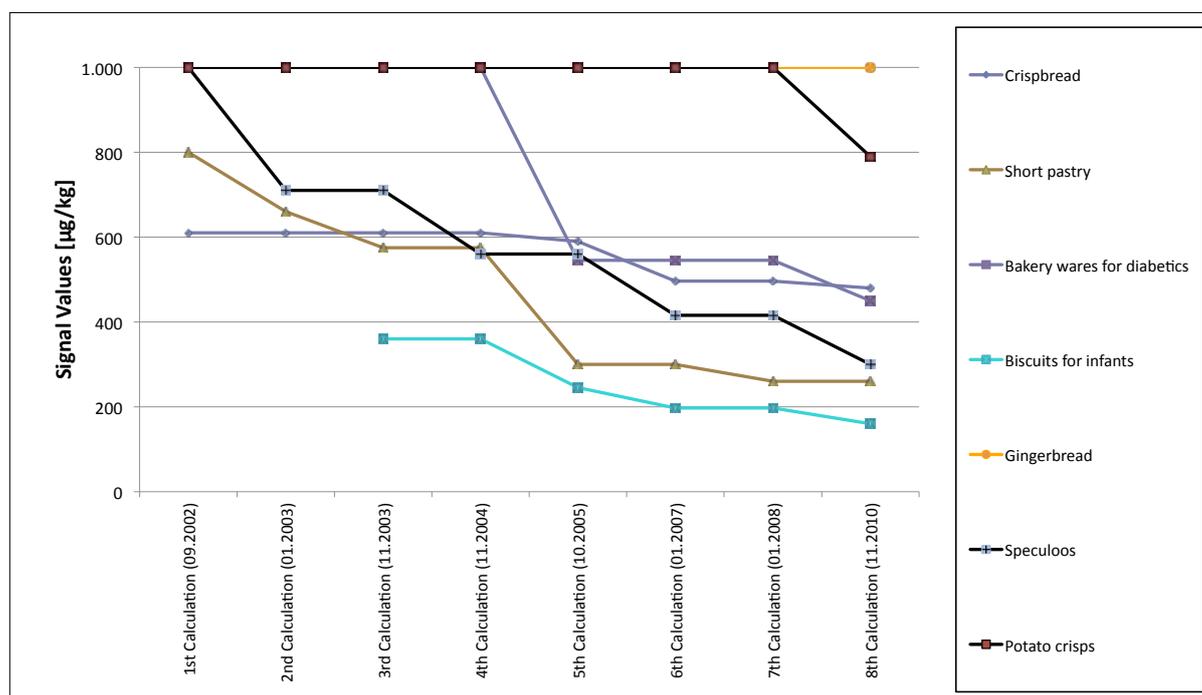


Figure 1: Eight signal value calculations for certain foodstuffs from 2002 to 2010

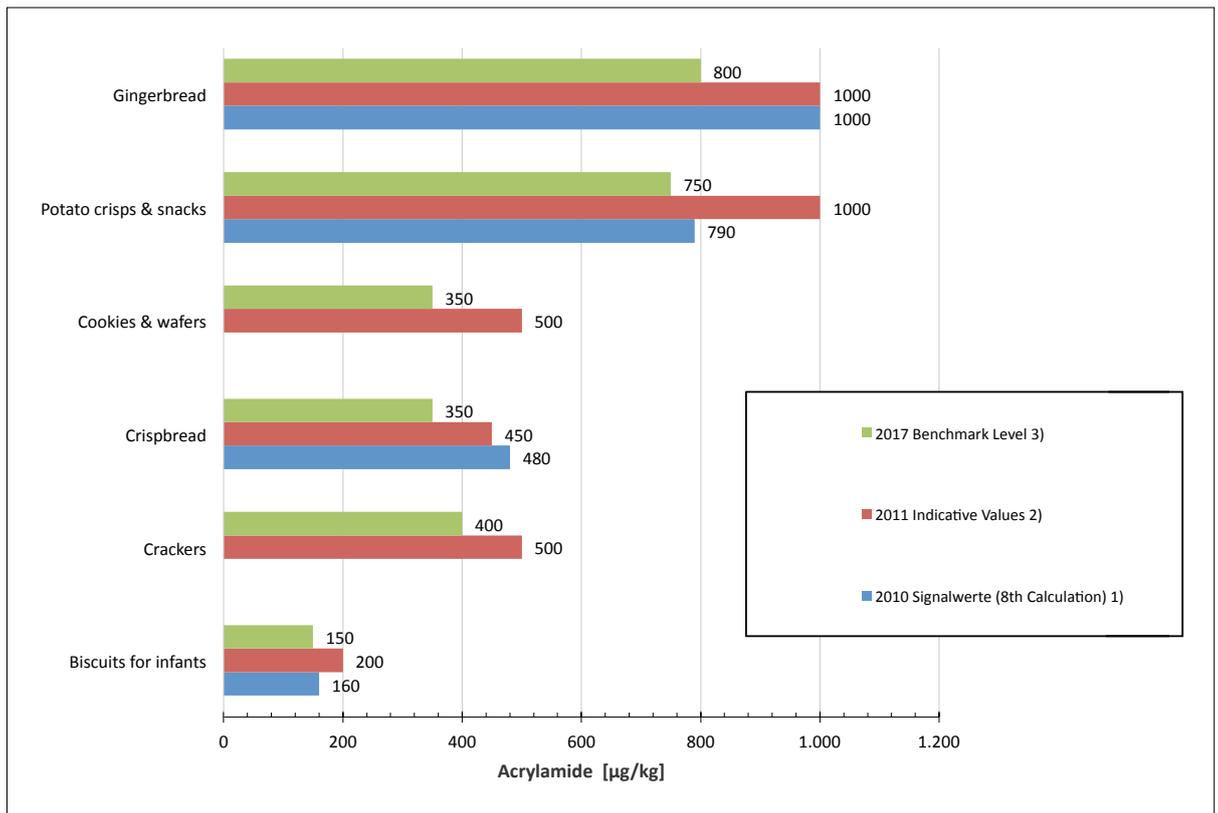


Figure 2: Comparison of the 8th signal value calculation for selected foodstuffs,

1) www.bvl.bund.de,

2) EU Commission (2011) European Commission recommendation of 10/1/2011 regarding the analysis of acrylamide levels in foodstuffs,

3) SANTE/11059/2016 ANNEX Rev. 3 (POOL/E2/ 2016/11059/11059R3-EN ANNEX.doc) D048379/05[...] (2017) XXX draft

In this respect, worthy of special mention is the unprecedented success story of the potato crisp manufacturers in Germany, who – from as early as April 2002 all the way through to today – have been publishing the effectiveness of their wide-reaching reduction measures in the form of a regularly updated diagram of the weekly mean value (www.lci-koeln.de).

European indicative values & benchmark levels

In keeping with the example set by the German minimisation concept, an extensive EU-based monitoring programme has been gathering acrylamide data across numerous product groups since 2007 and on this basis first published so called indicative values in the form of a EU Commission recommendation in 2011. In the meantime, the European

Commission has adopted a flexible concept for regulating and minimising acrylamide levels in foodstuffs. This involves getting the European specialist associations to take up “Best Practice”-guidelines in a so called “Code of Practice”, CoP, and increasing the binding nature of the code for the industry stakeholders. In addition, the earlier indicative values are to serve as baseline values for the successful implementation of minimisation measures (in future known as “benchmark levels”) within the scope of the regulatory proposal. The approach taken by the European Commission pays tribute to the diversity of the affected products and the factors contributing to the formation of acrylamide and is hence, in the view of the food industry, a suitable basis for continuing Europe-wide minimisation efforts. Development work on this proposal is still continuing at present. The draft regulation

passed on 19 July 2017 is to be presented to the European Parliament.

Since the objective of the food safety authorities, the German Federal Institute for Risk Assessment (BfR) and the European Food Safety Authority (EFSA), and also the industry stakeholders, is to continually minimise acrylamide content levels in foodstuffs, the values of the planned benchmark levels are respectively and significantly lower than the previous indicative values (cf. fig. 2). Given the fact that the relevance of acrylamide to human health cannot be ruled out and in view of the toxicological properties of its metabolite glycidamide, EFSA and BfR concur in their opinions that acrylamide content levels in foodstuffs should be kept as low as possible, in keeping with the ALARA principle (as low as reasonably achievable).