FOOD PACKAGING MATERIAL AND THE INTERACTION WITH THE PACKED GOOD AND THE ANALYTICAL CHALLENGES

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It is a fundamental requirement of all legal bodies as well as of any hygiene management system (e.g. DIN EN 15593 2008, ISO22000 or ISO/TS 22002, BRC/IoP, IFS…) that there is no transfer of chemicals into the packed good which endanger the end user at the point of sale under normal or foreseeable conditions of use.

The Regulation (EC) No. 1935/2004 "on materials and articles intended to come into contact with food" defines the requirements for all food contact materials in general. The European Framework Regulation (EC) No. 1935/2004 includes all material and articles intended to come into contact with food. This regulation, Regulation (EC) No. 1935/2004 covers not only packaging material (plastic, paper, metal,…) but also converting machines, pipes, bond-conveyors, tanks, cutting boards and other kitchen wear etc. .

It declares that any article intended to come into contact with food must be sufficiently inert to preclude substances from being transferred to food in quantities that may endanger human health or to bring about an unacceptable change in the composition of the food or deterioration in its organoleptic properties [1]. However food contact materials contain many substances that can migrate into the food, therefor the Regulation (EC) No. 1935/2004 is accompanied by specific measures for controlling the legal provisions depending on the type of the food contact material. Beside many "traditional" analytes (like heavy metals, PCP, PCB, PAH, etc.) especially UV stabilizers, photosensitizers for printing inks and varnishes (e.g. derivates of benzophenones), dyes (e.g. primary aromatic amines), and endocrine disruptors (bisphenol A, phthalates, etc.) are actually intensely discussed in any food contact application and their impact to the consumers [2,3].

Besides the above mentioned substances, unknown substances can enter the process chain and must be identified and quantified to ensure the product quality (Non-Intentionally Added Substances, NIAS) [4]. NIAS (as defined in the Regulation (EC) No. 10/2011 – plastic implementation measure) are impurities in the substances used for manufacture or reaction intermediates formed during the production process or decomposition or reaction products occurring in the final product.

Generally, it is accepted that only compounds <1000 Dalton are considered as NIAS, because substances with a higher molecular weight are regarded as inert towards migration due to their larger size. Very often the volatile composition can be complex and therefore demands sensitive and selective methods. The combination of gas chromatographic separation with mass spectrometric detection is still the gold standard.

The optimization process for analytical methods is always a compromise of speed, selectivity, sensitivity and cost. A proper analytical process has optimized all three relevant parts (sample preparation, separation and detection). It should be kept in mind that there are no ideal sample preparations and measuring instruments available at the market, so each method should be checked carefully if the instrumentation and the methods fulfill the requirements in terms of sensitivity, reproducibility and accuracy.

Another problem can be the identification of odorous volatiles, because here no legal limits exist (except in cases of specific migration limits). The limiting factor is given by the sensitivity of the human nose and therefore detection limits in the nanogram per kilogram limit or even lower must be reached.

Several examples of analytical strategies will be discussed in this presentation.

References:

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