



Customer information note

Secondary amines in printing inks for food packaging

Regulation (EC) No 1935/2004 provides that materials and articles, which in the finished product state are intended to come into contact or are brought into contact with foodstuffs and are intended for that purpose, do not transfer their constituents to food in quantities which could endanger human health or bring about an unacceptable change in the composition of the food or bring about a deterioration in the organoleptic characteristics thereof.

The official food control authorities in Germany have determined the release of so-called secondary amines from various food contact materials made of paper and cardboard, about which the Federal Ministry of Food and Agriculture (BMEL) informed the affected associations in a letter on February, 4th 2019. The letter names the three specific amines (actually acid amides) naphthol AS, N-acetoacetyl-m-xylydine (NAAX) and N-(2,4-dimethylphenyl)-acetamide (NDPA), which were identified in the course of the investigations.

The members of the VdL contacted the raw material suppliers and ETAD (*The Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers*) immediately after receiving the letter, in order to initiate appropriate measures.

At the request of the VdL, additional information was provided by the BMEL on March, 28th 2019 in the form of a table with the exact analytical values of the findings for the three amides mentioned above for different product groups. In addition, results on 3-hydroxy-2-naphthoic acid (HNS), also known as "BONA", were listed. This substance was not mentioned in the letter of February 2019. The data show that, fortunately, many products (e.g. drinking straws) gave no findings. It can also be seen that the increased values were found mainly in product groups for which a rather low consumer exposure can be assumed (e.g. bakery wrapping paper), which is very far from the standard assumptions (1 kg daily consumption of the concrete foodstuff). It should also be noted that the methodology of the cold-water extract clearly overestimates (potential) migration and hence the findings do not correspond to the actual consumer exposure of the substances.

The named substances are not used in the manufacture of printing inks as such. However, they can be used as starting materials (so-called coupling components) for the production of pigments (naphthol AS, NAAX and HNS). NDPA is rather a contaminant of NAAX. Based on the approaches of the EuPIA guideline for the risk assessment of NIAS, specific migration limits (self-derived SMLs) for the acid amides can be derived, showing that the findings for other product groups are well below the relevant limits. A comprehensive reply letter was sent by the VdL to the BMEL on June, 13th 2019.

On September 26th 2019, the BfR published a statement on its website entitled "*Buntbedruckte Bäckertüten, Servietten & Co. können gesundheitsgefährdende Stoffe freisetzen* (Colour-printed bakery bags, napkins & Co. can release hazardous substances). The publication contains a comprehensive toxicological assessment of the above compounds and their potential metabolites. For naphthol AS, NAAX and NDPA, the evaluation of the BfR was based on the assumption of a complete cleavage of the amide bond. For the resulting metabolites aniline and 2,4-dimethylaniline, daily acceptable intake values were derived on the basis of the Threshold of Toxicological Concern (TTC) concept, which also served as a basis for the further calculation of acceptable intake quantities of the acid amides. Following this assessment, the substances must not be



detectable in the cold-water extract (the detection limit should be a maximum of 10 µg substances per kg of food or food simulant in accordance with Regulation (EU) No. 10/2011).

At this point it needs to be stressed that the evaluation of the BfR is based on the metabolites of the acid amides. Thus, it is assumed that there is a complete cleavage of the amide bond, which there is no scientific proof. The printing ink industry has also carried out additional exemplary investigations in which printed samples were subjected to the cold water extract. However, the metabolites aniline and 2,4-dimethylaniline cited by the BfR could not be detected in these investigations. Since an extreme "worst case scenario" was chosen at several points, both by the choice of the experimental method and in the assumptions of the risk assessment (complete amide cleavage, high food consumption), the BfR comes to the conclusion that the daily acceptable intake can be exceeded and therefore advises that materials which release these substances or their starting materials should not be used in contact with foodstuffs until suitable toxicological studies have been carried out, which prove the safety of the compounds mentioned. In the opinion of the VdL, however, these findings did not pose a risk to consumers at any time. Only in the case of NDPA it could be argued that the precautionary limit has been exceeded in the context of a very strict application of the precautionary principle, assuming a genotoxic effect of the substance. However, a mutagenic effect of NDPA could be disproved by toxicological studies (Ames test), which were financed by the VdL. The VdL has written to the BfR on this issue and continues to maintain a scientific exchange with the BfR on this subject. Despite the presentation of this result, the BfR sees an absolute necessity for an in vivo study to exclude the formation of possible harmful metabolic products of NDPA before the BfR statement can be amended. This possibility is currently being examined by the VdL.

Nevertheless, the members of the VdL take these findings very seriously. The VdL shares the conclusion of the BfR that manufacturers should check raw materials and end products for impurities of the substances mentioned and minimize their release. For an in-depth analysis of the findings and causes, detailed information would be helpful, in particular information on the colour and ink coverage of the printing. According to the BMEL, however, this information is unfortunately not available.

The members of the VdL continue to work intensively on corresponding measures within the supply chain on the basis of the available information.

As soon as we have further information, we will update this customer information.

VdL, 14 February 2019

1. Update, August 1, 2019
2. Update, October 14, 2019
3. Update, January 28, 2020
4. Update, July 6, 2020