

MIGRATION AND THE SUBSEQUENT REQUIREMENT OF PRINTING INKS FOR FOOD CONTACT MATERIALS AND COSMETIC PACKAGING

The specifications for this market segment are described by Pascal Iffland

Packaging exists in different forms and types which are an indispensable part of everyday life. Especially in the case of sensitive contents, such as foods and cosmetics, the question arises as to product safety. Do packages really protect their content or do they represent a health hazard?

In addition to increasing technical and visual requirements of the decorated surface, minimising the unwanted transfer (migration) of dangerous substances is becoming more and more important as the health of consumers must not be affected. The safety of the packaging material, which comes into contact with the sensitive contents, is regulated by appropriate legal standards.

Printing inks come into contact with these sensitive contents by printing of the packaging material. So, for the conformity of the contact material (for example cosmetic packaging), you also have to consider the transfer of substances coming from the ink. Beside the sensitive content and its related statutory regulations, migration appears in three forms which will be discussed in the following.

ALL MIGRATION IS NOT THE SAME

Mass transfers from printed packaging onto filling material occur in different ways. These are diffusion migration, set-off-migration, and gas phase migration.

Diffusion migration is a migration of printing ink ingredients through the substrate. Due to their chemical characteristics and molecular size (molecular weight < 1000 daltons) some substances, known as

'migrants', are able to migrate from the printed side through the substrate to the unprinted side. This is highly dependent upon the barrier properties of the substrate.

The second type of migration is known as set-off migration. This takes place in the form of direct material transfer from the printed side being in direct contact with the other (unprinted) side of the packaging. The contact of these sheets happens after the printing process in a stack, roll, or nested container.

The third type of migration is termed as gas phase migration. This occurs due to the evaporation of volatile materials by heating food in its original packaging. This migration also happens as well by steaming, cooking, baking, or sterilisation.

MIGRATION MAINLY DEPENDS ON THREE PARAMETERS

- 1) Substrates. As far as the migration is concerned, the substrate plays a significant role. The greater the barrier properties, the lower the risk of migration (functional barrier). Materials/substrates which are completely impermeable for substances, like glass or some metals (for example aluminium foil of at least 7µm) are established as 'absolute barriers'. A migration of substances through these materials/substrates (diffusion migration) is simply not possible.
- 2) Printing Ink. Migration is an issue for all kinds of printing inks. The selective use of high molecular weight substances (eg higher-functional monomers in UV inks), the specific selection and purity of the raw materials, as well as tailored production conditions (in order to avoid process-related impurities), can significantly reduce the amount of migrating substances compared to conventional inks (not developed specifically for this application).
- 3) Process Conditions. Effective drying and curing of the ink film is the prerequisite to minimise the existence of potential migratable substances, like solvents and monomers. Set-off, where possible, must be avoided throughout the entire printing process. The thickness of the ink film and the ratio of printed to non-printed surface

area determines the total amount of the potentially migratable substances from the ink. The more ink is used, the greater is the possibility of migration.

CONCLUSION – INK, MIGRATION AND BARRIER

Even if printing inks are designed for this purpose, a migration test on finished products is indispensable. Unexpected factors in the process chain, such as printing parameters, processing conditions and the choice of packaging components can also affect the migration risk. So the monitoring of compliance must always be done with the ready printed material. Quality standards, which are set for the printed materials are, therefore, essential.

MARABU'S INNOVATIVE ULTRA PACK UVPC – UV-INK FOR COSMETIC PACKAGING

Marabu is aware of the problem with migration and has developed a special UV-ink for cosmetic packaging. The UV-ink Ultra Pack UVCP is suitable for pre-treated polyethylene, pre-treated polypropylene, and polycarbonate. Based on foodstuffs packaging specifications, the substances of Ultra Pack UVCP are subjected to special selection and purity criteria. Marabu has taken into account the EuPIA Suitability List of Photoinitiators for Low Migration UV Printing Inks and Varnishes, Part 1A, of the Nestlé Guidance Note on Packaging Inks, and also the resolution AP (89)1 for pigments used. In addition, Marabu does not use any ingredients which are based on the harmful Bisphenol A. The ink series Ultra Pack UVCP is especially suitable for printing cosmetic packaging. Its advantages are fast cure, great adhesion, chemical and scratch resistance, and brilliant colours. ■

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