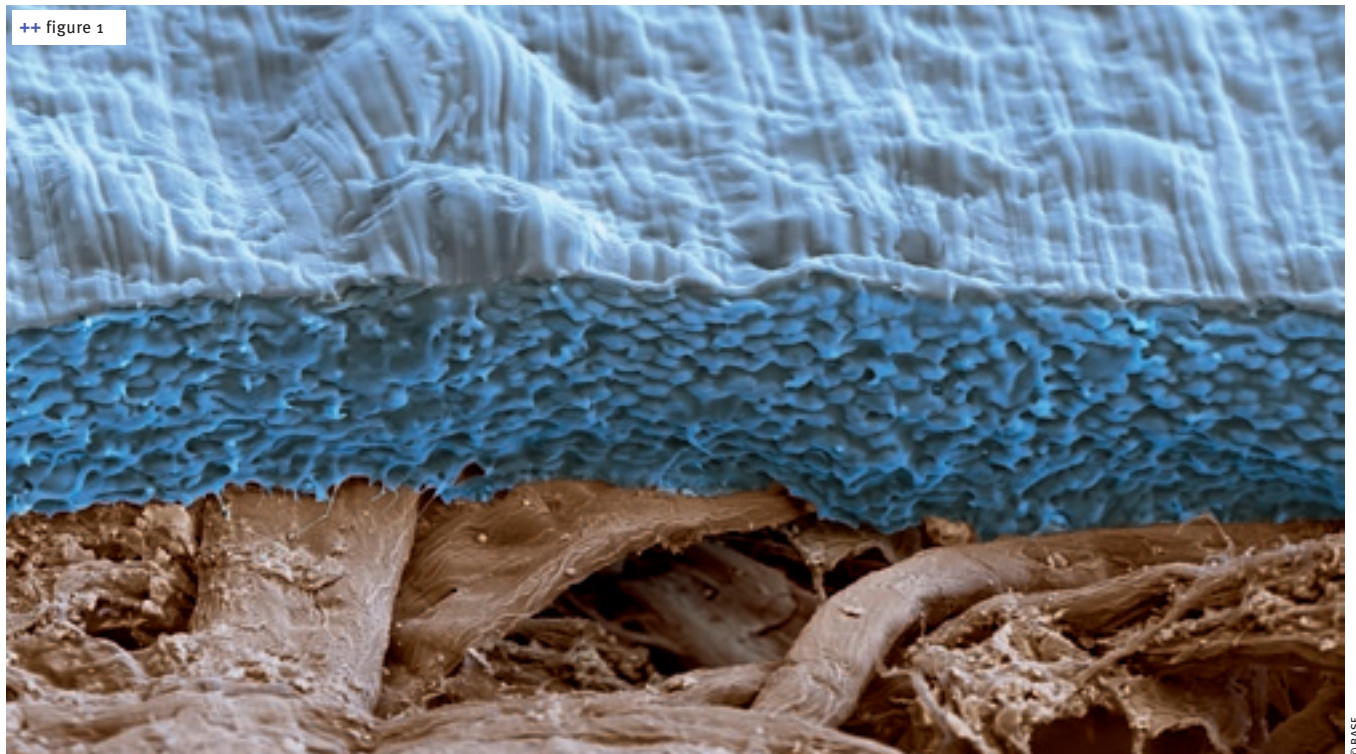


Avoidance of migration

THE PURPOSE OF PACKAGING IS TO PROTECT FOODSTUFFS FROM HARMFUL INFLUENCES. HOWEVER, THE PACKAGING CAN INTERACT WITH THE PRODUCT. THE AVOIDANCE OF MIGRATION DEPENDS ON THE CAREFUL CHOICE OF ALL THE COMPONENTS OF THE PACKAGING



++ figure 1

Ecovio FS Paper is a biodegradable plastic which can be used to manufacture coatings that are suitable both for cartons and for biodegradable film packaging (magnification 1000 : 1)

+ The public debate about petroleum-based printing inks is something that concerns not only folding carton manufacturers. Printed films can also be affected. In Europe most folding cartons, and in some cases wrapping papers as well, are printed by the sheet-fed offset process i.e. the material is cut into sheets and then printed. As a rule, standard inks contain mineral oils and/or low molecular weight fatty acid esters as solvents. Cardboard or paper does not constitute a barrier of any kind to these substances. Thus in addition to invisible set off, migration through the printed material and onto the goods packed in it is possible. Invisible set off also occurs when flexible materials, i.e. films, are stored on rolls after being printed. This brings the unprinted side of the material into close contact with the printing located underneath it. Printed carton sheets stacked on pallets before further processing also behave in the same way.

However, in addition to their high migration potential in paper and cardboard, these substances can also migrate through polyolefin coatings or bags. This means that polyethylene (PE) or polypropylene (PP) coatings or inner bags made of paper, oriented PP (OPP) or PE films cannot constitute a barrier of any kind to these substances. Therefore substance transfer of printing ink constituents from the sheet-

fed printed folding carton to the packed product cannot be excluded even with packaging in which the foodstuff is in a bag made of paper, OPP or PE. A change in the taste is also possible in the case of organoleptically sensitive foods.

Low-migration printing inks

Pollutant migration has been known about for a long time, which is why the food industry uses low-migration inks and lacquers. The fact that instances of contamination with mineral oil are discovered repeatedly nevertheless is connected with recycling. When cardboard, paper and board are collected and recycled together with graphic papers, petroleum-based printing inks from the graphic (printing) industry can contaminate the recycled cardboard. Therefore these types should not be used for food. The manufacturer is on the safe side here by using virgin fiber board.

Low-migration ultraviolet (UV) inks have already been in use for many years in UV package printing. In contrast to conventional low migration printing inks, the low migration property of UV printed matter depends decisively on the curing of the UV ink and lacquer film. The less the degree of curing, the less the cross-linking of the constituents used in the ink formulation and thus the higher the migration potential.



++ figure 2

Laboratory managers Matthias Frischmann and Rolf Herrmann examine samples in Henkel's Central Analytical Department

The hubergroup MMH Holding GmbH, a manufacturer of printing inks and lacquers for package printing in Kirchheim near Munich, Germany, has developed a low-migration UV sheet-fed offset printing ink with the brand name NewV pack MGA. Compared to other systems available on the market, it already has low migration even in the uncured state. These printing inks are formulated specifically for the manufacture of primary food packaging. The cured ink film contains exclusively constituents that do not migrate, or migratable constituents that have been assessed for food contact. The characteristic features of the NewV pack MGA series of inks are their high moisture tolerance and good color-water balance. In addition, odor and flavor impairments are also excluded.

Easy processing

The manufacture of packaging that conform to food legislation is also a key issue for the Fujifilm Europe GmbH, Düsseldorf, Germany. The company's low migration LM (Low Migration) lacquers are universally usable and offer food manufacturers a high level of safety and transparency regarding the conformity of their packaging, which can be reliably verified in specific migration tests. Fujifilm is constantly expanding its product range of low migration LM lacquers that allow compliance with the increasingly stringent statutory conditions. The LM lacquer portfolio includes a whole series of UV and dispersion lacquers covering a very wide variety of different requirements regarding the manufacture of packaging conforming to food legislation and regulations. Functional properties in the printing process are advertised, e.g. easy processability, quick drying and high abrasion resistance. Other characteristic features of the lacquers include good printability and foam-free processing.

New ink formulations

The rlc packaging group, Hanover, Germany, completely converted folding carton production in its Colorpack site in Berlin to low-migration, mineral oil free inks and lacquers three years ago. The company specializes in folding cartons for brand name owners, mainly packages for the food industry.



++ figure 3

++ figure 3

Mineral oil free inks and lacquers are used to print folding cartons for foodstuffs. A carton made from virgin fibers also ensures safety against migration

Colorpack is one of the biggest production facilities for folding cartons in Germany's food sector. As a result of the change-over and the use of the latest production standards such as HACCP (Hazard Analysis and Critical Control Points) and PSO (Process Standard Offset), rlc packaging exceeds the statutory requirements. The PSO Standard describes industrially oriented process procedures in the manufacture of printed products.

The introduction of the new inks and lacquers was preceded by comprehensive series of tests carried out by rlc in conjunction with the ink suppliers: how quickly do the inks dry? How do they respond in the printing process? What is the overall visual impression? How quickly can printing take place with the ink? Employees adapted the ink management to the printing machines in an appropriate way, and around 700 new ink formulations were newly blended.

Barrier material for cartons and films

BASF SE, Ludwigshafen, Germany, offers the printing industry mineral oil free aqueous binders under the Joncryl brand that are suitable for flexographic printing on packages, an offset rotary printing process that uses flexible printing plates made of photopolymer or rubber. The chemical company also has various barrier solutions for the packaging industry in its product range that are highly effective against mineral oil ▶

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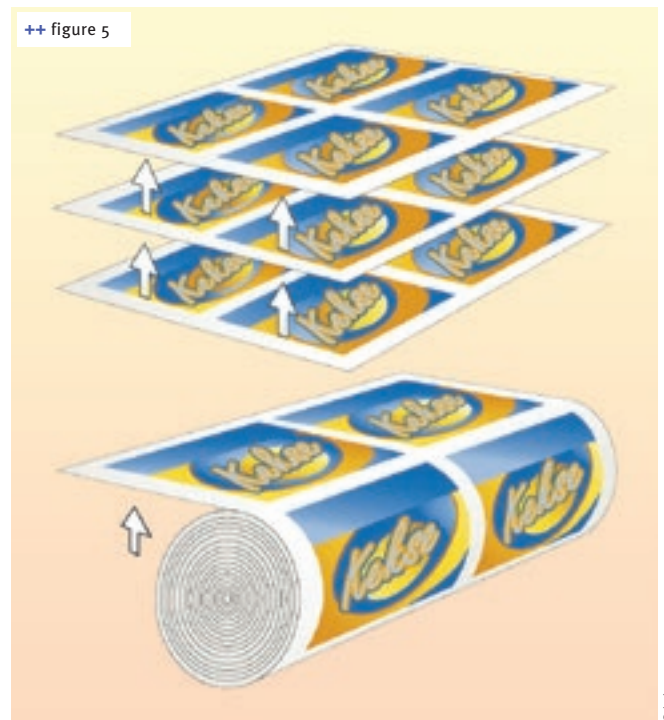


++ figure 4

Folding carton packages with and without inner bags: inner bags with matched barrier layers are the only way to provide adequate protection against migration

++ figure 5

For production reasons the side facing the packed goods comes into contact with the printed side in the printing machine – in the stack or on the roll. As a result there is a possible transfer of colorless and thus visually undetectable constituents of the printing inks, e.g. solvents



++ figure 5

residues. This has been demonstrated by series of experiments carried out by the Laboratory of the Canton of Zurich with the BASF products Ultramid, Epotal A 816, Ecovivo FS Paper and specially developed dispersions. In a study in 2010, the Zurich researchers had detected mineral oil residues from carton packages in food. Thus a total of four different solutions are available that can be used to coat food packaging of all kinds, both paper/cardboard and films.

The polyamide Ultramid, previously used in oxygen impermeable, resilient multi-layer films, is suitable both as a barrier coating for carton packages and as a component of an inner bag. The water-based dispersion Epotal A 816 is also suitable for coating films and thus as a barrier for inner bags. Water-based acrylate dispersions developed specifically for paper and carton packages are also available. Various grades of paper and cardboard were coated with these products on a laboratory and pilot plant scale. This proved their very good barrier effect against mineral oils. The new dispersions also act as barriers to native fats and oils and to flavorings. The acrylate dispersions, which are matched to the carton manufacturing process, are aimed at easy-to-implement solutions using established technologies.

Ecovio FS Paper is a biodegradable plastic that can be used to manufacture coatings suitable both for cartons and for biodegradable film packaging. The material complies with the standard EN 13432 for compostable packaging, which is applicable in Europe.

Non-polluting adhesion

Dispersion adhesives play an important part in the manufacture of packaging made from paper and cardboard. Adhesive-bonded folding cartons, sachets or bags are used in the food industry for dry foodstuffs with a long minimum shelf life. In this respect the possible migration of the con-

stituents of the adhesive into the interior of the packaging also represents a potential risk.

As a competence centre for analytical chemistry, the Central Analytical Department of Henkel AG, Düsseldorf, Germany, has access to more than 100 years of experience in the analysis of products, raw materials and additives in the consumer goods area. As would be expected of an adhesives manufacturer such as Henkel, special attention is devoted to assessing adhesives for food packaging. Henkel's analytical department uses standardized methods to investigate the causes of migration. Foodstuffs are simulated by suitable materials in the tests, and are brought into contact with the packaging. After a defined incubation time, analytical methods are used to evaluate the results of the migration tests, and solutions for safe food packaging are proposed. For the highest possible level of safety, Henkel has expanded its tried and tested Adhesin range of adhesives products by adding a complete low migration product series. Specific product variants are available for the different processing systems from roller to nozzle application. According to Henkel, another characteristic feature of Adhesin Low Migration products is their economical consumption for the same or even better adhesion properties than when using conventional adhesives. Plasticizers are completely avoided in the Adhesin Low Migration series. The use of other constituents with a potential migration risk is also reduced to a minimum. The new products comply with Recommendation XIV of the German Federal Institute for Risk Assessment. The Recommendation applies to plastic dispersions for food contact, and is aimed at reducing the pollution of recycled papers by entrained plasticizers. From a technical point of view, the plasticizer-free adhesives fulfill all the usual industry requirements for the adhesive bonding of folding cartons, corrugated board cartons, sachets, bags and other paper packaging including large-area lamination. +++

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