

MITIGATING MIGRATION

Dr. Simon Daplyn looks at how digital printing supports safer food packaging and explores the challenge of finding a non-harmful, effective ink that works across different substrates



Dr. Simon Daplyn is Marketing Manager at Sensient

When it comes to food packaging, manufacturers are having to address a growing number of requirements to deliver solutions that prevent contamination, stand out on busy store shelves and communicate key nutritional information, as well as meeting consumer expectations for sustainable materials to protect precious natural resources.

Digital printing gives packaging manufacturers an effective and flexible way to differentiate their offering on the shelves, provide accessible information and offer appealing branding for a wide range of consumer goods. However, finding a digital ink that works across different substrates without the use of harmful chemicals, while offering precise and vibrant results, can be challenging. Manufacturers also face fragmented regulations and legislation which, in a global marketplace, can prove difficult to navigate.

Ink migration – where volatile compounds within the ink migrate through the packaging to the foodstuff – is one of the biggest concerns when looking for food-safe inks. If migration isn't mitigated, consumers could be at increased risk of exposure to harmful substances in food and drink. In this article, we explore what the migration process means for packaging

'Migration compromises safety and quality, putting the consumer and brand reputation at risk'

manufacturers and how, by choosing the right digital ink solution, it is possible to achieve high quality, safe and appealing food packaging.

WHAT EXACTLY IS MIGRATION?

Migration occurs when substances within an ink pass through the substrate and contact with foodstuffs. The choice of ink is therefore crucial as migration compromises safety and quality, ultimately putting the consumer at risk and jeopardising brand reputation. Ink migration is a complex process and can be categorised into three distinct categories:

1. Set-off, which occurs when ink residue migrates following the drying stage, from one substrate to another, commonly from a printed surface to food-contact surface
2. Diffusion, when smaller, more mobile molecules diffuse through the packaging layers into food
3. Gas-phase, when ink migrates from cardboard packaging through the inner 'gas pouch' to reach foodstuffs.

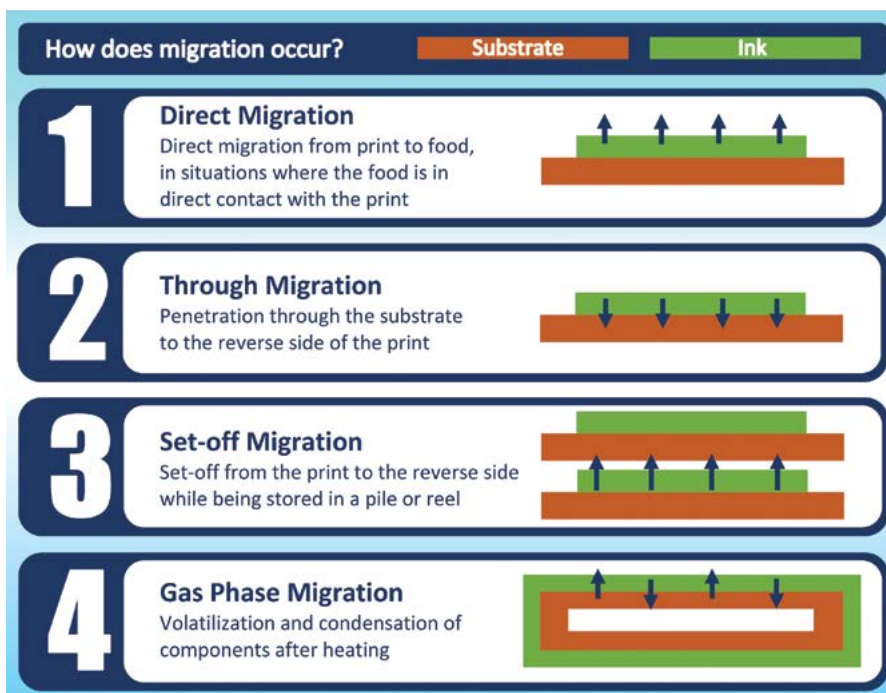
There are a number of factors which affect the likelihood of migration occurring. For example, the extent of ink migration is dependent on

the packaging material porosity, with more permeable materials typically presenting an increased risk. Printing on aluminium, metal or glass materials measuring over 7 microns, for instance, may help to prevent migration as they are classed as a permanent barrier. Cardboard, plastic or other thin materials, however, are classed as non-barriers and carry a greater probability of migration. The type of food and the intended use also affects the extent of the process. For example, a flexible pack intended for microwave processing will have different limitations than a more standard flexible packaging.

WHAT DOES THIS MEAN FOR MANUFACTURERS?

Packaging manufacturers need to make sure that a balance is achieved between using more sustainable materials, providing high-quality colour application, and ensuring that any migration risk is lowered. Although the use of recycled materials is a positive step in the reduction of waste across the food industry, the packaging itself can be a source of contamination – with a risk of chemicals in the packaging accumulating over time.

The regulatory landscape is also difficult to navigate. Legislation on the use of inks in food packaging differs across the world, with no uniform way of enforcing safety standards.



Overview of the types of migration that may occur after printing

In Europe, for example, [EEC] guidelines on food contact materials (FCMs) have not evolved in line with innovation in digital printing and have not been updated recently. Switzerland has legislation in place for food packaging printing inks – the country has a ‘positive list’ of substances that can be used in the manufacture of plastic and silicone articles, as well as printing inks. In the USA, any inks migrating into food should be compliant with food additive legislation and classed as ‘Generally Recognised as Safe’ (GRAS) – even if they fall below regulation thresholds. With such a diverse mix of legislation in place globally, it is the responsibility of brands to self-regulate, and to ensure that any substances used for printing on food packaging provide no risk to human health.

WHAT IS THE SOLUTION?

Finding an ink solution that meets fragmented global legislation, while also delivering on performance, may seem like an impossible task. However, the emergence of water-based digital inks that are fast drying, low odour and flexible in terms of substrate present a promising option for packaging manufacturers looking to mitigate the migration risk.

According to Transparent Market Research, the popularity of water-based inks is being felt across the packaging industry and is set to expand at a compound annual growth rate of 6.45% from 2019–2027 as manufacturers seek to provide consumers with a packaging solution that avoids the volatile organic compounds (VOCs) found in solvent-based inks.

Providing a cost-effective, compliant alternative by using water as the solvent instead of potentially harmful substances, water-based inks not only provide high-quality, precise colour application through complex chemistry but also reduce the environmental impact of businesses. Plus, crucially, in standardised test



Print is an essential part of food packaging, attracting and informing the consumer

conditions water-based inks were found to achieve lower migration potential – both in digital printing and inkjet applications.

By also harnessing the benefits of digital printing – including little or no setup required, and the flexibility of unlimited colours and no design limitations – water-based digital inks put manufacturers in a prime position to deliver the highest quality and safest packaging designs.

MEETING THE MIGRATION CHALLENGE

Collaboration is key to overcoming the migration challenge. It's only by identifying the specific requirements of the packaging and working closely together that an effective solution can be created that exceeds both performance and regulatory expectations. With a full understanding of market needs, processes and legislative requirements, ink manufacturers work in partnership with customers (OEMs, integrators, brands) to deliver greater efficiency and ensure

confidence in compliance for printing professionals.

Sensijet SX, a versatile aqueous ink platform for printing on both non-porous and semi-porous substrates, is part of Sun Chemical's development portfolio. In line with Sun Chemical's commitment to innovation within printing inks for packaging, this solution is being further optimised for use with primary food contact materials. With performance characteristics, such as adhesion, durability and jetting, the SX series offers an environmentally-friendly option for packaging

'The popularity of water-based inks is being felt across the packaging industry'

applications.

With the regulatory landscape proving difficult to navigate, and consumer demand only increasing, it is crucial for manufacturers across the industry to understand both the implications of migration and how they can protect themselves and consumers from its consequences. By harnessing the power of water-based, digital solutions, manufacturers can ensure that their operations and processes are future-proof for years to come. ■

For more information on Sun Chemical's acquisition of Sensient, visit www.sunchemical.com or www.sensientinkjet.com.

Dr. Simon Daplyn is Manager of Product Marketing at Sun Chemical

Further information:

Sun Chemical, Morges, Switzerland
tel: +44 7841 165646
email: simon.daplyn@sunchemical.com
advancedmaterials@sunchemical.com
web: www.sunchemical.com



Typical packaging application where print is a key part of the presentation