White Paper

Food Safety Compliance Backed by R&D Leads to a Total Offering of Energy Curable Ink Solutions

Overview

Brand owners face an increasingly complex environment when it comes to product packaging. There is growing market pressure to reduce time to market, increase shelf appeal, and customize products to address specific geographic, demographic or other target consumer characteristics.

As if that wasn't enough, brand owners also have the responsibility to ensure safe packaging and compliance with all regulations worldwide. Focus on food safety is at an all-time high, and brand owners need to scrutinize their supply chain from all angles to minimize risk.

This applies to packaging as much as to product sourcing and preparation. Where food or sensitive cosmetic products are concerned, it is vital that brand owners work hand-in-hand with their partner converters to ensure that the inks being used are suitable for the contents and pose minimal risk to consumers.

Low migration regulations have created global issues for brand owners to recognize and solve in recent years.

While the term "low migration packaging" is commonly used to designate materials used in the packaging structure which will have less of a potential to migrate into the product, the challenge is that the definition of what constitutes low migration is not standardized.

This makes it easier for manufacturers to claim their inks are "low migration compliant," creating a conundrum for the brand owner whose ultimate responsibility is to safeguard the consumer.

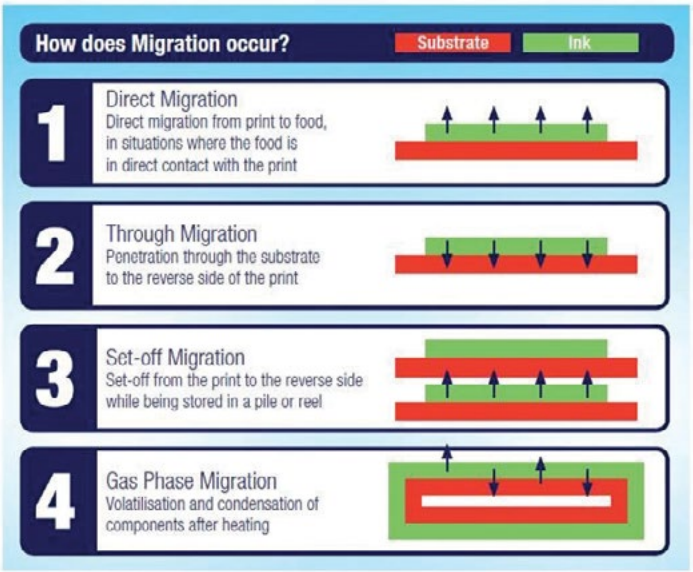
working for you.

SunChemical®
a member of the DIC group
DIC Color & Comfort

Sun Chemical is an ink manufacturer that understands the compliance issues required by brand owners and their converting partners and formulates its inks to meet the strictest regulations in the world, including the:

- Plastics Regulation (EU) No. 10/2011,
- Council of Europe Resolution AP(2002)1 on paper and board materials intended for contact with food,
- Resolution AP(2005)1 on packaging inks applied to the nonfood contact surface of food packaging materials,
- Swiss Ordinance,
- REACH,
- Food and Drug Administration, and
- Nestlé food packaging requirements.

Energy curable inks, in particular, have faced increased regulatory scrutiny. There are concerns that some photoinitiators are unsafe for food packaging. In some places, such as California, certain photoinitiators may create other challenges.



As the trusted go-to leader for safer food packaging inks and coatings and the first to bring energy curable inks to market, Sun Chemical is recognized across the industry for being conscientious and introducing products that comply with the strictest global standards, including some of the newest regulatory developments, such as the restriction of bisphenol-A (BPA). At the same time, Sun Chemical has built up vast experience on how to best apply quality controls and measure the integrity of low migration materials, simplifying use.

Sun Chemical recently launched a whole product portfolio of electron beam (EB), ultraviolet (UV) curable, LED curable and flexo inks that are *all* compliant for food packaging when cured properly, no matter what the print process. It is the only ink provider who can deliver all four compliant inks to the marketplace.

Package Design

Printing inks, coatings and adhesives, unless specifically designed for that purpose, should not under normal circumstances come into direct contact with packaged foods.

If it is to be fit for purpose, designing packaging that is suitable for the food requires specific information to be known. As required by good manufacturing practice, the chances of success are greatly improved if all the stakeholders in the production of the packaging are connected. That is not always straightforward, as some of the steps between the brand owner specifying the packaging and the consumer receiving the packaged goods may not be directly connected.

The nature of the foodstuff dictates how it must be packaged, and once that is determined, the choice of substrate, inks and coatings can be assessed. However, every package is different, so the outcomes may differ according to the perceived risk of transfer of material from the packaging to the food and the barrier properties of the packaging materials used.

End-use properties may also influence the choice. For example, food that is to be hot filled or heated in the packaging might create additional migration risks.

Selection of Materials

The key to the manufacture of high-quality, safe packaging for food and other sensitive products lies in good communication among stakeholders across the entire packaging supply chain. This will better ensure that final packaging complies with relevant regulations and guidelines and, ultimately, ensures consumer safety.

Stakeholders should be clear about all elements of specification and traceability, as well as what is to be packed and how (e.g., hot filling). Final consumer use of the product and packaging should also be fully understood. Questions to ask include:

- Is the packaging intended for food or other sensitive products?
- Is the package component destined to be used as primary packaging where the packaged goods are in prolonged direct contact with the nonprinted side of the packaging?
- Is the component designed as a primary outer wrap, where the goods are contained in some form of primary packaging such as a flow wrap or a tray?
- Is the primary packaging a barrier to migration? If not, low migration inks should be used.
- Will the packaging undergo some form of secondary processing, such as in boiling water, an oven or a microwave?
- Does the packaged food or other sensitive product contain materials that make it a higher risk for migration, such as high sugar or fat content?

Once the answers to these questions are understood, the packaging converter and the entire packaging supply chain is in a better position to select appropriate materials for the manufacture of the packaging.

There are a variety of low migration inks, coatings and adhesives that can be used in this manufacturing process. These include:

- Low migration UV inks and coatings that avoid the use of low-molecular-weight raw materials such as solvents, use polymeric photoinitiators and are fast curing with a high cross-link density.
- Low migration EB inks and coatings that provide for optimum curing with irradiation by an electronic beam. Curing usually takes place in an inerted chamber, with a nitrogen atmosphere preferred when producing food packaging.
- Conventional sheetfed inks designed for food packaging. These are normally based on very special and purified raw materials such as specially modified resins, high-molecular-weight polyesters and oil derivatives. These inks, under correct good manufacturing practices (GMPs) conditions with an appropriate aqueous coating, offer low migration opportunities.
- Low migration water-based coatings that avoid the use of ingredients that have been identified as potential migrants. Water-based coatings are made from specially selected polymers, but they may also contain very special coalescing solvents, slip control agents, and anticorrosion and antimicrobial additives in order to be fully effective.

Other consumables that should be optimized for the manufacture of low migration packaging include fountain solutions and press washes, which could leave migratory residues on the final printed package. This includes the avoidance of products that use slow-evaporating solvents that may get trapped in inks during the converting process and have the propensity to become potential migrants.

Printing Equipment and Press Room Handling, Transport and Storage Environment

Of course, a clean press and a clean working environment are a must in the production of packaging for food and other sensitive products. If a press can be dedicated to the manufacture of low migration packaging, the converter can derive a number of benefits, including reduced downtime in changeovers, decreased cleaning, lower waste and optimal dedicated work practices.

It is critical that proper GMPs are utilized during the converting process to help ensure adequate curing of all materials does occur. Curing equipment must be well maintained and audited more frequently. Proper quality control measures must be installed and be used several times in the converting process, because press running conditions can be quite dynamic.

Analytical validation of converted materials should be done on a regular basis using outside laboratories to help converters understand if their processes that use low migration inks and coatings meet both brand owner and government regulations associated with safe packaging guidelines.

Adhesives and glues used in the folding and gluing process should also be specialty low migration products.

In addition, manufacturers of packaging should:

- Understand and utilize proper time elements between converting and fabricating cartons.
- Ensure that adequate ventilation is used in curing areas.
- Avoid strong odors in all storage areas.
- Ventilate areas thoroughly after cleaning floors with products that contain volatile components.
- Carefully select paints and coatings for use on buildings and signage.
- Not allow exhaust fumes from vehicles to impact work in progress or print stored in warehouses.
- Store and transport packing work in progress at normal temperatures.

Sun Chemical's Portfolio of Fully Compliant Energy Curable Inks

SunBeam® Advance EB

Sun Chemical's **SunBeam Advance EB** offset inks meet the latest low migration and low odor requirements that are important to safer food packaging, are made without BPA-based chemicals to meet the most stringent global standards, and provide low odor as well as very low residual extractables, while maintaining the highest standards of pressroom performance at the very highest press speeds.

Specifically formulated to help increase productivity by significantly reducing the number of blanket washes, this ink system works on a variety of substrates, including nonporous types, and addresses concerns that brand owners face due to strict labeling laws, such as California's Proposition 65.

Designed for very-high-speed web folding carton and flexible packaging applications, SunBeam Advance electron beam (EB) curable offset inks offer high transfer and excellent lithographic properties, adhesion and abrasion resistance, outstanding cure response, excellent color recovery after a stop, greatly reduced board waste, and hold density well to help improve overall quality. SunBeam Advance inks are considered high strength to help improve mileage.

SunCure® Advance UV

Like the SunBeam Advance EB inks product line, Sun Chemical's **SunCure Advance UV** inks utilize photoinitiators that exhibit minimal migration properties under proper curing conditions to help meet safer food packaging guidelines, have low odor and residual extractables and are made with no BPA-based chemicals. This ink system can be used for the most sensitive packaging applications, where low odor and extractables are essential.

SunCure Advance UV inks are designed for food packaging applications and offer excellent runnability on super-high-speed sheetfed and web presses. In addition to extremely high transfer properties and very good lithographic response, these inks hold density well and provide very good UV cure response under either interstation curing or delivery-positioned lamp conditions. SunCure Advance inks also perform very well on CCNB- and SUS-type folding carton stocks that can be sensitive at times from a blanket wash standpoint. SunCure Advance inks also offer adhesion to some nonporous-type stocks.

SunCure UV LED

One of the challenges in formulating inks is to ensure they work for in-mold labels. In-mold labels have to abide by these same strict regulatory standards, such as the Swiss Ordinance and REACH. It is important that the inks exhibit the qualities needed to meet those requirements.

Designed specifically for low migration packaging, Sun Chemical's **SunCure UV LED** ink series has more polymeric ingredients, which lend more toward compliance with the strict global low migration standards. Additionally, the inks offer low odor solutions that are desirable on labels for food packaging applications.

The task for ink manufacturers is to create an ink that cures with UV LED lamps and has the ability to endure the injection molding heat.

Sun Chemical's new UV LED ink is designed to meet these requirements. Formulated with a higher viscosity in order to cure with conventional UV LED lamps and at faster curing speeds on difficult substrates, such as films used for in-mold labels, the new SunCure UV LED high-performance range of UV-curable printing inks offer excellent adhesion to films and papers, provide good printability and lithographic performance, demonstrate excellent color strength, have outstanding cure, and deliver good gloss and scuff properties.

SunCure Accuflex UV

Sun Chemical's **SunCure Accuflex UV** is a new UV flexo ink system designed for primary and secondary food packaging applications where low odor and extractables are requirements. These inks are not manufactured with any BPA-based materials and meet low migration specifications.

Compliant with the strictest global standards in the marketplace, including Nestlé food packaging requirements and Swiss Ordinance chemical composition requirements, SunCure Accuflex UV flexo inks utilize photoinitiators that are most conducive to low migration packaging guidelines and provide low odor and very-low-residual extractables, while maintaining the highest standards of pressroom performance.

The ink system specifically addresses concerns that brand owners face due to strict labeling laws such as California's Proposition 65, which requires businesses to provide warnings on their packaging for products that could expose consumers to BPA.

Designed for both folding carton and flexible film packaging applications where high press performance, color vibrancy and regulatory compliance are critical, SunCure Accuflex UV flexo inks offer good adhesion to a variety of film substrates, provide great flexo viscosity stability under high shear conditions, and exhibit excellent UV cure response.

Available in North America, SunCure Accuflex UV inks can be used for a variety of paper packaging applications and feature low post-odor properties that are essential to many brand owners.

SunCure Aspire UV

Sun Chemical has launched a new UV offset ink that was developed to make sophisticated graphics look stunning and vibrant on high-end luxury folding cartons while at the same time providing the longer-term shelf appeal brand owners require.

The new ink system, **SunCure Aspire UV,** has been formulated to exhibit a high degree of color transparency to help create vivid color graphic effects on metallized, lenticular and holographic board stocks frequently used for pharmaceutical, perfume, liquor, cosmetic and POP applications.

In addition to providing the essential packaging charisma that brands require for high-end folding carton applications, SunCure Aspire UV inks offer excellent transfer, a wide water window, a high degree of lithographic stability, very high pigment strength to ensure mileage on press, and good lightfastness so shelf appeal remains consistent over time.

This ink system has been designed to work extremely well with Sun Chemical's **SunInspire** special effects coatings to make cartons truly stand out.

The new UV ink system does not use any of the exclusion-type photoinitiators listed by Nestlé and other brand owners (as of June 2018) that are sometimes considered to be a concern to many brand owners and regulatory bodies. SunCure Aspire UV inks also deliver very good adhesion properties with many nonporous substrates.

SunCure Aspire UV inks come in a complete line of high-strength blending colors for all spot color needs and meet ISO color requirements for GRACoL G7 applications.

The Strength of a Partner that Understands Compliance and R&D

Sun Chemical is a leader in regulatory and compliance issues and works closely with its customers to help them comply with the strict standards required by brand owners and regulations. All of this is backed by a significant investment in research and development.

Part of the reason for Sun Chemical's recognized leadership in the industry is the thought it puts into packaging design by anticipating every need and use of the package, and creating inks that deliver what printers want. It also includes the care in procurement and the selection of raw materials it uses to formulate the inks.

It is important to remember that it is the responsibility of the packaging designer, packaging converter and distributor to ensure that packaging has been fully tested and meets all applicable regulations and guidelines for its end use prior to proceeding with full production printing, especially in the case of packaging for microwave or ovenable applications.

For this reason, packaging converters must take a lead role to partner with the right suppliers and work together, taking the right steps to bring increased value to the packaging supply chain.

Sun Chemical, for its part, has developed a whole family of energy curable inks that comply with the strictest regulations worldwide and deliver on the highest standards of pressroom performance. Sun Chemical's leadership in the industry is unmatched and allows customers to find the right energy curable ink solution for their individual needs.

To learn more, visit www.sunchemical.com/energy_curable or call 1-708-236-3798.

working for you.

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