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CASE STUDY
Paper & Packaging

Sustainable solutions from Kuraray

Innovative packaging for personal care and cosmetics products

KURARAY POVAL™ | EXCEVAL™ | PLANTIC™ | EVAL™ | MonoSol

Sustainability: the most urgent trend in packaging

Various trends and requirements are currently transforming the packaging market: renewable raw materials, reducing the amount of packaging material, cutting CO_2 emissions, monolayer products, recyclability, repulpability or biodegradability – to name a few.

Consumers and brand owners driving the trend

Greater sustainability and circularity are an urgent issue for the whole of society and are being driven forward by legislators and consumers as well as brand owners and industry. The objective is to find circular packaging solutions. This also applies to plastics. Major companies in the cosmetics and personal care industry have already published voluntary commitments or pledges: Beiersdorf, Colgate-Palmolive, Estée Lauder, L'Oréal, Procter & Gamble and Unilever, to name just a few.

Revision of the PPWD in the EU

The trend towards sustainability also has a political dimension. An example from the European Union: in conjunction with the "European Green Deal" to reduce CO_2, the "Packaging and Packaging Waste Directive" (PPWD) is intended to ensure a high level of environmental protection. The latest amendment to the directive contains, among other things, updated measures to promote reuse, recycling and other forms of recovery of packaging waste as an alternative to disposal. The EU Commission intends to publish a proposal on further tightening of the PPWD before the end of 2022.

International complexity

Sustainability is a global megatrend in the packaging industry. However, there are significant differences in national and regional legislation and regulatory requirements. Internationally, in some instances, the disparity between packaging and recycling regulations is as big as the difference in the available recycling infrastructure. Nevertheless, the overriding global trend is the same: reducing and recycling packaging are on the agenda everywhere and legislation is becoming more stringent. For brand owners and manufacturers, the extremely heterogeneous regulatory landscape is a major challenge. A conventional packaging concept that can still be used in some countries may no longer be acceptable in other states and regions. However, they all agree that the objective is to protect the product and avoid waste.

Combining functionality and sustainability

It is vital to ensure that new, more sustainable packaging solutions continue to meet the full range of functional requirements for food packaging. All the Kuraray innovations outlined below combine these two objectives: as well as focusing on sustainability, they provide reliable protection for food. These packaging ideas based on Kuraray's products point the way to circular packaging. Every packaging problem is specific. Therefore, Kuraray's experts are committed to helping their customers and the entire supply chain find packaging solutions that meet their specific needs and ensure compliance with specific regulatory requirements.

Innovative packaging for personal care and cosmetics products

Multilayer tubes that contain aluminium foil are commonly used to package shower gels, body creams and lotions for consumers. However, the aluminium content makes mechanical recycling after use impossible. Moreover, the extraction process used in the production of aluminium is extremely energy intensive. In addition, demand for aluminium has increased in other sectors, so it is now a relatively expensive packaging material. Multilayer plastic packaging would be an alternative. However, such packaging tends to be thicker and therefore requires larger amounts of material. Evidently that is undesirable from the perspective of avoiding plastics. Besides, in many cases, multimaterial plastic packaging cannot be recycled.

There is therefore a need for packaging for personal care products that does not contain aluminium, reduces the thickness of the plastic layers and is easy to recycle. All the packaging ideas outlined here achieve this combination of sustainability and functionality: as well as protecting the shower gel, body creams and lotions from odours and moisture, they bring the recyclability of multilayer plastic packaging to a new level.

1. MonoSol film packaging for shower gel refills

Example of a conceptual structure for such packaging:

MonoSol film (polyvinyl alcohol)

MonoSol is the brand name for Kuraray's water-soluble and biodegradable packaging films made from polyvinyl alcohol (PVOH). This packaging solution for shower gel centres on sustainable MonoSol monomaterial. The basic concept reduces both the amount of packaging material and transport costs. Shower gels are normally 85% water. Therefore concentrated shower gel refills are a particularly environment-friendly option. Consumers initially purchase a branded (premium) bottle of shower gel. Subsequently they buy concentrated refills, which they dilute with water in the bottle to obtain the normal-use concentration.

Odour-free and transparent MonoSol film has various benefits: if the water content of the concentrate is less than 10%, MonoSol pods are perfect for low-weight transport. When the consumer uses them in the shower, the packaging simply dissolves in the water. Packaging for refills can be produced on vertical form fill seal equipment, rotary drum pod-making equipment or flat-bed pod-making equipment. This concept significantly reduces packaging and transport requirements and therefore cuts CO_2 emissions. It also avoids the recycling problems associated with conventional shower gel bottles because of their multimaterial plastic structure or aluminium layers.

2. Plastic tube with EVAL™ as a barrier layer

Example of a conceptual structure for such packaging:

MDO-PE / EVAL™ EVOH MDOPE barrier layer / polyethylene

EVAL™ is a brand name for ethylene vinyl alcohol copolymers (EVOH) produced by Kuraray. Even a thin layer of EVAL™ forms an extremely reliable barrier to flavour and odour. Since tubes for body creams and lotions are mainly made of polyethylene (PE), some recycling guidelines classify them as a recyclable monomaterial. The middle layer in this three-layer structure has a barrier layer of EVOH and machine-direction orientated polyethylene layer (MDOPE). Thanks to the tremendous technological advances that machine manufacturers have made in production equipment for multilayer film in recent years, multilayer MDOPE films have become an attractive alternative. Using MDO technology, both cast and blown co-extruded films can be uniaxially oriented to improve performance. On the outer side, this structure comprises a thicker layer made entirely of MDOPE to give the tube mechanical stability. By contrast, the inner layer is a simple polyethylene with heat sealing capability. As well as production equipment for multilayer cast or blown film and a machine-direction orientation machine, this type of packaging requires a laminating unit. Thanks to the high barrier properties of EVAL™ in the middle layer, no aluminium foil is required for these tubes. Such a monomaterial tube can be recycled via the advanced polyethylene recycling stream.

MonoSol:
film packaging that disappears in the wastewater

MonoSol is Kuraray's brand of water-soluble, biodegradable polyvinyl alcohol (PVOH) films. MonoSol films have a good sustainability profile and are already used in many sectors. For example, they have revolutionized the detergents sector thanks to the introduction of dishwasher tabs and gel packs for washing machines. Kuraray has now extended its range of MonoSol films to include soluble films for the food, beverage, healthcare and cosmetics industries. MonoSol acts as a good barrier to oxygen and other gases, has only low diffusion and has good mouldability.

Sustainability benefits of MonoSol

The main benefits of MonoSol are that it is water-soluble and biodegradable. Moreover, it does not contain any harmful substances. MonoSol film packaging dissolves completely in water during or after use by consumers. In the wastewater stream, MonoSol PVOH is completely biodegradable.

3. Body cream refill packaging with EVAL™

Example of a conceptual structure for such packaging:

EVAL™ EVOH MDOPE / polyethylene

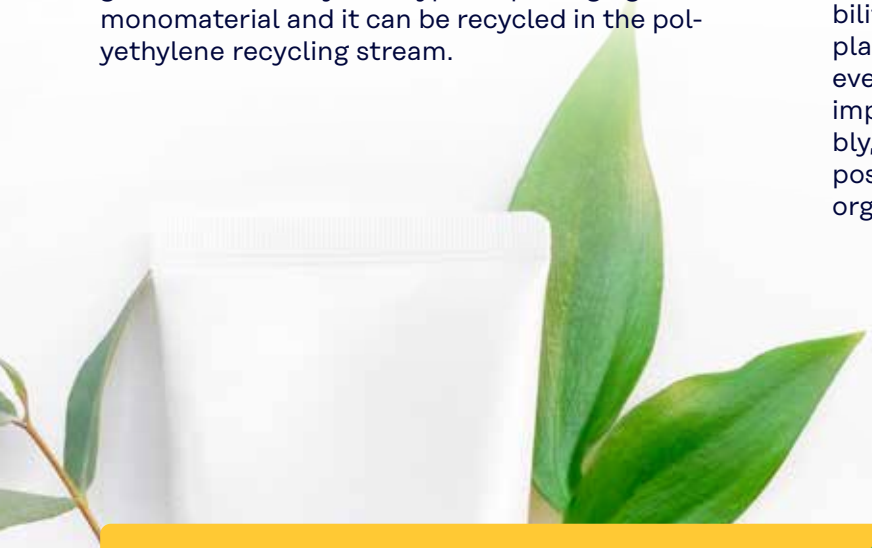
In the previous example, the outer machine-direction orientated polyethylene (MDOPE) layer is preferred for the stability of the tube. However, that is not necessary for refill pouches. A two-layer structure can be used, with an EVAL™ EVOH-MDOPE flavour barrier as the outer layer. Here too, the MDO technology gives the necessary mechanical properties. As well as production equipment for multilayer cast or blown film and a machine-direction orientation machine, this type of packaging requires a laminating unit. Like all refill concepts, a key advantage of these refill pouches for body cream is that they reduce the amount of packaging and its cost. Moreover, because only a very thin layer of EVAL™ is needed, some recycling guidelines classify this type of packaging as a monomaterial and it can be recycled in the polyethylene recycling stream.

4. Compostable shower gel tube made of PLANTIC™

Example of a conceptual structure for such packaging:

PLANTIC™ / biopolymers as a moisture barrier and heat-sealable layer

All the materials used in this shower gel tube, which is currently still in the development phase, are compostable: PLANTIC™, a biopolymer derived from starch, the other biopolymers used as a moisture barrier and/or heat-sealable layer, and even the adhesive that bonds the various layers. PLANTIC™ disintegrates in water. It is biodegradable and compostable (home and industrial composting) and does not contribute to the microplastic problem. It is used in this packaging concept because it provides a very good flavour and gas barrier. The tubes are manufactured by dry lamination and/or extrusion coating equipment. Industrial compostability is not yet recognized as an alternative to plastics recycling everywhere in the EU. However, by 2023, all EU member states have to implement organic waste collection. Presumably, shower gel tubes made entirely from compostable materials are likely to be permitted in organic waste recycling.



EVAL™ EVOH:
Functional barrier in a very thin layer

Kuraray's EVAL™ ethylene vinyl alcohol copolymer (EVOH) helps the food and healthcare sectors develop packaging that protects product quality for a prolonged period. Recyclable multilayer structures with EVAL™ EVOH meet the most stringent hygiene conditions and food contact standards and regulations. In packaging applications, a layer of EVAL™ EVOH just one millimetre thick creates a functional barrier equivalent to a ten metre thick wall of polyethylene.

Sustainability benefits of EVAL™

A thin EVAL™ EVOH layer allows the production of particularly lightweight, resource-saving packaging and therefore helps to reduce waste. Moreover, EVAL Europe N.V.'s EVOH production site in Belgium has ISCC PLUS certification. Certification is based on the mass-balance approach and documents the fact that the ethylene monomer in Kuraray's "biocircular EVOH" is produced from renewable resources.

5. Repulpable shower gel tube made of paper and PLANTIC™

Example of a conceptual structure for such packaging:

Paper / PLANTIC™ biopolymer / moisture barrier layer and heat-sealable layer

Consumers regard paper packaging as particularly high-quality and sustainable. Therefore, the outer layer of this shower gel tube is paper. A layer of PLANTIC™, Kuraray's starch-based biopolymer, is laminated onto the inner side as a flavour and gas barrier layer. Because it can be dispersed in water, PLANTIC™ allows simple repulping of the paper-based shower gel tubes. Other inner layers – for example, other biopolymers or polyethylene (PE) – are used as a moisture barrier to protect the shower gel and work as a heat-sealable layer. Technologies such as extrusion coating, lamination and extrusion lamination are used to produce these sustainable tubes. PLANTIC™ is dispersible and biodegradable in water, and it facilitates separation of the inner sealing layer and adhesive from the paper in the repulping process. Thanks to the water solubility of PLANTIC™, the repulping yield is higher than with a conventional PE layer applied directly to paper. Consequently, the paper fibre can be repulped without difficulty. This paper-based tube for shower gel therefore combines all the main requirements: it is attractive, functional and easy to recycle or repulp.

PLANTIC™:
The biopolymer that keeps oxygen out and preserves aroma

PLANTIC™ is a high-performance film manufactured by Kuraray using more than 80% renewable raw materials. It is produced from thermoplastic starch and is biodegradable and compostable (home and industrial composting). Due to its high gas barrier properties, this biopolymer from Kuraray can be used in packaging that preserves aromas and effectively keeps out oxygen. PLANTIC™ is therefore ideal for both MAP packaging for food with a short shelf life and packaging solutions for dry goods such as coffee, tea and animal feed.

Sustainability benefits of PLANTIC™

PLANTIC™ is made from plant-based starch and has a water content of around 12%. This biopolymer is dispersible in water, which makes it possible to separate multilayers and allows simple repulping of paper packaging. PLANTIC™ is certified for both industrial and home composting and can be used in the manufacture of completely compostable multilayer packaging.

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Established in 1991, Kuraray Europe GmbH is based in Hattersheim, near Frankfurt am Main, Germany. In 2021 the company generated annual sales of EUR 1.1 billion. It has more than 820 employees in Germany at its sites in Hattersheim, Frankfurt and Troisdorf. Kuraray is a global speciality chemicals company and one of the largest suppliers of polymers and synthetic microfibres for many sectors of industry. Examples are KURARAY POVAL™, MOWITAL®, TROSIFOL® and CLEARFIL™. Kuraray Europe also has around 215 employees at six other European sites. They are also working on the development and application of innovative high-performance materials for a wide range of sectors, including the automotive, paper, glass, and packaging industries, as well as for architects and dentists.

Kuraray Europe is a wholly owned subsidiary of the publicly listed Kuraray Group, which is based in Tokyo, Japan, and has more than 11,200 employees worldwide and sales of EUR 4.8 billion. Kuraray's current slogan is: "Possible starts here."

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